

Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN): Final Evaluation

Building Community Systems to Improve the Health of Newborns and Children in Rural Zambia

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Acronyms

ACT	Artemisinin Combination Therapy
ANC	Antenatal Care
CAC	Community Action Cycle
CBD	Community-based Distributor
CCM	Community Case Management
CDE	Classified Daily Employee
CGHD	Center for Global Health and Development
CHAZ	Christian Health Association of Zambia
CHW	Community Health Worker
CSHGP	Child Survival and Health Grant Program (USAID)
DHMT	District Health Management Team
DIP	Detailed Implementation Plan
EHO	Environmental Health Officer
ENC	Essential Newborn Care
FANC	Focused Antenatal Care
FE	Final Evaluation
HBB	Helping Babies Breathe
HC	Health Center
HF	Health Facility
HW	Health Worker
iCCM	Integrated Community Case Management
IMCI	Integrated Management of Childhood Illness
KPC	Knowledge, Practices and Coverage
LBW	Low Birth Weight
LINCHPIN	Lufwanyama Integrated Neonatal and Child Health Project in Zambia
LUNESP	Lufwanyama Neonatal Survival Project (of Boston University)
MCDMCH	Ministry of Community Development, Mother & Child Health
MCH	Maternal and Child Health
MNCH	Maternal Newborn and Child Health

MOH	Ministry of Health
MUAC	Mid-upper Arm Circumference
NHC	Neighborhood Health Committee
OR	Operations Research
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PNC	Postnatal Care
RDT	Rapid Diagnostic Tests
SBA	Skilled Birth Attendant
SC	Save the Children
SIDA	Swedish International Development Agency
SMAG	Safe Motherhood Action Group
SMGL	Saving Mothers, Giving Life
SNL	Saving Newborn Lives
TBA	Traditional Birth Attendant
TWG	Technical Working Group
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organization
ZIMMAPS	Zambia Integrated Management of Malaria and Pneumonia Study
ZISSP	Zambia Integrated Systems Strengthening Project (Abt Associates – USAID/Zambia bi-lateral Project)

EXECUTIVE SUMMARY: Lufwanyama Integrated Neonatal and Child Health Project in Zambia: Final Evaluation

Evaluation Purpose

The purpose of the Final Evaluation (FE) was to determine whether the Lufwanyama Integrated Neonatal and Child Health Project (LINCHPIN) increased use of evidence-based, life-saving interventions by caretakers and children in the Lufwanyama District of Zambia. The FE was conducted between September 1 and 14, 2014.

Evaluation questions

The FE drew upon existing data collected or compiled during the project cycle, as well as additional data collected during the evaluation for the following purposes: 1) To provide an overview of project goals, objectives, and key intervention strategies implemented; 2) To determine the extent to which the project accomplished the results outlined in the DIP and to present evidence of these accomplishments; 3) To describe key factors that contributed to what worked or did not work regarding some or all aspects of the program; 4) To identify the effectiveness and potential wider applicability of the CHW-TBA teaming approach; 5) To determine the sustainability of community-based newborn care, iCCM and community mobilization using NHCs and SMAGS in Lufwanyama District; and 6) To demonstrate how the project contributed to learning and evidence that is directly relevant to improving MOH policies and practices, as well as global learning about community-oriented health programming.

Evaluation methods

Five principal methods were used for the evaluation: 1) Review of 30-cluster KPC surveys, including those at project baseline and endline; and those conducted for the operations research (OR) project. 2) Review of community register data. 3) Document review – including policy documents, program reports, technical reports, reports of training activities, health worker (HW) registers, and training and health education materials. 4) Field visits – site visits were made to health centers (HCs) and communities and in-depth interviews conducted with health facility (HF) staff, community health workers (CHWs), Traditional Birth Attendants (TBAs), Neighborhood Health Committee members (NHC) and caretakers of young children. 5) In-depth interviews with District Managers, and partners and stakeholders at the national level.

Project Background

LINCHPIN is a five-year Innovation Project (CS-25 cycle) running between 1 October 2009-30 September 2014. The project is co-funded by the USAID Child Survival and Health Grant Program (CSHGP) and ELMA Philanthropies, with matching funding from Towers and Perrin and the Crown Family Philanthropies. Lufwanyama is a rural district with limited access to health care services. Malaria, pneumonia, diarrhea and under nutrition are the primary contributors to morbidity and mortality of children 1-59 months old, with newborns dying of asphyxia, prematurity/LBW and sepsis. Baseline surveys demonstrated that population coverage with key interventions to prevent or treat these conditions was low and showed gaps in the quality of care. The project strategic objective is *increased use of key newborn and child health services and practices*. All project activities were implemented in Lufwanyama District in the Copperbelt Province of northern Zambia. Activities were implemented in close collaboration with the District Health Office and several local partners.

The project has four main components: 1) **Integrated community case management (iCCM):** CHWs are trained to assess, classify and treat sick children 2 to 59 months old with malaria, pneumonia and diarrhea – and to refer children and newborns with danger signs; 2) **Community-based maternal and newborn care:** TBAs are trained to make home visits to mothers and newborns starting at delivery. Postnatal care (PNC) home visits are then conducted at 24 hours, 2, 3 and 7 days and at 2, 6 and 8 weeks postpartum. Mothers and newborns with danger signs are referred to the HF; 3) **Teaming of CHWs and TBAs:** CHWs and TBAs are trained to work as teams. Teaming teaches CHWs and TBAs to conduct joint PNC home visits at 2, 6 and 8 weeks postpartum, conduct joint health education and promotion activities and to encourage mutual support and problem solving; and 4) **Creating an enabled environment for maternal, newborn and child health:** NHCs and Safe Motherhood Action Committees (SMAGs) are trained in community mobilization for maternal, newborn and child health (MNCH) and in CHW/TBA teaming.

Principal findings of the Final Evaluation include:

- 1) **Community-based case management has been successfully implemented using district systems and has led to improved treatment practices for pneumonia, malaria and diarrhea.** Improvements in population-based coverage of key treatment interventions are associated with improved CHW practices. Data suggest that CHWs are able to: assess, classify, treat and refer sick children appropriately and complete community registers.
- 2) **Community-based maternal and newborn care has been successfully implemented using district systems and has led to improved coverage of ANC, skilled delivery care, and PNC.** Improved population based coverage of delivery and PNC interventions is associated with improved TBA practices. TBAs are able to identify mothers and newborns in villages, refer women for delivery care, make home visits as required in the PNC schedule and use registers.
- 3) **Operations research on CHW/TBA teaming has demonstrated that teams increase population coverage with key newborn and child health interventions; community mobilization is essential to supporting improvements in access to, availability of, and demand for, newborn and child health interventions.** Operations research data suggest that CHW/TBA teaming is associated with improvements in intervention coverage. Teams are well accepted by communities. The approach shows promise for wider use. Participatory methods using NHCs have improved community support.
- 4) **Community health worker attrition is an important problem that will limit program effectiveness in the long term.** The high attrition rate of CHWs limits population reach of the program; associated variability in CHW distribution also limits population reach.
- 5) **More attention to quality of care provided by both community-based and facility-based staff is needed.** Routine supervision of CHW and TBA practices does not occur. No data are available on the quality of delivery and sick newborn and child care provided at first level and referral HFs – and clinical care is not routinely monitored.

- 6) Capacity of the district to finance and manage project activities remains limited.** Sustainability will be limited by lack of district capacity (human and financial) to cover recurrent costs and activities previously provided by the project such as monthly supervision, CHW training, data collection and management and community support (Mobilizers).

Recommendations:

1. Continue implementation of the iCCM and community MNCH care programs including CHW/TBA teaming and community mobilization activities using NHCs and SMAGs.
2. Write-up and disseminate findings, including:
 - Complete analysis of OR findings and publish results;
 - Document project findings, approaches, methods and materials and OR results - ensure that findings are shared with the MOH at all levels and other stakeholders;
 - Link with national technical working group process to ensure that lessons learned, methods and materials inform national iCCM roll out; and
 - Consider “living university” approach for on-the-job training of other district staff in successfully used approaches.
3. Develop strategies to sustain community-based programs by addressing CHW attrition, quality of care and collection and use of data.
 - Develop an approach for managing CHW attrition and deployment – including monitoring numbers and ensuring resources for training of CHWs;
 - Develop strategies to regularly review clinical practice skills of CHWs and TBAs, provide feedback and solve problems. Assess current quality of sick newborn and child care, routine delivery care – and develop approaches for regular quality improvement;
 - Review current approach to routine community data collection using registers and revise approach if necessary; establish how the district will collect, enter, analyze and summarize data; consider simplifying registers; and
 - Ongoing review and development of medicine supply system.
4. Strengthen the capacity of the district to finance and manage project activities.
 - Cost project inputs and establish full annual implementation costs;
 - Establish mechanism for routine coordination with district and national stakeholders – to identify funding sources and share implementation costs. (Responsible: DHMT, SC local office); and
 - Consider project extension to focus on handing over responsibilities to district staff.

EVALUATION PURPOSE AND EVALUATION QUESTIONS

Evaluation Purpose

The purpose of the final evaluation (FE) was to determine whether the Lufwanyama Integrated Neonatal and Child Health Project (LINCHPIN) increased use of evidence-based, life-saving interventions by caretakers and children in the Lufwanyama District of Zambia. The aim was to use data to identify effective community-based approaches used by the project and to document mechanisms by which these approaches had worked; while also identifying approaches that had been less successful. As a part of this process the evaluation aimed to identify the extent to which project activities strengthened the capacity and sustainability of district MOH systems, used and documented innovative community-based program approaches, and informed national programming. Evaluation findings are intended to provide evidence-based recommendations to inform local and national planning in Zambia and in other countries implementing community-based newborn and child health programs.

Evaluation Questions

The FE drew upon existing data collected or compiled during the project cycle, as well as additional data collected during the evaluation for the following purposes:

- 1) To provide an overview of project goals, objectives, and key intervention strategies implemented;
- 2) To determine the extent to which the project accomplished the results outlined in the DIP and to present evidence of these accomplishments;
- 3) To describe key factors that contributed to what worked or did not work regarding some or all aspects of the program;
- 4) To identify the effectiveness and potential wider applicability of the CHW-TBA teaming approach;
- 5) To determine the sustainability of community-based newborn care, iCCM and community mobilization using NHCs and SMAGS in Lufwanyama District; and
- 6) To demonstrate how the project contributed to learning and evidence that is directly relevant to improving MOH policies and practices, as well as global learning about community-oriented health programming.

A. PROJECT BACKGROUND

A.1. Setting

Lufwanyama is a rural district with limited access to health care services. Malaria, pneumonia, diarrhea and under nutrition are the primary contributors to morbidity and mortality of children 1-59 months old, with asphyxia, pre-maturity/LBW and sepsis the most important causes of newborn deaths. A baseline newborn mortality rate of 40/1000 live births was estimated in the district¹. At baseline, only a third (36%) of mothers were delivered by a skilled attendant, less than half of newborns (44%) were put to the breast within an hour of birth, and 27% of mothers reported a PNC visit within two days of delivery. Only half (50%) of children with suspected pneumonia

¹ Gill CJ et al. Effect of training traditional birth attendants on neonatal mortality (Lufwanyama Neonatal Survival Project): randomised controlled study. *BMJ* 2011;342:d346

received an antibiotic - very few (12.5%) within 24 hours of illness; only 11% of children with fever received an antimalarial within 24 hours of the onset of fever; and only half (51%) of children 0-23 months old slept under an insecticide-treated bednet. The limited health systems in the district presented unique challenges that made it suitable for a project that focused on building community-based approaches.

A.2. Goals and objectives

The goal of LINCHPIN is to decrease under-five mortality in Lufwanyama District by increasing the use of evidence-based, life-saving interventions by caretakers and children. The strategic objective is *increased use of key newborn and child health services and practices*. This objective requires that curative interventions of high quality are continuously available and accessible to newborns and children because they fall ill unpredictably and can die quickly. There are four intermediate results that support attainment of the strategic objective:

1. Increased access to and availability of newborn and child health care services;
2. Improved quality of newborn and child health care services;
3. Increased demand for newborn and child health care services and healthy practices in the home and community; and
4. An enabled environment at all levels to support effective delivery of newborn and child health interventions.

A.3. Project location

Lufwanyama District is a large rural district in the Copperbelt Province of northern Zambia (12°46'S 27°32'E). The District Health Management Team (DHMT) oversees health programming for the district, which has 17 facilities staffed by nurses, nurse-midwives, clinical officers, or Environmental Health Officers (EHOs). Two of the facilities are operated by members of the Churches Health Association of Zambia (CHAZ). A new referral hospital was opened in the district in 2013. Access to and availability of services is limited by several factors including lack of trained staff, poor communications, limited roads with seasonal impassability, and lack of transportation. Facility staffing varies from one to 10 per facility; most facilities are understaffed. Retention of trained HWs is reported to be a problem at many facilities. A high proportion of basic healthcare services are provided by minimally trained community workers, including TBAs, CHWs, and community-based distributors for family planning (CBDs). Each HF links with 8-11 Neighborhood Health Committees (NHCs), each of which, in turn, serves up to 1,000 people. There are 118 active NHCs in the district. The NHC is a formally recognized structure that typically includes community leaders, TBAs, CHWs, CBDs, malaria agents, and other community-based providers. The role of the NHC is to support community-based agents, promote behavior change and link the community to its HF².

A.4. Estimated project area population

Lufwanyama District had a 2010 total population of 85,033 (official government projection extrapolated from the 2000 census) with 15,136 (17.8 percent) children under five and 18,537 (21.8 percent) women of reproductive age.

² Kalesha P, Overview of Community IMCI in Zambia, Sub-regional Conference on Community-based Child Health Interventions, Lusaka, Zambia, 3 May 2007.

A.5. Technical and cross-cutting interventions

The project focus is on delivering a core package of interventions at each level of the continuum of care for the mother, newborn and child – with a focus on improving delivery at community and first-level facility levels. Interventions were selected because they have been demonstrated to be effective in reducing newborn and child morbidity and mortality. Intervention packages at each level of the continuum of care include: (1) Pregnancy: Focused antenatal care (FANC); (2) Delivery and one hour post-delivery: Skilled delivery care, essential newborn care (ENC); (3) Newborn period: PNC, special care for low birth weight (LBW) babies; and recognition and referral of sick newborns; (4) Childhood: pneumonia case management, prevention and treatment of malaria and control of diarrheal diseases (iCCM). Approximately 40% of the project is allocated to maternal and newborn care, and 20% each to pneumonia case management, prevention and treatment of malaria, and control of diarrheal diseases.

A.6. Project Design

LINCHPIN is a five-year Innovation Project (CS-25 cycle) running between 1 October 2009-30 September 2014. The project is co-funded by USAID Child Survival and Health Grant Program (CSHGP) and ELMA Philanthropies, with matching funding from Towers and Perrin and the Crown Family Philanthropies.

Project activities are guided by the *Zambia National Health Strategic Plan 2010-2015* and the *Road Map for the Attainment of the Millennium Development Goals Related to Maternal and Newborn Health in Zambia* (finalized in 2010). National approaches to newborn and child health include IMCI at facility and community levels. Integrated community case management (iCCM) has been adopted as a component of community IMCI. CHWs are permitted to give antimicrobials by a letter of intent from the MOH, although a formal policy has not yet been adopted; iCCM case-management guidelines for national use are available. IMCI guidelines have been adapted to include management of the sick newborn, but training in the newborn component has not yet been conducted widely. The current national policy recommends that all delivery and post-delivery care be provided by skilled birth attendants (SBAs); TBAs are required to refer women for delivery at HFs and are no longer issued clean delivery kits. A national process to develop a community-based maternal and newborn health package for CHWs is underway. Project strategies were developed to be consistent with national policies and strategies.

The project had four main components:

- **Integrated community case management (iCCM)**

CHWs are trained to assess, classify and treat sick children 2 to 59 months old with malaria, pneumonia and diarrhea – and to refer children with danger signs. All sick newborns are referred. Malaria must be RDT confirmed before treatment is given. CHWs are provided with ORS, zinc, amoxicillin, ACT and RDTs – as well as a timer and MUAC tape. They enter each sick child seen in a register – recording the classification and treatment given, whether referral was recommended and completed, and whether follow-up was conducted. CHWs are also trained to give key messages on MNCH topics. CHWs are supervised by facility-based HWs. Supervisors meet CHWs each month at the HF, where they re-supply them with medicines and review and summarize register data. CHWs also have referral slips (slips have three sections: one kept with the CHW; one given to the caretaker of each child referred; and one given to the caretaker by the

facility worker summarizing the classification and treatment given – for return to the CHW when the caretaker returns home).

- **Community-based maternal and newborn care**

TBAs are trained to make home visits to mothers and newborns starting at delivery. If the newborn is delivered at home, the TBA provides ENC, including newborn resuscitation. PNC home visits are then conducted at 24 hours, 2, 3 and 7 days and at 2, 6 and 8 weeks. Mothers and newborns with danger signs are referred to the HF. TBAs record each newborn seen in a register – recording ENC tasks performed (if the TBA is present at the delivery), PNC visits completed, and whether the newborn was referred for danger signs. TBAs are also trained to give key messages on ANC, delivery and PNC. TBAs are supervised by facility-based midwives, if available, or by other facility-based staff. TBAs meet with supervisors each month at the HF, where register data are reviewed and summarized.

- **Teaming of CHWs and TBAs**

CHWs and TBAs are trained to work as teams. Teaming is primarily designed to bridge the gap between care provided at delivery and the early newborn period (usually provided by the TBA) and care in infancy and childhood (usually provided by the CHW). The teaming approach teaches CHWs and TBAs to do the following: 1) make joint 2, 6 and 8 week PNC home visits; 2) conduct joint health education and promotion activities during home visits, outreach sessions or at other community events or meetings; 3) encourage mutual support and problem solving; and 4) help promote and facilitate referral of sick mothers, newborns and children when necessary. In addition, NHC members are trained in the teaming approach. The intention is that they will support teams in a variety of ways, including mobilization of community resources. Teaming of CHWs and TBAs is an innovative approach that was tested for the first time in Zambia. For this reason, teaming is the focus of the project innovation research. OR on teaming was planned and was conducted by Boston University. The OR within LINCHPIN is aimed at assessing the feasibility and effectiveness of TBA-CHW teams supported by NHCs to deliver high impact *integrated newborn and child interventions among children 0-59 months of age in Lufwanyama District*. A full summary of the OR study and findings is presented in Annexes 15 and 16.

Summary of Methods: Teaming Operations Research

The OR was implemented in three phases. In the first phase, formative research used group discussions and pile sorting exercises to explore and identify domains and factors for measuring teaming and joint taskwork. This informed development of a teaming training guide and measurement tools. In the second phase, 47 CHW-TBA teams and two NHC members for each, were trained and certified. A household survey was conducted to assess baseline coverage of key maternal and newborn health indicators in communities with teams. Team measuring tools were used every six months for four cycles to assess the availability of teams and their levels of teamwork and taskwork, and other personal and community factors that might influence performance. Teams were given scores for levels of teamwork and taskwork. In the third phase, the population-based household survey of caregivers of children under five was repeated. The baseline (n=735) was in March-April 2011, and the endline (n=701) was in March-June 2013. In addition, focus group discussions (n=8) and in-depth interviews (n=29) were conducted with caregivers, teams, community leaders and district and provincial managers to explore the acceptability of teaming. Analysis to date has been descriptive and bivariate. The central analysis

compared intervention coverage in study areas by overall teamwork and taskwork scores to identify the impact of teaming on key maternal child and newborn practices. Research limitations include small numbers of teams, team attrition (14 of 47 (30.0%) teams became inactive over two years, most commonly due to CHWs obtaining a paying job); and lack of sufficient funds for a before/after *side-by-side* (with/without teaming) design to control for other LINCHPIN system strengthening activities.

- **Creating an enabled environment for MNCH**

NHCs are trained in community mobilization for MNCH and in CHW/TBA teaming. The purpose of community mobilization activities are to: 1) empower NHCs and communities to make informed decisions about MNCH – and to develop and implement local plans to make improvements; 2) strengthen and/or develop community-based referral systems to better respond to obstetric, newborn and child health emergencies; 3) increase demand for community-based case-management and TBA home visits in order to ensure that mothers, newborns and children seek care early; 4) help change social norms that results in or are related to harmful practices; and 5) strengthen social support networks for pregnant women. The project objective was to give NHCs and communities skills to develop simple action plans to address health-related problems, and to find resources to implement these plans. NHCs are central to improving community demand to help drive improvements in quality, access and availability of health services.

A.7. Partnerships and Collaboration

LINCHPIN has focused on building the capacity of the local government system to implement maternal, newborn child health activities. In collaboration with partners it has facilitated increased resources for MNCH, particularly at the community level. At the national level, the project has contributed to national development and roll-out of iCCM, the national newborn health policy and a community-based MNCH package. Important partners have included:

- Lufwanyama DHMT. Project activities are implemented using the routine district health system. For this reason the project has worked closely with district health officer and DHMT. The project has used existing district facility staff, essential medicines and supplies. Existing CHWs and TBAs were used where possible. When re-training of CHWs was required, the MOH and district selection processes and training course were used. The project trained district staff as facilitators, conducts joint supervisory visits and updates district staff on progress at quarterly review meetings. Facility-based district staff are supervisors for CHWs and TBAs. The intention was to incorporate all activities into routine district programming for the longer term.
- MOH and the Ministry of Community Development, Mother and Child Health (MCDMCH)³. At the national level, LINCHPIN's Program Manager sits on the IMCI Technical Working Group (TWG), which oversees iCCM and has been involved with development of an iCCM scale-up plan for Zambia; and the development of a newborn health policy and community-based newborn health implementation package. These fora facilitate sharing lessons learnt from district implementation into national materials and

³ This is a new ministry created in 2012 by the recently elected President to improve maternal and child outcomes in support of MDG 4 & 5.

guidelines. The Program Manager serves as a reference, advocate and technical resource for MNCH.

- District partners. Since 2009, LINCHPIN has received funds for project activities from the ELMA Foundation, Towers and Perrin, and Crown Family Philanthropies. In addition, Save the Children (SC) has attracted several additional donors to Lufwanyama District who are supporting complementary activities. These include Save the Children Korea (infrastructure development, including a new maternity ward for the Mukutum Health Center, and purchasing of an ambulance and two motorized tricycles for district use), the Swedish International Development Agency (SIDA) (*MDG 4&5* and *Local to Global* Projects) and the Swedish Postcode Lottery (project promoting infant and young child feeding in four of Lufwanyama's health zones). *MDG 4&5* aims to build elements of community capacity such as financial systems and governance - and provided small grants to approximately 29 of the district NHCs to carry out community "action plans" developed through the community action cycle process. Activities supported included the construction or rehabilitation of 14 Primary Health Care Units, protection of 12 shallow wells, NHC communication training, and procurement of bicycles for volunteers. *Local to Global* is an advocacy initiative that trains community leaders and NHCs in topics related to child rights and child rights governance. The Swedish Postcode Lottery funding has supported nutrition activities, including development of a KMC Unit at St. Josephs Hospital, growth monitoring and the formation of nutrition support groups – to improve nutritional status of all children over six months of age.
- National partners. The project has worked closely with UNICEF, WHO, JICA, USAID ZISSP and the Malaria Consortium as part of the IMCI TWG on development and national roll-out of iCCM and the newborn health policy. The TWG is responsible for the development of iCCM materials – and for helping to plan approaches for implementation. Development of the community-based maternal and newborn care package will adapt WHO materials – and will be informed by implementation experience of the SC/Saving Newborn Lives (SNL) initiative.

A.8. Relationship with USAID in Zambia

The USAID/Zambia Child Survival Specialist participated in the DIP Workshop. The project maintains regular contact with the USAID Mission's Health, Population, and Nutrition team. LINCHPIN strategies were built on two cluster randomized community-based research projects supported by USAID in Zambia – LUNESP (Lufwanyama Neonatal Survival Project) for newborn care and ZIMMAPS (Zambia Integrated Management of Malaria and Pneumonia Study) for CCM. Both were carried out by the Boston University Center for Global Health and Development (CGHD), working with the DHMT and local partners. SC coordinates with USAID -funded programs through participation in monthly partner meetings. LINCHPIN collaborated with the Zambia Integrated Systems Strengthening Project (ZISSP) to give basic training to 16 CHWs, and to provide 24 HWs IMCI training. SC is also working with the Saving Mothers, Giving Life (SMGL) Initiative, through MCHIP, to introduce Helping Babies Breathe (HBB) using a mentorship model. Although Lufwanyama is not one of the four priority districts for SMGL, district staff members were trained as HBB trainers for national scale-up.

B. EVALUATION METHODS AND LIMITATIONS

B.1. Overview of the approach

The LINCHPIN FE was conducted by a team that included an outside evaluator, SC staff from the Regional and Global offices, a MOH staff person from the District Health Office, and local SC project staff. The evaluation was conducted between September 1 and 12, 2014.

Five principal methods were used for the evaluation: 1) Review of 30-cluster KPC surveys, including those at project baseline and endline; and those conducted for the OR project. 2) Review of community register data. 3) Document review – including policy documents, program reports, technical reports, reports of training activities, HW registers, and training and health education materials. 4) Field visits – site visits were made to six randomly selected HFs and in-depth interviews conducted with HF staff (N=8), community health workers (CHWs) (N=10), Traditional Birth Attendants (TBAs) (N=9), Neighborhood Health Committee members (NHC) (N=56), SMAG members (N=28) and caretakers of young children (N=4); and 5) In-depth interviews with district staff and managers (N=2), and partners and stakeholders at the national level (N=12). Key informants and stakeholders were selected from all groups or organizations who had collaborated with the project or who worked in MNCH area and were familiar with the technical issues. All findings were discussed and synthesized by the evaluation group. A final summary of main findings and recommendations was reviewed and discussed with the head of the MOH Child Health Unit on September 9 and with USAID Health Advisors on September 12, 2014. Following these meetings evaluation findings and recommendations were further revised and finalized. Program data, documents and reports were available to the evaluation team, and interviews were conducted with key stakeholders at all levels. HFs and communities in the district were stratified by HC capacity and selected randomly from each group. It is recognized that since it was not possible to interview staff in all parts of the district, that some views were not captured during field interviews. National MNCH technical officers from WHO and from UNICEF CCM were not available during the evaluation and could not be interviewed. Details of the evaluation approach, team members and persons interviewed for the evaluation are presented in Annexes 8, 9, 10, 11 and 14.

B.2. Data quality and use

Household survey data

A baseline 30-cluster household survey was conducted in May 2010 and a follow-up in August 2014. Proportional sampling methods were used to select caregivers of children aged 0-23 months from all nineteen catchment areas in the district (N=465 at baseline and N=544 at endline). The study instrument was adapted from the RAPID CATCH 2008 questionnaire. Coverage indicators used were consistent with standard international indicators. Baseline data were used to establish targets for key indicators. Since coverage of CHWs and TBAs is variable in the district, it is possible that some sampled areas did not receive project interventions. Uneven coverage of project interventions may limit the ability of a district-wide sample to detect changes in key indicators at endline. Baseline and endline 30-cluster household surveys were also conducted as part of the OR study on CHW/TBA teaming. These surveys limited the sampling frame to communities where CHW/TBA teams were active and administered household survey questionnaires to the caretakers of children aged 0-59 months. Data from these surveys were designed to capture changes in intervention coverage only in areas receiving

routine project inputs plus teaming. Data from these surveys were used to supplement data from district-wide baseline and endline surveys.

Community-based register data

Two community-based registers are used for tracking field activities; a TBA register and a CHW register. The TBA register records all newborns born in the TBA catchment area. TBAs record ENC tasks performed (if the TBA attended the delivery), PNC contacts by the TBA (24 hours, 2, 3 and 7 days; and 2, 6 and 8 weeks) and newborns with danger signs referred. The CHW register records all sick children who are seen by the CHW. CHWs record assessment findings, classification made and treatment given, cases referred, referral completed and follow-up of sick children. Registers are brought to the HF each month. Facility-based HWs aggregate data in a facility aggregation register. Project team members collect aggregated data from each facility each month and process these data in the project office. Data are summarized as graphs and used to track performance. Register data are available for the period July 2011 – July 2014. Completeness of reporting varied between 40% and 91% during the reporting period. Data are reviewed at the HF level, for completeness and accuracy – and corrections made when possible. Register data are used to track a number of elements of community-based iCCM and MNCH home care. Representativeness and quality of register data will be affected by: 1) the proportion of all deliveries and sick children registered by TBAs and CHWs in communities; 2) the proportion of TBAs and CHWs reporting each month; and 3) the completeness and accuracy with which registers are filled-in by TBAs and CHWs. A decline over time in the proportion of TBAs and CHWs reporting quarterly was noted.

Project monitoring and documentation

The project tracks project inputs and outputs in four areas: 1) Materials and guidelines developed; 2) Trainings planned and conducted by category of trainee; 3) Availability and coverage of TBAs, CHWs and TBA/CHW Teams by geographic area and by density of population; and 4) CHW and TBA attrition rates over time and reasons for drop-outs. These data were useful for helping to determine “adequacy of implementation”, and therefore the likelihood that project activities contributed to changes in project outcomes.

C. FINDINGS, CONCLUSIONS AND RECOMMENDATION HIGHLIGHTS

Progress Towards Increased use of key newborn and child health services and practices

C.1. Integrated community case management

Project inputs, outputs and outcomes in the area of community case-management are summarized in Table 1.

Main project achievements include:

C.1.1. Population-based coverage of key newborn and child health interventions (Outcomes)

District household survey data show significant improvements in the proportion of children receiving treatment interventions between 2010 and 2014 including; skilled birth attendance (rising from 36% in 2010 to 96% in 2014), children with suspected pneumonia receiving amoxicillin (rising from 50% in 2010 to 78% in 2014), children receiving amoxicillin within 24 hours of symptom onset (rising from 13% in 2010 to 32% in 2014), children with suspected

pneumonia who were taken to an appropriate provider (rising from 67% in 2010 to 97% in 2014), children with diarrhea receiving zinc (rising from 0% in 2010 to 40% in 2014), and the proportion of children with fever who received ACT within 24 hours (rising from 11% in 2010 to 55% in 2014) (Figure 1). No significant changes were noted in the proportion of children with diarrhea receiving ORT. These coverage data are consistent with findings from the household survey conducted in 2013 for the OR project, which sampled only from populations with CHW/TBA teams (see Section C.4. and Annex 15). When considered with data on project inputs and outputs during the project period 2011-2014, it is plausible that improvements were causally associated with project actions. Improved treatment practices are likely to be associated primarily with the provision of community-based care; improved care seeking practices from HFs may also have played a role. The more modest improvements in early treatment for pneumonia (within 24 hours) may be due to several factors, including CHW medicine stock-outs, which may mean they are not always able to provide immediate treatment.

C.1.2. Project inputs

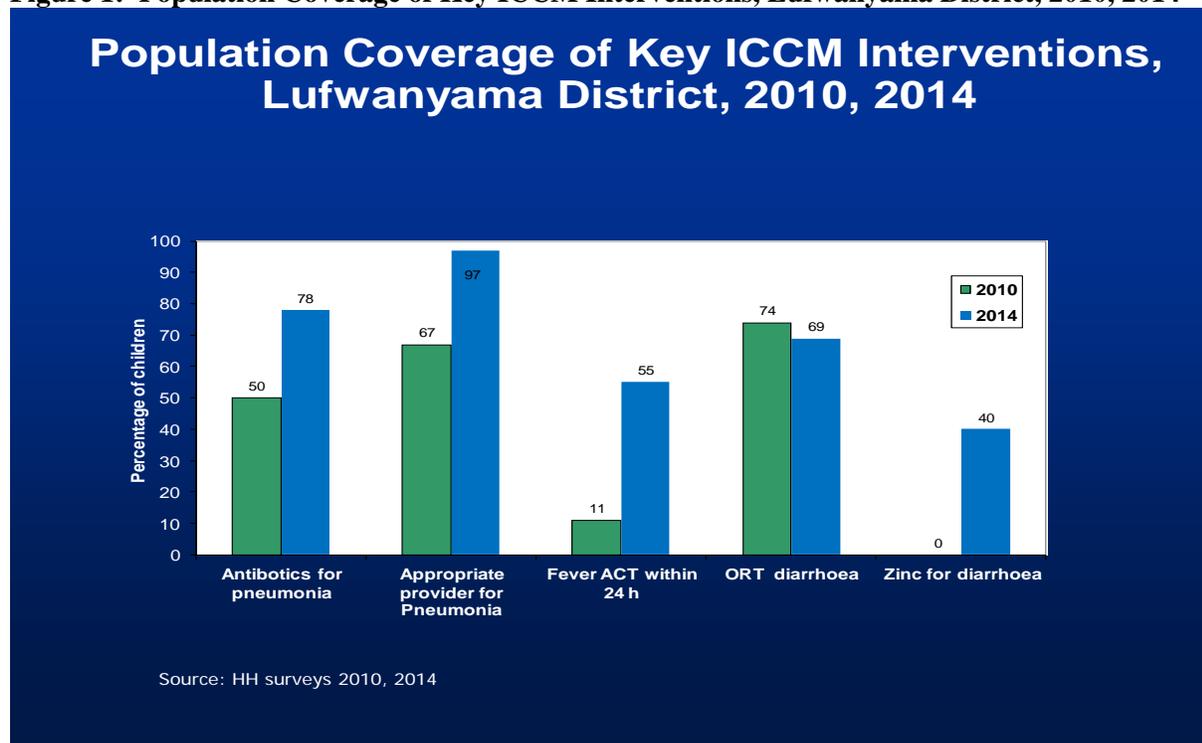
The project developed iCCM training materials, case-management job aids, community CCM registers for CHWs and aggregation registers for facility supervisors. Standard WHO/UNICEF CCM guidelines were adapted for local use. A total of 7 of 8 identified trainers for iCCM were trained. All 87 available CHWs (100%) in the district at baseline were trained in iCCM and in the use of registers, and an additional 15 CHWs were trained over the life of the project. Field interviews with facilitators and CHWs indicate that: CHWs were selected by NHCs and communities they served, and this selection process was generally believed to be effective (*“The selection criteria are good because communities are involved. And the goodness of these volunteers is that they reside in our community”*: Chinemu NHC); CHWs report that training contains enough clinical practice to give them case management skills and that registers are useful job aids. One CHW observed: *“The register tells me everything that I should look for, so it is a reminder of what I have to do”* (Mukumbo HC). The project supported all training, monthly joint supervisory visits to facilities with district staff, printing of registers and data entry and analysis. A summary of trainings conducted, facilitators trained and training materials or guidelines developed or adapted by the project is presented in Annex 7.

C.1.3. Improved access and availability

The project trained a total of 87 CHWs, lost 26 and trained an additional 15. CHW density ranged between 1 and 0.9/1000 during the life of the project. Considerable variability in CHW density is noted by facility catchment area, ranging between 0.15/1000 to 2.82/1000 (see Annex 17: Stakeholder Presentation: CHW density graphs). Between July 2011 and June 2014, a total of 30,066 sick children were registered by CHWs (suspected pneumonia = 3538, RDT confirmed malaria = 22142, diarrhea = 4386) - an average of approximately 11 cases/CHW/month. Seasonal variations are noted, with the number of cases generally higher in January and February, which coincide with the malaria season. Expected number of cases of pneumonia, malaria and diarrhea in the district were calculated using 2010 estimates of the total population of children under five years old in the district, and the expected annual incidence rates for pneumonia, malaria and diarrhea⁴. Using these estimates, CHWs registered approximately 87% of all expected cases of pneumonia and malaria during the full project period, and 9% of

⁴ Malaria (Roca-Feltrer et al, TMIH, 2008, estimates for rural central africa, high transmission areas); Pneumonia and diarrhea: Fischer Walker, Rudan et al, Lancet, 2013, 381:1405-16).

Figure 1: Population Coverage of Key ICCM Interventions, Lufwanyama District, 2010, 2014



expected cases of diarrhea. These estimates indicate that CHWs increased access to care for pneumonia and malaria; and make it plausible that population coverage with these interventions increased across the life of the project. A relatively low fraction of expected diarrhea cases were seen by CHWs, making it less likely that population coverage with diarrhea interventions increased. Key informant interviews suggest that CHWs were consulted less frequently for diarrhea and may be associated with a relatively high level of awareness of diarrhea case-management at baseline (74% of caretakers gave ORT for diarrhea at baseline), and the perception that it is a less severe disease that can be managed at home. The proportion of CHWs reporting during the project periods ranged from 91% to 59%, so reported figures underestimate total numbers of sick children seen by CHWs.

CHW coverage remains a challenge for two important reasons: 1) *CHW attrition*: An attrition rate of 30% was noted over the life of the project. Reasons for attrition were reviewed and are summarized in Annex 19 (CHW Attrition Learning Brief). Of those who stopped working, 12/26 found paid work, 5/26 had disciplinary issues (lax attitude to work, conflicts with supervisors or community members), 5/26 had personal reasons (such as relocation) and 1 died. A high proportion of CHWs found employment as Classified Daily Employees (CDEs) at HCs. Problems with selection criteria for CHWs and CHW training were not reported. Managing attrition will require monitoring and regular re-training and deployment of CHWs. 2) *CHW distribution*: CHW mapping shows that CHWs are distributed unevenly throughout the district – placement differs substantially by facility catchment area. Addressing this issue will also require monitoring and training of CHWs in underserved areas. Resources for CHW training are currently not available.

Table 1: Integrated CCM: Summary of Project Inputs, Activities, Outputs and Outcomes, LINCHPIN Project, Zambia, 2010-2014

Project Inputs	Activities	Outputs – systems (July 2011 – June 2014)	Outputs – case management (July 2011 – June 2014)	Outcomes – District Population coverage (2010 – 2014)
iCCM Technical support; Materials; Training; CHW bicycles, bag + supplies; Vehicles and fuel for site visits; 4 Community mobilizers	<ul style="list-style-type: none"> Development and testing of training materials (iCCM, supervision) and of community registers, forms and supervisory checklists Training of trainers, CHWs and supervisors Regular supervision with district staff Compilation and summary of register data Engagement with district planning 	# of CHWs trained in iCCM: 87 - 26 dropped out – 15 additional trained % of trained CHWs remaining 2014: 87% (76/87) % of CHWs receiving clinical supervision in last 3 months: 100% (2011) (74/74) – 19% (15/76) 2014 % of CHWs that have had no stock-outs of essential medicines in the previous month: range – zinc 3% (2/76) – ACT 37% (28/76) (2014) % of CHWs reporting 91% (67/74) (2011) – 65% (49/76) (2014) District workplan includes iCCM: Yes	% of CHW registered cases of suspected pneumonia treated with amoxicillin: 90% % of CHW registered cases of RDT positive malaria treated with ACT: 95% % of CHW registered cases of diarrhea treated with ORT: 85% % of CHW registered cases of diarrhea treated with zinc: 25% % of children referred who complete referral: 77% (2012) - 82% (2014)	% of children with suspected pneumonia receiving amoxicillin: 50% - 78% % of children receiving amoxicillin within 24 hours of symptom onset: 13% - 32% % of children with suspected pneumonia who were taken to an appropriate provider: 67% - 97% % of children with diarrhea receiving ORT: 74%-69% % of children with diarrhea receiving zinc: 0% - 40% % of children with fever who received ACT within 24 hours: 11% - 55%

C.1.4. Improved Quality

Case management of sick children. Between July 2011 and June 2014, 3538 cases of suspected pneumonia were recorded, of which 90% received amoxicillin treatment. During the same period, 22142 cases of RDT positive malaria were recorded of which 95% received ACT; and 4386 cases of diarrhea of which 85% received ORT and 25% received zinc. Registers do not capture those children who were taken directly to a HF, or those who visited the CHWs but were not registered. Field interviews indicate that in some cases, CHWs may not register children if they do not have a supply of medicines available, although most CHWs do not report that this happened often. Overall a high proportion of all registered cases were treated appropriately, with the exception of use of zinc for the treatment of diarrhea. These data make improvements noted in population-based coverage of treatment interventions plausible.

Recognition of danger signs. Overall, 420/30066 (1.4%) of registered children were identified with danger signs. A total of 2642 (9%) of registered cases were referred for any reason during the project period (for all causes including danger signs, for medicines, or for non-CCM problems). Of those referred, 82 % successfully completed referral. During field interviews, CHWs reported that they use referral slips, but often do not get the feedback referral slip from facility staff. Facility health workers report that they often forget to give feedback to CHWs. The proportion of all cases classified with danger signs is lower than reported for cases presenting to HFs (around 10%), which may reflect early care seeking by caretakers.

Sick newborn care at first-level facilities: Since a key element of the community-based approach is referral of all newborns with danger signs, there was an urgent need to improve the skills of facility staff in this area. To address this gap, the project trained 24 HWs in IMCI (updated to include management of the sick young infant 0-2 months) in 2013. No observation-based data are available on quality of sick newborn or child care at HCs.

Program supports for quality of care

- Supplies of essential medicines for CHWs. Improvements were noted in the availability of essential medicines following the midterm evaluation, which found problems with medicine ordering and supply at facility, district and central levels. Efforts have been ongoing to strengthen medicine availability. Essential HC medicines are now supplied monthly in kits. HWs report that supplies have improved since 2012; and that amoxicillin, RDTs, ADT, and ORT are usually available. Stock-outs of zinc are most common, since the amount supplied in kits is limited – this is reported to be a problem with central supply. The formulation of amoxicillin is now appropriate for use by children, an improvement from 2012 when capsules were supplied. Register data show that a high proportion of children with suspected pneumonia, malaria and diarrhea receive appropriate treatment, which indicate that essential medicines are usually available to CHWs. Never-the-less, CHWs report that stock-outs in the previous month were common. Between 2011 and 2014 stock-outs were reported by between 52% and 93% of CHWs in the previous month for ACT, amoxicillin, ORS or zinc – or of RDTs. Zinc and ORS have been most often out of stock – and treatment of diarrhea is the most likely to be compromised. CHWs report that they return to the HF during the month if they run out of medicines – to be re-supplied. In many cases therefore CHWs are able to overcome stock-outs and this may explain why a high proportion of registered children are treated appropriately.
- Supervision of CHWs. CHWs visit facilities monthly for re-stocking and register review. These are primarily administrative visits at which register data are summarized and CHWs re-supplied with medicines. HWs report conducting observation of CHW practice relatively infrequently due to time constraints. Observations can be conducted during outreach sessions or at the time CHW visit HFs. HWs report preferring conducting case observation at facilities since it is logistically easier. The proportion of CHWs receiving a supervisory visit that included observation of practice using a checklist has declined over time, from 100% in 2011 to 19% in 2014.
- Quality of care provided at first level and referral level HFs. The community case-management approach requires recognition and referral of newborns and children with danger signs; and referral of all mothers for facility deliveries with trained HWs. The project did not monitor or evaluate quality of newborn and child care or delivery care at HFs. Field interviews with both facility and community-based workers suggest that quality is often limited; in many facilities CHWs and TBAs provide facility services due to staff gaps. Regular review of quality of clinical care, feedback and problem solving by district supervisors would be an ideal approach – but will require investments in time and logistics that are not currently available.

- CHW and TBA registers have proved useful job aids for community workers, and data have been invaluable for tracking progress. Rates of monthly CHW reporting during the project period ranged between 59% and 91%, with the mean being 69%. Data are presented and discussed at quarterly DHMT reviews. All data management has been coordinated by the project: monthly joint supervisory visits with district staff to review registers and collect data; data entry; data analysis and production of summary statistics. It is unlikely that monthly supervisory visits will be able to continue when the project ends – the district will most likely conduct quarterly supervisions. In addition, technical capacity for data entry and management has not yet been transferred to district HMIS staff. These factors will limit the ability of the district to continue collecting and using register data. In addition, the costs of producing new registers will have to be borne by the district in the longer term – resources are not currently available. A simplified national CHW register has been developed and promoted by the national iCCM Program – and it may be preferable for the district to adopt this simplified register. Decisions need to be made about how register data will be managed in the long term, and district skills improved in this area.
- Availability of referral care. Transportation for cases needing referral has been improved by the provision of a district ambulance and two motorized tricycles (SC Korea) and bicycles for CHWs and NHC volunteers (*MDG4 &5 Project*). Availability of referral services has been improved in the last year by the opening of the new district hospital (MOH); and rehabilitation of 14 primary health care units (*MDG 4&5 Project*). These referral supports represent examples of project leverage of resources from other partners to help improve availability and quality of care.
- Ongoing inputs required to sustain project activities. The project successfully implemented many activities through the existing district system using district staff, facilities and medicines. The project has supported monthly supervision; training and re-training of staff including CHWs; equipment and supplies for CHWs and TBAs; data collection and review; and full-time community mobilizers. To sustain activities in these areas, alternative sources of funding will need to be found. It would be useful to cost all project inputs– and to have a mechanism for coordinating stakeholder inputs to secure on-going support for all activities. Currently costing data and mechanisms for seeking stakeholder support are not available.

C.1.5. Improved Demand

CHWs are able to give key health education messages during home visits, at community meetings and during outreach sessions – NHC members report that they are well accepted by caretakers and community members. Both teaming and community mobilization activities are reported to have improved demand and acceptance for iCCM. Household survey data show improvements in the proportion of caretakers who know at least two danger signs for seeking care for their sick newborns and children (rising from 11% to 41% - recognition of danger signs for sick newborns - and from 22% to 65% - recognition of danger signs for sick children), making it plausible that care seeking practices have also improved over the life of the project. CHWs and TBAs are issued with a list of key messages, but no counseling cards or flip charts that use pictorial images have been developed by the project due to the high costs of production. Use of visual aids would improve the capacity to transmit messages to the communities. Further inputs in this area could improve quality and sustainability of health education activities.

C.2. Community-based Maternal and Newborn Care

Field interviews with HWs, CHWs and community members indicate that TBAs are able to identify mothers and newborns in villages, make home visits as required in the PNC schedule, and use registers. TBAs are no longer issued clean delivery kits or equipment and supplies for managing newborn resuscitation. They are required to counsel mothers to deliver at facilities and to accompany mothers to facilities for delivery where possible. Project inputs, outputs and outcomes in the area of community case-management are summarized in Table 2.

Main project achievements include:

C.2.1. Population-based coverage of key newborn and child health interventions (Outcomes)

District household survey data show significant improvements in the proportion of mothers making at least four ANC visits during pregnancy (rising from 55% in 2010 to 78% in 2014), delivering with a SBA (rising from 36% in 2010 to 96% in 2014), and in the proportion of babies who were dried and wrapped at birth (rising from 80% and 88% in 2010 to 96% and 99% respectively for drying and wrapping). The proportion of children receiving a postnatal visit within two days of birth rose (from 27% in 2010 to 81% in 2014) (Figure 2). Taken with data on project inputs and outputs during the project period 2011-2014, it is plausible that improvements in ANC, deliveries at HF's and postnatal contacts are causally associated with TBA home visits and health education activities.

C.2.2. Project inputs

The project developed training materials for TBAs, TBA registers and aggregation registers for facility supervisors. National policy is to phase out deliveries by TBAs, although they continue in many remote and rural areas. For this reason, training included basic ENC skills and registers tracked drying, wrapping and newborn resuscitation practices for deliveries conducted by TBAs. Standard WHO ENC guidelines, "Helping Babies Breathe" guidelines and national TBA training guidelines were adapted for local use. Skills included basic ENC, PNC and recognition of danger signs and referral. TBAs were trained to facilitate ANC and delivery at facilities. Trainings were well accepted. TBAs are usually established community residents and are well accepted locally. The project supported all training, monthly joint supervisory visits to facilities with district staff, printing of registers and data entry and analysis. A summary of trainings conducted, facilitators trained and training materials or guidelines developed or adapted by the project is presented in Annex 7.

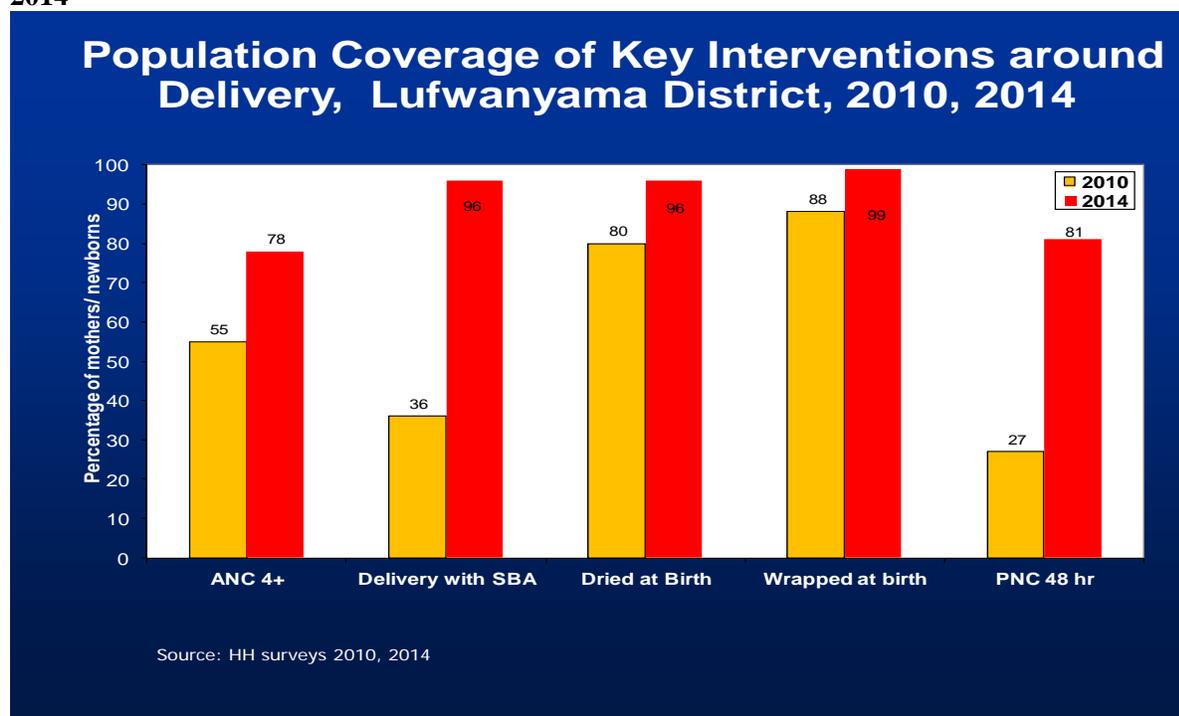
C.2.3. Improved access and availability

The project trained a total of 111/120 TBAs (90% of the total available in 2010) and lost 14 TBAs during the life of the project (13% attrition). The most frequent reasons for TBA attrition were employment elsewhere, death or illness and personal reasons, such as moving out of the community. TBA density was constant around 1.1/1000 during the life of the project, which is the national standard – although considerable variability in density is noted by HF catchment (range 0.29/1000 – 3.58/1000 -see Annex 17: Stakeholder Presentation: density graphs).

Between July 2011 and June 2014, a total of 6,161 deliveries were registered by TBAs - an average of 1.76 deliveries per TBA per month. The expected number of deliveries during this period, using district 2010 estimates, is 8,555. Using this estimate, TBAs registered approximately 72% of all expected deliveries during the project period. Over the three-year

project period, register data show that: deliveries conducted by unskilled providers (TBAs and family members) fell (from 68% in 2011 to 17% in 2014); deliveries by SBAs at clinics rose (from 32% in 2011 to 83% in 2014); and PNC contacts within 24 hours of birth rose (from 73% in 2010 to 81% in 2014). These data suggest that TBAs contributed to increasing clinic deliveries with SBAs and an increase in PNC visits. The proportion of TBAs reporting during the project periods ranged from 88% to 45%, so reported figures underestimate total numbers of women and newborns registered by TBAs. Interviews with facility-based HWs indicate that TBAs are less literate than CHWs and find registers more difficult to complete – reporting tends to be late and sometimes incomplete. Project staff interviews indicate that lower reporting by TBAs can generally be addressed by active follow-up of TBAs in the field; so far this has not been possible in 2014, which is why the proportion reporting remains relatively low.

Figure 2: Population Coverage of Key Interventions around Delivery, Lufwanyama District, 2010, 2014



C.2.4. Quality

Register data show an increasing proportion of babies delivered by TBAs were dried and wrapped over the project period (rising from 86% in 2011 to 97% in 2014); and 2-6% of all registered newborns were referred for danger signs. The proportion referred for danger signs is consistent with the expected proportion of cases with severe illness or complications of around 10%. Registers also tracked the proportion of TBA-assisted deliveries receiving assisted breathing (bag and mask resuscitation); these data show that rates were between 6-11% for 2011 and 2013, with an increase to 18% in the first six months of 2014. The estimated rate of asphyxia requiring resuscitation in this population from previous study data is 6%. Interviews with project staff, HWs and TBAs did not suggest a reason for this increase. The project developed TBA supervision checklists (including two clinical observation forms – on immediate ENC and possible severe bacterial infection, and clinical case-study for review of PNC practices). The

proportion of TBAs receiving clinical supervision (with a checklist) within the previous three months, declined over the project period from 93% in 2011 to 13% in 2014. Joint supervision of facility staff and CHWs by SC project staff and district staff is generally taking place monthly.

Table 2: Community-based Maternal and Newborn Care: Summary of Project Inputs, Activities, Outputs and Outcomes, LINCHPIN Project, Zambia, 2010-2014

Project Inputs	Activities	Outputs – systems (July 2011 – June 2014)	Outputs – maternal newborn care contacts (July 2011 – June 2014)	Outcomes – District Population coverage (2010 – 2014)
<p>Community-based maternal and newborn care</p> <p>Technical support Materials Training TBA bicycles, bag + supplies Vehicles and fuel for site visits</p>	<ul style="list-style-type: none"> Development of training materials – MNH home visits, ENC, supervision – and of community registers and supervisory checklists Training of TBAs and supervisors Regular supervision with district staff Compilation and summary of register data 	<p>% of TBAs trained in c-MNH: 90% (111/120)</p> <p>% of trained TBAs remaining: 87% (97/111)</p> <p>% of TBAs receiving clinical supervision in last 3 months: 93% (97/104) 2011 – 13% 13/97 2014</p> <p>% of TBAs reporting: 88% (98/111) 2011 – 45% (44/97) 2014</p>	<p>% of TBA registered newborns receiving a PNC contact within 24 hours of delivery: 73% – 81%</p> <p>% of TBA registered newborns delivered by trained staff at HF 32% – 83%</p> <p>% of TBA registered newborns delivered by TBAs: 57% - 12%</p> <p>Proportion of deliveries attended by a TBA where the baby was dried and wrapped: 86% – 97%</p> <p>Proportion of newborns delivered by a TBA receiving assisted breathing: 7% – 18%</p> <p>Proportion of TBA registered newborns who are referred for danger signs: 6% – 2%</p>	<p>% of mothers of children 0-23 months who had at least 4 ANC visits when they were pregnant with the youngest child: 55% - 78%</p> <p>% of children 0-23 months whose birth was attended by a SBA: 36% - 96%</p> <p>% of children 0-23 months who were dried and wrapped at birth: 80% (D), 88% (W) – 96% (D), 99% (W)</p> <p>% of children 0-23 months who received a postnatal visit from an appropriately trained HW within 2 days of birth: 27% - 81%</p>

C.2.5. Demand

Interviews with NHCs indicate that TBAs are able to give key health education messages during home visits, at community meetings and during outreach sessions – NHC members report that they are well accepted by caretakers and community members. Both teaming and community mobilization activities are reported to have improved demand and acceptance for TBA home visits (see sections C.3. and C.4.).

C.3. Teaming of CHWs and TBAs: Operations Research

Principal findings:

Teamwork and taskwork: Seventeen teamwork functions and seven taskwork functions were quantified. Mutual trust, comprehension of team goals and objectives, and team cohesion were high, and team motivation and communication improved over time. The most common jointly performed functions were postnatal “hand over” visits from TBA to CHW at about 6-8 weeks of age, social and behavior change communication, monthly NHC meetings, and outreach. Team members residing within one hour’s walking distance were more likely to score high. Teams that were jointly supervised, were of the same sex, or had at least one member receiving some incentive scored higher, but the differences were not statistically significant.

Intervention coverage in populations with teams: Coverage of maternal and child health (MCH) interventions improved at endline compared to baseline in communities served by teams. For example, nearly twice as many women reported delivering their youngest child at a HF (53.8% vs. 29.4%; $p < 0.0001$), by SBAs (46.4% vs. 26.8%; $p < 0.0001$) and receiving PNC (84.1% vs. 76.4%; $p = 0.017$). Rates of exclusive breastfeeding improved despite high baseline rates (87.2% vs. 76.6%; $p = 0.012$). Reported use of case management for sick children increased over baseline, for management of malaria, pneumonia and diarrhea – although rates of use of ORT and zinc remained low. Improvements in care seeking outside the home and compliance with referral were also noted.

Impact of level of teaming on intervention coverage. The level of teaming was positively associated with reported use of life-saving services and practices. Coverage of key interventions was higher among teams with higher teamwork and taskwork scores for 12 of 14 indicators. The differences were significant for both teamwork and taskwork for four indicators: receipt of ACT for malaria within 24 hours; receipt of early and appropriate treatment for malaria; care seeking for pneumonia outside the home; and care seeking for severe illness outside the home. The difference was significant for only taskwork for receipt of amoxicillin for pneumonia.

Community acceptance: Community members and health managers reported that teaming CHWs and TBAs was acceptable and beneficial. Reported benefits included a perceived reduction of child death, well informed and educated communities, referral support, and improved facility delivery and PNC. Support for teaming was unreserved with the recommendation to introduce it to other rural areas.

C.4. Enabled environment for MNCH

The project has worked with Neighborhood Health Committees (NHCs) and Safe Motherhood Action Groups (SMAGs) to build community capacity to support MNCH activities.

Main project achievements; community mobilization

Community mobilization activities contributed to improved access to, availability and quality of and demand for key newborn and child health interventions. Improvements in intervention coverage noted in sections C.1., C.2. and C.3. may all be associated with community mobilization activities. A full qualitative summary of community mobilization activities is presented in Annex 19 (Community Collective Action summary and the learning brief in Annex 1.) NHCs are part of local community structure, developed and endorsed by the MOH by an act of parliament. The main function of the NHC is to be the link between the community and the health care system, and to work with HWs, CBOs and community members to identify local health problems and solutions. The project aimed to empower NHCs to make informed decisions regarding maternal and neonatal health care, to improve access to and availability of services and referral care, and to improve home care practices. The Community Action Cycle (CAC) approach was used to foster individual and collective action to address key health program goals and related outcomes.

C.4.1. Project inputs

The project developed a community mobilization plan and NHC training materials – in the areas of CHW/TBA teaming, and community mobilization. Training materials were also developed for SMAG members on MNCH health communication. All 118 NHCs were trained and 87/118 SMAGs (73%). As mentioned in section C.3., 92 NHC members were also trained in teaming – to support CHW/TBA teams. Five project-supported community mobilizers were trained and deployed by the project, based throughout the district, and overseen by a Project CM Supervisor. Mobilizers were provided with salaries, motorbikes, fuel for site visits and were responsible for ongoing oversight and support of NHCs as they worked through the community mobilization process and developed action plans. Incentives for NHCs included training, regular supervisory visits and links with other partners to provide support for local projects. A goat distribution scheme was introduced for CHWs/TBAs and NHCs, with the idea that the offspring of these goats would be progressively distributed to HWs and NHC members as a form of incentive. NHCs were provided with stationery, pens and a file box for record keeping of group decisions and plans. NHCs meet monthly and send representatives to Health Center Management Committee meetings each month, to strengthen linkages between the facility and community. NHC and SMAG training and planning have been done in collaboration with the DHMT NHC Point Person and EHO.

C.4.2. Status of community mobilization

Field interviews with NHC members found that they are interested in working on health issues, and like being associated with CHW/TBA teams. All NHCs have a written constitution and a list of members. All have developed an MNCH action plan, 75% of NHCs have raised resources to support their plans, and 77% have made emergency transport available. Women have been elected chairpersons of 23% NHCs, and participate in 89% of executive committees which provide support and oversight of NHC activities. Activities supported by NHCs are documented in Annex 19 and include refurbishment of HCs, purchasing of transportation for referral and outreach, community nutrition activities, health education, support for CHWs (including farming for CHWs to allow them to provide case-management services), and building of schools. SMAGs have been responsible for health education around maternal and newborn health, in particular ANC, delivery and PNC. In many communities they have played a supplementary role to TBAs, including home visits and accompanying women to facilities for delivery and for PNC. Both NHCs and SMAGs are well accepted by communities

Partnerships: NHCs have formed partnerships to support community action plans, including with SC Korea (infrastructure development), the *MDG4&5 Project* which has supported a number of NHC plans, and Rotary (bednet procurement and distribution). Six local chiefs have been engaged to support MNCH activities and promote community planning.

Table 3: Community Mobilization: Summary of Project Inputs and Outputs, LINCHPIN Project, Zambia, 2010-2014

Project Inputs	Activities	Outputs – systems (July 2011 – June 2014)	Outputs (July 2011 – June 2014)	Outcomes – District Population coverage (2010 – 2014)
Community mobilization Technical support 5 c-mobilizers Materials Vehicles and fuel for site visits CM- Motorbikes	<ul style="list-style-type: none"> • Development of community mobilization guidelines • Training of trainers, and NHCs/ SMAGS in CM • Training and deployment of 5 C-mobilizers • Review of action plans 	% of NHCs trained in CM and CAC: 100% (118/118) % of NHCs with action plan completed: 100% (118/118) % of planned SMAGS established and implementing action plans: 73% (87/118)	% of NHCs that have raised funding for action plans: 73% % of HNCs that have made emergency transportation available: 77% % of NHCs with a women chairperson: 23%	See district population-based coverage indicators CHW/TBA teams: Teamwork and taskwork scores both significantly associated with improved coverage of MNCH interventions – early treatment of malaria with ACT, pneumonia care seeking, and care seeking for severe illness. Taskwork significantly associated with improved coverage of amoxicillin for pneumonia. Improvements in other indicators – not significant
Teaming of CHWs and TBAs Technical support Materials Training Vehicles and fuel for site visits	<ul style="list-style-type: none"> • Formative research • Development of training materials • Training of trainers, CHWs, TBAs and NHC members • OR follow-up visits 	% of CHW/TBA teams trained: 47/47 (100%) – 30% attrition – number remaining - 33	Most frequent jointly performed functions were postnatal “hand over” visits from TBA to CHW at about 6-8 weeks of age, behavior change communication, monthly NHC meetings, and outreach.	

D. CONCLUSIONS AND RECOMMENDATIONS

The principal conclusions of the evaluation are:

1. Community-based case management has been successfully implemented using district systems and has led to improved treatment practices for pneumonia, malaria and diarrhea.

Improvements in population-based coverage of key treatment interventions are associated with improved CHW practices. Data suggest that CHWs are able to: assess, classify, treat and refer sick children appropriately; complete community registers; and make monthly visits to HFs for re-stocking. Successful implementation required CHW registers and referral slips, monthly facility supervision visits, and simple equipment and supplies including bicycles for home visits. Although stock-outs of essential medicines are noted, a proportion of sick children receive appropriate treatment.

2. Community-based maternal and newborn care has been successfully implemented using district systems and has led to improved availability of antenatal care, skilled delivery care, and PNC.

Improved population-based coverage of delivery and PNC interventions is associated with improved TBA practices. TBAs are able to identify mothers and newborns in villages, refer women for delivery care, make home visits as required in the PNC schedule, use registers, and refer sick mothers and newborns if necessary. Successful implementation required monthly facility supervision visits and oversight of data collection registers.

3. Operations research on CHW/TBA teaming has demonstrated that teams increase population coverage with key newborn and child health interventions.

OR data suggest that CHW/TBA teaming is associated with improvements in intervention coverage. The research quantified teamwork and taskwork skills that improve access to, quality of, and demand for care, by linking community workers with mothers and babies. Teams are well accepted by communities. The approach shows promise for wider use.

4. Community mobilization activities using NHCs and SMAGs have supported improved access to, availability of, and demand for key newborn and child health interventions.

NHCs and SMAGs developed and implemented community action plans using participatory methods. NHCs have improved availability of transportation, functional HFIs, health education and supported CHWs and TBAs. Community mobilization is required to support community-based HWs and to improve demand for care. Pectoral counseling cards are needed to strengthen health education and counseling efforts at the community level.

5. CHW attrition is an important problem that will limit program effectiveness in the long term.

The high attrition rate of CHWs limits population reach of the program; associated variability in CHW distribution also limits population reach.

6. Strengthening availability of essential medicines needs continued attention.

Improvements are noted since the mid-term evaluation in the availability of essential medicines, and a high proportion of sick children receiving appropriate treatment. However, stock-outs remain common, particularly for ORS and zinc. Continued attention at national, district and HC levels is needed to ensure that CHWs have adequate supplies of medicines.

7. More attention to quality of care provided by both community-based and facility-based HWs is needed.

Routine supervision of CHW and TBA practices does not occur. No data are available on the quality of delivery and sick newborn and child care provided at first level and referral HFIs – and clinical care is not routinely monitored. The effectiveness of the iCCM approach depends on the recognition of cases needing referral, effective referral and high quality care. The community MNCH package is based on referral of all women for delivery at facilities and referral of mothers and babies with danger signs.

8. Capacity of the district to finance and manage project activities remains limited.

Sustainability will be limited by lack of district capacity (human and financial) to cover recurrent activities previously supported by the project such as monthly supervision, CHW training, data collection and management and community support (mobilizers).

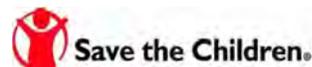
The principal recommendations of the final evaluation are:

1. Continue implementation of the iCCM and community MNCH care programs including CHW/TBA teaming and community mobilization activities using NHCs and SMAGs
 - Continue with all routine activities with available district human and financial resources (Responsible: DHMT).
2. Write-up and disseminate findings
 - Complete analysis of OR findings and publish results (Responsible: DHMT, SC local, national and international, Boston University).
 - Document project findings, approaches, methods and materials and OR results - ensure that findings are shared with MOH and other stakeholders including provinces and districts (Responsible: DHMT, SC LINCHPIN Program Manager and staff).
 - Link with national technical working group process to ensure that lessons learned, methods and materials inform national iCCM roll-out (Responsible: SC National Program Health and Nutrition Coordinator and LINCHPIN Manager, National Program Managers).
 - Consider “living university” approach for on-the-job training of other district staff in approaches used successfully (Responsible: DHMT, SC local office, SC national office, international staff; consider grant proposal to fund on-going activities incorporating living university methods).
3. Develop strategies to sustain community-based programs by addressing CHW attrition, quality of care and collection and use of data (Responsible: DHMT, SC local and national offices, MOH national IMCI TWG, other district partners and collaborators).
 - Develop an approach for managing CHW attrition and deployment – including monitoring numbers and ensuring resources for training of CHWs.
 - Develop strategies to regularly review clinical practice skills of CHWs and TBAs, provide feedback and solve problems. Consider clinical supervision at the time of monthly facility visits. Assess current quality of sick newborn and child care, routine delivery care – and develop approaches for regular quality improvement.
 - Review and current approach to routine community data collection using registers and revise approach if necessary. Establish how the district will collect, enter, analyze and summarize data; consider simplifying registers.
 - Ongoing review and development of medicine supply system.
4. Strengthen the capacity of the district to finance and manage project activities.
 - Cost project inputs and establish full annual implementation costs. (Responsible: SC local and national offices).
 - Establish mechanism for routine coordination with district and national stakeholders – to identify funding sources and share implementation costs. (Responsible: DHMT, SC local office).
 - Consider project extension to focus on handing over responsibilities to district staff (Responsible: DHMT, SC local and national office, SC International).

Annexes

- Annex 1: Program Learning Briefs: Evidence Building
 - A) Organizational Strengthening of Neighborhood Health Committees to Improve Maternal, Newborn and Child Health, Lufwanyama District, Zambia
 - B) Community-owned Analysis and Planning to Improve Use of MNCH Services in Rural Zambia
- Annex 2: List of Publications and Presentations Related to the Project
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- Annex 6: Final Knowledge, Practice and Coverage Report
- Annex 7: Community Health Worker Training Matrix
- Annex 8: Evaluation Scope of Work
- Annex 9: Evaluation Methods and Limitations
- Annex 10: Data Collection Instruments
- Annex 11: Sources of Information
- Annex 12: Disclosure of Any Conflicts of Interest
- Annex 13: Statement of Differences
- Annex 14: Evaluation Team Members, Roles and Their Titles
- Annex 15: Final Operations Research Report
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- Annex 17: Stakeholder Debrief PowerPoint Presentation
- Annex 18: Project Data Form
- Annex 19: Optional Annexes
 - A. Project Indicator Table
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 - D. Published Papers from Project
 - 1. Teaming Feasibility
 - 2. Prevention and Management of Neonatal Hypothermia
 - 3. Beyond Distance: An Approach to Measure Effective Access
 - 4. Measuring Teamwork and Taskwork
 - E. Community Collective Action for Improved Maternal, Newborn and Child Health in Lufwanyama District LINCHPIN Project

Annex 1A: Program Learning Brief (Evidence Building)



Organizational Strengthening of Neighborhood Health Committees to Improve Maternal, Newborn and Child Health, Lufwanyama District, Zambia

Neighborhood Health Committees in Lufwanyama District, Zambia have re-organized and strengthened their organizational capacity to explore, plan and act collectively to improve maternal, newborn and child health.

This project was funded by the U.S. Agency for International Development through the Child Survival and Health Grants Program.

August, 2014

Project Background

The Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN) is a five-year Innovation Project (CS-25 cycle) running between 1 October 2009-30 September 2014. Its strategic objective is to *increase use of key newborn and child health services and practices*. All project activities are implemented in Lufwanyama District in the Copperbelt Province of northern Zambia. Activities are implemented in close collaboration with the District Health Office and several local partners. One of the project's four main components is **creating an enabled environment for maternal, newborn and child health**. Neighborhood Health Committees (NHCs) are a government-recognized community structure that includes a number of community members. The role of the NHC is to support community-based agents, promote behavior change, and improve community access to health facilities¹. At the beginning of the project most NHCs had limited organizational capacity, no written action plans, and little human or financial resources to support MNCH activities.

Design

NHCs were trained in community mobilization for maternal, newborn and child health using the Community Action Cycle (CAC) approach². The CAC uses participatory methods to build community capacity in order to make informed decisions about MNCH, develop action plans to address gaps, improve referral practices, and to provide support to CHWs (community case-management for diarrhea, malaria and pneumonia) and trained TBAs (promotion of facility deliveries, PNC home visits). The CAC has seven phases: Preparing to Mobilize; Getting Organized; Exploring the MNCH issue and Setting Priorities, Planning Together, Acting Together, Evaluating Together and Preparing to Scale-Up. The project developed a *Training of Trainers* on the application of the CAC for Environmental Health Officers whose role it is to support NHCs. The approach was then cascaded in phases by training NHC members in their catchment areas. Community mobilizers were employed by the project to work with the DHMT, conduct training and mentor NHCs.

Methodology

To build NHC capacity the project focused on developing NHC structures and procedures. It supported activities that motivated NHCs to develop plans and act on them. Example activities included:

- Encouraging NHCs to expand their membership to include women of child-bearing age, grandmothers, TBAs, and those most interested in MNCH. A membership made up of at least 60% women was suggested in order to establish a greater voice for those most marginalized.
- Developing a clear and motivating MNCH 'goal' which could be expressed in Lamba, the local language; and using this goal to clarify roles and responsibilities. This resulted in more community members understanding what the community aimed to achieve and increased ownership.
- Encouraging NHCs to develop 'group norms'. These included where and how often they would meet; how they would elect and rotate leadership (normally every two years); how decisions would be made; and how members would treat each other. NHCs were encouraged to re-elect leadership so that those who were most interested in

¹ Kalesha P, Overview of Community IMCI in Zambia, Sub-regional Conference on Community-based Child Health Interventions, Lusaka, Zambia, 3 May 2007.

² Save the Children, *How to Mobilize Communities for Health and Social Change Field Guide*, Health Communication Partnership, 2002

MNCH were in charge.

- Building technical skills in areas where there were gaps, including: leadership, group management, planning, resource mobilization; management of resources (human; financial); proposal development; and advocacy. Community-to-community exchange of experiences and applied learning was also used.³
- Providing matching funds for selected NHCs 'Champion Communities' proposals⁴.

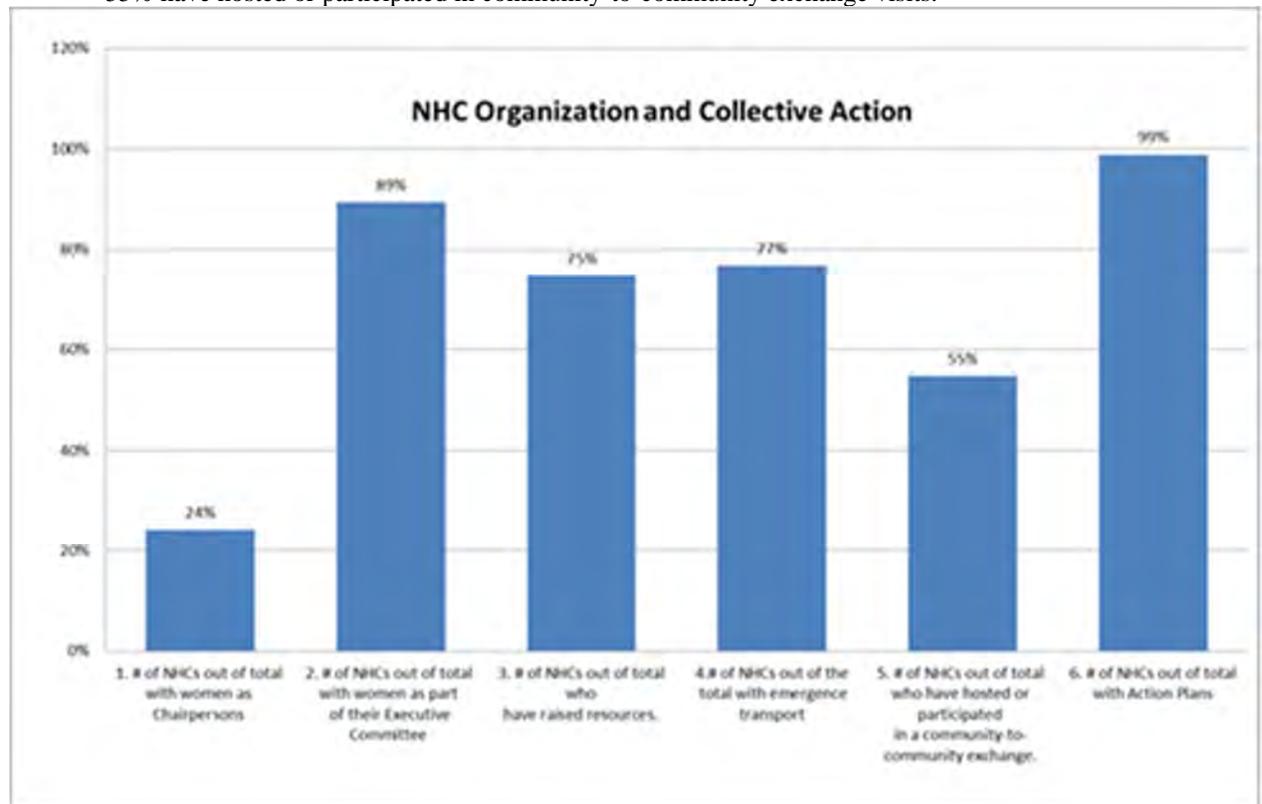
To assess current status of implementation community mobilizers visited NHCs in August 2014 to collect data on performance. In-depth interviews were conducted with NHC members.

Findings and Conclusions

All 118 NHCs in the district were trained, re-organized and mentored to conduct participatory planning. Key findings include:

Organization and planning: NHCs

- 24% now have women as their Chairperson; 89% of NHCs have women as part of the Executive Committee structure; and 58% of NHCs had women representing 60% of their membership.
- 100% have written roles and responsibilities in the form of a constitution; 80% of NHCs meet monthly with minutes in place, and have a representative on the *Health Centre Management Committee*.
- 100% have written Action Plans, of which 100% have implemented at least one of their planned activities.
- 77% have developed emergency transport plans for women in labor and sick children.
- 90% have Save Motherhood Groups in place (107 SMAGs total) with members trained in referring and accompanying pregnant women for ANC; skilled delivery and postnatal follow-up. 100% of SMAGs also have an action plan.
- 55% have hosted or participated in community-to-community exchange visits.



³ Resources: *Simplified Guide to Participatory Planning and Partnership*, Ministry of Health, Zambia, 2013; *Helping Communities Help Themselves Towards Better Health – Participatory Planning and Partnership*, A Facilitator's Guide for District Health Offices, November 2009.

⁴ SIDA, *Millennium Development Fund* matching grant, Zambia

Resource mobilization and implementation of plans: NHCs

- 75% of NHCs raised internal or external resources to support their action plans. Over \$33,442 USD was raised by NHCs to improve MNCH services – from family contributions, or in-kind labour and services⁵. Activities included refurbishing health centers, purchasing bicycles, community gardening and school development.
- A high proportion of NHCs provide support to CHW/TBA teams, including working in their gardens, provision of in-kind incentives, and problem solving.
- External linkages made with six traditional chiefs, and the *Chiefdom Development Fund*.

Conclusions and Lessons Learned

- The LINCHPIN program strengthened community capacity of 118 NHCs to organize, plan and act together to improve MNCH. NHCs now meet and plan on their own. A high proportion has financed activities in their own communities. Over the long term, investments in NHC mechanisms, membership and skills is believed to contribute to a greater likelihood of sustainability.
- Investment in NHCs using participatory methods is required at the start of the program, and requires continual attention and support to achieve success.
- NHC members need basic information about MNCH including barriers to access, key interventions, health rights and responsibilities. They are capable of providing counseling and health education in their own communities.



The Bulaya NHC works through a decision-making process to assess their local health plan.

A strong commitment to support community capacity-building activities is needed from the District MOH and partners. Local staff (EHOs) need skills to continue mentoring and support after the life of the program. Ongoing financial and human resources will be required from the DHMT to continue oversight and support in the long term.

Recommendations

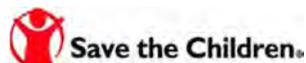
Methods and findings should be documented and disseminated with district, provincial and national MOH staff – and other stakeholders – to inform community-based programming more widely. The DHMT should continue to support NHCs in the district using trained EHOs, materials and methods tested and developed locally – and to build on existing NHC action plans. To ensure that human and financial resources are available for ongoing support, it is recommended that a mechanism for regular coordination and planning with all district stakeholders be developed, so that resources can be allocated and responsibilities for on-going support described.

The Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN), Lufwanyama District, Copperbelt Province, Zambia, is supported by the American people through the United States Agency for International Development (USAID) through its Child Survival and Health Grants Program. LINCHPIN is managed by Save the Children under Cooperative Agreement No. GHS A-00-09-00013-00. The views expressed in this material do not necessarily reflect the views of USAID or the United States Government.

For more information about Save the Children, please visit: www.savethechildren.org.

⁵ *NHC Resource Mobilization – LINCHPIN Project Final Evaluation, 2014*

Annex 1B: Program Learning Brief (Evidence Building)



Community-owned Analysis and Planning to Improve Use of MNCH Services in Rural Zambia

Community analysis of the factors that support and limit the use of MNCH services resulted in improved community-owned action plans and collective action in Lufwanyama District, Zambia.

This project was funded by the U.S. Agency for International Development through the Child Survival and Health Grants Program.

August, 2014

Background

The Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN) is a five-year Innovation Project (CS-25 cycle) running between 1 October 2009-30 September 2014. Its strategic objective is to *increase use of key newborn and child health services and practices*. All project activities are implemented in Lufwanyama District in the Copperbelt Province of northern Zambia. Activities are implemented in close collaboration with the District Health Office and several local partners. One of the project's four main components is **creating an enabled environment for maternal, newborn and child health**. Community mobilization (CM) was used to support other program approaches including integrated community case-management of pneumonia, malaria and diarrhea and teaming of CHWs and TBAs. The CM approach was designed to increase communities' capacity to collectively analyze, plan, implement, and evaluate actions to improve maternal and neonatal health and prevent MN morbidity and mortality in Lufwanyama District.

Project Design

Community mobilization is defined as: "*a capacity-building process through which community individuals, groups, or organizations plan, carry out, and evaluate activities on a participatory and sustained basis to improve their well-being, either on their own initiative*".

The *Community Action Cycle (CAC)*⁶ process was introduced at the beginning of 2011 through neighborhood Health Committees (NHCs). The CAC used seven phases: Preparing to Mobilize; Getting Organized; Exploring MNCH issues and Setting Priorities, Planning Together, Acting Together, Evaluating Together and Preparing to Scale-Up. District MOH Environmental Health Officers (EHOs), who support NHCs, were trained in CAC. EHOs then trained NHC members in their areas of responsibility. A total of 118 NHCs were identified, corresponding to the 118 Catchment Areas in Lufwanyama District. At project start-up, NHCs had little activity in the area of MNCH; weak membership (with only 10-30% of membership held by women); limited organization; no written action plans available, and few human or financial resources to support activities.

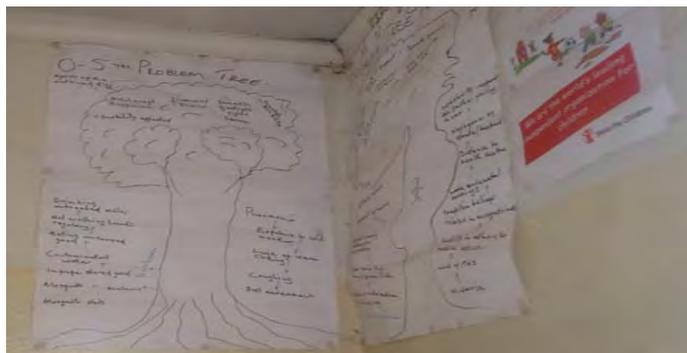
Methodology

Building capacity of communities to explore, set priorities and plan to improve maternal, newborn and child health requires participation and engagement of men and women of all ages. To help ensure community ownership the necessary groundwork must be done. Action planning without engaging those who are truly affected or interested in MNCH can result in plans not focused on the important underlying issues, including the social determinants affecting decision-making and health-seeking behaviors.

The *Getting Organized* and *Explore Phases* of the CAC were used to prepare NHCs for planning. In the *Getting Organized Phase* the focus was on strengthening the organizational structures of NHCs, including: greater women's participation including women in the child-bearing age, grandmothers, TBAs, and those most interested in MNCH; New governing norms and clear roles and responsibilities; and a vision established for improved MNCH in communities.

⁶ Save the Children, *How to Mobilize Communities for Health and Social Change Field Guide*, Health Communication Partnership, 2002

The *Explore Phase* trained NHCs to explore the barriers to improved MNCH practice and demand for services. Two tools were applied by NHCs to explore these issues, the *Problem Tree* (picture below), and the *Community Resource Map*. Maternal, newborn and child health issues were analyzed using the *Problem Tree* approach. The *Community Resource Map*, an asset-based tool, was used to identify human, financial and natural resources currently being used to address MNCH, resources available but not being used and those needed from external sources. A number of issues arose from the *Explore Phase* including: lack of decision-making power among young married women; the important role of mother-in-laws and grandmothers in determining MNCH family practice; frequent delays in illness recognition; the important role that TBAs played in accompanying women for skilled delivery; a



Problem Tree analysis by NHC for Shimukunami Rural Health Center, Lufwanyama District.

lack of family birth planning; and limited emergency transport systems. Maternal, newborn and child health issues were prioritized by NHCs using pile ranking. Three priority issues were selected for maternal, newborn and child health by each NHC, which were used to develop nine separate plan objectives.

During the *Planning Together Phase* NHCs were taught how to create a community action plan based on their own community MNCH priorities. Initial community action plans were developed for a six month time period. This was to allow communities to engage in health activities and see results early to motivate and encourage

further activities. This phase built planning skills and an understanding of effective strategies and activities. A simple planning matrix was introduced to guide discussions which asked for Priorities; Objectives; Strategies; Activities; Persons Responsible; Indicators for Success; and Resources/budgets required. To support planning, NHCs also involved health center staff, community leaders (formal and non-formal), women's groups, and Environmental Health Technicians. Unique strategies that communities could use to deliver evidence-based interventions were discussed – to create a link between bio-medical approaches and community innovation. On average communities required three half days spread over a week to complete the planning process. Once a draft action plan was prepared it was shared with the broader community to generate interest and support for proposed actions.

Additional community capacity building on how to find internal and external resources to support action plans and on monitoring of activities was also conducted with support from the *Millennium Development Fund* (SIDA, Swedish Development Agency). These projects also provided small matching funds to NHCs who completed action plans and developed approaches to improving health, in order to facilitate community action.

Findings

All 118 NHCs in the Lufwanyama District completed written action plans focused on maternal newborn and child health priorities and implemented at least one planned activity. A review of the initial 80 NHC action plans found that all plans addressed the health of newborns and children, but that only 20% or fewer addressed issue of maternal health, pregnancy and/or delivery. In response, the project's community mobilizers and District MOH partners mentored NHCs to review their maternal health *Problem Tree* analyses and priorities, and to integrate maternal health into plans. A full summary of NHC achievements is presented in the Learning Brief, "*Organizational Strengthening of NHCs to Improve MNCH in Lufwanyama District, Zambia*". Data from the final project evaluation show that community supports have contributed to improved MNCH intervention coverage.

Community Action Plans have been updated annually for the past three years based on successes and challenges. Example community activities have included:

- Malaria: promotion of ITNs; identification of illness and early health seeking behavior; promotion of quality antenatal care (IPT);
- Diarrhea: improved availability and use of chlorine; construction and rehabilitation of water wells and bore holes;
- Maternal health: danger sign recognition; development of emergency transport systems; rehabilitation of Primary Health Care Units; construction of mother's waiting homes (prior to delivery);

- Newborn care: danger sign recognition and early referral; support to TBA/HW teams; emergency transport for newborns;
- Support to CHW through incentives such as assistance with farming and maize contribution;
- Nutrition: sales of molded bricks and labor to purchase food supplements for malnourished children; purchasing of hammer mills to generate income to support food supplementation for malnourished children; healthy cooking demonstrations for improved infant and young child feeding; counseling and health education; use of elders, including TBAs to promote breastfeeding; and
- Male Engagement: encouragement of men/fathers to become more active in family health, including accompanying women to ANC and delivery and support for sick children.

The participatory process worked best when communities were allowed to develop their own plans with facilitation, but with limited pressure by health workers and others who are traditionally in positions of authority. Development of local approaches and engagement required that external facilitators understood how to allow community groups to come to their own conclusions without external interference.

Conclusions and Lessons Learned

The community action cycle approach built the capacity of communities, through NHCs, to support improved health of mothers and children in the rural Lufwanyama District. Key lessons learned from community analysis and action planning included:

1. Ensuring that all voices are heard during planning - by using a *participatory* planning process which includes those most affected by and interested in MNCH;
2. Focusing on the most important MNCH problems by including *at least* 60% women in NHCs;
3. Promoting community solutions to local problems by using trained facilitators to support the process of community participation and not hijacked by health professionals or others who traditionally are seen as being in positions of authority;
4. Informing NHCs and community members of evidence-based interventions for MNCH to ensure that they understand what home and community practices are needed;
5. Reinforcing successes and modifying strategies that do not work by monitoring of action plans against realistic benchmarks and updating plans annually; and
6. Building sustainability by improving community capacity to find resources to support action plans – human, financial, and material resources were analyzed and procured from a range of sources, including volunteers from existing women’s, faith-based groups and agricultural groups.

Recommendations and Use of Findings

Community action planning for MNCH builds ownership and active participation in health. It is recommended that the approach continue in Lufwanyama using trained NCHs to develop, implement and monitor their own action plans. MOH district facilitators will be essential to supporting this process, and to ensuring that human, financial and material resources are leveraged to support community plans. Resources for continued facilitation will be required from the district when project support ends.

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For more information about Save the Children, please visit: www.savethechildren.org

Annex 2: List of Publications and Presentations Related to the Project

Direct -papers

1. Guenther T, Sadruddin S, Chimuna, T, Sichamba B, Yeboah-Antwi K, Swedberg E, Marsh DR, Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa– Am J Trop Med Hyg 2012;87 77-84 Open Access
http://www.ajtmh.org/cgi/content/abstract/87/5_Suppl/77?etoc
2. Yeboah-Antwi K, Snetro-Plewman G, Waltensperger KZ, Hamer DH, Kambikambi C, MacLeod W, Filumba S, Sichamba B, Marsh D: Measuring teamwork and taskwork of community-based “teams” delivering life-saving health interventions in rural Zambia: a qualitative study. BMC Med Res Methodol 2013, 13: 84. doi: 10.1186/1471-2288-13-84.
3. Yeboah-Antwi K, Hamer DH, Semrau K, Waltensperger KZ, Snetro-Plewman G, Kambikambi C, Sakala C, Filumba S, Sichamba B, Marsh DR. Can a community health worker and a trained traditional birth attendant work as a team to deliver child health interventions in rural Zambia? BMC Health Services Research 2014, 14:516.
<http://www.biomedcentral.com/1472-6963/14/516>.
4. Yeboah-Antwi K, Waltensperger KZ, Hamer DH, Semrau K, Snetro-Plewman G, Sakala A, Filumba S, Sichamba B, Marsh DR. Integrating community-based newborn and child health services in rural Zambia: effectiveness of teams of community health workers and trained traditional birth attendants, in preparation.
5. Lunze K, Yeboah-Antwi K, NN, Marsh DR, Kafwande SN, Musso A, Semrau K, Waltensperger KZ, Hamer DH, Prevention and Management of Neonatal Hypothermia in Rural Zambia, PLOS ONE 9(4):e92006.

Indirect – publications and guidelines

1. Marsh DR, Waltensperger KZ, Waiswa P, Guenther T, How do Ethiopia’s Health Extension Workers Spend their Time? (editorial) Eth. Med. J. 2014 (under review). – *informed by rapid assessment methods developed in Zambia and reported as Learning Brief during LINCHPIN mid-term evaluation, 2012.*
2. Marsh DR, Adamo M, Koepsell J, Martínez L, Ortiz JP, Navarrete CJJ, Rivera D, How Much Time Do Nicaragua’s Brigadistas Allocate to Deliver the National Community Program for Health and Nutrition (PROCOSAN), Including Community Case Management? (in preparation for the Journal of the Pan-American Health Organization). – *informed by rapid assessment methods developed in Zambia and reported as Learning Brief during LINCHPIN mid-term evaluation, 2012*
3. World Health Organization, UNICEF, Save the Children, Planning Handbook for Countries to Introduce and Scale Up Caring for Newborns and Children in the Community, expected 2014. – *pilot-tested in Zambia in 2012.*

Annex 3: Project Management Evaluation

This section reports on six management domains: (1) organizational structure; (2) planning; (3) human resources and staff management; (4) logistics; (5) financial management; and (6) technical support. The final evaluation team aggregated the following details and conclusions from a series of semi-formal interviews conducted with seven LINCHPIN team members and SC Zambia senior managers during the course of the final evaluation, along with additional information obtained from informal exchanges with others. The evaluation team explored the evolution of these areas, noting challenges, responses to the challenges, and current efficiencies and/or deficiencies.

Organizational structure When the CSHGP cooperative agreement was first awarded to Save the Children (US), the Zambia country office was managed by two Save the Children members, Sweden and Norway, co-located in Lusaka. As Zambia was not a Save the Children (US) country office, Save the Children (US) sub-granted to Save the Children Sweden to implement LINCHPIN on the ground.

During the life of LINCHPIN, Save the Children underwent a corporate reconfiguration and global “transition” that, naturally, challenged the organization along with its staff and programs. The 30 global Save the Children member organizations, including Save the Children US, incorporated a new entity, Save the Children International (SCI). Over a three-year period, “ownership” of 120 Save the Children country offices was transferred to the new entity. With its “Centre” in London, SCI now heads the Save the Children Zambia country programs. Field budgets were “transitioned” to SCI along with the introduction of a new financial tracking system for all members and country offices. The transition is considered a resounding success, but the organization is still settling and adjusting to new corporate relationships, human resources and financial practices, and changes in global and country-level leadership and organizational structure. Save the Children now considers itself a “global movement.”

At the country office level, LINCHPIN’s success has helped to attract a variety of other donors to Lufwanyama and usher in a number of complementary programs, including important match and cost-share activities for maternal newborn, and child health. This has included funding from Sweden (Postcode Lottery, SIDA), Athene Good Gaming, Save the Children Korea and Lithuania, and two additional grant awards from the Crown Family Philanthropies for iCCM. In addition, Save the Children has initiated a long-term sponsorship program in the district, with 1,000 of 8,000 planned sponsored children registered. Sponsorship will support early childhood care and development (ECCD), basic education, and nutrition.

The LINCHPIN Deputy Program Manager segued into the *de facto* role of Lufwanyama Field Office Manager, a title he will assume formally when LINCHPIN ends. While the new funds and programs have enhanced LINCHPIN and SC’s relationship with the district, the new portfolio of responsibilities has somewhat diluted managerial support for LINCHPIN as a discrete project.

Planning Since inception, during the DIP process, and throughout LINCHPIN implementation, Save the Children has nurtured a positive and productive collaborative relationship with the Lufwanyama DHMT and district counterparts. Happily, there has been stability and continuity in

the senior management at the District Health Office. The Clinical Care Officer, who often acts for the District Health Officer, participated in the DIP Workshop and has continued to make substantial contributions to both the LINCHPIN M&E plan and work plan. Save the Children has engaged actively in the district's planning cycle, and joint activities figure prominently in the district's annual action plan. This collaboration has satisfied the needs of Lufwanyama as one of the first 11 districts to roll out iCCM in Zambia. Save the Children has also supported the National Child Health Weeks in Lufwanyama with vehicle, driver, and mobilization. LINCHPIN supported the district with national roll out of new vaccines, during the past two years.

Human resources and staff management From LINCHPIN's outset, both the original Project Manager and Deputy Project Manager have been replaced. The project's technical advisors, LINCHPIN, staff, and SCS senior management all agree these changes have been positive. Further, in anticipation of the end-of-project, some LINCHPIN team members have recently been moved to other programs, preserving their jobs while also diluting support to LINCHPIN itself during its final months. This may account for some observed "dropping off" of activities and follow-up during the last quarter of the project.

LINCHPIN team members whom we interviewed reported satisfaction, even "excitement," with their job roles and work they have done over the past five years. Most reported feeling valued by management and free to contribute opinions and suggestions. All said they felt "supported" by field office and country office management.

SC encourages its employees to pursue higher education and sometimes grants salary advances to assist with educational expenses. LINCHPIN team members have studied for degrees or diplomas, either online or at local schools or colleges; a couple are working on MPH degrees. LINCHPIN's M&E Officer recently completed a Post Graduate Diploma in Community Health granted by the African Medical Research Foundation in Nairobi, Kenya, from which he graduated with distinction and was recognized as "third best student in 2012." In addition, a number of LINCHPIN team members reported having completed multiple USAID Global Health e-Learning certificates in iCCM topics, newborn care, and cross-cutting interventions.

LINCHPIN's Deputy Project Manager (recruited mid-project) oversees day-to-day operations in Kalulushi and has succeeded in reinforcing teamwork, maintaining excellent relationships with the DHMT and other partners, and representing Save the Children at both the district and provincial levels. LINCHPIN team members reported high morale and good cohesion in the Kalulushi office, agreeing that external and internal collaboration and coordination are both good. Team members especially appreciated the introduction of mechanisms (such as "employee of the quarter") to recognize staff contributions and excellent performance.

Earlier this year, the Deputy Program Manager nominated DHMT counterpart, Clinical Care Officer Nerbat Mwanza for a REAL Award, who was selected as a 2014 Global Honoree for 2014 (<http://www.therealawards.com/nominees/885>). A formal recognition ceremony to honor Mr. Mwanza took place in Lufwanyama in September 2014. (The REAL awards to honor frontline health workers are sponsored by the Bill & Melinda Gates Foundation, Merck Foundation, Masimo, and others.)

In order to represent Save the Children and LINCHPIN, and provide technical leadership in newborn and child health at the national level, the LINCHPIN Project Manager was based in Lusaka. This has resulted in sometimes weak and inconsistent project oversight, especially as the country office's health and nutrition portfolio expanded over the past few years. The location of the Project Manager in the capital has not resulted in the dissemination of LINCHPIN best practices, lessons learnt, and innovations at the national level to the extent expected. The Project Manager sits on the IMCI Technical Working Group (TWG). The incumbent (two individuals over the life-of-project) has also been a key actor in two MCHIP-sponsored national technical support activities (iCCM implementation strength assessment in 2013 and iCCM scale-up planning in 2014), but this "seat at the table" does not appear to have been used assertively to communicate or transfer best practices from LINCHPIN's model or "teaming" innovation. On the other hand, as an MCHIP partner, SC's technical leadership has been recognized positively in the area of newborn health, where it has played a leading role in the development of the national newborn health strategy and introduction of Helping Babies Breath (HBB) and KMC (Kangaroo Mother Care) into the national agenda.

Logistics One of LINCHPIN's major logistical challenges was drug supply. This is discussed in detail in the body of the final report narrative. Supplies have improved over the life of the project and strong improvements in case-management practices support this. A second logistical challenge has been transport, a shortage of vehicles exacerbated by poor road conditions, seasonal impassability, and considerable distances to health centers and communities. The Mushingashi Health Center, for example, is a 4-5 hour drive from the field office in Kalulushi. LINCHPIN started out with two vehicles, and the fleet of vehicles assigned to the office was increased to four with the coming of complementary programs in ECCD, basic education, and nutrition. Save the Children Korea donated a new ambulance to the district, along with three motorized "tricycles."

Financial management In mid-August, it became evident that the project would be underspent by ~\$136,000 due to reduction of Save the Children's ICR and, possibly, changes in the financial tracking system associated with the "transition" as mentioned above. At the same time, a new funding opportunity emerged that, if successful, might continue to fund LINCHPIN and expand the model to a second district over the next three years. SC submitted an application to USAID CSHGP for a 6-month no-cost extension (unsuccessful) and a formal proposal to Crown Family Philanthropies for the new funding (successful, three years commencing in January 2015). This provides an opportunity for SC to implement the Lufwanyama Living University proposed in the original CSHGP application and support the neighbouring district of Masaiti.

Technical support The cross-cutting technical domain of Community Mobilization (CM) was a gap in the LINCHPIN DIP document. It was neither well elaborated nor planned. Post-DIP engagement of Gail Snetro, SC's Senior Africa Capacity-Building Advisor, filled the CM gap by providing technical leadership and assistance to strengthen CM. Ms. Snetro, who previously worked on the USAID-funded Health Communications Project (HCP) in Zambia, facilitated training for LINCHPIN community mobilizers in the Community Action Cycle (CAC) and worked with the team to develop a coherent CM work plan and process indicators. Ms. Snetro also developed the "teaming" training package for CHW-TBA teams, ensuring that the LINCHPIN "innovation" was fully implemented. To add to LINCHPIN's CM capacity, its new

Deputy Project Manager came to SC just a little over a year ago, also with HCP experience. The 118 NHCs trained in the CAC are now able to develop their own action plans based on “problem trees” and make meaningful inputs into the action plans of the health facilities and the district.

Interviews with LINCHPIN team members reported that technical support has been strong and practical. Technical advisors (Karen Z. Waltensperger, David Marsh, Gail Snetro) have made scheduled periodic field visits, consistent with the work plan, to assist with program implementation, M&E, CM, and teaming training. Their visits have not always aligned with the OR timeline, but this does not appear to have been a major issue. Kojo Yeboah-Antwi, Principal Investigator for LINCHPIN OR from the Boston University Center for Global Health and Development, made independent visits to Lufwanyama. For the most part, technical assistance has been well-timed and described by team members as “practical,” “helpful,” “motivating,” and even “inspirational.” Technical Backstop, Karen Z. Waltensperger has supported LINCHPIN from South Africa at 20% level of effort (LOE); David Marsh supported the M&E and OR components of LINCHPIN and was principal liaison with Boston University at approximately 10% LOE. He also stepped out of his retirement to participate on the final evaluation team. Gail Snetro supported the CM and teaming activities, also from South Africa, at approximately 10% LOE.

Management recommendation While overall technical leadership of the country office’s health sector becomes more critical as programs grow, it is important that large projects have dedicated and consistent technical and managerial oversight. At the central level, the Zambia country office will need both an overall H&N Program Manager, as well as an H&N Technical Advisor. This, of course, will depend on the development of long-term and sustained resources.

Annex 4: Work Plan Table: LINCHPIN (CSHGP) 2009- 2014

Objectives/Activities	Objective(s) Met	Activity Status
Start up	Yes	
Staff recruited	Yes	Complete
Briefings for the national, provincial, district level stakeholders	Yes	Complete-happened during the DIP process
Detailed implementation planning with stakeholders	Yes	Complete
Partnership agreement signed with DHMT and MOH	Yes	Complete
DIP review in Washington	Yes	Complete
Project Monitoring and Evaluation	Yes	
Activity 1: Baseline assessment developed	Yes	Complete
Activity 2: Formative research	Yes	Complete
Activity 3: Baseline population based survey	Yes	Complete
Activity 4: Health facility assessment	Yes	Complete
Activity 5: Policy and strategy review	Yes	Complete
Activity 6: Baseline assessment results disseminated	Yes	Complete-results disseminated during the DIP
Activity 7: Process documentation	Yes	Complete
Activity 8: Midterm evaluation	Yes	Complete
Activity 9: End line population based survey	Yes	Complete
Activity 10: Final evaluation	Yes	Complete
Activity 11: Routine data collection	Yes	Complete-data collected up to June 2014
Implement Operational Research	Yes	
Activity 1: Questions finalized	Yes	Complete
Activity 2: Protocol developed	Yes	Complete
Activity 3: Data collection tool developed	Yes	Complete
Activity 4: Data collection study#1 (teaming)	Yes	Complete
Activity 5: Data cleaning and analysis	Yes	Complete
Activity 6: Documentation and dissemination	Yes	Complete
Activity 7: Data collection study #2 (training: funding did not permit)	No	Not conducted
Activity 8: Data collection study #3 (supervision: funding did not permit)	No	Not conducted
Increased access and availability of services	Yes	
Activity 1: Review adapt, develop training materials	Yes	Complete -The newborn training materials were adapted from various resources including the WHO newborn guidelines. The CCM trainings were adapted from the MOH/WHO/UNICEF training guidelines.

Objectives/Activities	Objective(s) Met	Activity Status
Activity 2: Train 8 master trainers in CCM	Yes	Complete -Planned to train 8 master trainers: 7 were trained as one participant did not participate
Activity 3: Train 85 CHW in CCM and ENC	Yes	Complete -(Trained 88/88). 85 are certified CHWs while 3 are not.
Activity 4: Refresh 120 TBAs in ENC	Yes	Complete -Refreshed 111 TBA, 9 had dropped out at the time of the training
Activity 5: Support national mark days	Yes	Complete -The project supported all the child health week activities for immunization and growth monitoring for children under 5. Other national days include supporting the commemoration of national malaria days. Leveraged resources and supplied DHMT with Vitamin A, Mebendazole tablets during the child health weeks. Fuel to DHMT for social mobilization
Activity 6: Train 150 TBA/CHW/NHC in teaming	Yes	Complete -The project trained 8 trainers of trainers in teaming who in turn trained 184 TBA/CHW/NHC in teaming.
Improved quality of services	Yes	
Activity 1: Refresh 20 nurses in TBA supervision	Yes	Complete -At the time of training, the DHMT included 15 health workers, all of whom were trained in TBA supervision for providing maternal and newborn care.
Activity 2: Train 22 nurses/EHT in CCM supervision	Yes	Complete -17 CO/EHT from the health centres and 4 from the DHO trained in supervision of CHWs in CCM. At the time of training, this was the number available for training.
Activity 3: Medication and supplies monitored	Yes	Complete -Developed drug availability and stock-out form to monitor drug supplies. Advocated for the supply of drugs for CCM to the district, although CCM drug availability was a challenge.
Activity 4: Supportive supervision facilitated/documentated	Yes	Complete -CHW and TBAs received routine supervision conducted at least once a month. Mentoring check list developed were rarely used by health workers during observed mentorship.

Objectives/Activities	Objective(s) Met	Activity Status
Increase demand to quality services	Yes	
Activity 1: Community mobilization officer and 3 community mobilizers trained as trainers in CM/BCC	Yes	Complete -1 community mobilization officer and 4 mobilizers trained in community mobilization (Community Action Cycle) and messaging. BCC messages on maternal, newborn and child health developed and distributed.
Activity 2: 135 NHCs trained in CM/BCC	Yes	Complete - All of the 118 identified NHCs were trained in community mobilization.
Activity 3: Lufwanyama District center of excellence-TO BE DETERMINED	No	Not done.
Activity 4: Participation in national technical working groups, strategy meetings	Yes	Complete –Save the Children sits on the child health technical working group and the interagency task force for health. Lufwanyama was recognized as one of the CCM districts.
Activity 5: District/provincial planning cycles engaged	Yes	Complete -The LINCHPIN Project is has been part of the Lufwanyama District planning cycle. DHMT budget now includes line item(s) for CCM. The provincial plans are yet to include CCM in the plans and budgets
Activity 6: Monthly skills building meetings with community mobilizers	Yes	Complete.
LINCPIN national dissemination meeting	No	To be held at end line – Preliminary findings and experience could be included in national IMCI technical review meetings and provincial reviews.

Annex 5: Rapid CATCH Table: LINCHPIN Integrated Neonatal and Child Health Project in Zambia

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
Maternal Newborn Care	(1) <u>Antenatal Care</u> : Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child.	255	463	55.1%	50.4 – 59.7	421	541	77.8	73.5-82.1 5%
	(2) <u>Maternal TT Vaccination</u> : Percentage of mothers with children age 0-23 months who received at least two tetanus toxoid vaccinations before the birth of their youngest child.	439	465	94.4%	91.8 - 96.2	416	544	76.5	72.3-80.7 5%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	(3) <u>Skilled Birth Attendant</u> : Percentage of children age 0-23 months whose births were attended by skilled personnel.	168	465	36.1%	31.8 – 40.4	522	543	96.1	94.1-97.5 2.3%
	* <u>(4) Post-natal visit to check on newborn within the first 2 days after birth</u> : Percentage of children age 0-23 who received a post-natal visit from an appropriate trained health worker within two days after the birth of the youngest child.	127	465	27.3	17.7-38.6	442	543	81.4	77.5-87.3 4.6%
	(5) <u>Current Contraceptive Use Among Mothers of Young Children</u> : Percentage of	217	465	46.7%	42.1 – 51.3	314	544	57.7	56.4-59.0 5.9%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	mothers of children age 0-23 months who are using a modern contraceptive method.								
Breastfeeding	(6) <u>Exclusive breastfeeding</u> : Percentage of children age 0-5 months who were exclusively breastfed during the last 24 hours.	110	134	82.1%	74.5 – 88.2	147	150	98	94.7-100 3.2%
Nutrition	(7) <u>Infant and Young Child Feeding</u> : Percent of infants and young children age 6-23 months fed according to a minimum of appropriate feeding practices.	171	329	52.0%	46.4 – 57.5	207	312	66.3	64.4-68.5 7.4%
Vitamin A	(8) <u>Vitamin A Supplementation in the last 6 months</u> : Percentage of	293	329	89.1%	85.2 – 92.2	305	312	97.8	96.6-99.0 2.3%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall								
Immunization	(9) <u>Measles vaccination</u> : Percentage of children age 12-23 months who received a measles vaccination.	163	191	85.3%	79.5 – 90.0	134	156	85.9	81.8-90.1 7.7%
	(10) <u>Access to immunization services</u> : Percentage of children aged 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey.	176	191	92.2%	87.4 – 95.5	151	156	96.8	92.6-100 3.9%
	(11) <u>Health System Performance</u>	164	191	85.9%	80.1 – 90.5	143	156	91.7	87.8-95.6 6.1%

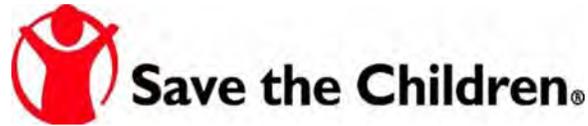
CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	<u>regarding Immunization services:</u> Percentage of children aged 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey.								
Malaria	(12) <u>Treatment of Fever in Malarious Zones</u> Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began.	20	178	11.2%	7.0 – 16.8	18	33	54.6	53.3-55.6 24%
Control of Diarrheal Diseases	(13) <u>ORT use:</u> Percentage of children age 0-23 months with	93	126	73.8%	65.2 – 81.2	87	126	69.1	66.1-72.1 11.4%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids.								
Pneumonia Case Management	(14) <u>Appropriate Care Seeking for Pneumonia</u> : Percentage of children age 0-23 months with chest-related cough and fast and/ or difficult breathing in the last two weeks who were taken to an appropriate health provider.	48	72	66.7%	54.6 – 77.3	76	78	97.4	95.3-99.5 5%
Control of Diarrheal Diseases	(15) <u>Point of Use (POU)</u> : Percentage of households of children age 0-23 months that treat water effectively.	196	465	42.2%	37.6 – 46.8	375	545	68.8	64.7-72.6 5.5%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	(16) <u>Appropriate Hand washing Practices:</u> Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing.	279	465	60.0%	55.4 – 64.5	352	545	64.4	60.4-68.6 5.7%
Malaria	(17) <u>Child sleeps under an insecticide-treated bednet:</u> Percentage of children age 0-23 months who slept under an insecticide-treated bed net (in malaria risk areas, where bed net use is effective) the previous night.	237	465	51.0%	46.3 – 55.6	440	545	80.7	77.1-83.9 4.7%
Nutrition	(18) <u>Underweight:</u> Percentage of children 0-23 months who are underweight (-2	93	408	22.8%	18.9 – 27.2	95	435	21.8	19.3-24.3 5.5%

CSHGP Intervention Area	Rapid CATCH Indicator	2010 Report				2014 Report			
		n	N	%	95% CI	n	N	%	95% CI
	SD for the median weight for age, according to WHO/NCHS reference population).								

Annex 6: Final Knowledge, Practices, and Coverage Report



Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN)

CAREGIVER KNOWLEDGE AND REPORTED PRACTICE REGARDING LIFE-SAVING CHILD SURVIVAL INTERVENTIONS

Results of Endline Population-Based Knowledge, Practice and Coverage Household Survey

Cooperative Agreement: GHS-A-00-09-00013-00

Project Dates: 1 October 2009 – 30 September 2014

Category: Innovation

Location: Lufwanyama District, Copperbelt Province, Zambia

Submitted by:

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July/August 2014

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Acronyms

ACT	Artemisinin Combination Therapy
ANC	Antenatal Care
ARI	Acute Respiratory Tract Infection
CATCH	Core Assessment Tool for Child Health
CHW	Community Health Worker
CS	Child Survival
CS-25	Child Survival-25
CSHGP	Child Survival and Health Grant Program (USAID)
D	Denominator
DPT	Diphtheria, Pertussis, Tetanus
EPI	Expanded Program on Immunization
HF	Health Facility
ITN	Insecticide-treated bed-nets
KPC	Knowledge, Practice and Coverage
N	Numerator
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PNC	Prenatal Care
POU	Point of Use
SBA	Skilled Birth Attendant
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
TBA	Traditional Birth Attendant
TDRC	Tropical Disease Research Centre
TT	Tetanus Toxoid
WHO/NCHS	World Health Organization/National Center for Health Statistics

Summary

Save the Children, in partnership with the Lufwanyama District Management Team and the Tropical Disease Research Centre (TDRC) in Ndola, conducted a baseline 30-cluster household survey in May 2010 and a follow-up at endline survey in August 2014. Proportional sampling methods were used to select caregivers of children aged 0-23 months from all nineteen catchment areas in the district (N=465 at baseline and N=544 at endline). The study instrument was adapted from the Rapid CATCH 2008 questionnaire, with the same questionnaires being used at baseline and endline. Coverage indicators used were consistent with standard international indicators. Standard methods were used to estimate 95% confidence intervals around estimated proportions.

The objectives of the endline survey were to:

- Assess the knowledge, practice and, coverage of high-impact maternal, newborn, and child health services and practices in Lufwanyama District;
- Measure changes in the indicator values from baseline and to determine whether project objectives were met; and
- Provide data for the Rapid CATCH indicators reporting requirement.

Principal Findings

Socio-demographic characteristics of the sample at baseline and endline were similar.

Treatment interventions for sick children. Significant improvements are noted in the proportion of children receiving treatment interventions between 2010 and 2014 including; children with suspected pneumonia receiving amoxicillin (rising from 50% in 2010 to 78% in 2014), children receiving amoxicillin within 24 hours of symptom onset (rising from 13% in 2010 to 32% in 2014), children with suspected pneumonia who were taken to an appropriate provider (rising from 67% in 2010 to 97% in 2014), children with diarrhea receiving zinc (rising from 0% in 2010 to 40% in 2014), and the proportion of children with fever who received ACT within 24 hours (rising from 11% in 2010 to 55% in 2014). ORT coverage declined slightly.

Maternal and newborn interventions. Significant improvements are noted in the proportion of mothers making at least four ANC visits in pregnancy (rising from 55% in 2010 to 78% in 2014), delivering with a skilled birth attendant (SBA) (rising from 36% in 2010 to 96% in 2014), and in the proportion of babies who were dried and wrapped at birth (rising from 80% and 88% in 2010 to 96% and 99% respectively for drying and wrapping). Newborns and mothers receiving a post-natal check within the first two days after birth increased from 27% to 81%.

Nutritional Status. The proportion of children 0-23 months old who were underweight (<2 SD below the reference median) did not change during the life of the project, remaining at about 22% of all children. Exclusive breastfeeding of infants 0-5 months old increased (baseline: 82% vs. endline: 98%). Infant and Young Child Feeding practices improved, with the proportion of infants and young children age 6-23 months old fed according to a minimum of appropriate

feeding practices increasing (baseline: 52% vs. endline: 66%). Vitamin A supplementation for children 6-23 months old in the previous 6 months increased from 89% to 98%.

Immunization status. Measles vaccination coverage held steady (baseline 85% vs. endline: 86%). During the life of the project DPT1 coverage increased slightly (baseline 92% vs. endline: 97%); this measure is often considered to be a measure of access to and availability of immunization services. DPT3 coverage improved modestly (DPT3 baseline: 86% vs. endline: 91%).

1. Objectives

The objectives of this endline survey were to:

- Assess the knowledge, practice and, coverage of high-impact maternal, newborn, and child health services and practices in Lufwanyama District;
- Measure changes in the indicator values from baseline and to determine whether project objectives were met;
- Provide data for the Rapid CATCH indicators reporting requirement.

The endline KPC survey was conducted using the same tools and methodology as the baseline survey so that data were comparable.

2. Methods

Questionnaire: The baseline survey questionnaire was used. The questionnaire was adapted from the CORE Group KPC 2000+ survey and included the core rapid CATCH indicators (December 16, 2007) and Minimum Activities for Mothers and Newborns (MAMAN). A tabulation plan and interviewer instructions were developed to match the questionnaire. The questionnaire has 12 modules: (1) Introduction, (2) Maternal and Newborn Care, (3) Breastfeeding and Infant and Young Child Feeding, (4) Vitamin A Supplementation, (5) Child Immunizations, (6) Malaria –Treatment of Fever, (7) Malaria – ITN Use, (8) Control of Diarrhea, (9) ARI/Pneumonia, (10) Water and Sanitation, (11) Household Wealth, and (12) Anthropometrics. Questions on community mobilization which assessed community perceptions were added to the endline survey questionnaire. The questionnaire is presented in Annex 1 of this report.

Study Site: The study was conducted by Tropical Diseases Research Centre (TDRC), an independent government institution. Lufwanyama has 17 formal health care centers (14 health centers and three health posts) staffed exclusively by nurses, nurse midwives, and/or clinical officers – with two physicians stationed at Lufwanyama District Hospital, a new facility commissioned in 2014. A high proportion of basic health services are provided through several categories of minimally trained community workers – trained traditional birth attendants (TBAs), trained community health workers (CHWs), male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, family planning agents, as well as untrained TBAs and untrained CHWs.

Study Participants: Women who resided in the study area with a living child aged below two years (0–23 months) old, were invited to participate in the survey. Those who refused to participate were excluded.

Sample Size and Sampling: The sampling frame consisted of 118 Zones drawn from the catchment areas of the 17 health facilities (HFs) in the Lufwanyama District. In the first stage of sampling, populations for 118 Zones were collected from HFs and used to select 30 clusters (Zones) using probability proportional to size sampling. Some selected clusters comprised several villages – in this case one village was randomly selected from the complete list. Systematic sampling was used in each of the 30 villages to randomly select 15 households. To ensure that the sample size was equal to the one used at baseline, an extra cluster was added to make a total of 31 clusters which produced a comparative sample size of 465 households (N=465).

In each village, households with mothers with young children (0-23 months) were selected systematically. The center of the village was identified with the help of the village headman and a bottle was spun to determine in which direction to select the first house. An integer “n” from 1-9 was randomly selected by the data collector and the nth house along the ray was selected as the first house. The next house selected was the one with the door nearest to the previous selected house and this continued until 15 survey participants had been identified and interviewed. If the selected household did not have a mother with 0-23 month old child, it was replaced by going to the next household. If the household had more than two mothers with a child of this age, the first to be introduced was recruited. If the mother had more than one child < 24 months, the questions were related to the youngest child.

Selection and Training of Data Collectors: The enumerators were recruited based on the previous experience in conducting similar exercises. The minimum qualification for the enumerators was diploma. Sixteen enumerators were recruited with two supervisors from Save the Children and five from TDRC. The team underwent a one-day training which focused on content of the program, questionnaire, and how to administer the questionnaire. During the training, the evaluation team pre-tested the questionnaire in the field. The questionnaire was administered in Bemba, a commonly understood standard form of the local language.

Measurements: The birth date of the child was recorded (day, month, and year) from the EPI card, when available. If unavailable, the mother was helped to remember using a local calendar of events. The age of children was recorded in months. The child’s weight was recorded in kilograms. Children were weighed with a 25 kg Salter scale, precise to 100 grams. The accuracy of the scale was checked daily, and the scale was zeroed with the weighing pants prior to every measurement. Depending on the child’s age, pants or a triangulated cloth was used for weighing young infants.

Field Methods: The survey was conducted between 1-12 August, 2014. Surveyors were organized into teams of three. Each team completed one cluster per day, i.e. each team completed fifteen questionnaires daily. The time to complete one questionnaire ranged from 30 to 40 minutes, depending on the understanding of the respondent. The data collection took six days (75 questionnaires daily). Clusters were allocated to teams randomly. Team members were

responsible for ensuring that data collected at each household was accurate and complete. Data collectors checked their questionnaires to see if they were clearly filled out before leaving the household, ensuring that all answers were clear and reasonable, and that their handwriting was legible. At the end of each day, data collectors again checked all completed questionnaires with their supervisor to ensure that all items were completed and skip patterns were followed. The team supervisor re-checked questionnaires, and discrepancies were referred to the data collector for correction. Each evening teams met to review problems and identify solutions.

Supervision: Each team’s supervisor ensured adherence to protocol, checked questionnaires for completeness and accuracy and answered questions. During first days of the survey *every* completed questionnaire was reviewed for completeness.

Data Handling, Entry, and Checking: After assuring the completeness of all questionnaires, teams forwarded them to the survey managers for safekeeping until the survey was completed. Most responses were pre-coded. Responses to open-ended questions were categorized and coded. A trained data-entry clerk double-entered the data into SPSS (version 17.0) using pre-designed templates.

Ethics: Informed consent was obtained from all mothers, who were told that they could refuse to participate. They were informed of the purpose of survey and assured of confidentiality of their responses. They were interviewed in private to improve the likelihood of frank responses and to ensure confidentiality.

Analytic Approach: The analytic framework and indicator definitions are presented in Annex 2. Indicators were consistent with Rapid CATCH indicators collected at baseline.

3. Results and Discussion

A total of 544 caregivers of children 0-23 months old were interviewed in all selected clusters. Demographic characteristics are summarized in Table 1. The population demographics were similar to that selected at baseline.

Table 1: Socio-demographic Characteristics of Respondents and Household

	Numerator	Denominator	Percent	95% CI
Maternal age				
< 20 years	117	544	21.5%	18.2% - 25.3%
20 – 35 years	354	544	65.1%	60.9% - 69.1%
> 35 years	73	544	13.4%	10.7% - 16.6%
Number of children				
1	238	543	43.8%	39.6% - 48.1%
2 – 3	150	543	27.6%	23.9% - 31.6%
≥4	155	543	28.5%	24.8% - 32.6%
Level of education				
No education	23	544	4.2%	2.8% -6.4%

		Numerator	Denominator	Percent	95% CI
	Primary	334	544	61.3%	57.0% - 65.4%
	Secondary	175	544	32.1%	28.2% - 36.2%
	Higher	5	544	0.9%	0.3% - 2.3%
Head of household					
	Mother	49	544	9.0%	6.8% - 11.8%
	Husband/partner	432	544	79.4%	75.7% - 82.7%
	Female relative	28	544	5.1%	3.5% - 7.4%
	Male relative	22	544	4.0%	2.6% - 6.2%
	Other	8	544	1.5%	0.7% - 3.0%
Work outside home to earn money					
	No work	215	543	39.6%	35.5% - 43.9%
	Farm labor	120	543	22.1%	18.7% - 25.9%
	Selling/trading	112	543	20.6%	17.3% - 24.3%
	Salaried worker	22	543	4.1%	2.6% - 6.2%
	Other	43	543	7.9%	5.9% - 10.6%

Maternal and Newborn Care

Significant improvements in the proportion of mothers making at least four ANC visits during pregnancy (rising from 55% in 2010 to 78% in 2014), delivering with a SBA (rising from 36% in 2010 to 96% in 2014), and in the proportion of babies who were dried and wrapped at birth (rising from 80% and 88% in 2010 to 96% and 99%, respectively for drying and wrapping). The proportion of caretakers who knew at least two danger signs for seeking care with a sick newborn also rose over the project period, from 11% in 2010 to 41% in 2014 suggesting that awareness of newborn illness has increased – although this did not meet the 60% target.

The proportion of children 0-23 months old who received a postnatal visit from an appropriate trained health worker within two days after the birth increased (baseline: 27% vs. 81%). In addition, TBA register data indicate that about 80% of registered newborns received a PNC visit by a TBA within 24 hours in 2014. The household survey conducted in 2013 for the project's operations research component (see Annex 15: Final Operations Research Report or the Final Evaluation submitted to USAID, 6 February, 2015), which sampled only from populations with CHW/TBA teams, found that 84% of infants (<12) months had received a PNC contact within two days of birth.

A decline was noted in the proportion of women receiving at least two doses of TT vaccine before the birth of their previous child. The programmatic importance of this finding is not clear since the indicator does not measure newborns protected against neonatal tetanus at birth. A lower proportion of women receiving two doses of TT vaccine may mean that a higher proportion of women had already received multiple doses before the current pregnancy, with their newborns being protected. It may also reflect problems with the quality of ANC or of

systems required to support administration of TT vaccine – although no significant deteriorations in service delivery were reported.

Overall, taken with data on project inputs and outputs during the project period 2011-2014, it is plausible that improvements in ANC, deliveries at HFs and postnatal contacts are causally associated with TBA home visits and health education activities.

Table 2: Maternal and Newborn Care Indicators, Baseline and Endline Surveys, Lufwanyama District 2010, 2014

CSHGP Intervention Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
Maternal Newborn Care	(1) <u>Antenatal Care</u> : Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child.	255	463	55.1%	50.4 – 59.7	421	541	77.8%	73.5-82.1	70%
	(2) <u>Maternal TT Vaccination</u> : Percentage of mothers with children age 0-23 months who received at least two TT vaccinations before the birth of their youngest child.	439	465	94.4%	91.8 - 96.2	416	544	76.5%	72.3-80.7	95%
	(3) <u>Skilled Birth Attendant</u> : Percentage of children age 0-23 months whose births were attended by skilled personnel.	168	465	36.1%	31.8 – 40.4	522	543	96.1%	94.1-97.5	70%
	* <u>(4) Post-natal visit to check on newborn within the first 2 days after birth</u> : Percentage of children 0-23m who received a post-natal visit from an appropriately trained health worker within two days after the birth of the youngest child.	21	77	27.3%	17.7-38.6	9	93	81.4%	7.75-87.3	60%
	(5) <u>Current Contraceptive Use Among Mothers of Young Children</u> : Percentage of mothers of children age 0-23 months who are using a modern contraceptive method.	217	465	46.7%	42.1 – 51.3	314	544	57.7%	56.4-59.0	N/A

Nutrition

Exclusive breastfeeding of infants increased (baseline: 82% vs. endline: 98%). Infant and Young Child Feeding practice improved, with the proportion of infants and young children age 6-23

months fed according to a minimum of appropriate feeding practices increasing (baseline: 52% vs. endline: 66%). Vitamin A supplementation for children 6-23 months increased moderately (baseline 89% vs. 98%). The proportion of children 0-23 months who were underweight (<2 SD below the reference median) did not change during the life of the project, remaining about 22% of all children.

Table 3: Nutrition Indicators, Baseline and Endline Surveys, Lufwanyama District 2010 and 2014

CSHGP Interventi on Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
Nutrition	(6) <u>Exclusive breastfeeding:</u> Percentage of children age 0-5 months who were exclusively breastfed during the last 24 hours.	110	134	82.1%	74.5 – 88.2	147	150	98%	94.7-100	90%
	(7) <u>Infant and Young Child Feeding:</u> Percent of infants and young children age 6-23 months fed according to a minimum of appropriate feeding practices.	171	329	52.0%	46.4 – 57.5	207	312	66.3%	64.4-68.5	70%
	(8) <u>Vitamin A Supplementation in the last 6 months:</u> Percentage of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall.	293	329	89.1%	85.2 – 92.2	305	312	97.8%	96.6-99	95%
	(9) <u>Underweight:</u> Percentage of children 0-23 months who are underweight (-2 SD for the median weight for age, according to WHO/NCHS reference population).	93	408	22.8%	18.9 – 27.2	95	435	21.8%	19.3-24.3	15%

Immunization

Zambia introduced the fully liquid Pentavalent (DPT, plus Hepatitis B and *Haemophilus influenzae*, type B) in 2007. “DPT1” and “DPT3” includes Pentavalent 1 and Pentavalent 3, respectively. Immunization information was reported by mothers because cards and other documentation were often not available.

Measles vaccination coverage remained stable (baseline: 85% vs. endline: 89%) during the life of the project. DPT1 coverage declined slightly, although this decline was not statistically significant (92% vs. 88%); this measure is often considered to be a measure of access to and availability of immunization services. DPT3 coverage improved slightly (DPT3 baseline: 86% vs. 88% overall) although this improvement was not significant.

Table 4: Immunization Indicators, Baseline and Endline Surveys, Lufwanyama District 2010, 2014

CSHGP Intervention Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
Vaccines	(9) <u>Measles vaccination</u> : Percentage of children age 12-23 months who received a measles vaccination.	163	191	85.3%	79.5 – 90.0	134	156	85.9%	81.8-90.1	90%
	(10) <u>Access to immunization services</u> : Percentage of children aged 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey.	176	191	92.2%	87.4 – 95.5	151	156	96.8%	92.6-100	95%
	(11) <u>Health System Performance regarding Immunization services</u> : Percentage of children aged 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey.	164	191	85.9%	80.1 – 90.5	143	156	91.7%	8.7-95.6	90%

Prevalence of fever, diarrhea, cough and fast or difficult breathing

Prevalence of diarrhea and cough and fast or difficult breathing was comparable between baseline and endline surveys. The two-week prevalence of fever was however considerably lower at endline. The baseline survey was conducted toward the end of the rainy season in 2010, while the endline survey was conducted in the dry season in 2014 – and this is likely to account for the difference in prevalence.

Table 5: Two Week Prevalence of Reported Fever, Diarrhea and Cough and Fast or Difficult Breathing

Indicator	Baseline		Endline	
	N	%	N	%
Prevalence of Fever	178/465	38%	33/544	6%
Prevalence of Diarrhea	126/465	27%	126/544	23%
Prevalence of Cough and Fast or Difficult Breathing	72/465	16%	78/544	14%

Malaria

The proportion of children with suspected malaria who received an effective anti-malarial (ACT) within 24 hours of fever onset improved (baseline: 11% vs. endline:55%). A significantly higher proportion of children slept under an insecticide treated bednet the previous night at endline – suggesting that access to nets and home practices have improved.

Table 6: Malaria Indicators, Baseline and Endline Surveys, Lufwanyama District 2010, 2014

CSHGP Intervention Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
Malaria	(12) <u>Treatment of Fever in Malarious Zones</u> Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began.	20	178	11.2%	7.0 – 16.8	18	33	54.6%	53.3-55.6	50%
	(13) <u>Child sleeps under an insecticide-treated bednet</u> : Percentage of children age 0-23 months who slept under an insecticide-treated bed net (in malaria risk areas, where bed net use is effective) the previous night.	237	465	51.0%	46.3 – 55.6	440	545	80.7%	77.1-83.9	80%

Acute Respiratory Infection (ARI)

An increased proportion of caretakers of children 0-23 months old with suspected pneumonia sought care from an appropriate provider (baseline 67% vs. 97%) and the target was met. Increases were also noted in the proportion of children with suspected pneumonia treated with an effective anti-biotic antibiotic (baseline 50% vs. 78%) and the proportion who received the treatment within 24 hours of onset of symptoms (baseline: 13% vs. 32%). Caretaker knowledge

of at least 2 danger signs for seeking care with sick children improved from 22% at baseline to 65%. Overall, these data suggest that careseeking and treatment practices for ARI have improved over the life of the project. The more modest improvements in early treatment for pneumonia (within 24 hours) may be due to several factors, including CHW medicine stock-outs, which may mean ACTs are not always able to provide immediate treatment.

Table 7: ARI Indicators, Baseline and Endline Surveys, Lufwanyama District 2010, 2014

CSHGP Interventi on Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
ARI	(14) <u>Appropriate Care Seeking for Pneumonia:</u> Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider.	48	72	66.7%	54.6 – 77.3	76	78	97.4%	95.3-99.5	90%
	(15) Proportion of children with suspected pneumonia who received amoxicillin.	36	72	50%	--	61	78	78.2%	--	70%
	(16) Proportion of children with suspected pneumonia who received amoxicillin within 24 hours of onset of symptoms.	--	--	13%	--	--	--	32%	--	50%

Diarrhea

A significant improvement was noted in the proportion of households treating water appropriately (baseline: 42% vs. endline: 69%). Availability of soap for hand washing also showed a modest improvement although this was not significant washing (baseline: 60% vs. 64%). ORT use declined (baseline: 74% vs. endline: 69%) although this was not significant. The proportion of children with diarrhea who were treated with zinc increased (baseline: 0% vs. endline: 40%) but still fell short of the 50% target. Supplies of zinc, while available at the HFs, do not always get to CHWs in the field.

Table 8: Diarrhea Indicators, Baseline and Endline Surveys, Lufwanyama District 2010, 2014

CSHGP Interventi on Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
Diarrhea	(13) <u>ORT Use:</u> Percentage of children age 0-23 months with diarrhea in the last two weeks	93	126	73.8%	65.2 – 81.2	87	126	69.1%	66.1-72.1	

CSHGP Interventi on Area	Rapid CATCH Indicator	Baseline (2010)				Endline (2014)				Target
		N	N	%	95% CI	N	N	%	95% CI	
	who received oral rehydration solution (ORS) and/or recommended home fluids.									90%
	Proportion of children with diarrhea who received zinc.	0	126	0%		50	126	40%		50%
	(15) <u>Point of Use (POU)</u> : Percentage of households of children age 0-23 months that treat water effectively.	196	465	42.2%	37.6 – 46.8	375	545	68.8	64.7-72.6	60%
	(16) <u>Appropriate Hand washing Practices</u> : Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing.	279	465	60.0%	55.4 – 64.5	352	545	64.4	60.4-68.6	70%

4. Survey Limitations

A number of limitations are noted including:

Sampling error. As with all cluster surveys errors associated with clustering of sampled mothers and homogeneity within clusters may have limited representativeness and precision of estimates. The survey sample procedure began in the village center and selected consecutive households; homogeneity could have been reduced by alternative sampling methods including a random starting point, and selection of non-sequential households.

Variable coverage of CHWs and TBAs. Since coverage by community-based workers is variable in the district, it is possible that some sampled areas did not receive project interventions. Uneven coverage of project interventions may limit the ability of a district-wide sample to detect changes in key indicators at endline.

Timing. Logistical issues required that the baseline and endline surveys be conducted at different times of the year, which likely affected morbidity, principally that of malaria. The low number of malaria cases may limit the precision of survey estimates – in addition it may have modified the care-seeking practices of caretakers, and the treatment practices of health workers.

5. Conclusions

The main conclusions of the endline-wide district household survey conducted in Lufwanyama are as follows:

1. Significant improvements are noted in the proportion of children receiving treatment interventions between 2010 and 2014 including; children with suspected pneumonia receiving amoxicillin (rising from 50% in 2010 to 78% in 2014), children receiving amoxicillin within 24 hours of symptom onset (rising from 13% in 2010 to 32% in 2014), children with suspected pneumonia who were taken to an appropriate provider (rising from 67% in 2010 to 97% in 2014), children with diarrhea receiving zinc (rising from 0% in 2010 to 40% in 2014), and the proportion of children with fever who received ACT within 24 hours (rising from 11% in 2010 to 55% in 2014). No significant changes were noted in the proportion of children with diarrhea receiving ORT.
2. Significant improvements are noted in the proportion of mothers making at least four ANC visits during pregnancy (rising from 55% in 2010 to 78% in 2014), delivering with a SBA (rising from 36% in 2010 to 96% in 2014), and in the proportion of babies who were dried and wrapped at birth (rising from 80% and 88% in 2010 to 96% and 99% respectively for drying and wrapping). The proportion of newborns 0-23 months old receiving a postnatal visit within two days of birth (baseline: 27% vs. endline: 81%) also rose significantly.
3. The nutritional status of children 0-23 did not change over the life of the project (the proportion of children underweight remained constant). The rate of exclusive breastfeeding increased (baseline: 89% vs. endline: 98%). The proportion of children receiving Vitamin A in the previous 6 months increased slightly (baseline: 89% vs. endline: 98%).
4. The immunization status of children 0-23 months old showed no improvement. Measles vaccination coverage remained the same (baseline: 85% vs. endline: 86%). Coverage of DPT1 and DPT3 showed only slight improvement.

ANNEX 1: Household Survey Questionnaire

Identification			
Health Facility Name and Code			
Village Name and Code			
Household Number			
Name of Mother			

Interview			
Interview date	___/___/___ dd/mm/yy		
Name of Interviewer and Code			
Result Code	1. Completed	2. Not completed	3. Refused
Name of Supervisor and Code			

Data Entry		
	Name	Date
First Data Entry		___/___/___ dd/mm/year
Second Data Entry		___/___/___ dd/mm/year

1. DEMOGRAPHICS

1.1 How old are you? (99 IF DO NOT KNOW)

1.2 Have you ever attended school?

1. Yes	2. No
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1.3 What is the highest level of education that you attained?

1. Primary	2. Secondary	3. Higher	8. NA
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1.4 How many children do you have?

1.5 What is the name of the surveyed child? _____

1.6 What is the date of birth of (NAME)

1.7 What is the sex of (NAME)?

1. Male	2. Female
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1.8 Does (NAME'S) biological father live in this household?

1. Yes	2. No	
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1.9 Who is the head of this household?

1. Mother (Respondent)	2. Husband/Partner
3. Female relative _____	
4. Male relative _____	
5. Other _____	

1.10 Do you work outside of the home to earn money?

1. Yes	2. No
--------	-------

1.11 What kind of work do you do?

1. Handicrafts	2. Farm labour
3. Sellers/traders	4. Shop keeper
5. Servant/Household worker	6. Salaried worker/formal employment
7. Other _____	
8. NA	

1.12a What is the most common means of getting to the nearest health centre/post?

1. Walking	2. Bicycle
3. Ox-cart	4. Vehicle
5. Other _____	

1.12b About how long does it take you to get to the nearest health center/post by this means? hrs Mins

2. MATERNAL AND NEWBORN CARE

2.1 During your pregnancy with (NAME), did you see anyone for antenatal care?

1. Yes	2. No
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2.2 Whom did you see for the antenatal care?

2.2.1 Doctor/Clinical officer

1. Yes	2. No	8. NA
--------	-------	-------

2.2.2 Nurse /Midwife

1. Yes	2. No	8. NA
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2.2.4 Traditional Birth Attendant

1. Yes	2. No	8. NA
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2.2.5 Other _____

1. Yes	2. No	8. NA
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2.3 How many times did you receive antenatal care? (88 IF NO ANC)

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2.4 During pregnancy, a woman may encounter severe problems or illnesses and should go or be taken immediately to a health facility. What type of symptoms would cause you to seek immediate care at a health facility? DO NOT READ RESPONSES

2.4.1 Vaginal bleeding

1. Yes	2. No
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2.4.2 Fast/difficult breathing

1. Yes	2. No
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2.4.3 Fever

1. Yes	2. No
--------	-------

2.4.4 Severe abdominal pain

1. Yes	2. No
--------	-------

2.4.5 Headache/blurred vision

1. Yes	2. No
--------	-------

2.4.6 Convulsions

1. Yes	2. No
--------	-------

2.4.7 Foul smelling discharge/fluid from vagina

1. Yes	2. No
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2.4.8 Baby stop moving

1. Yes	2. No
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2.4.9 Leaking brownish/greenish fluid from vagina

1. Yes	2. No
--------	-------

2.4.10 Other _____

1. Yes	2. No
--------	-------

2.5 During your pregnancy with (NAME) did you receive an injection in the arm to prevent the baby from getting tetanus, that is convulsions after birth?

1. Yes	2. No	9. Do not know
--------	-------	----------------

2.6 While pregnant with (name), how many times did you receive such an injection?

1. One	2. Two	3. Three or more	8. NA	9. Do not know
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2.7 Did you receive any tetanus toxoid injection at any time before that pregnancy, including during a previous pregnancy or between pregnancies?

1. Yes	2. No	9. Do not know
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2.8 Before the pregnancy with (Name), how many times did you receive a tetanus injection?

1. One	2. Two	3. Three or more	8. N/A	9. Do not know
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2.9 When you were pregnant with (NAME), did you take any drugs in order to prevent you from getting malaria?

1. Yes	2. No	9. Do not know
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2.10 Which drugs did you take to prevent malaria?

2.2.1	SP/Fansidar	1. Yes	2. No	8. NA
2.2.2	Chloroquine	1. Yes	2. No	8. NA
2.2.5	Other _____	1. Yes	2. No	8. NA

2.11 How many times did you take SP/Fansidar (88 IF NO FANSIDAR TAKEN)

2.12 When you were pregnant with (NAME), did you sleep under a bednet?

1. Yes	2. No	
--------	-------	--

2.13 How often did you sleep under the bed net?

1. All the time	2. Most of the time	3. Some of time
4. Rarely	8. NA	

2.14 Where did you deliver?

1. Health facility	2. Home	3 TBA hut
4. Other _____		

2.14a Was (NAME) delivered by caesarean section?

1. Yes	2. No
--------	-------

2.15 Who assisted with the delivery of (NAME)?

2.15.1	Doctor/Clinical Officer	1. Yes	2. No
2.15.2	Nurse/ Midwife	1. Yes	2. No
2.15.5	Other health staff with midwifery skills	1. Yes	2. No
2.15.6	Trained TBA	1. Yes	2. No
2.15.7	CHW	1. Yes	2. No
2.15.8	Untrained TBA	1. Yes	2. No
2.15.9	Relative/Friend	1. Yes	2. No

2.16 Was a Clean Delivery Kit used during delivery?

1. Yes	2. No	9. Do not know
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2.17 What was used to tie the cord?

1. New string of thread	2. String or thread	3. Other _____
9. Do not know		

2.18 Was the thread/string used to tie the cord boiled prior to use?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

2.19 What was used to cut the cord?

1. New razor blade	2. Razor blade	3. Scissors
4. Other _____	9. Do not know	

2.20 Was the instrument used to cut the cord boiled prior to use?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

2.21 Was anything placed on the umbilical cord after it was cut?

1. Yes	2. No	9. Do not know
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2.22 What was placed on the cut cord?

1. Cow dung	2. Any type of oil	3. Antiseptic	
4. Ash	5. Other _____	8. NA	9. Do not know

2.23 Was (NAME) dried (wiped) immediately after birth before the placenta was delivered?

1. Yes	2. No	9. Do not know
--------	-------	----------------

2.24 Was (NAME) wrapped in a dry, warm cloth or blanket immediately after birth before the placenta was delivered?

1. Yes	2. No	9. Do not know
--------	-------	----------------

2.25 Did your baby cry or breathe easily immediately after birth?

1. Yes	2. No	9. Do not know
--------	-------	----------------

2.26 Was anything done to help the baby cry or breathe at the time of birth?

1. Yes	2. No	9. Do not know
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2.27 What was done to help the baby cry or breathe at the time of birth? (DO NOT READ RESPONSES: ASK ANYTHING ELSE? IF NOTHING WAS DONE, SELECT NA

2.27.1	Rubbed /massaged	1. Yes	2. No	8. NA
2.27.2	Dried	1. Yes	2. No	8. NA
2.27.3	Mouth cleared	1. Yes	2. No	8. NA
2.27.4	Other _____	1. Yes	2. No	8. NA

2.28 Did this child (NAME) put to the breast immediately (within 1 hour) after birth?

1. Yes	2. No	9. Do not know/remember
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2.29 IF NO TO 2.28, How long after birth did you first put (NAME) to the breast?(88 IF NA, 99 IF DO NOT KNOW)

		days			hrs
--	--	------	--	--	-----

2.30 Sometimes after delivery mothers have severe illnesses and should be taken immediately to a health facility. What types of symptoms would cause you to go to a health facility right away? (DO NOT READ RESPONSES: ASK ANYTHING ELSE?)

2.30.1	Excessive vaginal bleeding	1. Yes	2. No
2.30.2	Fast/difficult breathing	1. Yes	2. No
2.30.3	High fever	1. Yes	2. No
2.30.4	Severe abdominal pain	1. Yes	2. No
2.30.5	Headache/blurred vision	1. Yes	2. No
2.30.6	Convulsions/loss of consciousness	1. Yes	2. No
2.30.7	Foul smelling discharge from vagina	1. Yes	2. No
2.30.8	Pain in calf	1. Yes	2. No
2.30.9	Verbalization/behavior that indicates she may hurt herself or the baby	1. Yes	2. No
2.30.10	Other _____	1. Yes	2. No

2.31 Sometimes newborns, within the first month of life, have severe illnesses and should be taken immediately to a health facility. What types of symptoms would cause you to take your newborn to a health facility right away? (DO NOT READ RESPONSES: ASK ANYTHING ELSE?)

2.31.1	Convulsions	1. Yes	2. No
2.31.2	Fever	1. Yes	2. No
2.31.3	Poor sucking or feeding	1. Yes	2. No
2.31.4	Fast/difficult breathing	1. Yes	2. No
2.31.5	Feels cold	1. Yes	2. No
2.31.6	Too small or born too early	1. Yes	2. No
2.31.7	Redness or discharge around cord	1. Yes	2. No
2.31.8	Red swollen eyes/discharge	1. Yes	2. No
2.31.9	Yellow palms/soles/eyes	1. Yes	2. No
2.31.10	Lethargy	1. Yes	2. No
2.31.11	Unconscious	1. Yes	2. No
2.31.12	Other _____	1. Yes	2. No

2.32 Are you currently doing something or using any method to delay or avoid getting pregnant?

1. Yes	2. No
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2.33 What **main** method are you (or your husband/partner) using?

1. Female Sterilization	2. Male Sterilization	3. Pill	4. IUD
5. Injectables	6. Implants	7. Male Condom	8. Female condom
9. Diaphragm	10. Foam/Jelly	11. Lactational Amen. Method	
12. Standard Days method/Cyclebeads			
13. Rhythm method (other than Standard days)		14. Withdrawal	
15. Other _____			
88. NA			

**3. MATERNAL AND NEWBORN CARE
(MOTHERS WITH INFANTS LESS THAN 3 MONTHS)**

IF CHILD IS MORE THAN 3 MONTHS OLD,
DRAW TWO LINES ACROSS THIS SECTION

3.1 After (NAME) was born, did any health care provider or volunteer community health worker check on your baby's health in the first week?

PROBE FOR VISITS IN AND OUTSIDE THE HOME WHERE DISCUSSION OR COUNSELLING OR EXAMINATION TOOK PLACE

1. Yes	2. No
--------	-------

3.2 How long after delivery did the first check take place? (88 IF NA) days hrs

3.3. Who checked on your baby's health at that time?

1. Doctor/Clinical officer	2. Nurse/Midwife	
3. Other health worker	4. TBA	5. Volunteer Community health worker
6. Other _____		8. NA

3.4 Where did this first check take place?

1. Hospital	2. Health Center	3. Health Post
4. Private Clinic		5. Your home
6. Other _____		8. NA

3.5 What did the health worker do during that visit to check the health of your baby?

3.5.1	Generally examined/looked at baby's body	1. Yes	2. No	8. NA
3.5.2	Weighed baby	1. Yes	2. No	8. NA
3.5.3	Checked cord	1. Yes	2. No	8. NA
3.5.4	Counseled on breastfeeding	1. Yes	2. No	8. NA
3.5.5	Observed breastfeeding	1. Yes	2. No	8. NA
3.5.6	Counseled on skin-to-skin contact/warmth	1. Yes	2. No	8. NA
3.5.7	Checked baby for danger signs	1. Yes	2. No	8. NA
3.5.8	Counseled on danger signs	1. Yes	2. No	8. NA
3.5.9	Other _____	1. Yes	2. No	8. NA

3.6 Was there a second check on (NAME) after the delivery ?

1. Yes	2. No	8. NA
--------	-------	-------

3.7 How long after delivery did the second check take place? days hrs
CODE 88 IF NA

3.8 Who checked on your baby's health at this second check?

1. Doctor/ Clinical officer	2. Nurse/Midwife	
3. Other health worker	4. TBA	5. Volunteer community health worker
6. Other _____		8. NA

3.9 After (NAME) was born, did any health care provider or volunteer community health worker check on your health in the first week?

PROBE FOR VISITS IN AND OUTSIDE THE HOME WHERE DISCUSSION OR COUNSELLING OR EXAMINATION TOOK PLACE

1. Yes	2. No
--------	-------

3.10 How long after delivery did the first check take place? (88 IF NA) days hrs

3.11 Who checked on your health at that time?

1. Doctor/Clinical officer	2. Nurse/Midwife	
3. Other health worker	4. TBA	5. Volunteer Community health worker
6. Other _____		8. NA

3.12 Where did this first check take place?

1. Hospital	2. Health Center	3. Health Post
4. Private Clinic		5. Your home
6. Other _____		8. NA

3.13 Was there a second check on your health after the delivery?

1. Yes	2. No	8. NA
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3.14 How long after delivery did the second check take place? days hrs
CODE 88,88 IF NA

3.15 Who checked on your health at this second check?

1. Doctor	2. Nurse/Midwife	
3. Other health worker	4. TBA	5. Volunteer Community health worker
6. Other _____		8. NA

4. CHILDHOOD ILLNESS

4.1 Sometimes children get sick and need to receive care or treatment for illnesses. What are the signs of illness that would indicate your child needs treatment? (DO NOT READ RESPONSES: ASK ANYTHING ELSE?)

4.1.1	Looks unwell or not playing normally	1. Yes	2. No
4.1.2	Not eating or drinking	1. Yes	2. No
4.1.3	Lethargic or difficult to wake	1. Yes	2. No
4.1.4	High fever	1. Yes	2. No
4.1.5	Fast/difficult breathing	1. Yes	2. No
4.1.6	Vomits everything	1. Yes	2. No
4.1.7	Convulsions	1. Yes	2. No
4.1.8	Other 1 _____	1. Yes	2. No
4.1.9	Other 2 _____	1. Yes	2. No

4.2 Did (NAME) experience any of the following in the past two weeks?

4.2.1	Diarrhea	1. Yes	2. No
4.2.2	Blood in stool	1. Yes	2. No
4.2.3	Cough	1. Yes	2. No
4.2.4	Difficult breathing	1. Yes	2. No
4.2.5	Fast breathing/short quick breaths	1. Yes	2. No
4.2.6	Fever	1. Yes	2. No
4.2.7	Malaria	1. Yes	2. No

IF RESPONSE TO 4.2.1 OR 4.2.2 IS YES, ADMINISTER **DIARRHEA MODULE**

IF RESPONSE TO (4.2.3 AND 4.2.4) OR 4.2.3 AND 4.2.5) ARE YES ADMINISTER **PNEUMONIA MODULE**

IF RESPONSE TO 4.2.6 OR 4.2.7 IS YES ADMINISTER **MALARIA MODULE**

5.0 MALARIA OR FEVER TREATMENT MODULE

5.1 Did you give any special care or treatment at home to (NAME) when s/he had the fever or malaria?

1. Yes	2. No
--------	-------

5.2 What did you give?

5.2.1	Antimalarial: ACT (Coartem/Lumet)	1. Yes	2. No	8. NA
5.2.2	Paracetamol/Aspirin	1. Yes	2. No	8. NA
5.2.3	Sponge/ Wash with water	1. Yes	2. No	8. NA
5.2.4	Traditional herbs/Steaming	1. Yes	2. No	8. NA
5.2.5	Other _____	1. Yes	2. No	8. NA

5.3 Did you seek advice or treatment for the fever/malaria outside the home?

1. Yes	2. No
--------	-------

5.4 Where did you go first for advice or the treatment?

1. Hospital	2. Health Center	3. Health Post
4. Clinic		5. Community health worker
6. Traditional practitioner		
7. Pharmacy		8. Friend /Relative
9. Other _____		88. NA

5.5 Did you go anywhere else for advice or treatment?

1. Yes	2. No	8. NA
--------	-------	-------

5.6 Where did you go for this next advice or the treatment?

1. Hospital	2. Health Center	3. Health Post
4. Clinic		5. Community health worker
6. Traditional practitioner		
7. Pharmacy		8. Friend /Relative
9. Other _____		88. NA

5.7 How many days after the fever began did you first seek treatment for (NAME)?

1. Same day	2. next day	3. Two days	
4. Three days	5. Four or more days	8. NA	9. Do not know

5.8 Did the child have a finger-prick for a malaria rapid diagnostic test when you sought treatment for the fever?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

5.9 What was the result of the test?

1. Positive	2. Negative	8. NA	9. Do not know
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5.10 IF 5.3 IS NO, Why didn't you seek care for your child outside the home?

1. Expecting self resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

5.11 At any time during the illness did (NAME) take any drugs for the fever?

1. Yes	2. No	9. Do not know
--------	-------	----------------

5.12 What drugs did (NAME) take?

5.12.1	ACT (Coartem/Lumet)	1. Yes	2. No	8. NA
5.12.2	SP/Fansidar	1. Yes	2. No	8. NA
5.12.3	Chloroquine	1. Yes	2. No	8. NA
5.12.4	Amodiaquine	1. Yes	2. No	8. NA
5.12.5	Quinine	1. Yes	2. No	8. NA
5.12.6	Paracetamol/Aspirin	1. Yes	2. No	8. NA
5.12.7	Other _____	1. Yes	2. No	8. NA

5.13 How long after the fever started did (NAME) start taking the medicine?

5.13.1	ACT (Coartem/Lumet)	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
5.13.2	SP/Fansidar	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
5.13.3	Chloroquine	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
5.13.4	Amodiaquine	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
5.13.5	Quinine	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
5.13.6	Paracetamol/Aspirin	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK

5.14 How many days did (NAME) take the drugs? (88 IF DRUG WAS NOT TAKEN)

5.14.1	ACT (Coartem/Lumet)		
5.14.2	SP/Fansidar		
5.14.3	Chloroquine		
5.14.4	Amodiaquine		
5.14.5	Quinine		

6. DIARRHEA TREATMENT MODULE

6.1 When (NAME) had the diarrhea how did you breast him/her?

1. Less than usual	2. About same amount	3. More than usual
8. NA (Child is not breastfeeding)	9. Do not know	

6.2 When (NAME) had the diarrhea how did you offer drink to him/her?

1. Less than usual	2. About same amount	3. More than usual
9. Do not know		

6.3 When (NAME) had the diarrhea how did you offer food to him/her to eat?

1. Less than usual	2. About same amount	3. More than usual
8. NA exclusive breast-feeding	9. Do not know	

6.4 Did you seek advice or treatment for the diarrhea outside the home?

1. Yes	2. No
--------	-------

6.5 Where did you go first for advice or the treatment?

1. Hospital	2. Health Center	3. Health Post
4. Clinic	5. Community health worker	
6. Traditional practitioner		
7. Pharmacy	8. Friend /Relative	
9. Other _____	88. NA	

6.6 How many days after the diarrhea began did you first seek treatment for NAME?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA
		9. Do not know

6.7 IF NO TO 6.4, Why didn't you seek care for your child outside the home?

1. Expecting self resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

6.8 Was (NAME) given any of the following to drink at anytime since started having the diarrhea?

- 6.8.1** Fluid from ORS packet/sachet/powder
- 6.8.2** ORS liquid
- 6.8.3** Homemade fluid

1. Yes	2. No	9. DK
1. Yes	2. No	9. DK
1. Yes	2. No	9. DK

6.9 Was (NAME) given any of the following to treat the diarrhea?

- 6.9.1** Antibiotic pill or syrup
- 6.9.2** Anti motility pill or syrup
- 6.9.3** Zinc
- 6.9.4** Unknown pill or syrup
- 6.9.5** Injection
- 6.9.6** Intravenous
- 6.9.7** Home remedies/herbal medicines
- 6.9.8** Other _____

1. Yes	2. No

6.10 How many days did (NAME) take the drugs? (88 IF DRUG WAS NOT TAKEN)

- 6.10.1** Antibiotic pill or syrup
- 6.10.2** Anti motility pill or syrup
- 6.10.3** Zinc

7.0 PNEUMONIA TREATMENT MODULE

7.1 Did you seek advice or treatment outside the home for (NAME) when s/he had cough with fast/difficult breathing (suspected pneumonia)?

1. Yes	2. No
--------	-------

7.2 Where did you go first for advice or the treatment?

1. Hospital	2. Health Center	3. Health Post
4. Clinic	5. Community health worker	
6. Traditional practitioner		
7. Pharmacy	8. Friend /Relative	
9. Other _____	88. NA	

7.3 Did you go anywhere else for advice or treatment?

1. Yes	2. No	8. NA
--------	-------	-------

7.4 Where did you go next for this advice or the treatment?

1. Hospital	2. Health Center	3. Health Post
4. Clinic	5. Community health worker	
6. Traditional practitioner		
7. Pharmacy	8. Friend /Relative	
9. Other _____	88. NA	

7.5 How many days after the cough/fast breathing began did you first seek treatment for NAME?

1. Same day	2. next day	3. Two days	
4. Three days	5. Four or more days	8. NA	9. Do not know

7.6 Why didn't you seek care for your child outside the home?

1. Expecting self resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

7.7 At any time during the illness did (NAME) take any drugs for the cough/fast breathing?

1. Yes	2. No	9. Do not know
--------	-------	----------------

7.8 Did (NAME) take any of the following drugs?

7.8.1	Amoxicillin pill/syrup	1. Yes	2. No	8. NA
7.8.2	Cotrimoxazole/Septrin	1. Yes	2. No	8. NA
7.8.3	Erythromycin	1. Yes	2. No	8. NA
7.8.4	Other antibiotic _____	1. Yes	2. No	8. NA
7.8.5	Cough mixture	1. Yes	2. No	8. NA
7.8.6	Paracetamol/Panadol/Aspirin	1. Yes	2. No	8. NA
7.8.7	Other _____	1. Yes	2. No	8. NA

7.9 How long after the cough/fast breathing started did (NAME) start taking the medicine?

7.9.1	Amoxicillin pill/syrup	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
7.9.2	Cotrimoxazole/Septin	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK
7.9.3	Erythromycin	0. D0	1. D1	2. D2	3. D3	8. NA	9. DK

7.10 How many days did (NAME) take the drugs? (88 IF DRUG WAS NOT TAKEN)

7.10.1	Amoxicillin pill/syrup		
7.10.2	Cotrimoxazole/Septin		
7.10.3	Erythromycin		

8. BREASTFEEDING/INFANT AND YOUNG CHILD FEEDING

8.1 Now I would like to ask you about liquids or foods (NAME) had yesterday during the day or at night. Did s/he drink/eat any of the following?

8.1.1	Breast milk	1. Yes	2. No	9. DK
8.1.2	Plain water	1. Yes	2. No	9. DK
8.1.3	Commercially produced infant formula	1. Yes	2. No	9. DK
8.1.4	Fortified commercially infant and young child food (e.g. cerelac)	1. Yes	2. No	9. DK

8.2 Now I would like to ask you about (other) liquids or foods that (NAME) may have had yesterday during the day or at night. I am interested in whether your child had the item even if it was combined with other foods. Did s/he drink/eat-

8.2.1	Group 1: Dairy			
8.2.1.1	Milk such as tinned, powdered, or fresh animal milk	1. Yes	2. No	9. DK
8.2.1.2	Cheese, yogurt, or other milk products	1. Yes	2. No	9. DK
8.2.2	Group 2: Grain			
8.2.2.1	Any (other) porridge or gruel	1. Yes	2. No	9. DK
8.2.2.2	Bread, rice, noodles, or other foods made from grains	1. Yes	2. No	9. DK
8.2.2.3	White potatoes, white yams, , cassava, or any other foods made from roots	1. Yes	2. No	9. DK
8.2.3	Group 3: Vitamin A Rich vegetables			
8.2.3.1	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside	1. Yes	2. No	9. DK
8.2.3.2	Any dark green leafy vegetables	1. Yes	2. No	9. DK
8.2.3.3	Ripe mangoes, papayas	1. Yes	2. No	9. DK
8.2.3.4	Foods made with red palm oil, palm nut, palm nut pulp sauce	1. Yes	2. No	9. DK
8.2.4	Group 4: Other Fruits/Vegetables			
8.2.4.1	Any fruits or vegetables like oranges, bananas, or pineapple	1. Yes	2. No	9. DK

8.2.5	Group 5: Eggs			
8.2.5.1	Egg	1. Yes	2. No	9.DK
8.2.6	Group 6: Meat, poultry, fish			
8.2.6.1	Liver, kidney, heart or other organ meats	1. Yes	2. No	9.DK
8.2.6.2	Any meat such as beef, pork, lamb, goat, chicken or duck	1. Yes	2. No	9. DK
8.2.6.3	Fresh or dried fish	1. Yes	2. No	9.DK
8.2.6.4	Grubs, snails, insects, other small protein food	1. Yes	2. No	9.DK
8.2.7	Group 7: Legumes/nuts			
8.2.7.1	Any foods made from beans, peas, lentils, or nuts	1. Yes	2. No	9. DK
8.2.8	Group 8: Oils/fats			
8.2.8.1	Any oils, fats, or butter, or foods made with any of these	1. Yes	2. No	9.DK
8.2.9	Group 9: Other foods			
8.2.9.1	Tea or coffee	1. Yes	2. No	9. DK
8.2.9.2	Any other liquid	1. Yes	2. No	9.DK
8.2.9.3	Any sugary foods, such as chocolates, candy, sweets, pastries, cakes, or biscuits	1. Yes	2. No	9.DK
8.2.9.4	Any other solid or soft food	1. Yes	2. No	9.DK

8.3 How many times did (NAME) eat solid, semi-solid, or soft foods other liquids yesterday during the day or at night

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9. VITAMIN A SUPPLEMENTATION AND IMMUNIZATIONS

9.1 Has (NAME) ever received a vitamin A dose? SHOW COMMON TYPES

1. Yes	2. No	9. Do not know
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9.2 Did (NAME) receive a vitamin A dose within the last 6 months?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

9.3. Do you have a card or child health booklet where (Name’s) vaccinations and vitamin A (capsules) are written down?

1. Yes	2. No	9. Do not know
--------	-------	----------------

COPY VACCINATION DATE FROM BOOKLET OR CARD (88 /88/88 IF CARD NOT AVAILABLE AND 99/99/9999 IF DATE NOT RECORDED

9.4.1	Vitamin A								
9.4.2	DPT1								
9.4.3	DPT3								
9.4.4	Measles								

9.5. Has (NAME) received any vaccinations that are not recorded on this card, including vaccinations given during immunization campaigns?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

9.6 How many times (88 IF NA AND 99 IF DO NOT KNOW)?

--	--

9.7. Has (NAME) received a DPT vaccination that is an injection given in the arm/thigh, sometimes at the same time as polio drops?

1. Yes	2. No	8. NA (CARD SEEN)	9. Do not know
--------	-------	-------------------	----------------

9.8 How many times (88 IF NA AND 99 IF DO NOT KNOW)?

--	--

9.9. Has (NAME) ever received an injection in the arm to prevent measles?

1. Yes	2. No	8. NA (CARD SEEN)	9. Do not know
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10. WATER AND SANITATION

10.1. Do you treat your water in any way to make it safe for drinking?

1. Yes	2. No
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10.2 What do you usually do to the water to make it safer to drink?

10.2.1	Let it stand and settle/Sedimentation	1. Yes	2. No	8. NA
10.2.2	Strain it through cloth	1. Yes	2. No	8. NA
10.2.3	Boil	1. Yes	2. No	8. NA
10.2.4	Add bleach/chlorine	1. Yes	2. No	8. NA
10.2.5	Water filter (ceramic, sand, composite)	1. Yes	2. No	8. NA
10.2.6	Solar disinfection	1. Yes	2. No	8. NA
10.2.7	Other _____	1. Yes	2. No	8. NA

10.3. Can you show me where you usually wash your hands and what you use to wash hands?
ASK TO SEE AND OBSERVE

10.3.1 SITE OF WASH

1. Inside /near toilet	2. Inside or near kitchen or cooking place	
3. Elsewhere in yard	4. Outside yard	5. No specific place
6. No permission to see		

10.3.2 WASHING SUBSTANCE

1. Soap	2. Detergent	3. None
4. Other _____	7. No permission to see	

11 MALARIA – ITN USE

11.1 Does your household have any mosquito nets that can be used while sleeping?

1. Yes	2. No
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11.2 Did (NAME) sleep under the bed net last night?

1. Yes	2. No	8. NA
--------	-------	-------

11.3 Was the bed net that (Name) slept under last night ever soaked or dipped in a liquid or treated to repel mosquitoes or bugs?

1. Yes	2. No	9. Do not know
--------	-------	----------------

11.4 How long ago was the net last soaked or dipped in a liquid/treated to repel mosquitoes or bugs? months

MORE THAN 2 YEARS = 90; LLINS = 95, NA = 98, DO NOT KNOW =99

12. LUNESP

12.1 Have you heard of a program in Lufwanyama called LUNESP?

1. Yes	2. No
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12.2 Did you participate in LUNESP?

1. Yes	2. No	8. NA
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12.3 Have you changed your TBA because of LUNESP?

1. Yes	2. No	8. NA
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13. ANTHROPOMETRICS

13.1 May I weigh (NAME)? 99.9 IF WEIGHT NOT TAKEN . kg

14. PERCEPTIONS OF COMMUNITY

I would like to begin by asking you some questions about the area in which you live and the people who live in this area. In these questions, I will refer to this area and its people as your community. By community, I would like you to think about all of the people that live in the area served by your Neighborhood Health Committee.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
14.1	Are you aware of the group in this area called the Neighborhood Health Committee?	YES 1 NO 2 DON'T KNOW 3	

I am going to read out some statements. For each statement, please tell me if you strongly agree with the statement, if you only slightly agree with it, if you slightly disagree with it, or if you strongly disagree with it. INTERVIEWER: SHOW CARD WITH FOUR SETS OF THUMBS TO EXPLAIN HOW TO USE THUMBS TO INDICATE YOUR ANSWER.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
14.2	[SOCIAL COHESION] a. Most people in this community will help their neighbors when they have a problem b. People in this community repay their debts to others c. Disputes between households are very rare in this community	Strongly Agree Agree Neutral Disagree Strongly Disagree a. 1.....2.....3.....4.....5 b. 1.....2.....3.....4.....5 c. 1.....2.....3.....4.....5	

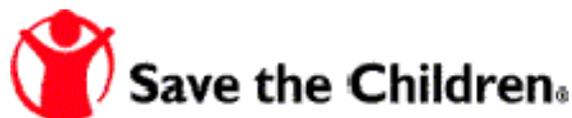
NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
	d. People in this community do not help each other in times of need e. People in this community tend not to trust one another f. There are strong relationships between people in this community g. People in this community are always able to discuss problems that affect everyone	d. 1.....2.....3.....4.....5 e. 1.....2.....3.....4.....5 f. 1.....2.....3.....4.....5 g. 1.....2.....3.....4.....5	
14.3	[COLLECTIVE EFFICACY] a. If a problem arise that people cannot solve by themselves, our community as a whole will be able to solve it b. Whenever our community undertakes a project, we know that we will all work hard until it is accomplished c. Whenever a community problem arises, I have a lot of confidence that we will be able to solve it d. As members of this community, we are able to tackle the most difficult situations because we are all committed to the same collective goals e. If people in this community work together, we can find solutions to many of our problems	Strongly Agree Agree Neutral Disagree Strongly Disagree a. 1.....2.....3.....4.....5 b. 1.....2.....3.....4.....5 c. 1.....2.....3.....4.....5 d. 1.....2.....3.....4.....5 e. 1.....2.....3.....4.....5	
14.4	[CONFLICT MANAGEMENT] a. When conflicts or disagreements arise between community members, they are always resolved quickly b. People in this community usually have trouble dealing with conflict c. There are people in the community who have been feuding for a long time d. When conflicts or disagreements arise between community members, other community members get involved to help resolve the issue	Strongly Agree Agree Neutral Disagree Strongly Disagree a. 1.....2.....3.....4.....5 b. 1.....2.....3.....4.....5 c. 1.....2.....3.....4.....5 d. 1.....2.....3.....4.....5	
14.5	[LEADERSHIP] Now, I would like to hear your opinions about the leaders in this community. Once again, use your thumbs to tell me if you strongly agree, slightly agree, slightly disagree or strongly disagree with the following statements a. There are women leaders in our community b. Our leaders treat all people in the community equally c. Our leaders listen to input from everyone in the community when making a decision d. Our leaders always lead by example e. When our leaders ask people to help with a community activity, almost everyone is willing to do their share of the work f. Our leaders are good at resolving disagreements between people in this community g. Our leaders understand my problems	Strongly Agree Agree Neutral Disagree Strongly Disagree a. 1.....2.....3.....4.....5 b. 1.....2.....3.....4.....5 c. 1.....2.....3.....4.....5 d. 1.....2.....3.....4.....5 e. 1.....2.....3.....4.....5 f. 1.....2.....3.....4.....5 g. 1.....2.....3.....4.....5	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
14.6	<p>[EFFECTIVE LEADERSHIP] I am going to read you a list of things that some leaders do and I would like you to tell me how good you believe the leaders in this community are at doing these things. Use your thumbs to tell me if you think that they are very good, slightly good, slightly bad, or very bad:</p> <p>How good are your leaders at:</p> <p>a. Getting people in the community to start talking about a problem</p> <p>b. Encouraging people in the community to participate in community meetings</p> <p>c. Setting goals and objectives for community activities</p> <p>d. Developing a plan for community activities</p> <p>e. Assigning tasks fairly</p> <p>f. Ensuring that everyone in the community gets the same benefits from the community activity</p> <p>g. Obtaining money from organizations outside the community to support the activity</p> <p>h. Reconciling disputes in the community</p>	<p>Very Good Slightly Good Neutral Slightly Bad Very Bad</p> <p>a. 1.....2.....3.....4.....5</p> <p>b. 1.....2.....3.....4.....5</p> <p>c. 1.....2.....3.....4.....5</p> <p>d. 1.....2.....3.....4.....5</p> <p>e. 1.....2.....3.....4.....5</p> <p>f. 1.....2.....3.....4.....5</p> <p>g. 1.....2.....3.....4.....5</p> <p>h. 1.....2.....3.....4.....5</p>	
14.7	<p>What would you say are the three biggest health problems affecting the people that live in this your community?</p> <p>(Allow respondent to provide problems before proceeding to rank)</p> <p>Which is the most important?</p> <p>Which is the second most important?</p>	<p style="text-align: right;">RANK</p> <p>1.</p> <p>2.</p> <p>3.</p>	
14.8	<p>How likely do you think your community could obtain help from organizations outside the community to solve these problems – very likely, a little likely, not very likely, or not at all likely?</p>	<p>VERY LIKELY 1</p> <p>A LITTLE LIKELY 2</p> <p>NOT VERY LIKELY 3</p> <p>NOT AT ALL LIKELY 4</p>	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
14.9	<p>Now I will read some statements to you. Please use your thumbs to tell me whether you strongly agree, agree, disagree or strongly disagree with each statement.</p> <p>a. Whenever our community undertakes a project together, I know that I can participate</p> <p>b. Whenever a community problem arises, I have a lot of confidence that I will be able to solve it if I work with other people in my community</p> <p>c. I have the skills, knowledge and ability to help solve problems facing this community</p> <p>d. I believe that my contribution to community activities can help our community achieve its goals</p>	<p>Strongly Agree Agree Neutral Disagree Strongly Disagree</p> <p>a. 1.....2.....3.....4.....5</p> <p>b. 1.....2.....3.....4.....5</p> <p>c. 1.....2.....3.....4.....5</p> <p>d. 1.....2.....3.....4.....5</p>	

CHECK FOR THE COMPLETENESS OF THE
FORM AND THANK THE MOTHER FOR THE INTERVIEW

ANNEX 2: Indicator Definitions and Tabulation Plan



LINCHPIN

Lufwanyama Integrated Neonatal and Child Health Project in Zambia

Indicators and Tabulation Plan

**Final Knowledge, Practice, and Coverage (KPC)
Household Survey
(Including Revised Rapid CATCH)**

Cooperative Agreement: GHS-A-00-09-00013-00

Project Dates: 1 October 2009 – 30 September 2014

Category: Innovation

Location: Lufwanyama District, Copperbelt Province, Zambia

Submitted by:

Save the Children Federation, Inc.

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PRIORITY CHILD HEALTH INDICATORS

Maternal and Newborn Care

1. Percentage of mothers with children age 0-23 months who received at least two tetanus toxoid before the birth of the youngest child.
2. Percentage of children age 0-23 months whose births were attended by skilled personnel.
3. Percentage of children age 0-3 months who received a post-natal visit from an appropriately trained health worker within three days after birth.

Breastfeeding and Infant and Young Child Feeding

4. Percentage of children age 0-5 months who were exclusively given breast milk the day prior to the interview.
5. Percent of children age 6-23 months fed according to a minimum of appropriate feeding practices.

Vitamin A Supplementation

6. % of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall.

Immunization

7. Percent of children aged 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey.
8. Percent of children aged 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey.
9. Percent of children age 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey.

Malaria

10. Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began.
11. Percentage of children age 0-23 months who slept under an insecticide-treated bed net the previous night.

Control of Diarrhea

12. Percentage of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids.

Acute Respiratory Infections

13. Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider.

Water and Sanitation

14. Percentage of households of children age 0-23 months that treat water effectively.
15. Percentage of mothers of children age 0-23 months who live in a household with soap at the place for hand washing.

Anthropometrics

16. Percentage of children age 0-23 months who are underweight (-2SD for the median weight for age, according to WHO/NCHS reference population).

Question Number	Indicator	How to Calculate the Indicator
2.5-2.8	<p style="text-align: center;">Tetanus Toxoid</p> <p>% of mothers with children age 0-23 months who received at least 2 tetanus toxoid vaccinations before the birth of their youngest child</p>	$\frac{\text{\#of mothers with children age 0-23 months who received at least 2 tetanus toxoid vaccinations before the birth of their youngest child}}{\text{Total \# of mothers of children age 0-23 months in the survey}} \times 100$
2.15	<p style="text-align: center;">Skilled Delivery Assistance</p> <p>% of children age 0-23 months whose births were attended by skilled personnel</p>	$\frac{\text{\# of children age 0-23 months whose birth was attended by a doctor, nurse, midwife or auxiliary midwife}}{\text{Total \# of mothers of children age 0-23 months in the survey}} \times 100$
2.19-21	<p style="text-align: center;">Clean Cord Care</p>	$\frac{\text{\# of births using clean instrument}}{\text{Number of mothers of children age 0-11 months in the survey}} \times 100$
2.23-24	<p style="text-align: center;">Newborns Dried and Wrapped</p>	$\frac{\text{\# of newborns who were dried and wrapped with a warm cloth or blanket immediately after birth(before placenta delivered)}}{\text{\# of mothers of children age 0-11 months in the survey}} \times 100$
2.31	<p style="text-align: center;">Knowledge of Neonatal Danger Signs</p>	$\frac{\text{Percent of mothers able to report at least two known neonatal danger signs}}{\text{Total no. of mothers with children less than 24 months}} \times 100$

Question Number	Indicator	How to Calculate the Indicator
4.1	Maternal Knowledge of Child Danger Signs	Percent of mothers of children aged 0-23 months who know at least two signs of childhood illness that indicate the need for treatment $\frac{\text{Total no. of mothers of children aged 0-23 months who know at least two signs of childhood illness that indicate the need for treatment}}{\text{Total no. of mothers of children aged 0-23 months}} \times 100$
28	Maternal Vitamin A Supplementation	Percent of mothers who received a Vitamin A dose during the first two months after delivery $\frac{\text{Total no. of mothers who received a Vitamin A dose during the first two months after delivery}}{\text{Total no. of mothers with children less than 24 months}} \times 100$
3	Post-Natal Visit to Check on the Newborn % of children age 0-3 months who received a post-natal visit from an appropriate trained health worker within two days after birth	# of children age 0-3 months who received a post-natal visit within two days after birth by an appropriate health worker $\frac{\text{# of children age 0-3 months who received a post-natal visit within two days after birth by an appropriate health worker}}{\text{Total # of children age 0-3 months in the survey}} \times 100$
39-42	Exclusive Breastfeeding ** % of children age 0-5 months who were exclusively breastfed during the last 24 hours **NOTE: If any answers to Q40 or Q41 are coded as Don't Know (9) or Missing (Blank) then the entire case should not be included in the numerator and denominator	# of children age 0-5 months who drank breast milk in the previous 24 hours AND Did not drink any other liquids in the previous 24 hours AND Was not given any other foods or liquids in the previous 24 hours $\frac{\text{# of children age 0-5 months who drank breast milk in the previous 24 hours AND Did not drink any other liquids in the previous 24 hours AND Was not given any other foods or liquids in the previous 24 hours}}{\text{Total # of children age 0-5 months in the survey**}} \times 100$

Question Number	Indicator	How to Calculate the Indicator
39-42	<p>Infant and Young Child Feeding</p> <p>Percent of children age 6-23 months fed according to a minimum of appropriate feeding practices</p>	See Below
9.1-2	<p>Vitamin A Supplementation</p> <p>% of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall</p>	$\frac{\text{\# of children age 6-23 months who received a dose of Vitamin A in the last 6 months}}{\text{Total \# of children age 6-23 months in the survey}} \times 100$
9.3-9	<p>Measles Vaccination</p> <p>% of children aged 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey</p>	$\frac{\text{\# of children age 12-23 months who received a measles vaccination by the time of the interview as seen on the card OR recalled by the mother}}{\text{Total \# of children age 12-23 months in the survey}} \times 100$
9.3-9	<p>Access to Immunization Services</p> <p>% of children aged 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey</p>	$\frac{\text{\# of children who received DTP1 at the time of the survey according to the vaccination card/child health booklet OR mother's recall}}{\text{Total \# of children age 12-23 months in the survey}} \times 100$

Question Number	Indicator	How to Calculate the Indicator
9.3-9	<p>Health Systems Performance Regarding Immunization Services</p> <p>% of children aged 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey</p>	<p>#of children who received DTP3 at the time of the survey as verified by vaccination card or child health booklet OR Recalled by the mother</p> <hr/> <p>Total # of children age 12-23 months in the survey</p> <p style="text-align: right;">x 100</p>
5	<p>Treatment of Fever in Malarious Zones</p> <p>% of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began</p>	<p># of children age 0-23 months with a febrile episode during the last two weeks AND who sought treatment within 24 hours AND Was treated with an appropriate anti-malarial drug</p> <hr/> <p>Total # of children age 0-23 months with a febrile episode in the last two weeks</p> <p style="text-align: right;">x 100</p>
11	<p>ITN Use</p> <p>% of children age 0-23 months who slept under an insecticide-treated bed net the previous night</p>	<p># of children age 0-23 months who slept under an insecticide-treated bed net the previous night</p> <hr/> <p>Total # of children age 0-23 months in the survey</p> <p style="text-align: right;">x 100</p>
6	<p>ORT Use</p> <p>% of children age 0-23 months with diarrhea in the last two weeks who received oral re-hydration solution and/or recommended home fluids</p>	<p># of children age 0-23 months with diarrhea in the last two weeks AND who received oral rehydration solution (ORS) and/or recommended home fluids</p> <hr/> <p>Total # of children age 0-23 months who had diarrhea in the last two weeks</p> <p style="text-align: right;">x 100</p>

Question Number	Indicator	How to Calculate the Indicator
6	Zinc Treatment for Diarrhea	Proportion of children aged 0-23 months with diarrhea in the last two weeks who were treated with zinc supplements $\frac{\text{No. of children aged 2-23 months with diarrhea in the last 2 weeks}}{\text{Total \# of children aged 0-23 months with diarrhea in the last 2 weeks}} \times 100$
7	Appropriate Care Seeking for Pneumonia % of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider	$\frac{\text{\# of children age 0-23 months with chest-related cough and difficult breathing in the last two weeks AND who were taken to an appropriate health provider}}{\text{Total \# of children age 0-23 months with chest-related cough in the last two weeks}} \times 100$
10	Point of Use % of households of children age 0-23 months that treat water effectively	$\frac{\text{\# of households of mothers of children age 0-23 months that treat water effectively}}{\text{Total \# of mothers of children age 0-23 months in the survey}} \times 100$
10	Appropriate Hand Washing Practices % of mothers of children age 0-23 months who live in households with soap at the place for hand washing	$\frac{\text{\# of mothers of children age 0-23 months who live in households with soap at the place for hand washing}}{\text{Total \# of mothers of children age 0-23 months in the survey}} \times 100$

Question Number	Indicator	How to Calculate the Indicator
83	<p data-bbox="527 240 695 269">Underweight</p> <p data-bbox="342 313 867 456">% of children age 0-23 months who are underweight (-SD for the median weight for age, according to WHO/NCHS reference population)</p>	<p data-bbox="926 277 1755 345"># of children age 0-23 months with weight/age -2 SD for median weight for age, according to WHO/NCHS reference population</p> <hr data-bbox="999 410 1682 414"/> <p data-bbox="1024 423 1656 456">Total # of children age 0-23 months in the survey</p> <p data-bbox="1808 391 1881 418">x 100</p>

IYCF Calculations

The summary IYCF indicator measures several IYCF practices among children age 6-23 months. Based on WHO guidelines for feeding breastfed (2003) and non-breastfed (2005) children, the **IYCF practices indicator** is comprised of the following three components:

1. Continued breastfeeding or feeding of milk or milk products
2. Feeding solid/semi-solid food the minimum number of times per day according to age and breastfeeding status
3. Feeding the minimum number of food groups per day according to breastfeeding status

Feeding Practice	Breastfeeding Status	
	<i>Breastfed</i>	<i>Non-breastfed</i>
Breastfed or Fed milk or milk products	Continued breastfeeding (A)	Fed milk or milk products (i.e. milk, dairy products or infant formula) (B)
Fed (solid/semi-solid foods) minimum number of times per day		
6- 8 months	Two (C)	Four (D)
9-23 months	Three	Four
Fed minimum number of food groups¹		
6-23 months	Three (E)	Four (F)

X= age of child in months

FOR THE BREASTFED CHILD

In order to meet the minimum appropriate feeding practices, the breast fed child must meet **ALL** the following conditions:

1. The child must be between 6 and 23 months of age
2. Be fed breast milk in the previous 24 hours
3. If the child is between 6 and 8 months, be fed at least 2 times during the previous 24 hours. If the child is between 9 and 23 months, be fed at least 3 times during the previous 24 hours.
4. Be fed a minimum of 3 of the 8 food groups. (See the footnote 1 below for more information.)

Syntax for these conditions:

Q10A=1 AND [((x >= 6 AND x <= 8) AND (Q12 >=2 and Q12 <=7)) OR ((x >= 9 AND x <= 23) AND (Q12 >=3 and Q12<=7))] AND Q11T>=3

¹ Based upon a 24 hour recall of food groups fed to the child age 6-23 months. The eight food groups are: 1. infant formula, milk other than breast milk, cheese or yogurt (Q.11A OR Q.11B OR Q.11C); 2. foods made from grains, roots, and tubers, including porridge, fortified baby food from grains (Q.11D OR Q.11E OR Q.11F OR Q.11G); 3. vitamin A-rich fruits and vegetables (and red palm oil) (Q.11H OR Q.11I OR Q.11J OR Q.11K); 4. other fruits and vegetables (Q.11L); 5. eggs (Q.11M); 6. meat, poultry, fish, and shellfish (and organ meats) (Q.11N OR Q.11O OR Q.11P OR Q.11Q); 7. legumes and nuts (Q.11R); 8. foods made with oil, fat, butter (Q.11S).

FOR THE NON-BREASTFED CHILD

In order to meet the minimum appropriate feeding practices, the non-breast fed child must meet **ALL** the following conditions:

1. The child must be between 6 and 23 months of age
2. Not fed breast-milk in the previous 24 hours
3. Be fed milk or milk products
4. Be fed at least four times during the previous 24 hours
5. Be fed a minimum of 4 of the 8 food groups. (See the footnote 1 below for more information.)

Syntax for these conditions:

[(Q10A <> 1) AND (Q10C = 1 OR Q11B = 1 OR Q11C = 1)] AND (Q12>=4 and Q12 <=7) AND Q11T >=4

How to Calculate the Indicator	
<p>Infant and Young Child Practice Indicator</p> <p>Percent of infants and young children aged 6-23 months fed according to a minimum of appropriate feeding practices</p>	<p># <i>breastfed</i> children aged 6-23 months fed according to a minimum of appropriate feeding practices (with the number of children who meet the criteria for all of the following three indicators: Continued Breastfeeding Indicator AND Minimum frequency of feeding for breastfed child AND Minimum dietary diversity for breastfed child)</p> <p style="text-align: center;">OR</p> <p># <i>non-breastfed</i> children aged 6-23 months (with the number of children who meet the criteria for all of the following three indicators: Fed milk or milk products for non-breastfed children Indicator AND Minimum frequency of feeding for non-breastfed child AND Minimum dietary diversity for non-breastfed child)</p> <hr style="width: 80%; margin-left: auto; margin-right: 0;"/> <p style="text-align: right;">x 100</p> <p style="text-align: center;">Total # children aged 6-23 months in the survey</p>

Annex 7: Community Health Worker Training Matrix

Project Area (Name of District Or Community)	Type of CHW/support staff	Official Government CHW or Grantee-Developed Cadre	Paid or Volunteer	Number Trained Over Life of Project		Focus of Training
				Male	Female	
Lufwanyama District	Trained Traditional Birth Attendants	TBAs	Volunteers		111	Refresher-Focused on ANC, ENC NRP, PNC and maternal and newborn danger signs.
Lufwanyama District	Nurses and Midwives	Government	Paid	1	14	Training of Supervisors-Supervision of TBAs in providing maternal and newborn care.
Lufwanyama District	Health Workers, LINCHPIN staff	Government and Project staff	Paid	3	4	Training of Trainers-Skills in training CHWs in CCM of diarrhea, pneumonia, malaria and Neonatal sepsis.
Lufwanyama District	Male and female Community Health Workers	Community health Workers	Volunteers	58	16	Training in CCM-Assessing and managing sick children, identifying danger signs and making referrals
Lufwanyama District	LINCHPIN staff and District EHT	Government and Project staff	Paid	5	3	Training of Trainers-Community mobilization and BCC.
Lufwanyama District	Environmental Technicians, Clinical Officers and Nurses	Government and Project staff	Paid	9	8	Training of Supervisors-Supervision of CHWs trained in CCM.
Lufwanyama District	LINCHPIN staff, District EHT and Maternal and Child Coordinator	Government and Project staff	Paid	5	3	Training of Trainers-Facilitation skills in training teams in teaming concept.
Lufwanyama District	Community Health Workers, Traditional Birth Attendants and Neighborhood Health	CHW	Volunteers	102	82	Training-Teaming-Working as a team to provide continuum of care for maternal newborn and child health, conduct joint postnatal visits

Project Area (Name of District Or Community)	Type of CHW/support staff	Official Government CHW or Grantee-Developed Cadre	Paid or Volunteer	Number Trained Over Life of Project		Focus of Training
				Male	Female	
	Committees					and identify danger signs and make prompt and appropriate referrals.
Lufwanyama District	Clinical Officers, Nurses, EHTs	Government	Paid	15	15	Orientation - CCM Data Collection
Lufwanyama District	Community Health Providers	Leaders NHCs, SMAGs Male Motivators, Chief Retainers	Volunteers	42	30	Training - Leadership skills, communication, community mobilization, resource mobilization, conflict resolution
Lufwanyama District	Safe Motherhood Action Group Members	SMAG Members	Volunteers	35	77	Training-To provide skill to SMAGS in order to sensitize the community to issues related to pregnancy, childbirth and child health.
Lufwanyama District	CHWs and TBAs and NHCs	CHW/TBA/NHC	Volunteers	49	53	Refresher-PNC, ENC and continuum of maternal and newborn care

MDG 4 and 5: Local to Global Trainings

Project Area	Type of Provider	Paid or Volunteer	# Trained		Focus of Training
			M	F	
MDG 4 & 5 SIDA FRAME					
Action Planning	NHCs	Volunteer	28	12	Planning and implementation
Financial Management	NHCs	Volunteer	28	12	Proper management and utilization of funds
Roles and Responsibilities	NHCs	Volunteer	20	20	Proper functioning of NHCs
Proposal Writing	NHCs	Volunteer	24	16	External resource mobilization
Leadership skills	NHCs	Volunteer	24	16	Proper functioning of NHCs
Health Centre Staff Supervisory Roles	Health Centre Staff	Civil Servants	5	2	Proper supervision of NHCs
Budget Tracking and Use of Score Cards	NHCs	Volunteer	8	12	Track funds meant for community
Community Action Plan	NHCs	Volunteer	20	20	Proper implementation of community activities
LOCAL TO GLOBAL					
Train duty bearers in rights-based advocacy	Civil Servants	Civil servants	10	2	Promotion of child rights
Train caregivers and parents in child rights	Caregivers	Volunteer	27	13	Promotion of child rights
Train traditional leaders in CRP	Traditional Leaders	Volunteer	10	2	Promotion of child rights
Train children in CRP	Children	pupils	20	20	Promotion of child rights
Train frontline health workers in rights-based advocacy	NHCs	Volunteer	10	5	Promotion of child rights
Train Teachers in CRP	Teachers	Civil servants	6	9	Promotion of child rights
Train Teachers in rights-based approaches	Teachers	Civil servants	6	9	Promotion of child rights

Materials and Guidelines Adapted or Developed to Support Training

Material /Manuals	Developed /Adopted	Trainees/Cadre
Simplified Guide Manual	Health Communication Partnership(z)	NHCs/CHW/TBA
Health Care within Community	Health Communication Partnership(z)	NHCs/CHW/TBA
Leadership Manual	LINCPHIN	NHCs/CHW/TBA
Teaming Manual	LINCHPIN	NHCs/CHW/TBA
Financial and Resource Mobilization	LINCHPIN	NHCs/Partners
SMAG	MCDMCH	SMAGs
Community Mobilization	Save the Children	NHCs/CHW/TBA
Mobilizing Communities for health and social change	Save the Children	SCI Staff
iCCM	UNICEF and Ministry of Health	CHWs
Refresher ENC	Ministry of Health, WHO	TBAs
C-BGMP	National Food and Nutrition Commission/Ministry of Health	GMPs/Health Workers
IYCF for Community Health	National Food and Nutrition Commission/Ministry of Health	IYCF/Health Workers
CCM Supervision	Ministry of Health	Health Workers
ENC Supervision	Ministry of Health	Health Workers
IMCI	Ministry of Health	Health Workers
Child Rights Programming	SCI	SCI Staff
Aggresso/Awards Management	SCI	SCI Staff
Implementation and Evaluation	Zambia capacity building	SCI Staff/Partners
HBB	American academy of Paediatrics	Health Workers
KMC	MCHIP, ACCESS, MOH	Health Workers

Annex 8: Evaluation Scope of Work

Scope of Work

USAID/CSHGP CS-25 Project - LINCHPIN

Lufwanyama Integrated Neonatal and Child Health Project in Zambia

Cooperative Agreement Number: GHS-A-00-09-00013-00

Project Background

In Zambia 77,000 children die every year before reaching their fifth birthdays, most from common childhood infections: pneumonia, malaria, diarrhea. More than one in four (26 percent) of these deaths occurs in the first month of life. In Zambia's sparsely settled and underserved Lufwanyama District, the situation for newborns and young children is worse than the national average. Only one in ten families can reliably access treatment for the common, but serious, childhood infections because of long distances to health facilities, poorly equipped facilities, incomplete staffing, poor road infrastructure, lack of transport, and seasonal flooding. Newborns and children die at home, often untreated.

In 2009 Save the Children was awarded a five-year cooperative agreement by USAID Child Survival and Health Grant Program (CSHGP) (October 2009-September 2014). This CS-25 cycle innovative category project, known as the Lufwanyama Integrated Child Health Program in Zambia (LINCHPIN), addresses the country's four main causes of under-five death: newborn conditions, pneumonia, malaria, and diarrhea. Designed and implemented in collaboration with local health authorities and national and international partners, LINCHPIN interventions include maternal and newborn care (40%), pneumonia case management (20%), prevention and treatment of malaria (20%), and control of diarrheal disease (20%). LINCHPIN's overarching strategy is delivery of an integrated community-based newborn care and integrated Community Case Management (iCCM) package through an enhanced district-wide community health program linked to health facilities and consistent with government¹ plans and policies. The LINCHPIN "innovation" teams traditional birth attendants (TBAs), community health workers (CHWs), and Neighborhood Health Committees (NHCs) to work together to close gaps in the continuum of care and mobilise communities to support increased use of evidence-based high-impact life-saving services and practices.

Lufwanyama District (12°46'S 27°32'E) in Zambia's Copperbelt Province has a current (2011) total population of 87,592 (2010 census) with 17,518 (20 percent) children under-five and 19,270 (22 percent) women of reproductive age. The goal of LINCHPIN is to decrease under-five mortality in Lufwanyama District by increasing the use of life-saving interventions through delivery channels that are accessible, available, high quality, demanded and supported.

LINCHPIN has four intermediate results (IRs): **IR-1:** Increased access to and availability of services, **IR-2:** Improved quality of services, **IR-3:** Increased demand for services and health practices, and **IR-4:** Enabled environment. The major corresponding strategies are: (1) community-based providers (TBAs and CHWs) delivering antenatal, newborn, and post-natal care (PNC) and iCCM with facilitated referral; (2) competency-based CHW and TBA training;

¹ NOTE: After the project commenced, a new Ministry of Community Development, Mother and Child Health was formed to take responsibility for service delivery at the district and community levels.

(3) reliable supply of drugs and equipment; (4) systematic supervision; (5) health facility staff trained or retrained in all intervention packages; (6) NHCs supported to expect and request high quality services; (7) health facility staff and NHCs promoting key practices, danger sign recognition, and appropriate care-seeking, other locally appropriate behavior change channels and enhanced community capacity, (8) program learning; and (9) government policies and strategies favoring iCCM in place at the national level.

The CSHGP award is/has been matched by funds from the ELMA Foundation and Crown Philanthropies, Athene Foundation, Towers and Perrin, and other generous donors.

Purpose of the Final Evaluation

The purpose of USAID's CSHGP is to contribute to advancing the health system strengthening goals of Ministries of Health (MOH) toward achieving sustained improvements in child survival and health outcomes, particularly among vulnerable populations. This purpose is carried out by supporting the innovative, integrated, community-oriented programming of PVOs/NGOs and their in-country partners. CSHGP cooperative agreements offer unique opportunities to demonstrate the links between specific delivery strategies and measured outcomes. The final evaluation is intended as a performance evaluation and should be broadly accessible to various audiences, including MOH. Findings will contribute evidence relevant to global initiatives such as the Global Health Initiative and Feed the Future.²

The FE provides an opportunity for all project stakeholders to take stock of accomplishments to date and to listen to the beneficiaries at all levels, including mothers and caregivers, other community members and opinion leaders, community- and facility-based health workers, health system administrators, local partners, other organizations, and donors. The FE report may be used by the following audiences as a source of evidence to help inform decisions about future program designs and policies. It is important that the final evaluation consider these audiences when conducting the evaluation and writing the report:

- In-country partners at national, regional, and local levels (e.g., MOH and other relevant ministries, district health teams, local organizations, beneficiary communities).
- USAID (CSHGP, Global Health Bureau, USAID Missions) and other CSHGP grantees.
- The international global health community. The FE reports will be posted for public use on the MCHIP PVO/NGO Web site (<http://www.mchipngo.net>) and the USAID DEC

In addition, the FE provides an opportunity to learn from implementation experience (see text box below) to identify what worked, what did not, and why.

² For more information on these two initiatives, visit <http://www.usaid.gov> and <http://www.feedthefuture.gov>.
LINCHPIN Zambia (CS-25), Final Evaluation Report, February 2015, Save the Children

Learning: *Evaluations of projects that are well designed and executed can systematically generate knowledge about the magnitude and determinants of project performance, permitting those who design and implement projects and develop programs and strategies—including USAID staff, host governments, and a wide range of partners—to refine designs and introduce improvements into future efforts. Learning requires careful selection of evaluation questions to test fundamental assumptions underlying project designs, methods that generate findings that are internally and externally valid (including clustering evaluations around priority thematic questions), and systems to share findings widely and facilitate integration of the evaluation conclusions and recommendations into decision making. The FE report should represent a thoughtful, well-researched, and well-organized effort to objectively evaluate what worked in the project, what did not, and why.**

**From USAID Evaluation Policy titled “Learning from Experience” at <http://transition.usaid.gov/evaluation/USAIDEvaluationPolicy.pdf>.*

The FE will draw upon existing data collected or compiled during the project cycle, as well as additional data collected during the evaluation for the following purposes:

- To provide an overview of project goals, objectives, and key intervention strategies implemented
- To determine the extent to which the project accomplished the results outlined in the DIP and to present evidence of these accomplishments
- To describe key factors that contributed to what worked or did not work regarding some or all aspects of the program
- To demonstrate how the project contributed to learning and evidence that is directly relevant to improving MOH policies and practices, as well as global learning about community-oriented health programming
- To provide a record of the results obtained by the project and the process by which they were achieved, so USAID can share these results with others outside of the CSHGP—including the U.S. Congress and in-country partners—and help others understand what should be done if they want to reproduce these results

The FE provides grantees and local stakeholders with an additional opportunity for the project to benefit from the outside perspective of a consultant (i.e., the final evaluator). This outside perspective also provides to grantees and local partners information on accomplishments and areas for improvement. Thus, future work can take advantage of these experiences, focusing on the relevance of evidence generated during the project for implementation design and possible scale-up decisions. In-country partners who may be continuing project work require a record of what was done as a basis for their future activities. The PVO/NGO can also use the evidence produced in future programming, both within the country and in other parts of the world.

USAID Missions are crucial partners for centrally funded CSHGP projects. The USAID Mission represents and carries out the agency’s strategy for health at the country level, seeking to strengthen MOH efforts and policies through complementary health programming to maximize overall impact. Mission bilateral programs are vehicles for achieving scale of proven interventions. USAID Missions can provide a forum for exploring opportunities to achieve scale at the country level. USAID Missions will review the FE reports to determine how results contribute to fulfilling the USAID Mission’s strategic plan.

In addition to reviewing project results, CSHGP extracts information from the portfolio of all CSHGP projects to present the key accomplishments of the program. This information, including interpersonal contacts made by community health workers (CHWs) and other community-based cadres and the estimated number of additional lives saved using KPC survey data, is used to understand best practices and lessons learned and explain how CHSGP contributes to the global health community.

In addition, Save the Children is particularly interested in exploring:

- Sustainability of community package in Lufwanyama District, especially newborn care and iCCM
- District and national-level interest in the CHW-TBA teaming approach and potential for uptake by government and/or non-governmental structures
- Community mobilization and capacity-building of NHCs and their relationship to project's strengths and weaknesses

Final Evaluation Methodology

A Team Leader (external consultant) will lead the final evaluation, which will focus on outcomes, results, sustainability, partner relationships, and the enabling environment, including challenges and barriers to success.

The core FE team is expected to include representatives from the Ministry of Community Development, Mother and Child Health (MCDMCH), Lufwanyama District Health Management Team, Boston University (OR partner), and Save the Children. Save the Children team members will likely include: Senior Child Survival Advisor; Senior Advisor, Health-Africa/CS-25 Technical Backstop; Senior Capacity-Building Advisor-Health; LINCPHPIN Program Manager; LINCPIN Deputy Program Manager; and others as designated.

Save the Children will provide the Team Leader (Consultant) and other core team members with key project documents and both qualitative and quantitative data prior to arrival in-country. Both electronic and hard copies of these and other pertinent documents will be available upon arrival. The Team Leader and Save the Children will agree on a timetable for documents to be sent out and details of fieldwork plans through email exchange through the Technical Backstop (Karen Waltensperger).

Key documents include but not limited to:

- Detailed Implementation Plan (DIP);
- Baseline Health Facility Assessment (HFA) results;
- Baseline and endline KPC survey results;
- Documentation of community mobilization/community capacity building through NHCs;
- Training materials and documentation (if requested);
- Annual Reports to CSHGP for Years 1,2,and 4;
- Report of midterm evaluation;
- OR protocol, teaming assessment, and final OR Report; and
- Copies of publications and papers in preparation for publication.

Guidance and tools for key informant interviews and focus group discussion will be rafted or adapted by the Team Leader and shared with the Save the Children core team members and LINCHPIN team prior to arrival in-country.

The core evaluation team will meet in the Save the Children Kalulushi office for a day of discussion and logistics review, led by the Team Leader. This is an opportunity to present the project and team members, identify and resolve last-minute problems, divide tasks among participants, and take care of final logistic arrangements. A second day in the office will be devoted to a review of the M&E system, data collection tools, and OR.

The evaluation team, split into two sub-teams, will spend 2 days in the field in Lufwanyama District to collect qualitative data using interviews, observations and focus group discussions at provincial, district, and community levels. One sub-team may focus on the community package of iCCM and neonatal care, while the other may focus on community capacity building and teaming. Key contacts will likely include DHMT, district authorities, health facility staff, CHWs, TBAs, NHC members, community and traditional leaders, and other stakeholders.

The FE team and sub-teams will work together in the field to identify successes and challenges, review findings, triangulate information, and highlight strengths and gaps identified. Following a week in the Copperbelt, the core evaluation team and other key persons will travel to Lusaka for a second week of interviews, contacts, and de-briefings at the national level.

**Tentative In-country Schedule for Save the Children LINCHPIN Final Evaluation
31 August – 30 September 2012**

Dates	Activities
Sun, 31 Aug	<ul style="list-style-type: none"> • Arrivals in Ndola/Transfer to Kitwe (John Murray, Karen Waltensperger, Gail Snetro, David Marsh, Kojo Yeboah-Antwi)
Mon, 1 Sep	<ul style="list-style-type: none"> • FE team meets in Kalulushi office • Morning: Presentation of LINCHPIN (results framework, CCM and newborn care interventions, teaming innovation, community mobilization) • Afternoon: Review of evaluation schedule, sites selected for field visits, tools, and logistics arrangements and finalization of task assignments
Tue, 2 Sep	<ul style="list-style-type: none"> • Morning: M&E (Bias) and OR (David Marsh) presentations • Afternoon: Meetings/interviews with District Health Officer in Kalulushi, local partners
Wed, 3 Sep	<ul style="list-style-type: none"> • Morning: Meeting/interview with Provincial Health Officer, Ndola, and other key local stakeholders • Afternoon: Review of key documents, Q&A with LINCHPIN team
Thu, 4 Sep	<ul style="list-style-type: none"> • Field visits
Fri, 5 Sep	<ul style="list-style-type: none"> • Interviews with LINCHPIN team members
Sat, 6 Sep	<ul style="list-style-type: none"> • De-briefing with Kalulushi team; core team members fly to Lusaka
Sun, 7 Sep	<ul style="list-style-type: none"> • TBD (rest and teamwork)
Mon, 8 Sep	<ul style="list-style-type: none"> • National-level partner contacts (MCDMCH, MOH, UNICEF, etc.)
Tue, 9 Sep	<ul style="list-style-type: none"> • Review of collected data and development of preliminary results

Dates	Activities
Wed, 10 Sep	• Development of preliminary recommendations cont'd.
Thu, 11 Sep	• De-briefing with MCDMCH IMCI TWG (led by External Consultant)
Fri, 12 Sep	• De-briefing with SC Zambia and USAID Mission (led by external consultant)
Sat, 13 Sep	• Departures

Responsibilities of External Team Leader (Consultant)

- Review key project documents and assessments
- Draft/adapt final evaluation interview and focus group discussion guides and observation tools
- Lead the final evaluation in-country/lead one sub-team for field visits
- Conduct interviews with key stakeholders and partners at national/provincial?/district levels
- Present FE preliminary findings and recommendations at de-briefings with LINCHPIN team, Save the Children Lusaka, key partners/stakeholders (including IMCI TWG), USAID
- Write/assemble and submit final draft of evaluation report per deliverable schedule

Team Leader Deliverables

- Draft data collection tools by 15 August 2014
- Draft final evaluation key findings before leaving Zambia
- First draft of the FE report submitted by 24 October 2014
- Final draft of FE report submitted by 21 November 2014

Evaluation Guidelines

Current Final Evaluation Guidelines, Child Survival and Health Grants Program, USAID/GH/HIDN/NUT (July 2013) attached. Note that submission of a draft report to USAID CSGHP prior to end-of-project is no longer required, per Meredith Crews. Additional materials for evaluating iCCM projects to be supplied when available

Annex 9: Evaluation Methods and Limitations

1. Summary of evaluation process

The final evaluation (FE) was designed to review progress towards achieving project objectives; and to determine whether the project increased use of evidence-based, life-saving interventions by caregivers and children in the Lufwanyama District of Zambia. The FE team included an outside evaluator, SC staff from the regional and home offices, an MOH staff person from the District Health Office, and local SC project staff. Evaluation team members are listed in Annex 14.

The evaluation was conducted between September 1- 12, 2014. Interviews with district and sub-district staff were conducted from September 3-6. Topic guides were developed by the lead evaluator, adapted for local use and used by field teams to guide interviews with key informants. Health centers in the district were stratified by level of functioning (high, medium and low) and two facilities sampled randomly from each group. Three sub-teams were formed for field visits. Teams visited three health centers on September 4 (Mibila, Chinemu and Kapilamikwa), and three health centers on September 5 (Lumpuma, Bulaya, Mukumbo). A total of 6 of 17 health facilities were visited. At each health facility, interviews were conducted with facility staff. At least two CHWs and TBAs working the catchment area of the facility were randomly selected and interviewed – an attempt was made to interview both a teamed and an un-teamed worker at each facility. In addition, one NHC was selected randomly from the catchment area of each facility and interviews conducted with two NHC members. Additionally, one caregiver of a young child was randomly selected from a CHW or TBA register, and interviewed at home. Interviews with central level informants were conducted from September 8-11.

The evaluation team met at the beginning of the evaluation to review responsibilities of team members, collect documents, sample facilities and to develop the schedule for field visits and key informant interviews. The team met regularly during the evaluation process to review findings and monitor progress. All findings were discussed and synthesized by the evaluation team. A final summary of main findings and recommendations was reviewed and discussed with the head of the MOH Child Health Unit on September 9 and with a representative of the USAID HPN section on September 12, 2014. Following these meetings, evaluation findings and recommendations were further revised and finalized.

2. Data quality and use

Household survey data

A baseline 30-cluster household survey was conducted in May 2010 and a follow-up in August 2014. Proportional sampling methods were used to select caregivers of children aged 0-23 months from all nineteen catchment areas in the district (N=465 at baseline and N=544 at endline). The study instrument was adapted from the RAPID CATCH 2008 questionnaire. Coverage indicators used were consistent with standard international indicators. Standard methods were used to estimate 95% confidence intervals around estimated proportions. Baseline data were used to establish targets for key indicators. Since coverage of CHWs and TBAs is variable in the district, it is possible that some sampled areas did not receive project

interventions. Uneven coverage of project interventions may limit the ability of a district-wide sample to detect changes in key indicators at endline. Baseline and endline 30-cluster household surveys were also conducted as part of the operations research study on CHW/TBA teaming. These surveys limited the sampling frame to communities where CHW/TBA teams were active and administered household survey questionnaires to the caregivers of children aged 0-59 months. Data from these surveys were designed to capture changes in intervention coverage only in areas receiving routine project inputs plus teaming.

Measurement issues were noted for one indicator: Postnatal visits to check on newborns within the first 2 days after birth: Percentage of children age 0-23 who received a postnatal visit from an appropriate trained health worker within two days after the birth of the youngest child. A marked decline was noted (the indicator fell from 27% in 2010 to 10% in 2014). TBA register data indicate that about 80% of registered newborns received a PNC visit by a TBA within 24 hours in 2014. In addition, the household survey conducted in 2013 for the operations research project, which sampled only from populations with CHW/TBA teams, found that 84% of infants (<12) months had received a PNC contact within 2 days of birth. Taken together, these data suggest that coverage with early PNC contacts is higher. It seems likely that there was a measurement error associated with how this survey question was asked or interpreted, for example TBAs may not have been recorded as “appropriate providers” of PNC check-ups.

Community-based register data

Two community-based registers are used for tracking field activities; a TBA register and a CHW register. The TBA register records all newborns born in the TBA catchment area. TBAs record ENC tasks performed (if the TBA attended the delivery), PNC contacts by the TBA (24 hours, 2, 3 and 7 days; and 2, 6 and 8 weeks) and newborns with danger signs referred. The CHW register records all sick children who are seen by the CHW. CHWs record assessment findings, classification made and treatment given, cases referred, referral completed and follow-up of sick children. Registers are brought to the health facility each month. Facility-based health workers aggregate data in a facility aggregation register. Project staff collect aggregated data from each facility each month and process these data in the project office. Data are summarized as graphs and used to track performance. Register data are available for the period July 2011 – July 2014. Data are reviewed at the health facility level, for completeness and accuracy, and corrections made when possible. Register data are used to track a number of elements of community-based iCCM and MNCH home care.

Representativeness and quality of register data will be affected by:

- 1) The proportion of all deliveries and sick children registered by TBAs and CHWs in communities (CHWs are estimated to have registered approximately 87% of all expected cases of pneumonia and malaria during the full project period, and 9% of expected cases of diarrhea. TBAs are estimated to have registered approximately 72% of all expected deliveries during the project period – see FE text);
- 2) The proportion of TBAs and CHWs reporting each month (the proportion of CHWs reporting quarterly during the project period ranged from 91% to 59% and the proportion of TBAs

reporting during the project periods ranged from 88% to 45%, so reported figures underestimate total numbers of women and newborns registered by CHWs and TBAs); and

3) The completeness and accuracy with which registers are filled-in by TBAs and CHWs.

Overall register data provide useful data for tracking trends in performance and for determining the plausibility of reported changes in population coverage.

Process evaluation data

The project tracks project inputs and outputs in four areas: 1) Materials and guidelines developed; 2) Trainings planned and conducted by category of trainee; 3) Availability and coverage of TBAs, CHWs and TBA/CHW Teams by geographic area and by density of population; and 4) CHW and TBA attrition rates over time and reasons for drop-outs. Process data were useful for helping to determine “adequacy of implementation”, and therefore the likelihood that project activities contributed to changes in project outcomes.

Annex 10: Data Collection Instruments

Final Evaluation of the LINCHPIN Integrated Neonatal and Child Health Project: Key Informant Interview Guide

What is the purpose of key informant interviews?

Key informant interviews ask the question: “How well have program activities been implemented, and what are the barriers to effective implementation?”

Key informant interviews provide qualitative data from caregivers of children, community leaders and groups, CHWs and TBAs, facility-based health workers and district staff. They provide information about difficulties caregivers face in accessing services or information in communities. They may help identify problems CHWs and TBAs have in reaching communities they serve and in completing their tasks. They may also provide ideas for making improvements that will improve coverage.

Field interviews can help:

- Explain what is and is not working;
- Identify barriers to improving program performance; and
- Explore reasons for and solutions to, problems.

Who should be interviewed?

Key informants for the end of project evaluation could include:

- National staff – Maternal, Newborn and Child Health Program Staff, Child Health Technical Working Group Members;
- Provincial staff – PHO or PHMT;
- District staff – Medical Officer, Supervisors, DHMT Members;
- Facility-based health workers who see mothers, newborns and children at HFs;
- Midwives;
- CHWs and TBAs who have been trained – both in an out of teams;
- Caregivers of young children; and
- Key members of communities such as Lufwanyama District Council Members, NHC Members, SMAG Members, Health Center Committee Members and village leaders.

How many health workers, CHWs, TBAs or caregivers should be visited?

Key district staff, as well as staff involved with operations research can be interviewed at the district. Two teams will have three days for field visits. If we assume that each team can visit one health center or health post and the catchment area of that facility each day – then a total of nine facilities and catchment areas be visited. In each visited area, consider conducting:

- An interview with at least four facility staff–Nurse, Nurse-Midwife, Clinical Officer, Environmental Health Technician (could be conducted individually or jointly);
- An interview with one CHW/TBA team, and 1 un-teamed CHWs and TBAs;
- An interview with one caregiver of children 0-11 months of age; and
- An interview with two community leaders that are part of the NHC, SMAG or other relevant informants, if available.

How should key informants be selected?

Randomly select HFs

Assume three FE teams. Assume that each FE team can visit two facilities in the time available – for a total of nine. Stratify the 17 facilities in the district into two or three logical categories by geographic area. Once facilities have been listed – decide whether any need to be excluded – the most important reason for excluding is usually inaccessibility in the available time. From the final list of facilities, randomly select two facilities in each stratum – depending on the number of strata and the total number of facilities needed.

At each facility, FE teams will conduct interviews with health workers responsible for seeing children and newborns - also an interview with a Nurse-Midwife responsible for deliveries at the facility, if available. Ideally facilities will not be notified in advance – but if they do have to be notified, they should not be otherwise ‘prepared’ for the visits. It is important to try to get an idea of what is really happening in the field.

Randomly select CHW/TBA/NHCs/SMAGs

Each FE team will visit the randomly selected facilities. Each HF has a number of CHW/TBA teams, un-teamed CHWs and TBAs, NHCs/SMAGs in its catchment area. Make a list of the total number of teams, un-teamed CHWs and TBAs, NHCs/SMAGs in the catchment area of the facility. This list can be stratified into two categories – close to the facility (say within 1-2 miles) and more distant from the facility (more than 1-2 miles). Once the list is complete, make any exclusions, if necessary (possible reasons for exclusion: team members not available on the dates of the visit; geographically very inaccessible; high levels of NGO activity which make them unusual). Then randomly select a team from each stratum (two CHW/TBA teams), and an un-teamed CHW and TBA from each stratum. Interview NHC/SMAG members who work in the area of the selected team.

The selected two CHW/TBA teams, un-teamed CHW/TBA pairs and selected NHC/SMAG members will be visited in the community – they will need to be notified. In-depth discussions would then be held with CHWs, TBAs, NHC/SMAG members on the day of the visit. A focus group discussion with the NHC/SMAG all together could also be conducted.

Randomly select community informants

Community informants will ideally also be randomly selected. This can be done in communities. A possible way to do the selection would be:

Caregivers of young children. List women who have delivered in the previous six months from the list in the community register of the CHW/TBA team that has been randomly selected. Randomly select two women from the list. Ask the team to help find the women and arrange for them to meet for a short interview. If a woman is not available, randomly select another woman from the list.

Other community informants. Select NHC and SMAG members or other key local leaders from the community of one of the randomly selected teams. Ask the team to help find these people for a short interview. It may be easiest to conduct interviews in small groups.

How should interviews be conducted?

It is important that the interviewer does not prompt answers and that they allow informants to express their opinions. Caregivers of young children may respond better to female interviewers. Interviews should all be conducted with the informant alone, without other health staff, or community members present – to ensure that they do not influence responses. Interview topic guides are a way of guiding the

discussion, but are not a questionnaire. The questions do not have to be asked in any particular order, but the main issues should be covered – responses are noted in a separate notebook.

What preparations are needed?

Key preparations include:

- Deciding how to select key informants in each district;
- Deciding on the composition of interview teams;
- Making logistical arrangements: vehicles, fuel, per diems;
- Contacting district staff in advance if necessary;
- Adapting interview guides for local use; and
- Reviewing interview guides with team members to ensure that they are clear on how to complete them.

Introducing Key Informant Interviews

- Introduce yourself and explain that the interview is to find out about the maternal, newborn and child care program.
- Explain that all responses are anonymous and do not record the name of the respondent.
- Find a place away from others to ensure that respondents can answer without interference or the feeling that they are being observed or judged.
- Explain that you are asking questions about pregnancy, delivery, newborns and children. Newborns are babies between birth and 28 days old.
- Explain that there are no right or wrong answers. You would like the respondent to answer questions based on his or her own experience and as honestly as possible. You are interested in his or her experience and opinions, so that the program is made better. If something is not working well, or if there are problems, then these should be mentioned. If something is working well, and there are no problems, then these should be mentioned too.
- If there is anything else that is of concern to the respondent, that is not raised in the interview, they are welcome to express these other concerns.

Record responses in a separate notebook

Record:

- HF/community;
- Category of respondent (CHWs, TBAs, NHC member, Nurse, Clinical Officer, etc.);
- Topic being discussed; and
- Responses to the topic.

Remember: Topic guides can help introduce and guide the discussion. There may be other issues or questions that you would like to raise as part of this discussion.

Suggested Respondents

- DHMT Members, District Medical Officer/Supervisors.
- Health workers based at HCs and HPs.
- Community Health Workers.
- NHC Members.

Topics for Discussion

- **CHW training and coverage.** Is a CHW training plan available for the district? Is there enough skills practice included in the training? Does the training prepare CHWs to do their job? Is there anything about the training that you would do differently?
- **Community demand.** Are sick newborns and children taken to CHWs when they are sick? If not, where do they go first? Why do they go to this source first? What could be done to encourage them to seek care from CHWs first?
- **Community case-management.** Is it difficult for CHWs to manage sick children? What are the reasons for these difficulties? Are there parts of this district where sick children may be difficult to reach? What would you do to improve the ability of community workers to manage all children? Is it difficult for CHWs to follow-up with sick newborns and children in the home after they have been treated? If yes, why is it difficult?
- Have there been any problems with the use of antimicrobials by CHWs? Do they give a complete course of medicines when they have to give them? Do they charge for medicines?
- Do caregivers who are referred to the HFs always accept referral? If not, what are the reasons they do not go for referral? What could be done to improve their likelihood of going for referral?
- Has there been any improvement in the availability of transportation for sick newborns and children who need urgent referral? What methods have been used in this district or community? What needs to be done to improve the availability of transportation?
- **Facility case-management.** If a sick newborn or child is able to be taken to the facility, are they treated well/correctly? Have health workers at HFs been trained in IMCI to manage sick newborns and children? If not, why not?
- Facility support. Do CHWs communicate frequently with health centers in their area? If yes, why? If not, why not? Is there anything you would do to improve links between HFs and CHWs?
- Sustainability. Do you think CCM is sustainable in the long term? What has been done to ensure that it continues when the project ends? Is there anything you would do to make it more likely to be sustainable?

Topic Guide –Availability of essential supplies for CHWs delivering CCM

Suggested Respondents

- District Medical Officers/Supervisors.
- Health workers based at HCs and HPs.
- CHWs/TBAs.

Topics for Discussion

- Have stock-outs/lack of availability of essential supplies for CCM been a problem in the last three months. If so, which supplies have been in short supply?

Consider:

- ✓ ARI Timer
- ✓ MUAC
- ✓ Amoxicillin
- ✓ Zinc
- ✓ ORS
- ✓ ACTs
- ✓ RDTs
- ✓ Job aids (sick child recording form)
- ✓ CCM chart booklet
- ✓ Forms and registers
- ✓ Bicycles
- ✓ Newborn resuscitation equipment
- ✓ Counseling cards, flip charts or other MNCH educational materials

- What are common reasons for stock-outs in your area?

Consider:

- ✓ Financial resources available;
- ✓ Provision of supplies from the central level;
- ✓ District re-ordering and distribution practices; and
- ✓ Facility-level ordering or distribution practices;

- Have you seen any improvements in the availability of essential supplies in the last two years? If so, what improvements have you seen? Do HF staff use community registers to estimate medicine needs each month? If not, do you think this would be useful?
- What are the main problems with supply of essential medicines and supplies, from your point of view? Have any of these problems been solved by implementation of the CCM package? Have CCM medicines and supplies been included in the district budget? If so have allocations been adequate?
- What are possible solutions to supplying essential supplies, from your point of view?

Suggested Respondents

- District Supervisors.
- Health workers based at HCs and HPs.
- CHWs/TBAs.

Topics for Discussion

- *District/HF staff.* What proportion of supervisors have been trained in supervisory skills for CHWs implementing CCM and TBAs? Has this improved in the last year? Is more training needed?
- What types of supervision occur (who, what, where, how)? What is the supervision plan (dates and frequency)? Have all planned visits in the last six months been conducted? Has this changed in the last two years? What are the most important reasons that supervision visits do not take place? For supervisors: Do you have a schedule for supervisory visits? Do you conduct joint supervisory visits with other program staff? Do you think that supervision is well coordinated with other programs working in the community? Do you receive supervision yourself? Do you think you receive enough supervision?
- Do supervisors use integrated checklists? Do checklists work well? What are the problems with using checklists?
- Do supervisors usually conduct observations of practice? If not, why not?
- Are any data available on how well CHWs are practicing key CCM tasks? What is the impression of the quality of CCM, based on supervisory visits?
- Do supervisors usually give immediate feedback on their findings?
- Are records of findings and actions to be taken, left at the facility or with health workers?
- Do supervisors usually follow through with actions they have promised?
- Are supervisors generally supportive? What problems and successes have you seen?
- What are the main problems with supervision, from your point of view? Will effective supervision continue when the project stops? Why or why not?
- What are possible solutions to supervision problems, from your point of view?
- For CHWs/TBAs: How many times have you been supervised in the last three months? What does the supervisor supervise you on? If a newborn or child is sick and there is a health problem that you can't solve, who do you go to for help – and how do you contact them?

Suggested Respondents

- District Supervisors.
- Health workers based at HCs and HPs.
- CHWs/TBAs.
- NHC Members.

Topics for Discussion

- **TBA training and coverage.** *District/HF staff.* Is a training plan for TBAs available? What proportion of TBAs have been trained? Are adequate numbers of TBAs available? Do you think an adequate number of TBAs will be trained when the project stops? If not, why not?
- Is there enough skills practice included in the training? Does the training provide key skills needed to manage women and newborns? Is there anything about the training that you would do differently? Are there any skills that you need that have not been provided?
- **Home care practices.** Are essential equipment and supplies needed for clean deliveries, essential newborn care and PNC available? Have HFs and TBAs been provided with newborn resuscitation equipment? Have there been problems with supplies? If so, what are the reasons for these problems?
- Are there any barriers to conducting home visits in the community? If yes, what are they? Are all women and newborns reached within 24 hours after delivery? If not, why are women and newborns not reached? How could more women and newborns be reached?
- Do women in communities accept the advice of TBAs on postnatal care practices such as the need to begin early breastfeeding, to dry and wrap the newborn, and to not bathe the newborn? If not, why not?
- **Community demand.** Are more women aware of the need for ENC and PNC since activities began? Have attitudes and behavior towards pregnancy, delivery and care of newborns changed? What changes in attitudes have you seen?
- What are the most difficult local practices around the time of childbirth and in the early newborn period to change? Why is this so? Is there anything that can be done to improve practices, in your opinion?

Suggested Respondents

- District Medical Officers/Supervisors.
- Health workers based at HCs and HPs.
- CHWs/TBAs.
- NHC Members.

Topics for Discussion

- **Use of community forms and registers.** Are the CHW/TBA recording forms/registers difficult to complete? Is there anything you would do to make the forms/registers easier to complete? In the past, TBAs have not always been able to complete registers and recording forms. Is this a problem now? Can anything be done to improve reporting by TBAs?
- Have forms and registers been available?
- Is all the information on the forms/registers useful? If not, what information is not used? What modifications would you make to registers?
- **Using data for decision making.** Are the data summarized regularly and given to CHWs/TBAs, HF staff and district staff? If so, how have the data been summarized? Has this been useful?
- Are the data used by CHWs, HFs or district staff to make decisions? What kind of decisions have been guided by data from community registers?
- **Sustainability.** Do you think that use of community registers is sustainable after the LINCHPIN project stops? If not, why? What could make their use more sustainable?
- **District data management.** Does the district now have the capacity to manage community register data, summarize and use data on its own without project support? If not, why not? Is the district producing monthly updates on progress with implementation of iCCM or MCH home visit activities?

Suggested Respondents

- District Medical Officers/Supervisors.
- Health workers based at HCs and HPs.
- CHWs/TBAs.
- NHC Members.

Topics for Discussion

- **Training and capacity building.** *District and HF staff.* Is a training plan for CHW/TBA/NHC teams available? What proportion of NHCs are included in teams? Are there any barriers to training in teaming skills?
- Does the training give all the skills required to work effectively in communities? Are there any areas where you feel you need more training? Is there anything about the training that you would do differently?
- **Acceptance of teams.** Has the presence of teams made a difference to how newborns and children are looked after in communities? What are the main differences? Have there been any negative consequences to having teams? If so, what are they?
- Are teams well accepted in villages? Why? Why not?
- **Team activities and responsibilities.** What have teams done well? What have teams not done well? Are there good links between CHWs, TBAs and community members? Are home visits done jointly? Are all team members available when they are needed? Do team members have enough time to complete all required tasks?
- Are roles and responsibilities for CHWs, TBAs and NHCs clearly defined? What makes teams less likely to work? What makes teams work better? Would you recommend any changes to improve how teams operate?
- Have teams received regular oversight or supervision from project and district staff? Is supervision adequate? Is more supervision or contact needed?
- **Sustainability.** Will teams continue to work independently when the project is no longer present? If so, why? What might prevent them from continuing to work? What can be done to ensure they continue to work?

Suggested Respondents

- District Medical Officer/Supervisors.
- Health workers based at HCs and HPs.
- CHWs, TBAs.
- NHC Members.
- Caregivers.

Topics for Discussion

- **Training and capacity building.** *District/HF staff.* Have all NHCs/SMAGs in this district/HF catchment area been trained in community mobilization for newborn and child health? If not, why not?
- Is the training useful? Does it give you skills that are useful? Is there enough skills practice included in the community mobilization training? Is there anything about the training that you would do differently?
- **Roles and responsibilities.** Have NHCs worked well? How have they been guided by the community action cycle? Are the NHCs active? Have they helped improve the management of newborns and children?
- Have SMAGs worked well? How have they been guided by the community action cycle? Are the SMAGs active? Have they helped improve the management of newborns and children?
- What skills or capacities have been strengthened, if any, from NHCs application of the community action cycle? What skills or capacities need further strengthening?
- Are materials such as counseling cards and other job aids available for community education? If no, why are these not available? Are they effective?
- Have all the key stakeholders in the community been trained in community mobilization – are there other groups or individuals who should be involved?
- **Funding and implementation of plans.** Have community action plans been developed? Are there any problems with the development of community action plans? How have they been used?
- Have these plans been implemented?
- What types of activities have been conducted by those who have been trained in community-mobilization? Has this been difficult?
- Have NHC raised resources to support the implementation of their action plans? What type of resources?
- Have grants or other sources of support or funding been available to support all planned activities? Are any resources or additional support needed to allow community activities to be conducted better?

- **Sustainability.** What are the barriers to implementing effective community mobilization? Will community mobilization activities continue without project support? What would you do to ensure that it continues in the longer term?

Topic Guide – Community capacity

Suggested Respondents

- District Medical Officer/Supervisors.
- Health workers based at HCs and HPs.
- CHWs, TBAs.
- NHC Members.
- Caregivers.

Topics for Discussion

- **Community support.** What are the most useful approaches to giving information about the newborn and child health, in your experience? Are the materials available for health education/community mobilization adequate? Are other materials needed? What materials are needed?
- Do local partners provide support for community-based activities? If not, why not? Would you like more involvement of partners? Which partners should be more involved and how?
- Can all people in the community reach HFs? What are the barriers to getting to HFs? What would you do to increase access to HFs in this area?
- **CHWs.** Do you think there are adequate numbers of CHWs and TBAs working in the community? If not, why not? How many CHWs and TBAs are required? Do you think the selection process for CHWs and TBAs works well? Are the best people trained for these jobs? If not, what would you do differently?
- Have you had a problem with CHWs and TBAs leaving their jobs? What is done now to encourage them to continue working? Could more be done to motivate them to continue? What more would you do to ensure that they remain in their jobs?
- Other community resources. Are there individuals or groups in the community who could be providing information or services, but who are not being used? If yes, which individuals or groups do you mean? Why are they not being used? What could be done to use them better?

Annex 11: Sources of Information

No.	Partner/Organization	Informants Contacted
1	Lufwanyama District Health Office	Mr. Mwanza, District Clinical Care Officer Mr. Moses Chomba, Environmental Health Officer
2	Kapilamikwa Health Center	1 enrolled Midwife 1 teamed CHW 1 un-teamed CHW 1 teamed TBA NHC – 4 male and 4 female members SMAG – 3 male and 4 female 2 Caregivers
3	Lumpuma Health Center	1 Clinical Officer 1 Midwife 1 Environmental health technician 1 teamed CHW 1 un-teamed CHW 2 teamed TBAs 1 un-teamed TBA NHC – 4 male, 4 female SMAG – 2 male, 3 female
4	Mibila Health Center	1 Clinical Officer 1 un-teamed TBA 1 un-teamed CHW NHC – 5 males, 4 females SMAG – 3 females 1 Caregiver
5	Bulaya Health Center	1 Environmental Health Officer 1 CHW un-teamed 1 CHW teamed 3 TBAs un-teamed NHC – 3 males, 1 female SMAG – 4 females 1 Caregiver
6	Mukumbo Health Center	1 Nurse 1 CHW un-teamed 1 TBA un-teamed NHC – 7 males, 7 females SMAG -3 females
7	Chinemu Health Center	1 Nurse Midwife 1 CHW teamed 1 CHW un-teamed 1 TBA teamed NHC – 8 females, 5 males SMAG – 6 females

No.	Partner/Organization	Informants Contacted
9	National MOH	Dr. Francis Mwansa – Child Health Specialist and Director, Child Health Unit
16	UNICEF	Dr. Nilda Lambo, Head of Health and Nutrition Ms. Christine Lemba, Health Specialist MNCH
17	ZISSP	Dr. Nanthalile Mugala, Director of Technical Support Mr. Elijah Mulva – iCCM Specialist Ms. Mary Kaoma – Training Specialist
18	USAID	Dr. William Kanweka, Senior Health Advisor Dr. Masuka Musumali. Health and Nutrition Officer Dr. Chomba Sinyangwe, Health Advisor
19	Save the Children Zambia – National Office	Mr. Tamer Kirolos, Country Director Dr. Chilboe Kambikambi – Operations Officer Dr. John Kabongo, LINCHPIN Program Manager

Annex 12: Disclosure of Any Conflicts of Interest

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	CHINGU HOLIES
Title	COMMUNITY MOBILIZATION OFFICER
Organization	SAVE THE CHILDREN
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 4. Current or previous work 	

<p>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</p>	
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I certify (1) that I have completed this disclosure form fully and to the best of my ability and (2) that I will update this disclosure form promptly if relevant circumstances change. If I gain access to proprietary information of other companies, then I agree to protect their information from unauthorized use or disclosure for as long as it remains proprietary and refrain from using the information for any purpose other than that for which it was furnished.

Signature	
Date	13 th - Sep - 2014

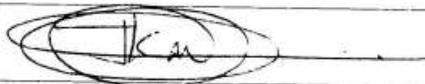
DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	JCHN KABONGO
Title	PROGRAM MANAGER HEALTH NUTRITION
Organization	SAVE THE CHILDREN
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	GHS A - 00 - 09 - 00013 - 00
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	CS-25 LINCHPIN SAVE THE CHILDREN
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 4. Current or previous work 	

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Signature	
Date	02/09/2014

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	Amelda Phiri
Title	Nutrition Coordinator
Organization	
Evaluation Position	<input type="checkbox"/> Team Leader <input type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	GH/A-CC-09-00013-00
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	LINCHPIN SAVE THE CHILDREN
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 	
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Signature	
Date	02 29 / 2014

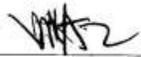
DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	Paul Musole
Title	
Organization	Save the Children
Evaluation Position	<input type="checkbox"/> Team Leader <input type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 	
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Signature	
Date	02/09/14

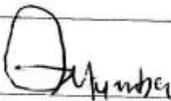
DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	FILUMBA STEPHEN
Title	DEPUTY PROGRAMMANAGER
Organization	
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 	
4. Current or previous work	

<p>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</p>	
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Signature	
Date	02/09/14

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	FRANCIS M NYONI
Title	COMMUNITY MOBILIZER
Organization	SAVE THE CHILDREN
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number <i>(Contract or other instrument)</i>	LINCHPIN - G-HSA-00-09-0013-00
USAID Project(s) Evaluated <i>(Include project name(s), implementer name(s) and award number(s), if applicable)</i>	LINCHPIN - SAVE THE CHILDREN
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i>	
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<p><i>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</i></p> <p>5. <i>Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</i></p> <p>6. <i>Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</i></p>	
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Signature	
Date	02/08/14

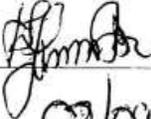
DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	BIAS SICHAMBA
Title	Monitoring & Evaluation Officer
Organization	Save the Children
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number <i>(Contract or other instrument)</i>	
USAID Project(s) Evaluated <i>(Include project name(s), implementer name(s) and award number(s), if applicable)</i>	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i>	
<ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 	
4. Current or previous work	

<p>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</p>	
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Signature	
Date	02/09/2014

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	GRACE NKATIWE
Title	COMMUNITY MOBILIZATION OFFICER
Organization	SAVE THE CHILDREN
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	GHSA - 00 - 09 - 0003 - 00
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 4. Current or previous work 	

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Signature	<i>Chwe</i>
Date	02 08 14

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	GAIL SNETRO
Title	Senior Advisor Capacity Building
Organization	Save the Children
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	6411-0-00-09-00000000
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	2011-2012-2013 SAVE THE CHILDREN
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 4. Current or previous work 	

<p><i>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</i></p> <p>5. <i>Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</i></p> <p>6. <i>Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</i></p>	
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I certify (1) that I have completed this disclosure form fully and to the best of my ability and (2) that I will update this disclosure form promptly if relevant circumstances change. If I gain access to proprietary information of other companies, then I agree to protect their information from unauthorized use or disclosure for as long as it remains proprietary and refrain from using the information for any purpose other than that for which it was furnished.

Signature	<i>[Handwritten Signature]</i>
Date	<i>[Handwritten Date: February 14, 2014]</i>

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

Name	KAREN ZOE WALTENSPERGER
Title	SENIOR ADVISOR, HEALTH - AFRICA REGION
Organization	SAVE THE CHILDREN
Evaluation Position	<input type="checkbox"/> Team Leader <input checked="" type="checkbox"/> Team Member
Evaluation Award Number (Contract or other instrument)	GHS A-00-09-00013-00
USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	LINCHPIN SAVE THE CHILDREN GHS A-00-09-00013-00
I have real or potential conflicts of interest to disclose.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i>	Involvement in project design and support (technical) of project implementation.
1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated	
2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation	
3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project	
4. Current or previous work	

<p>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</p>	<p>Helen Keller International, Pathfinder, American Red Cross</p>
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I certify (1) that I have completed this disclosure form fully and to the best of my ability and (2) that I will update this disclosure form promptly if relevant circumstances change. If I gain access to proprietary information of other companies, then I agree to protect their information from unauthorized use or disclosure for as long as it remains proprietary and refrain from using the information for any purpose other than that for which it was furnished.

<p>Signature</p>	
<p>Date</p>	<p>2 September 2014</p>

DISCLOSURE OF ANY CONFLICTS OF INTEREST

[The Evaluation Policy requires that evaluation reports include a signed statement by each evaluation team member regarding any conflicts of interest. A suggested format is provided below.]

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USAID Project(s) Evaluated (Include project name(s), implementer name(s) and award number(s), if applicable)	LINCHPIN
I have real or potential conflicts of interest to disclose.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If yes answered above, I disclose the following facts: Real or potential conflicts of interest may include, but are not limited to the following: 1. Close family member who is an employee of the USAID operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation 3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project 4. Current or previous work	Helped in design, planning, operations research, and mid term evaluation.

<p><i>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</i></p> <p>5. <i>Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</i></p> <p>6. <i>Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</i></p>	
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USAID Project(s) Evaluated <i>(Include project name(s), implementer name(s) and award number(s), if applicable)</i>	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to the following:</i>	
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2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation	
3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project	
4. Current or previous work	

<p>experience or seeking employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation</p>	
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Signature	<i>Jimmery</i>
Date	9/2/2014

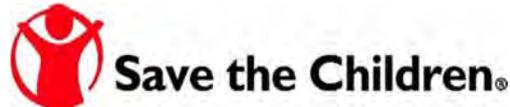
Annex 13: Statement of Differences

Not applicable.

Annex 14: Evaluation Team Members, Roles, and Their Titles

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Annex 15: Final Operations Research Report



The Feasibility and Effect of Teaming Community Health Workers and Trained Traditional Birth Attendants to Deliver Newborn and Child Survival Interventions in a Remote ZAMBIAN District

FINAL REPORT

An Operations Research Protocol within the Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN), supported by USAID/CSHGP, ELMA Philanthropies, Towers and Perrin, and Crown Family Philanthropies

Cooperative Agreement: GHS-A-00-09-00013-00

Project Dates: 1 October 2009 – 30 September 2014

Category: Innovation

Location: Lufwanyama District, Copperbelt Province, Zambia

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September 2014

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ACRONYMS

ACT	Artemisinin-based Combination Therapy
ANC	Antenatal Care
BU-CGDH	Boston University Center for Global Health and Development
BU-IRB	Boston University Institutional Review Board
CCM	Community Case Management
CDC	Centers for Disease Control
CHW	Community Health Worker
CI	Confidence Interval
DHMT	District Health Management Team
FGD	Focus Group Discussion
HF	Health Facility
iCCM	Integrated Community Case Management
IDI	In-depth Interview
LINCHPIN	Lufwanyama Integrated Neonatal and Child Health Project
MCDMCH	Ministry of Community Development, Mother and Child Health
MDG	Millennium Development Goal
MNCH	Maternal, Newborn and Child Health
MOH	Ministry of Health
NHC	Neighborhood Health Committees
OR	Odds Ratio
ORT	Oral Rehydration Therapy
NHC	Neighborhood Health Committee
RDT	Rapid Diagnostic Test
SBCC	Social and Behavior Change Communication
TBA	Traditional Birth Attendant
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Background Zambia is not on track to achieve the Millennium Development Goal (MDG) 4. Several categories of minimally trained community volunteers, including Community Health Workers (CHWs) and traditional birth attendants (TBAs), provide many basic health services in rural areas of Zambia, for example in the extremely remote Lufwanyama District where Save the Children has implemented the LINCHPIN Zambia Project, a USAID Cooperative Agreement. LINCHPIN aims to improve maternal and newborn care and community case management of sick children.

”Teaming” is a common health delivery strategy in high income settings, but is rarely reported in low income settings. We thought that – in areas where a TBA and CHW are already deployed in close proximity – joint training, supervision, health education, referral, and accountability to local Neighborhood Health Committees (NHCs), among other tasks, could make the individual workers more effective. Thus, we hypothesized that CHW-TBA *teams* would increase use of high impact interventions and services for pregnant women, newborns, and children in settings like Lufwanyama with low access to health facilities (HFs). TBAs are volunteers willing to take up ”new roles” now that they are prohibited by national policy to assist deliveries in the community. In Zambia, CHWs also work as volunteers, although some perform their duties on a nearly fulltime basis.

Save the Children partnered with the Boston University Center for Global Health and Development to develop and evaluate a CHW-TBA teaming intervention to provide continuity of selected services for pregnant women and children 0-59 months of age. Our approach had three phases (with a total of three objectives): (1) define teaming in this context (i.e., identify characteristics of teamwork and taskwork, and develop measurement tools); (2) measure teaming longitudinally (i.e., assess levels of teamwork, taskwork, and other factors that might influence those levels); and (3) measure effects (i.e., assess coverage, examine associations between levels of teaming and coverage, and assess community acceptability).

Methods In *Phase I*, we conducted six focus group discussions with CHW-TBA team candidates and NHCs to identify and prioritize through pile-sorting important aspects of teamwork and then to discuss potential joint activities as taskwork. This informed a teaming training guide and measurement tools.

In *Phase II*, we trained and certified 47 CHW-TBA teams with two NCH members for each. We gathered baseline information on team members, and then we prospectively applied the team measuring tools every six months for four cycles to assess the availability of teams and their levels of taskwork and teamwork. We assessed taskwork for seven vetted tasks with the CHW and TBA together. We assessed teamwork from each individually through 17 variables. We also assessed 20 other personal, community, or service factors with each individually. Regarding tasks, the team received a score of zero if a task was not performed, one if performed but not documented, and two if documented. A team’s taskwork score at each assessment was the sum of the scores of the seven functions; a team’s overall taskwork score was the mean of the four assessments. A team’s teamwork score was the average of the two members’ responses for the 17 indicators. A team’s overall teamwork score was the mean of the four assessments.

In *Phase III*, we repeated the population-based household survey of caregivers of children under five in teamed communities (i.e., not in the whole district). The baseline (n=735) was conducted in March-April 2011, and the endline (n=701) in March-June 2013. We also conducted focus group discussions (n=8) and in-depth interviews (n=29) of caregivers, teams, community leaders and district and provincial managers to explore the acceptability of teaming. Analysis to date has been descriptive and bivariate. Our central analysis compared the overall taskwork and teamwork scores of teams serving mothers who reportedly did vs. did not use various interventions.

Results Through participatory formative research, we categorized 17 teamwork factors into eight processes: mutual performance monitoring, mutual trust, decision making/planning, team cohesion, team motivation, goals and objectives, communication, and conflict resolution. We adopted seven taskwork functions: monthly meetings with NHC, social and behavior change communication, problem-solving, outreach services, supporting referral, intra-term referral, and postnatal handover visit.

Over two years, 14 of 47 (30.0%) teams became inactive, most commonly due to obtaining a paying job. Mutual trust, comprehension of team goals and objectives, and team cohesion were high. Team motivation and communication improved over time. The most common jointly performed functions were postnatal “hand over” visits from TBA to CHW at about 6-8 weeks of age, social and behavior change communication, monthly NHC meetings, and outreach. Team members residing within one hour’s walking distance were more likely to score high. Teams that were jointly supervised, were of the same sex, or had at least one member receiving some incentive scored higher, but the differences were not statistically significant.

Coverage of maternal and child health interventions improved at endline compared to baseline¹ in the communities served by teams. For example, nearly twice as many women reported delivering their youngest child at a HF (53.8% vs. 29.4%; $p < 0.0001$) and by skilled birth attendants (46.4% vs. 26.8%; $p < 0.0001$). Some indicators improved even over high baseline values, for example postnatal care (84.1% vs. 76.4%; $p = 0.017$) and exclusive breastfeeding (87.2% vs. 76.6%; $p = 0.012$). Reported use of case management for sick children increased over baseline, for example – for fever or RDT-confirmed malaria: receipt of ACT (90.6% vs. 75.9%; $p < 0.0001$); receipt of ACT within 24 hours (60.5% vs. 29.3%; $p < 0.0001$); and receipt of ACT within 24 hours for three days (59.5% vs. 25.9%); for cough/difficult breathing: amoxicillin within 24 hours (63.0 vs. 36.4%; $p = 0.011$); for diarrhea: zinc and ORT (13.7% vs. 5.6%; $p = 0.03$) although still low; and for severe illness: care-seeking outside the home (92.7% vs. 78.8%; $p < 0.001$); receipt of referred by CHWs (65.0% vs. 37.2%; $p < 0.001$); compliance with referral (95.8% vs. 77.1%; $p = 0.04$); and compliance within 24 hours (95.7% vs. 74.1%, $p = 0.038$).

The level of teaming was positively associated with reported use of life-saving services and practices. Specifically, teamwork and taskwork scores were higher among teams serving mothers who reported use than among teams serving mothers who did not. We observed this pattern for 12 of 14 indicators. The differences were significant for both teamwork and taskwork for four indicators: receipt of ACT for malaria within 24 hours, receipt of early and appropriate treatment

¹ Note the OR baseline and endline survey were conducted separately from LINCHPIN’s baseline and endline household surveys (KPC) and the OR sampled mothers of children 0-59 months old.

for malaria, care-seeking for pneumonia outside the home, and care-seeking for severe illness outside the home. The difference was significant for only taskwork for receipt of amoxicillin for pneumonia.

Community members and health managers reported that teaming CHWs and TBAs was acceptable and beneficial. Reported benefits included a perceived reduction of child death, well informed and educated communities, referral support, and improved facility delivery and postnatal care. Support for teaming was unreserved with the recommendation to introduce it to other rural areas.

Discussion This operations research defined – in a participatory way – community health worker teaming for rural Zambia, developed tools and methods to assess teaming, trained CHW-TBA teams and NHC supporters, achieved teamwork and joint taskwork, measured improvement in coverage of life-saving interventions in communities served by teams, found an association between levels of teaming and coverage, and confirmed widespread acceptance. The research objectives have been achieved within budget and on time. The attached table summarizes program learning within LINCHPIN and output documents, which include five publications and various reports, guides and tools.

Limitations include small numbers of teams due to sparse deployment at baseline, aggravated by 30% attrition; lack of sufficient funds for a before/after *side-by-side* (with/without teaming) design that constrained attributing coverage improvement to teaming in the face of other LINCHPIN system strengthening activities; lack of sub-analyses that could explore, for example, the effect of later – rather than average – teamwork scores on coverage, among others; and especially lack of multivariate analysis. On the other hand, we did prospectively define teaming through a participatory process, apply this definition to assess team performance, and find a positive association between levels of teaming and caregivers' reported use of interventions. This rich dataset should be further analyzed. Moreover, the current findings should be interpreted in light of the district-wide changes in coverage, which as of this writing, remain pending. Multivariate analyses are planned.

Conclusion Teaming may be a partial solution to improve coverage, but it requires team member candidates, who are already sparsely deployed and experience attrition (11% per year for CHWs and 4% per year for TBAs). If Save the Children succeeds in obtaining resources for the rural Copperbelt Province, replicating teaming in other district(s) is a priority. USAID might consider it elsewhere.

1.0 BACKGROUND

Zambia has made progress in reducing child mortality but too many children continue to die before their fifth birthday [1]. Zambia is not on track to achieve the Millennium Development Goal (MDG) 4, which calls for a two-thirds reduction in under-five mortality from 1990 levels by 2015 [2]. Most sub-Saharan African countries have strained health care systems with limited health facilities (HFs), and human resources are geographically mal-distributed with health workers most concentrated in urban regions [3, 4]. The use of community health workers (CHWs) and other volunteer or compensated community-based workers has emerged as a solution with a potential to strengthen primary health care delivery [5,6]. In Zambia many basic health services, especially in rural areas, are provided through several categories of minimally trained community workers, including CHWs and traditional birth attendants (TBA). Volunteer CHWs provide preventive and promotive services, health education, community mobilization, and treatment of common childhood illnesses (fever, diarrhea and pneumonia); while TBAs provide maternal and newborn interventions, including antenatal care, postnatal care, and recognition and referral for danger signs in pregnant women on a voluntary basis. TBAs in Lufwanyama have been willing to take on new roles in the context of national policy that prohibits them from assisting with deliveries in the community. These two cadres remain an essential component of the health system for many rural districts in Zambia and are supported by the Neighborhood Health Committees (NHCs) selected by the communities as per the Ministry of Health (MOH) community-based delivery strategy [7].

Like many developing countries, the majority of the childhood death in Zambia is due to neonatal conditions, pneumonia, diarrhea and malaria, and occurs without any contact with the formal health system [8]. An estimated two-thirds could be prevented by low-cost, integrated newborn and child health interventions [9, 10].

There is growing evidence that scaling up community and household interventions has had an impact on newborn and child survival [11]. Such interventions have included promotion of early initiation of breastfeeding, early postnatal follow-up care of newborns, exclusive breastfeeding for at least six months, recognition of danger signs by mothers, and case management of acute febrile illnesses in early childhood [8, 10, 12, 13]. As integrated maternal, newborn, and child health (MNCH) packages are now delivered at scale in many low-income countries, the decline of global childhood mortality has accelerated since 2000 [14].

The Boston University Center for Global Health and Development (BU-CGHD) of Boston University in partnership with local partners, including the District Health Management Teams (DHMTs), conducted two community-based research projects in Zambia that showed the feasibility and effectiveness of using CHWs and TBAs to provide integrated community case management (iCCM) and newborn care, respectively [15,16]. Currently TBAs and CHWs may reside in the same community, but work independently of each other, leading to inefficiency and missed opportunities for continuity of care. Experts suggest that health interventions for newborns should be integrated into child health programs [17]. The continuum of care approach is expected to promote care for mothers and children from pregnancy to delivery, the immediate postnatal period, and childhood [18].

Teams occur in many settings, including health care, in both developed and developing countries. There is a general agreement that a team consists of two or more individuals who have specialized knowledge, have specific roles, make decisions, perform interdependent tasks, are adaptable, and share a common goal [19-21]. Benefits of a team may include distributing workload among team members, reinforcing individual capabilities, creating the feeling of participation and involvement, better decision-making and generating a diversity of ideas for a common purpose [22].

Two general categories of behaviors are often used to distinguish a team: teamwork and taskwork. *Teamwork* consists of behaviors related to team member interactions to achieve team goals, such as goal comprehension, communication, conflict management, decision-making/planning, leadership, mutual performance monitoring, mutual trust, team cohesion, and team motivation [21, 23-26]. Teamwork has increasingly been recognized by several organizations as important for improving healthcare [27-29]. *Taskwork*, on the other hand, consists of behaviors performed by individual team members to execute team functions [23, 31].

Based on the two BU-CGHD studies, Save the Children – in collaboration with BU-CGHD and the Ministry of Community Development, Mother and Child Health (MCDMCH), MOH, and the Lufwanyama DHMT – is implementing the Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN), which teams CHWs and TBAs, supported by NHCs, to provide a continuum of evidence-based essential newborn and curative care for children 0-59 months of age in Lufwanyama District. LINCHPIN is an integrated, community-based newborn care and community case management package delivered through an enhanced district-wide community health program linked to HFs and NHCs in a manner consistent with the Zambia MOH plans and policies, and MCDMCH strategies and approaches [32,33]. This integrated intervention is intended to provide a continuum of care from the neonatal period through five years of age, in underserved rural communities.

The rationale for the integration and the teaming is that it will increase the likelihood that the effect of the team will exceed the effects of the individuals working alone in some or all of the following ways: (1) joint selection by communities for complementarity; (2) joint coordination by and accountability to the community; (3) joint training for overlapping content areas; (4) joint supervision approaches by the local health personnel and DHMT; (5) intra-team referral; (6) team approach to urge referral, especially for a reluctant family with a newborn or child with danger signs; (7) coordinated “hand-over” of newborn from TBA to CHW at joint visit at about four to six weeks of age; (8) multi-channel delivery of identical messages for key household and family practices; (9) intra-team encouragement to boost confidence; (10) intra-team consultation to boost quality; (11) common monitoring approach, stressing use (or “coverage) of interventions and quality (performance according to protocol); (12) age-gender balance: older female (TBA) and younger male (CHW) with complementary social networks to facilitate dissemination of messages and identification and referral of ill children or pregnant women; and (13) cross-covering for some tasks during a team member’s temporary absence.

This three-phase operations research: (1) developed a tool for measuring teaming in this rural Zambian context; (2) assessed the feasibility of teaming; and (3) assessed the effectiveness of the CHW-TBA teams to provide integrated newborn and child care services in rural Zambia. The

findings are meant to inform strategies to reduce newborn and young infant mortality in settings where TBAs and CHWs are policy-supported, widely available community-based cadres and to contribute to the scant teaming literature from low income countries.

2.0 OBJECTIVES AND OUTCOMES

2.1 Main Objective:

To assess the feasibility and effectiveness of community-based teams of CHW and TBAs to provide integrated newborn and child health services in rural Zambia.

2.2 Specific Objectives

Phase I:

1. To identify processes and factors for measuring teamwork and determinants of teamwork in community-based health teams.
2. To identify functions for measuring taskwork in community-based teams.
3. To develop a tool for measuring teamwork and taskwork in community-based teams.

Phase II

1. To assess the level of teamwork and taskwork among community-based teams.
2. To assess the factors that influence the level of teamwork and taskwork achieved by community-based teams.

Phase III

1. To assess the effect of CHW-TBA teams on the use and coverage of key newborn and child health interventions and services.
2. To examine the association between levels of teaming and use or coverage of interventions.
3. To assess community acceptability of teaming CHWs and TBAs.

2.3 Study Outcomes

Phase 1

1. Factors and processes for measuring teamwork and teamwork determinants.
2. Functions for measuring taskwork.
3. Tool for measuring teamwork and taskwork.

Phase II

1. Level of teamwork achieved.
2. Level of taskwork achieved.
3. Factors influencing the level of teamwork and taskwork achieved.

Phase III

1. Antibiotic use for pneumonia: percentage of children aged 0–59 months with suspected pneumonia receiving amoxicillin.
2. Use of artemisinin combination therapy (ACT) use for malaria: percentage of children aged 0–59 months with fever or fever with positive rapid diagnostic test (RDT) receiving ACT.
3. Zinc and oral rehydration therapy (ORT) use for diarrhea: percentage of children aged 0–59 months with diarrhea receiving zinc and ORT.

4. Referrals for neonatal sepsis and other serious conditions: percentage of children aged 0–59 months with neonatal sepsis or other serious childhood conditions who are referred by a community-based health worker. A “serious condition” is the presence of any of the following: i) looks unwell or not playing normally; ii) not eating/sucking or drinking; iii) lethargic or difficult to wake; iv) high fever with or without twitching; v) labored breathing with chest wall moving in when breathing; vi) vomiting almost everything; vii) convulsions; viii) redness around or discharge from cord; ix) red, swollen or discharge from eyes; or x) yellow palms/soles/eyes.

3.0 METHODS

3.1 Study location

The study was conducted in Lufwanyama District in the Copperbelt Province of Zambia. Lufwanyama is a large, rural, undeveloped district with an estimated 2012 population of 91,462 [34] and a population density of 8 persons per square kilometer. Most people are of the Lamba ethnic group and are engaged in farming, mining and fishing. The district lacks physical infrastructure and many roads are impassible during the rainy season. It has twelve health centers, five health posts and a newly opened district hospital. Only four HFs offer in-patient services, and only three have functional laboratories. For the past four years, malaria, pneumonia and diarrhea have been the top three causes of morbidity and mortality. The DHMT operated for many years outside the district, but is now based at the new district hospital. The district operates below the optimum staff required to provide basic health care services; as a result, some basic care is provided through several categories of minimally trained community workers – trained TBAs, CHWs, male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, and untrained TBAs [35].

3.2 Phase I: Development of tool for measuring teaming

3.2.1 Study design

This formative research employed participatory, qualitative methods (facilitated group discussion and pile-sorting) to explore and identify processes and domains for measuring teamwork and functions for measuring taskwork. The pile-sorting technique engages participants in sorting cards with words into piles that represent how they think about and categorize elements of interest [26]. Six sessions were conducted, three with NHC members and three with CHW-TBA pairs. Each NHC session had the chairperson, the secretary and four other members including at least two women. The CHW-TBA sessions had three CHWs and three TBAs. We purposively selected three NHCs considered as “highly effective” by the DHMT (held regular meetings and had strong, dynamic chairpersons). The CHWs and TBAs came from the selected NHC areas. A total of 36 individuals were involved. Sample sizes of 30-40 have been shown to have adequate reliability [37, 38].

3.2.2 Recruitment and informed consent

The study team contacted the LINCHPIN project manager and the DHMT and asked them to nominate three highly effective NHCs (see above). The study team in collaboration with the LINCHPIN project team contacted the chairperson of each of the NHCs, explained the study

purpose, and asked him/her to identify five other members of his/her committee (including the secretary and at least two women) and three TBAs and three CHWs to participate in the pile-sorting session. Each participant was contacted to ascertain his/her willingness to participate in the study and negotiate a time and place for the pile-sorting session if the participant expressed interest in taking part. On the day of the session, the study team explained the purpose and rationale of the study, informed participants that they would not be paid for participating and that they were not obliged to participate, and then obtained informed consent from participants in their local language. They were assured of confidentiality and were asked to sign, mark, or thumbprint the consent form. The subjects participated only after the written informed consent was provided.

3.2.3 Group discussions and pile-sorting

Each focus group discussion (FGD) had a facilitator and a recorder, was held at a quiet place in the community, and lasted 1.5 to 2 hours. The session was audio-recorded, and the recorder also took written notes of the discussions. All sessions were facilitated in the local language, Bemba. Each session had three parts.

The first part was a group discussion. We used a discussion guide with open-ended questions and a timeline activity to identify local concepts, perceptions, and experiences of teamwork processes. The guide was pretested to ensure that the questions were clear and understandable to the people involved since the guide was translated into the local language. The timeline activity initiated dialogue on teaming. Participants were asked to give examples of a recent situation where they worked with someone else to help mothers and children stay healthy. The events were plotted on a timeline on the ground using sticks, stones, and leaves. Probe questions included: *How or why did you decide to invite someone to help you? What was the first thing this person did to help? What was the next thing they did? Looking back on this timeline, what was the most helpful thing this person did? Why do you think you worked well as a team? What would have made this teamwork better? What made your team work well? Now, share a time when teamwork did not go as expected? What made it not go well? What could have improved teamwork?* The same guide was used in all the six sessions, and the questions were asked in the same order.

During the discussions, participants were asked to identify processes that helped or hindered teamwork. The processes that participants indicated as important for teamwork were written on cards by the facilitator. Based on the literature, our experience, and pre-formative discussion with the community, we wrote some cards ahead of time for processes that we considered important for teamwork. If these pre-prepared processes were not already mentioned, the facilitator asked participants if they also were important for teamwork.

The second part was the pile-sorting, during which the processes written on cards were then sorted. Participants were given the cards and asked to work as a team to sort the cards into three groups: “very important,” “important,” and “least important.” After the sorting, the facilitator took each of the cards in the “very important” group and asked the participants to explain why they considered it as “very important.” The reasons given were recorded by the note taker.

During the third part, we vetted functions. Through prior consultation with health workers, community-based workers, and NHCs, we identified seven possible teaming functions. From this list, we asked participants to identify and justify important functions for the CHW and TBA to perform jointly to assist providing integrated newborn care and CCM. Their choices informed which taskwork functions to measure.

3.2.4 Data Analysis

We used a weighting system to prioritize processes for measuring teamwork from those identified and sorted by the participants. Five points were given for “very important,” three for “important,” and one for “least important.” A process was selected if it scored 22 or more of a possible 30 points. A threshold of 22 meant that at least two FGDs classified it as “very important,” and the remaining four FGDs classified it as “important.” We further categorized the selected processes into teamwork domains from the literature. Participants identified some factors that we thought did not necessarily measure teamwork but rather might influence the way the team performs. We called these teaming “determinants” and categorized them into three groups: personal, community-related, and service-related.

3.3 Phase II – Feasibility of CHW-TBA teams

3.3.1 Study design

This prospective study assessed the level of teamwork and taskwork among community-based CHW-TBA teams supported by NHC members. We used an assessment tool developed through formative research with community leaders, health workers, CHWs and TBAs (39). We carried out the assessment every six months from June 2011 to March 2013.

3.3.2 Team creation and training

The CHW and TBA serving the same community constituted the CHW-TBA team. We did not create teams for communities which had only a CHW or trained TBA. LINCHPIN had earlier (one year before the teaming concepts training) trained CHWs and TBAs in skills to provide immediate newborn care; manage malaria, pneumonia, and diarrhea; and refer neonatal conditions and serious illnesses, and in teaming concepts prior to deployment. The TBA clinical skill training involved performing routine antenatal care; recognizing danger signs in pregnancy, labor, and the postnatal period; referring to the HF; and providing essential newborn care, including cord care. The CHW clinical skill training covered iCCM, including performing and interpreting RDTs for malaria; treating with ACT (malaria), ORT and zinc (diarrhea), and amoxicillin (non-severe pneumonia); and recognition and referral of severe illness after giving first dose of treatment if applicable.

The CHW-TBA team plus two NHC support members were trained in the teaming concepts. It was a three-day training and addressed both specific tasks (Table 1) that the teams would undertake as well as the skills to maintain a functioning team (Table 2). The training emphasized the importance of performing the joint tasks and the need to document tasks performed. They practiced and demonstrated how to perform these tasks. Teamwork competencies covered included: good communication, respectful dialogue and action, helping each other, making decisions together, managing conflicts, trust and confidentiality, monitoring

team task and team maintenance, evaluating successes and failures to improve outcomes of teaming, asking for feedback, and motivating and encouraging one another.

Table 1: Taskwork Description

Task	Description
Meeting with NHCs	This is a team initiated task to meet with NHCs to discuss teamwork and performance including challenges and the support needed.
Conducting BCC	This is a joint session in the community to educate community members in relevant health topics including exclusive breastfeeding, disease prevention, danger signs in pregnancy and childhood illnesses, importance of antenatal and postnatal care, hygiene and sanitation.
Problem solving for newborn and child care	Home visits including follow up visits to help and support caregivers in their care of children such as individual counselling, addressing challenges and seeking care.
Outreach Services	Support of outreach services in their communities including publicizing dates of service, mobilizing caregivers to attend and performing specific activities during sessions.
Support Referral	Convincing caregivers and households about the need to attend referral and help with mobilizing transport.
Intra-team referral	CHW referring pregnant or postnatal women seen at clinic or on home visit to the trained TBA for care. Trained TBA referring sick child seen on home visit or at postnatal care to CHW for treatment and advice.
Postnatal care visit at 6-8 weeks	Conducting joint home visits to children aged 6-8 weeks for the trained TBA to “hand over” child to the CHW.

The training utilize several methods such as exercises, practice, demonstrations, role plays, experience sharing, brainstorming and real-life scenarios for the teams to acquire the necessary knowledge and skills of teamwork competences for maintaining functioning teams. The training also clarified roles of the NHCs as identified by the MOH guidelines. The LINCHPIN project staff and personnel from the Lufwanyama DHMT facilitated the training sessions. Participants were evaluated and certified to ensure that they had acquired the knowledge and skills to work as teams. The specific tasks and skills required for successful community teams were identified during earlier formative research [39].

Table 2: Teamwork Competencies

“GREAT TEAM”	
G	Good communication
R	Respectful dialogue and action
E	Each helping the other; mutual support; and working hand-in-hand
A	Assess, make decisions and manage conflicts
T	Trust and confidentiality of care-seekers/community members
T	Together monitor Team <i>Task</i> and Team <i>Maintenance</i> Abilities
E	Evaluate successes and failures and improve outcomes of teaming effort
A	Asking for feedback – how did I do?
M	Motivate and encourage each other

3.3.3 Baseline data collection

Prior to training, we collected baseline information from team members, including age, gender, education, ethnic group, marital status, religion, membership of a social group (e.g., faith-based fellowships, parent-teacher associations, corporative societies, etc.), length of service, other occupation, and walking time from each other.

3.3.4 Team assessment

An independent, non-LINCHPIN data collector visited the core team members (CHW and TBA) and administered a three-part team measurement tool (Annex 1). Part A was administered to both members together and assessed taskwork, i.e., whether the team had jointly performed any of seven agreed specific tasks in the previous three months: (1) meeting with NHCs to discuss work and performance, (2) conducting behavior change communications sessions, (3) problem-solving for newborn or child care, (4) participating in outreach services, (5) supporting referral of a pregnant woman or sick child, (6) conducting intra-team referral, and (7) conducting postnatal care visits to a mother with a newborn aged 6-8 weeks. The team scored “0” if a function was not performed, “1” if performed but not documented, and “2” if it was documented to have occurred.

Part B was administered separately to the CHW and TBA. It assessed 27 characteristics from eight teamwork processes identified during the formative research [39]: (1) mutual performance monitoring, (2) mutual trust, (3) decision making/planning, (4) team cohesion, (5) team motivation, (6) goals and objectives, (7) communication, and (8) conflict resolution/management. Data were collected from each member about whether, in his/her opinion, the characteristic was present in the team over the previous six months. They scored “1” if a member reported that the characteristic was not or hardly present in the team, “2” if sometimes present; and “3” if always present. The score for the team was the average score of the two members.

Part C – also administered separately to each team member – collected information on perceived factors that may influence teamwork, such as supervision, refresher training, availability of supplies, incentives, and ownership of bicycle or cell phone.

3.3.5 Team score and classification and analysis

The score for the taskwork of each team at each assessment was the sum of the scores of the seven functions. The overall taskwork score for the teams was the mean score of the four twice-

yearly assessments. For teamwork, the score for the team at each assessment was the average score of the two members from the twenty seven indicators. The overall teamwork score was also the mean score of the four twice-yearly assessments.

A team was categorized as “inactive” if unavailable for an assessment and the local NHC confirmed its inactivity and break-up. We categorized the remaining teams as “high” if the mean score on the taskwork scale was ≥ 7 of a possible 14, and the mean score on the teamwork scale was $\geq 90\%$; and “low” if the taskwork score was < 7 or teamwork score was $< 90\%$. We also calculated the proportion of teams that performed a specific task/function or exhibited the presence of a taskwork competency in the team at each of the four assessments. For taskwork, the proportion of teams that performed a specific task/function was calculated as the number of teams that scored “3” for the task/function divided by the total number of teams assessed multiplied by a hundred. For teamwork, the proportion of teams that exhibited the presence of taskwork process was calculated as the number of teams that scored “3” for each of the indicators derived from each taskwork process divided by the total number of teams assessed, multiplied by a hundred.

In order to evaluate factors that could influence the level of teaming, we compared proportions of factors between high teams and low/lost teams and presented results in odds ratios (OR) with 95% confidence intervals (CI) and p-values. All data analysis was conducted in EpiInfo (CDC, Atlanta, GA).

3.4 Phase III – Effectiveness of CHW-TBA teams

3.4.1 Study design

We employed a pre- and post-design. In March-April 2011, we conducted a baseline cross-sectional household survey of women with children aged under five to measure study outcomes; and in March – June 2013, we remeasured the study outcomes with an endline cross-sectional household survey, two years after the training in teaming and deployment of the CHW-TBA teams. We used this design to evaluate the district-wide program since it was not feasible to have part of the district serve as a comparison area as would be necessary for a cluster randomized controlled design. The study outcomes included use of antibiotics (amoxicillin) for suspected pneumonia, use of artemisinin combination therapy (ACT) for malaria, use of zinc and oral rehydration therapy (ORT) for diarrhea, and referrals for severe illness.

3.4.2 Sample size and sampling

We based the sample size on the expected prevalence of pneumonia, the least common outcome of interest. Based on our previous work in a similar rural district in Zambia, we assumed that 15% of children aged 0 – 59 months would have a history of cough and fast and/or difficult breathing (i.e., acute respiratory infection needing assessment) during the most recent two weeks and that 40% would receive the recommended antibiotic (i.e., amoxicillin) [15]. To increase the proportion of children receiving antibiotic treatment to 60% (50% increase at the end of two years of implementation, with 80% power at 95% CI) we needed to recruit 720 women with children aged 0-59 months in each survey (EPI Info Version 3.5.1, CDC, Atlanta, GA, USA). We recruited participants from all CHW-TBA team areas. In each team area, up to 16 households were selected.

3.4.3 Recruitment and informed consent

We selected study participants systematically in each team area. The data collector with the help of the NHC chairman, identified the center of the team area and spun a bottle to determine the direction for selecting the first house. The next house selected was the one with the door nearest to the previous selected house. This selection method continued until the number of survey participants for the area was attained. If the selected household did not have a mother with a child 0-59 month of age, we skipped that house and proceeded to the next. We selected the woman with the youngest child as the study participant if there were two or more women in the household with children aged 0-59 months. If a selected mother had more than one child aged 0-59 months, we asked questions about the youngest child. The interviewer obtained informed consent in the participant's own language. S/he explained the purpose and rationale of the study and informed her that she would not be paid for participating, was not obliged to participate, and could refuse to answer any question. She was asked to sign, mark or thumbprint the consent form, and only after the written informed consent was provided was the subject interviewed.

3.4.4 Data collection

In both surveys we collected information on socio-demographic characteristics of mothers and household, care-seeking behaviors, childhood morbidity and mortality, preventive health measures, and knowledge of danger signs for childhood illness. We also collected information on the use of antenatal, delivery, neonatal, and child health services for the last child and barriers to accessing health services and interventions. We asked specific questions surrounding the most recent illness of their under-5 children, including disease-specific signs and symptoms, where they sought care, what kind of care they sought, what kind of care they received, and adherence to the recommended treatment regimens. We placed emphasis on treatment for pneumonia, malaria, and diarrhea, and on referral for neonatal sepsis and other serious conditions. We also collected information on their experiences with individual CHWs and TBAs and/or CHW-TBA teams.

We trained the data collectors in study procedures, use of study instruments, research ethics, and informed consent protocols. We used ten data collectors during the baseline survey but only three of the ten were available for the endline survey, which extended the time needed for data collection.

3.4.5 Qualitative data collection

To assess community acceptability of CHW-TBA teaming, we conducted FGDs and in-depth interviews (IDIs). The participants for the FGDs were mothers with children 0-59 months of age and CHW-TBA team members, and the IDI participants included community leaders, district health managers, and provincial health managers. The community leaders included village headmen, women's leaders, local council counsellors, and NHC members. For logistical reasons, we conveniently selected six "high" and six "low" teams. The mothers and community leaders were selected from two high or low team areas. Each CHW-TBA FGD was with three high or low teams.

The study team contacted the TBAs and CHWs asked for their participation. The study team did not tell the participants which group they belonged to. The study team also asked two CHW-TBA teams from each group to identify mothers for the FGDs and community leaders for the

IDIs. The study team then contacted the potential participants, explained the study purpose, and negotiated a time and place for the discussion or interview if the participants expressed interest in taking part. The study team contacted the DHMT leader and the provincial health officer who selected the DHMT members and provincial health managers for the IDIs respectively. On the day of the FGD or interview, the facilitator or interviewer explained the purpose and rationale of the study, informed them of their right to refuse participation and assured confidentiality. The FGD or interview was conducted only after written informed consent was provided.

The FGDs and the IDIs were held in the community and we utilized a semi-structured discussion guide to allow for open-ended responses. The questions explored participants' experiences with the CHW-TBA teams' work, community acceptability, and suggestions for improvement.

3.4.6 Data Management and Analysis

Data were double-entered using CS Pro (Version 5.0.2) into customized data entry screens with built-in range and consistency checks. Analysis was undertaken using SAS v9.3 (SAS Institute Cary, NC) software. For the main outcomes, we compared crude proportions of use of each intervention in the baseline and endline using a chi-square test. To analyze the effect of teaming on the use of interventions, we calculated the taskwork and teamwork "quality month score" for each team and applied the scores to the mothers served by the team. (We gave every mother a score based on the score of the team served by the mother). For each intervention, we compared the mean taskwork or teamwork score between users (mothers who responded "yes" to an indicator at the endline) and non-users (mothers who responded "no" to an indicator) with t-test. We defined significance as a p value <0.05. Team score was adjusted to account for how long a mother was exposed to a team before the survey.

We used "quality month score" because we recognized that the endline survey was conducted soon after the Assessment 4, and about eighteen months after Assessment 1. Hence, the influence of team performance during Assessment 1 on caregiver behavior measured at endline would be far less than the performance at Assessment 4. We therefore rated Assessment 4 as 1, Assessment 3 as 0.8, Assessment 2 as 0.6 and assessment 1 as 0.4. We therefore calculated the quality month score for each team over the six-month period as the product of the actual score, the rated score and six months (period between assessments). Hence a team which scored 90% in Assessment 1 will receive a quality month score of 2.16 ($0.9 \times 0.4 \times 6$) for the period while a team which scored 90% at Assessment 4 will receive quality month score of 5.4 ($0.9 \times 1 \times 6$). The total score for that team was the sum of the four periods. If a team was not available for assessment (because it was inactive) it scored zero for the period. We made an important assumption that the mother's behavior will be influenced by the performance of the team serving her area. We coded the notes from the qualitative data and analyzed resulting themes using Microsoft Excel 2010.

3.5 Ethical issues

We obtained ethical approval from the Boston University Institutional Review Board (BU-IRB) and a local Zambian ethical review committee (ERES CONVERGE). We also received approval from the MOH, the Provincial Medical Office and the DHMT. We obtained informed consent from all study participants with a consent form developed in accordance with guidelines of the

BU-IRB and the local ethical review committee and translated into Bemba, the language of common communication in the district.

3.6 Study Team Training

We trained the study team prior to data collection on how to use the study instruments (pile-sorting guide, household survey form, teaming measurement tool, FGD/IDI guide). We took them through the forms question by question, explaining each thoroughly and detailing the information required. The training also covered the protection of human participants, confidentiality, and the process of obtaining informed consent. We recruited study personnel with requisite experience, including research experience. The study instruments were piloted during the training of the study team.

4.0 RESULTS

4.1 Phase I-Development of tool for measuring teaming

4.1.1 Pile-sorting participants' characteristics

The NHC participants included 12 males and 6 females. Male participants were older than female participants (average age 46.9 [range 34-59] vs. 35.5 years [range 28-53]) and had more schooling than their female counterparts (Grade 10 and above: 70% vs. 33%). All NHC participants were farmers except for two female members who were businesswomen. CHW-TBA participants were comprised of 7 males and 11 females. Two CHWs and all TBAs were female. TBAs were older than the CHWs (average age 52.6 [range 46-58] vs. 46.5 years [range 35-65]). CHWs had more schooling than the TBAs. All CHWs had attained grade 9 or above while most TBAs had only reached grade 7 or below. Two TBAs had no schooling. All CHWs and TBAs were farmers.

4.1.2 Processes and factors for teamwork

Participants identified 17 factors that scored 22 or more, and these were selected to measure teamwork. We categorized these factors into dimensions of teamwork or processes that comprise the teamwork construct (Table 3).

Table 3: Processes and Factors of Teamwork

Process	Factors
1. Mutual performance monitoring	1) Consulting each other 2) Seeking help from each other 3) Checking each other's work and giving feedback
2. Mutual trust	4) Confidentiality 5) Respect 6) Trust
3. Decision making/planning	7) Making decisions together 8) Making a plan together 9) Dividing tasks so not to duplicate effort
4. Team cohesion	10) Interest and commitment 11) Members available and accessible
5. Team motivation	12) Motivating each other

Process	Factors
	13) Encouraging each other
6. Goals and objectives	14) Having a common goal
7. Communication	15) Good communication 16) Sharing information
8. Conflict resolution/management	17) Ability to manage conflict

All six FGDs identified three of the 17 factors as “very important,” and five FGDs identified six as “very important.” One factor “motivating each other” was considered “very important” by only two of the six groups, one NHC and the other CHW-TBA. Two groups (one NHC and the other CHW-TBA) considered all the seventeen factors as “very important” for measuring teamwork. Factors which scored below 22 and were therefore not selected included “leadership,” “similar vision,” “mutual support,” and “coordination among members.” All six FGDs indicated that leadership was not important in a two-person team. Reasons participants sorted some of the factors as “very important” are shown in Table 4.

Table 4: Importance and Illustrative Quotations of Teamwork Factors

Factors	# Groups indicating factor as “very important”	Illustrative Quotation
Confidentiality	6	<ul style="list-style-type: none"> • Many NHCs have stopped functioning because there was lack of confidentiality among members. • Many mothers refused to go to CHWs because of lack of confidentiality. • If there is no confidentiality among us as team members, the community will be scared to access the needed services from us. • Lack of confidentiality in a team can lead to dismantling of the team.
Having a common goal	6	<ul style="list-style-type: none"> • A common goal gives direction to a team. • A team without a common goal has no direction.
Making a plan together	6	<ul style="list-style-type: none"> • Making a plan together is the ingredient for achieving the goal of a team.
Good communication	5	<ul style="list-style-type: none"> • Anytime we do not communicate among ourselves, we feel our team is collapsing.
Seeking help from each other	4	<ul style="list-style-type: none"> • If we cannot help each other when the need arises, how can we work together? It’s like going in different directions.
Members available and accessible	4	<ul style="list-style-type: none"> • How can you work as a team if members are not available when needed?
Checking each other’s work and giving feedback	4	<ul style="list-style-type: none"> • It is important to learn from each other what happened, our mistakes and successes. • If we are not given feedback, how can we learn from the past? • Not learning from the past will affect the performance of the team.
Dividing tasks so as not to duplicate effort	4	<ul style="list-style-type: none"> • Duplicating efforts can cause conflict in the team.

4.1.3 Jointly performed functions for taskwork

Participants indicated that all seven pre-determined functions presented to them were essential for the CHWs and TBAs to perform jointly if they were to provide life-saving, integrated newborn care and CCM interventions effectively. The functions were:

1. Joint monthly meetings with NHCs to discuss work and performance.
2. Joint social and behavior change communications sessions targeting women on newborn and child care.
3. Joint problem-solving with regard to newborn or child care.
4. Joint participation in outreach services including child welfare clinics and immunization conducted by the supervising rural health center staff.
5. Collaboration to refer a pregnant woman or a mother with a sick child to the rural health center or hospital if necessary.
6. Intra-team referral (referral between team members, for example, CHW referring a pregnant woman to the TBA or TBA referring a mother with a sick child 0-59 months to the CHW).
7. Joint postnatal care visits to a mother with a newborn aged about 6-8 weeks where the TBA “hands over” the child to the CHW.

We used these functions to measure taskwork.

4.1.4 Determinants of teamwork

We selected 20 factors identified by the participants as determinants of teaming. These factors may help explain why teams achieve varying levels of efficiency and success. We categorized these into three sub-groups: personal, community-related and service-related. Most factors were personal or service-related (Table 5).

Table 5: Factors for Measuring the Determinants of Teamwork

Personal	Community-related	Service-related
<ul style="list-style-type: none"> • Age • Gender • Education • Socio-economic status • Language • Tribal affiliation • Religion • Employment • Membership in an association 	<ul style="list-style-type: none"> • Presence of and links to NHCs • Distance between CHW and TBA families • Distances among, CHW, TBA and rural health center 	<ul style="list-style-type: none"> • Training • Experience • Supervision and support by relevant community and health system structures • Payment or in-kind compensation • Motivation • Availability of means of transport (e.g., bicycle) • Possession of a cell phone • Availability of supplies and drugs that the CHW and TBA might need to provide the defined services

4.2 Phase II – Feasibility of CHW-TBA teams

4.2.1 CHW-TBA teams characteristics

The project created, trained and certified 47 teams. The CHWs were predominantly male (80.9%), and TBAs were all female (Table 6). CHWs were younger than TBAs (average age of 44 vs. 53 years). Most CHWs had more schooling than TBAs. Half the TBAs were of the local Lamba ethnic group while only a third of the CHWs were Lamba. CHWs were more likely to be currently married than TBAs. Only about a fifth of the CHWs and TBAs reported that being a CHW or TBA was their main occupation.

4.2.2 Overall team categorization

We categorized 21 (44.7%) teams as high, 12 (25.5%) as low, and 14 (29.8%) as inactive. Three teams became inactive after the first assessment, four after the second, and the remaining seven after the third. CHW departure, usually to find a new job, was responsible for most of the inactive teams (71.4%) (Table 7). Two CHWs were employed as casual laborers to work at rural health centers, two CHWs stopped because they became frustrated with the work, and one TBA was forced to stop because some members of the community believed she was a witch.

4.2.3 Teamwork performance

All team members reported the presence of mutual trust within their teams during all four assessments (Table 8). Many team members reported comprehension of team goals and objectives and team cohesion as present most of the time. On the other hand, decision making/planning and mutual performance monitoring were reported lacking in most cases. The teams reported only six conflicts in the four assessments, all of which were satisfactorily resolved or managed. Team motivation and communication were reported to have improved over time while mutual performance monitoring and decision making/planning declined during the last assessment after initial improvement (Figure 1). The possible explanation for high performance in mutual trust, team goal comprehension and team cohesion was that the members have known and work with each other over long periods of time and their trainings have always emphasized achieving goals of improving child survival. On the other hand, performance monitoring and planning and making decision together were new behaviors for most of them. Their attempts to perform these new behaviors likely diminished over time.

4.2.4 Taskwork performance

Table 9 shows joint taskwork activities performed. The most common *documented* joint activity was making a home visit to a mother with a young infant aged about 6-8 weeks where the TBA “handed over” the child to the CHW (55.3%), followed by meeting with NHCs to discuss work and performance (36.5%). Less commonly documented joint activities were problem-solving and intra-team referral, 21.6 and 15.6%, respectively. Figure 2 shows how the joint tasks were performed during the four assessments. The most common joint activities performed included participation in outreach services, SBCC sessions targeting women to educate them about newborn and child care and postnatal home visit. The least common activities by these criteria were intra-team referral and supporting referral to HFs. The tasks that were highly performed were tasks/functions they were accustomed to performing individually long before teaming started, hence it was likely easier for them to perform and sustain them in teams compared to tasks that were new to them.

Table 6: Baseline Characteristics of Team Members

Characteristics	CHW (n = 47)	TBA (n=47)
<i>Age (years)</i>		
Average (SD)	44.4 (8.8)	53.0 (6.6)
Range	28 – 69	33 – 66
<i>Sex</i>		
Male	80.9%	0
Female	19.1%	100%
<i>Educational Level</i>		
No education	0	8.5%
Primary	14.9%	68.1%
Secondary	85.1%	23.4%
<i>Ethnic Group</i>		
Lamba	36.2%	50%
Bemba	14.9%	16.5%
Kaonde	2.1%	2.2%
Other	46.8%	41.3%
<i>Marital Status</i>		
Single/not married	0	2.1%
Married	91.3%	66.0%
Separated/divorced	2.2%	6.4%
Widowed	6.5%	25.5%
<i>Religion</i>		
Christian (Jehovah Witness)	31.9%	19.2%
Christian (Catholic)	12.8%	10.6%
Christian (Pentecostal)	6.4%	10.6%
African Christian Church	25.5%	44.7%
Other	23.4%	14.9%
<i>Main Occupation</i>		
CHW/TBA	23.9%	19.2%
Farmer	76.1%	80.8%
<i>Length of Service (years)</i>		
Average (SD)	9 (5.9)	11.3 (7.7)
Range	1-28	3-40

Table 7: Reasons for Inactive Teams

Reason	CHW (n = 47) n (%)	TBA (n = 47) n (%)	Total (n=94) n (%)
Found new job	5 (10.6)	0	5 (5.3)
Relocated to another area	2 (4.3)	2 (4.3)	4 (4.3)
Illness/old age	1 (2.1)	1 (2.1)	2 (2.1)
Frustration	2 (4.3)	0	2 (2.1)
Forced to stop	0	1 (2.1)	1 (1.1)
Total	10 (21.3)	4 (8.5)	14 (14.9)

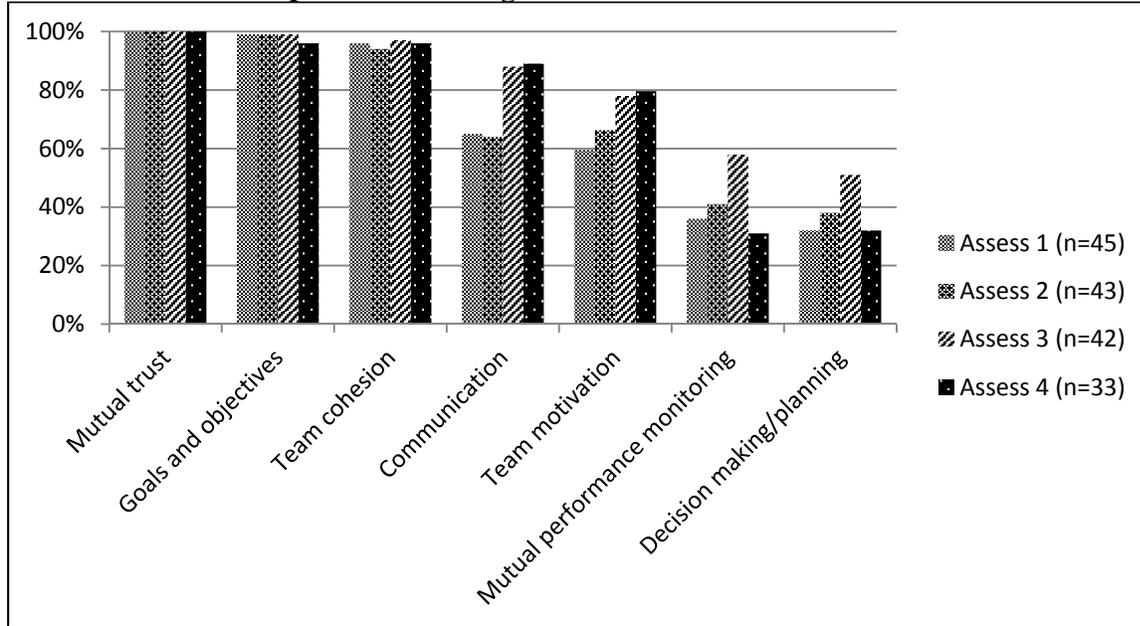
Table 8: Teamwork Performance – proportion of teams that exhibited teamwork processes during the four assessments

Teamwork process	Average performance
Mutual trust	100%
Goals and objectives	98.1%
Team cohesion	95.7%
Communication	76.3%
Team motivation	70.8%
Mutual performance monitoring	41.3%
Decision making/planning	38.1%

Table 9: Taskwork Performance – proportion of teams that performed the agreed task during the four assessments

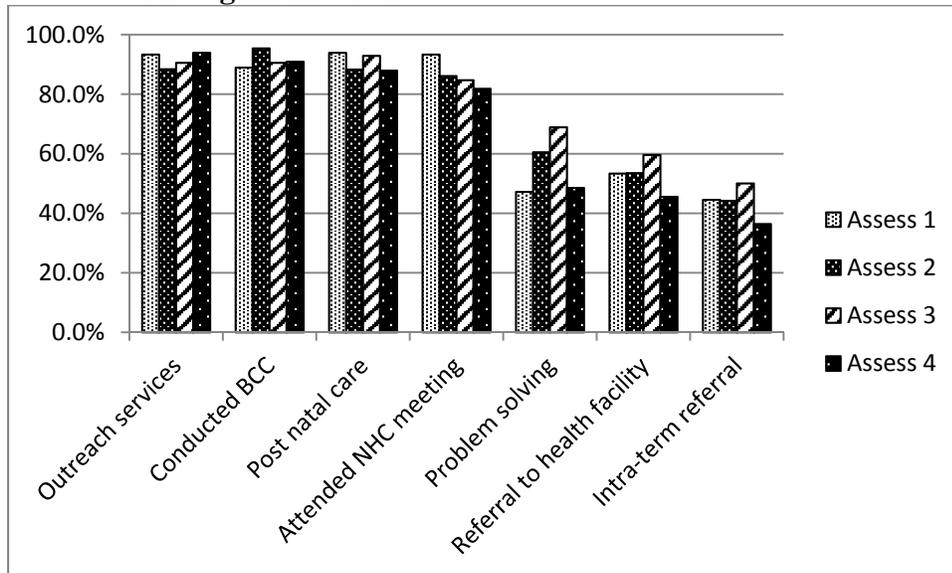
Taskwork	Average performance (documented)	Average performance (undocumented)
Attended NHC meeting	36.5%	50.3%
Conducted BCC	31.2%	60.3%
Problem solving	21.6%	34.5%
Outreach services	21.8%	69.8%
Referral to health facility	28.1%	24.9%
Intra-team referral	15.5%	28.3%
Postnatal care	55.3%	35.3%

Figure 1: Teamwork Performance Over Time – proportion of teams that exhibited teamwork processes during assessments*



* number of teams that scored “3” for each of the indicators derived from each taskwork process divided by the total number of teams assessed multiply by a hundred.

Figure 2: Taskwork Performance – proportion of teams that performed the identified tasks during assessments⁺



⁺number of teams that scored “3” for the task/function divided by the total number of teams assessed multiply by a hundred

4.2.5 Factors influencing teaming

We collected some data to identify factors that may influence whether teams performed “high” or not. However, the numbers in each group were small and the confidence intervals were quite

wide. Hence, it was difficult to make obvious conclusions although it may appear that teams with members residing within one hour's walking distance were more likely to score "high".

4.3 Phase III – Effectiveness of CHW-TBA teams

4.3.1 Characteristics of respondents and household

We interviewed 735 and 701 women in the baseline and endline household surveys, respectively. The characteristics of the women and households were similar in both surveys (Table 10). For example, most women fell into the 20-35 year age group, had at least a primary education, and resided in families where the husband or partner was the head of the household. Mothers in the post-intervention survey more commonly identified themselves as farmers than in the pre-intervention, probably because the timing of the post-intervention survey extended into the farming season, when women – normally housewives and traders – were most engaged in subsistence agriculture.

4.3.2 Maternal and child health services

We saw improved use (coverage) of maternal and child health services/interventions at endline compared to baseline (Table 11). Nearly twice as many women reportedly delivered their youngest child at a HF compared to baseline (53.8 vs. 29.4%; $p < 0.0001$) and by skilled birth attendants (46.4 vs. 26.8%; $p < 0.0001$). Even though the proportion of women who received at least four antenatal care visits did not change, the proportion of women who used TBAs as their only source of antenatal care (ANC) declined at endline (13.3 vs. 19.8%; $p < 0.001$).

4.3.3 Fever and malaria treatment

Malaria/fever treatment practices improved at endline (Figure 3). Significantly more children with fever/malaria received effective antimalarial, (i.e., ACT, 90.6 vs. 75.9%; $p < 0.0001$), early effective treatment, (i.e., ACT within 24 hours of onset of fever/malaria, 60.5 vs. 29.3%; $p < 0.0001$) and early and appropriate treatment, (i.e., ACT within 24 hours of fever onset and for three days, 59.5 vs. 25.9%, $p < 0.0001$). Fewer mothers resorted to home treatment of their sick children with fever/malaria, and there was significant reduction in the two-week prevalence of fever.

4.3.4 Diarrhea treatment

Treatment of diarrhea with zinc and ORT was low at both baseline and endline, but twice as many children with diarrhea received zinc at the endline (13.7 vs. 5.6%; $p = 0.03$; Figure 4). Children who received ORT for diarrhea and whose families sought treatment outside the home were similar at both baseline and endline. Fewer children were reported to have had diarrhea in the endline survey (10.4 vs. 21.8%; $p < 0.0001$).

Table 10: Socio-demographic characteristics of respondents and household at baseline and endline

Characteristic	Baseline Survey (N=735) n (%)	Endline Survey (N = 701) n (%)	p-value
Maternal age			
< 20 years	88 (12.0)	105 (15.0)	0.095
20 – 35 years	521 (70.9)	498 (71.0)	
> 35 years	126 (17.1)	98 (14.0)	
Proportion with 1 child	432(58.8)	380 (54.2)	0.081
Level of education			
No education	86 (11.7)	62 (8.9)	0.157
Primary	456 (62.0)	437 (62.3)	
Secondary and Higher	193 (26.3)	202 (28.8)	
Head of household			
Mother	32 (4.3)	43 (6.1)	0.170
Husband/partner	612 (83.3)	559 (79.8)	
Other relative	91 (12.4)	99 (14.1)	
Mother's main occupation			
Housewife	85 (11.6)	17 (2.4)	<0.001
Farmer	489 (66.5)	620 (88.5)	
Others	161 (21.9)	64 (9.1)	
Mothers marital status			
Single/not married	67 (9.1)	84 (12.0)	0.172
Married	619 (84.2)	566 (80.7)	
Other	49 (6.7)	51 (7.3)	
Biological father part of household	610 (83.0)	557 (79.5)	0.086
Sex of child			
Male	353 (48.0)	344 (49.1)	0.692
Female	382 (52.0)	357 (50.9)	
Within one hour walking distance to CHW	587 (79.9)	580 (82.7)	0.16

Table 11: Maternal and Child Health Services Utilization at Baseline and Endline

Variable	Baseline 2011	Endline 2013	p-value
Antenatal care			
Received ≥ 4 more visits	60.8% (439/722)	59.5% (416/699)	0.62
TBA only source of ANC	19.9% (144/724)	13.3% (93/699)	<0.001
Received 2 doses of IPTp	79.6% (585/735)	89.2% (625/701)	<0.001
Delivery			
Health facility delivery	29.4% (216/735)	53.8% (376/699)	<0.0001
Skilled birth attendant delivery	26.8% (197/735)	46.4% (324/698)	<0.0001
Postnatal care for children under 12 months	76.4% (214/280)	84.1% 280/333)	0.017
Exclusive breastfeeding for < 6 months	76.6% (111/145)	87.2% (157/180)	0.012
DPT 3 coverage	66.8% (135/202)	82.5% (146/177)	0.005

Figure 3: Fever/Malaria Treatment Practices at Baseline and Endline

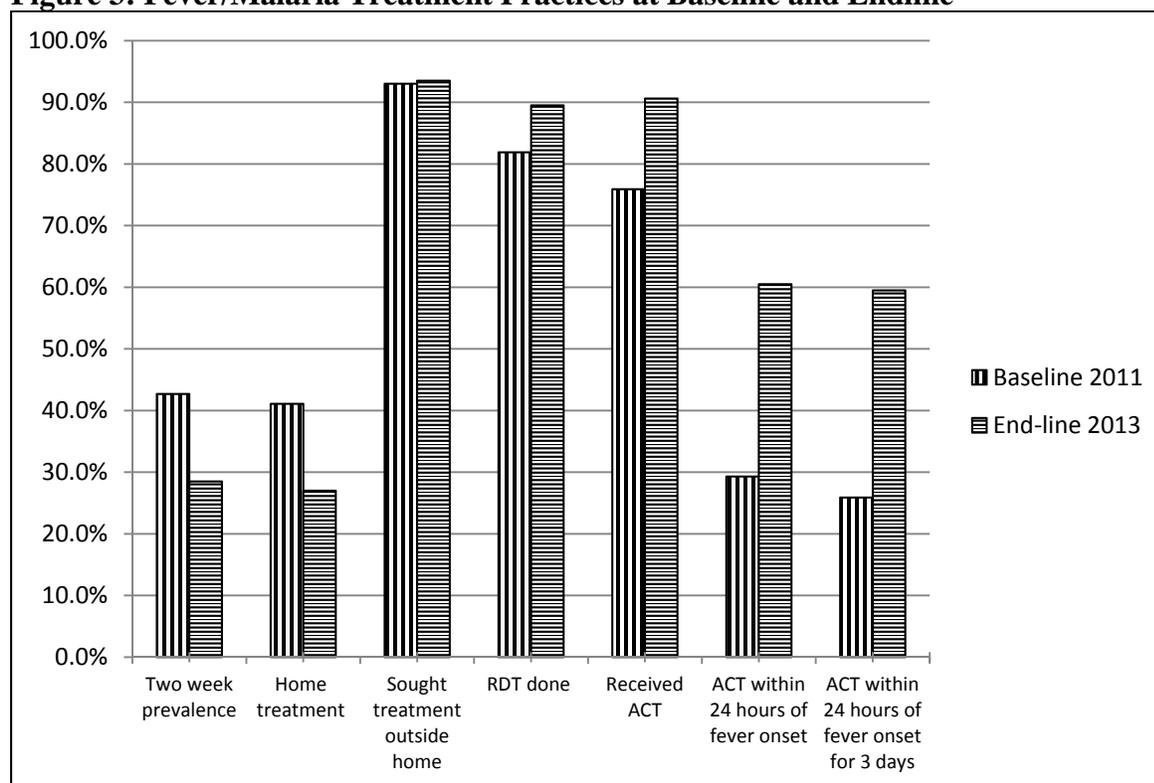
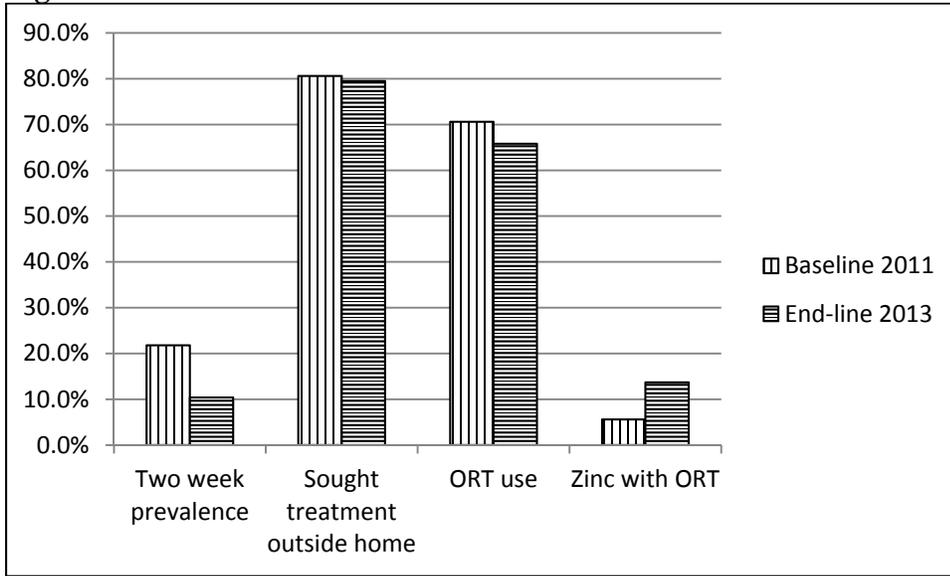


Figure 4: Diarrhea Treatment Practices and Behavior at Baseline and Endline



4.3.5 Pneumonia treatment

Figure 5 shows that more children with suspected pneumonia at endline than at baseline received the recommended antibiotic (i.e. amoxicillin) (77.9 vs. 59.9%; $p=0.08$), prompt recommended treatment for pneumonia (within 24 hours of onset symptoms) (63.0 vs. 36.4%; $p=0.011$) and prompt and appropriate treatment for pneumonia (within 24 hours of onset of symptoms and for five days) (44.4 vs. 31.1%; $p=0.18$). However, only the difference in prompt treatment was statistically significant. Fewer cases of suspected pneumonia were reported at the endline survey (3.9 vs. 18.0%; $p < 0.0001$).

4.3.6 Management of severe illness

Severe illness treatment practices improved from baseline to endline (Figure 6). More cases sought treatment outside the home (92.7 vs. 78.8%; $p < 0.001$), were referred by CHWs (65.0 vs. 37.2%; $p < 0.001$); complied with the referral (95.8 vs. 77.1%; $p = 0.04$), and complied with the referral within 24 hours (95.7 vs. 74.1%, $p = 0.038$). The one-month prevalence of severe illness reported at endline showed significant reduction (17.8 vs. 38.0%; $p < 0.0001$).

Figure 5: Pneumonia Treatment Practices and Behavior at Baseline and Endline

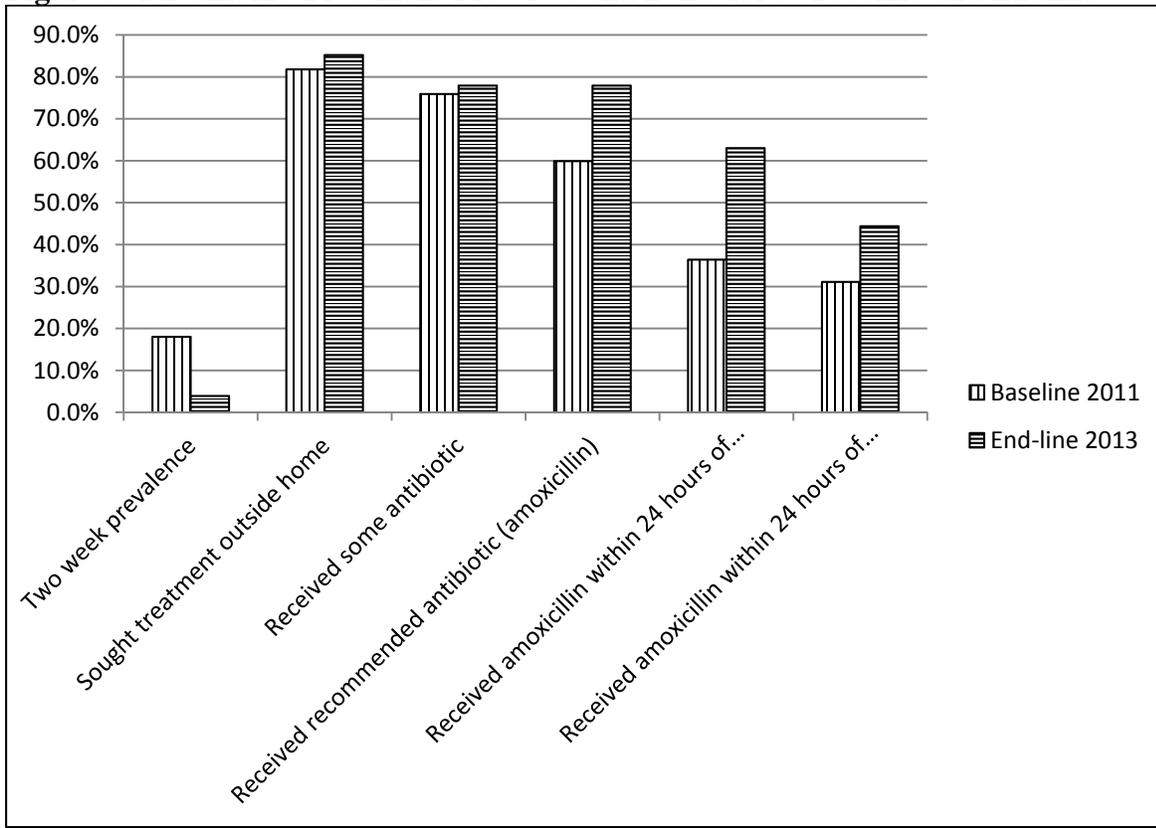
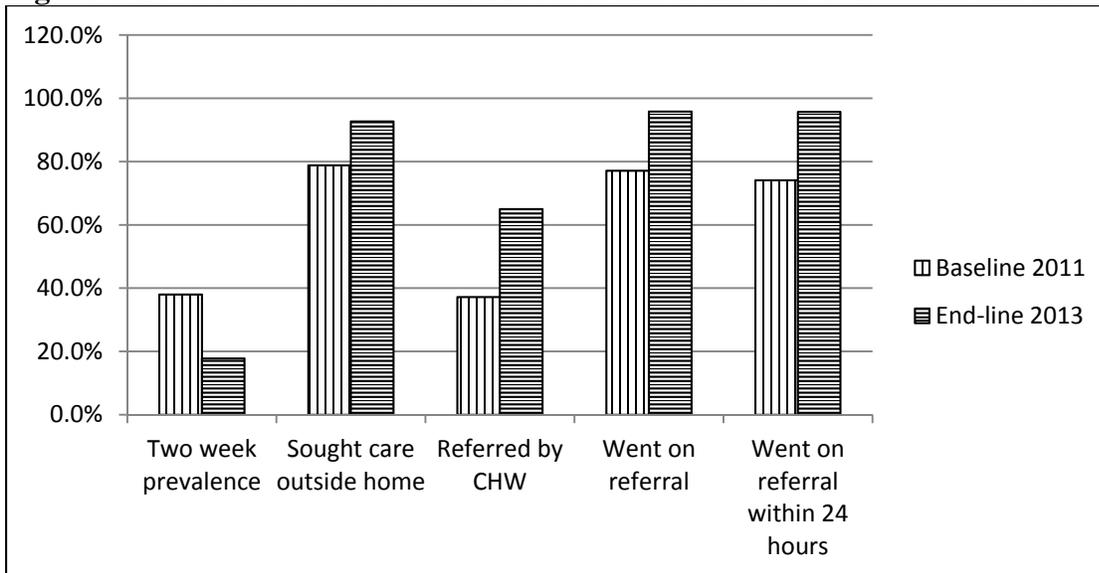


Figure 6: Severe Illness Treatment Practices and Behaviors at Baseline and Endline



4.3.7 Use of intervention and teaming

Teaming strength was positively associated with use of life-saving services and practices (Table 12). Specifically, teamwork and taskwork “quality month scores” were higher among teams

serving mothers who reported use than among teams serving mothers who did not. We observed this pattern in 12 of 14 indicators. The differences were significant for both teamwork and taskwork for four key indicators: receipt of ACT for malaria within 24 hours, receipt of early and appropriate treatment for malaria, care-seeking for pneumonia outside the home, and care-seeking for severe illness outside the home. The difference was significant for taskwork only for receipt of amoxicillin for pneumonia.

Table 12: Association Between Level of Teaming and Intervention Coverage at Endline*

Key outcomes	Mean teamwork score in “quality month scores” of mothers based on score of mothers’ teams			Mean taskwork score in “quality month scores” of mothers based on score of mothers’ teams		
	Yes	No	p-value	Yes	No	p-value
Sought care for malaria/fever outside home	13.3	11.9	0.23	7.6	6.0	0.097
RDT done for fever	13.4	13.2	0.92	7.7	7.0	0.67
Received ACT for malaria	13.6	12.1	0.14	7.8	6.0	0.13
Received ACT for malaria within 24 hours	14.2	12.4	0.003	8.3	6.7	0.002
Received early and appropriate treatment for malaria (ACT within 24 hours of onset and for 3 days)	14.1	12.4	0.005	8.3	6.8	0.004
Sought care for diarrhea outside home	13.8	13.1	0.20	7.8	7.4	0.36
Received ORT for diarrhea	14.0	13.1	0.37	8.1	7.1	0.19
Received ORT and zinc for diarrhea	12.0	14.0	0.12	7.1	7.8	0.53
Sought care for pneumonia outside home	14.2	9.6	0.04	7.7	3.2	0.04
Received amoxicillin for pneumonia	14.0	9.9	0.08	7.7	2.8	0.03
Received amoxicillin for pneumonia within 24 hours	13.5	13.5	0.98	6.9	7.4	0.64
Received early and appropriate treatment for pneumonia (amoxicillin within 24 hours of onset and for 5 days)	14.3	13.4	0.67	8.2	6.9	0.5
Sought care for severe illness outside home	14.0	10.7	0.01	8.2	5.0	0.002
Referred by CHW	14.5	15.4	0.31	8.6	8.9	0.70

* Team quality month score was adjusted to account for how long mother was exposed to team before the survey

4.3.8 Community acceptability

We conducted eight FGDs, four with mothers of children under-five and four with CHW-TBA teams, and 29 IDIs with 24 community leaders (including village headmen, women leaders, local

council counsellors and NHC members); three district health managers; and two provincial health managers. Community members had noticed CHW-TBA teams and reported that they visited homes, provided health education, and supported mothers and their children to complete recommended referrals.

Both community members and health managers indicated that teaming CHWs and TBAs was acceptable and beneficial. Benefits included perceived reduction of child deaths, well informed and educated community on health issues, referral support, and improved facility delivery and postnatal care. Support for teaming was universal and included recommendations to introduce it to other rural areas. The following quotations illustrate common views.

“Yes I have seen changes, in that before the idea of teaming was implemented, the TBAs and CHWs used to work in isolation, but now we have seen a situation where the TBA and the CHW worked as a team in attending to the patient.” – Ward Counsellor

“They just do things together, such as taking patients to the hospital.” – NHC Member

“Yes, the government should make it a policy because the team helps us and educates us on how to take care of our children, so we would want others to receive the services like us.” – mother

“The benefits of the teaming are many to this community, and some of them are deaths have reduced. The team supports referral of expectant mothers, and conducts health talk to this community.” – Ward Counsellor

“This idea of teaming has been welcomed in our village because it has improved our lives, for example in the health of our children and our mothers. We would like this idea to spread to other places in Zambia so that our family friends can also benefit and reduce deaths in their area.” – NHC Member

“The fact is we didn't know much about childbirth, birth spacing, danger signs during pregnancy and child growth. The TBAs and CHWs have been doing a very good job educating and counselling us about child health, and that is the method and procedures we have been following as a community.” – NHC Member

“This teaming has been beneficial to the community. They help and support referrals and post-delivery care. They provide early treatment and sensitize and educate the people. Their work has improved postnatal attendance.” – District Health Manager

5.0 DISCUSSION

We defined CHW teaming for a rural Zambian context; developed tools and methods to assess it; trained CHW-TBA teams; achieved teamwork and joint taskwork; measured improvements in coverage of life-saving interventions; found a positive association between the level of teaming and the level of improved coverage; and confirmed widespread acceptance of the approach.

The formative research employed group discussion and pile-sorting to identify community-generated processes, functions and factors to measure teamwork and taskwork, plus possible determinants of teamwork in this setting. We used these methods to promote consensus among group members [36]. Pile-sorting has been used in public health settings to capture local definitions of disease [40, 41], to study relationships between symptoms and disease severity [42], and to investigate the acceptability of interventions [43, 44]. In our case, the pile-sorting was somewhat constrained, as participants organized the cards according to provided categories [45]. Relatively few studies have used pile-sorting in focus groups similar to ours [46, 47].

The 17 factors identified for measuring teamwork were categorized under eight of the processes that comprise teamwork construct: (1) mutual performance monitoring, (2) mutual trust, (3) decision making/planning, (4) team cohesion, (5) team motivation, (6) goals and objectives, (7) communication, and (8) conflict resolution/management. Three of our processes are in the Team Development Measure constructed by Mahoney and Turkovich to measure the level of development of a team in a health care setting in the developed world [48]. Communication was also part of the Team STEPPS Teamwork Attitudes Questionnaire, a tool designed to assess attitudes towards the core components of teamwork in healthcare [21]. Factors that affect a team's processes identified by a WHO Working Group on Patient Safety [23] were similar to what we found.

Most of the 17 factors we identified for measuring teamwork belong to teamwork attitudes and behaviors, which underscores their importance in team performance in this rural setting. Leadership, commonly an important construct for measuring teamwork, was considered unimportant in our setting. Indeed, participants indicated that the team would likely fail if one member imposed him/herself as a leader of the team, perhaps because of team composition and small size and/or the relatively egalitarian rural culture. The seven functions identified for measuring taskwork emphasize the importance of strong relationships between the community-based workers and the community leadership in charge of health on one hand, and the community-based workers and the beneficiaries on the other.

We assessed 20 potential determinants of teamwork. Community and social systems are linked so assessing associations between teamwork level and especially community-level determinants, such as the supportive role of the NHC, is important. Personal factors, i.e., age and gender, have not typically been associated with teamwork in developed country settings; however, they may be relevant in rural communities where age and gender and deploying two-person teams can be sensitive.

We developed a three-part tool to measure teaming in this study. The tool may be used by the rural health center staff and the DHMT to assess the level of teamwork and taskwork and their relationship to the utilization of the services provided by teams of community-based workers. The teamwork and taskwork functions form the basis of an effective community-based team. They can serve as competencies to be strengthened during refresher trainings to improve team performance.

Our tool was unique that it measures community-based healthcare volunteers' views of teamwork and taskwork. The Safety Climate Survey tool measures perceptions of organizational

commitment to patient safety, leadership, interpersonal interactions, attitudes towards stress, and knowledge of how to report adverse events [49]. The Safety Attitudes Questionnaire also measures attitudes about teamwork, safety, perceptions of management, job satisfaction, working conditions, and stress [50]. The Team Climate Assessment Measurement Questionnaire was developed to enable teams in health and social care to review aspects of their team that likely affect patient safety and error management [51]. This tool may be adapted to measure teamwork and taskwork in other health settings and in situations where there are more than two members of a team.

Our team measurement tool has shown the feasibility of creating and deploying teams of volunteer community-based providers comprised of relatively younger, better schooled, predominantly male CHWs and older, less schooled, female TBAs in a rural setting. Most of the important teamwork dimensions – i.e., mutual support, team cohesion, comprehension of team goals and objectives and communication [21, 52, 53] – were high in about two-thirds of active teams.

Having a common purpose that all team members can articulate is fundamental to team effectiveness. Teams need to involve all members in purpose development, and everyone should be able to articulate and commit to the team's purpose. If members have different understandings of their common purpose, friction, confusion, and wasted resources and effort are inevitable [54]. In our study, team scores on the comprehension of goal and objectives were high; therefore, these CHW-TBA teams had the potential for effective delivery of integrated newborn and child care services. Team scores on communication were also high and improved over time, a welcome achievement since team communication failure has been associated with breakdown of teamwork, reduced outcomes, tension, stress and inefficiency [55-60].

The low score for mutual performance monitoring is concerning. A proposed model of five key dimensions for effective teams includes mutual performance monitoring [61]. Mutual performance monitoring requires sufficient understanding of the environment to monitor other team members to identify lapses. To achieve these five dimensions, team members must respect and trust each other to give and receive performance feedback and must have good communication skills to convey information accurately [62]. Despite scoring low in mutual performance monitoring, these teams had excellent scores on mutual trust and high scores on communication, so these teams have the potential to improve monitoring.

Member proximity was the main identified factor positively influencing the level of teaming, which is not surprising since proximity likely improves communication, interaction and collaboration. Where CHWs and TBAs are already deployed in proximity, teaming seems a promising strategy to deliver integrated community-based newborn and child care interventions. However, 30% team attrition over two years is a challenge (22% for CHWs and 8% for TBAs). This may not be surprising considering that many teams received few or no incentives from their communities. Annual attrition rates as high as 77% have been reported among volunteer community-based providers [63]. Attrition is largely due to low remuneration, “movement upwards to higher positions in the health system,” and finding better positions in other fields [64], similar to what we found. The importance of adequate retention and incentive structures for CHW programs is recognized as a key component of the WHO task-shifting proposal to tackle

health worker shortages to contribute to the achievement of several Millennium Development Goals in low-income countries [65]. If teaming is to be implemented, approaches to motivate and retain CHWs need to be adopted [66-69]. The development and implementation of the Zambian Government's new National Community Health Worker Strategy which establishes a new cadre of Community Health Assistants, whom the government will pay a monthly allowance, may be a step in the right direction [32]. The full potential of teaming will only be realized after both increased retention and increased deployment to address remaining access gaps.

In Phase III, we demonstrated that teaming CHWs with TBAs to provide integrated newborn and child health care services in rural communities along a continuum of care could be effective. Training CHWs and TBAs in teaming concepts and deploying them to work in teams, with support from NHCs, resulted in improved use of key services and practices for fever/malaria, pneumonia, diarrhea and severe illness as well as improved coverage of maternal and child health interventions, notably delivery at HF, skilled birth attendance, postnatal care and exclusive breastfeeding. Twice as many children received early and appropriate treatment for fever/ malaria and pneumonia, zinc for diarrhea and referral for severe illness following the deployment of CHW-TBA teams. In addition, two-week prevalence of fever/malaria, diarrhea, and pneumonia and the one-month prevalence of severe illness decreased by half. Both surveys started in March, but the endline extended into June, so seasonality may have contributed to the difference.

Bedford and colleagues in work done in Kenya, Nigeria and Niger identified lack of financial resources, HF deterrents, distance/location of facilities, socio-cultural and gender dynamics, and knowledge and information shortfalls as important demand-side barriers to receiving health care [70]. In the Zambian setting, treatment for malaria, diarrhea and pneumonia, as well as maternal and child health preventive services, are offered for free. Most families receive health care from community-based health workers and through outreach. Therefore, the demand-side barriers that influence health-seeking – knowledge and information and social cultural and gender dynamics – may prove most critical. The teaming concept approach influences these demand-side barriers leading to improved health seeking practices and improvement in our study outcomes.

Several taskwork activities and competencies exhibited in this study likely influenced and contributed to improving health care seeking. The teams jointly conducted SBCC sessions targeting women for newborn and child health care services. Team members planned and executed SBCC in their communities, educating mothers on the importance of adopting key household practices, seeking care early during illness and adhering to treatment and referral. Several studies have documented the importance of SBCC in improving health seeking and use of interventions [71-73]. Similarly, the CHW-TBA teams' community mobilization supported by the NHCs may have played complementary role in achieving the effects. Regular meetings with NHCs to discuss work and performance probably kept teams on course to carry out their work. Teamwork competencies, such as evaluating successes and failures to improve team performance, planning and making decisions together, motivating and encouraging each other, and mutual trust and team cohesion may have contributed positively to team maintenance and level of effort [74].

The study has limitations. In Phase I, we purposely selected well-functioning NHCs with prior experience working with community members, to solve health problems and to identify existing “best practices.” This was essential because there would be no point in studying a disorganized, dysfunctional setting where teamwork was unlikely to have been observed. We also acknowledge the complexity of measuring some of the determinants such as socio-economic status, motivation and links with NHCs. Another limitation is the small number of participants.

In Phase II, the assessment consisted mainly of participants’ subjective reports of satisfaction, attitudes, and opinions; and they may have over-rated themselves. The small sample size may have precluded identifying other factors influencing teaming.

In Phase III, we used a pre- and post-design and could not rule out other factors contributing to the observed associations. For example, the NHCs’ support of other community-based groups (e.g., Safe Motherhood Action Groups) and other community mobilization efforts (e.g., development of emergency transport systems) may have contributed to the changes observed. On the other hand, CHWs and TBAs – as individuals or together – certainly played roles in both these examples. However, the positive association between levels of teaming and levels of coverage supports the effect of teaming, perhaps through various pathways. This however, must be interpreted with caution because the assumption that a team’s performance influenced the behavior of caregivers in its catchment area may not be the case. We also recognize the potential influence of strengthening district health services on quality of care at HFs, thereby increasing demand. Other limitations include the use of maternal recall for care-seeking and recent treatments.

In summary, teaming is likely a partial solution to improving coverage in remote areas, but teams require members, who are already sparsely deployed and challenging to retain.

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7.0 ANNEXES
7.1 Annex 1: Teaming Measurement Tool

LINCHPIN CHW-TBA TEAMING ASSESSMENT FORM

PART A: TASKWORK (To be administered to both members jointly)

Introduction

The following statements describe functions and responsibilities you are supposed to perform as a team. Please answer all questions as openly and honestly as possible.

A1. Has this team jointly attended an NHC meeting in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A2. Has this team jointly conducted BCC (health education) session on newborn or child care in this community in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A3. Has this team jointly worked together to solve any problem related to newborn or child care in this community in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A4. Has this team jointly participated in outreach services in this community in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A5. Has this team jointly worked together to refer a pregnant woman or a mother with a sick child 0 – 59 months to the health center/post in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A6. Has there been any referral between team members (for example, CHW referring a pregnant woman to the TBA or TBA referring a mother with a child 0-59 months to the CHW) in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

A7. Has the team jointly conducted PNC visit to a mother with a newborn aged about 6-8 weeks where the TBA handed over the newborn to the CHW in the last 3 months?

1. No
2. Yes but no documentation
3. Yes and documented

PART B: TEAMWORK (To be administered to only the CHW)

Introduction

The following statements describe certain features and characteristics that may be present in your team. Please indicate what most represents the current situation for your team.

Please answer all questions as openly and honestly as possible.

CB1. Do you make plans together towards achieving the goal of this team which is improving the health of children?

1. No
2. Sometimes
3. All the time

CB2. Do you and your team member (TBA) clearly understand your common goal?

1. No
2. Not sure
3. Yes

CB3. Do you and your team member (TBA) clearly understand your roles and responsibilities in this team work?

1. No
2. Not sure
3. Yes

CB4. Do you make decisions together about the work of your team?

1. No
2. Sometimes
3. All the time

CB5. Do you divide your tasks so as not to duplicate efforts?

1. No
2. Sometimes
3. All the time

CB6. Do you check each other's work to ensure that you are each doing what you are expected to achieve your goals?

1. No
2. Sometimes
3. All the time

CB7. Are you and your team member (TBA) working together to achieve the goal of improving the health of children?

1. No
2. Not sure
3. Yes

CB8. Do you think there is mutual respect between you and your team member (TBA)?

1. No
2. Not sure
3. Yes

CB9. Do you feel there is mutual trust rather than suspicion or anxiety in your team?

1. No
2. Not sure
3. All the time

CB10. Do you feel that issues you deal with as a team are strictly confidential?

1. No
2. Not sure
3. Yes

CB11. Do you work through disagreements or conflicts with your team member (TBA) to manage them when they arise?

1. No
2. Sometimes
3. All the time
4. No disagreement/conflict

CB12. Do you enjoy working together with your team member (TBA)?

1. No
2. Sometimes
3. Yes

CB13. How committed are you to the success of this team?

1. No commitment
2. Some commitment
3. Very committed

CB14. How often do you communicate with your team member (TBA)?

1. Never
2. Sometimes
3. Very often

CB15. How available and accessible are you to support your team member (TBA) when there is the need?

1. Never
2. Sometimes
3. All the time

CB16. How often do you consult your team member (TBA) when there is the need?

1. Never
2. Sometimes
3. All the time

CB17. Do you seek help from your team member (TBA) if there is the need?

1. No
2. Sometimes
3. All the time

CB18. Do you openly share with your team member (TBA) information important for the success of the team?

1. No
2. Sometimes
3. All the time

CB19. Do you feel that the teamwork is worthwhile?

1. No
2. Not sure
3. Yes

CB20. Do you have a strong sense of being a member of this team?

1. No
2. Not sure
3. Yes

CB21. Do you motivate your team member (TBA) to work as a team?

1. No
2. Sometimes
3. All the time

CB22. Do you encourage your team member (TBA) to perform agreed upon roles and responsibilities in the team?

1. No
2. Sometimes
3. All the time

CB23. Do you feel free to share your ideas with your team member (TBA) about how the work is going and how to improve upon it?

1. No
2. Sometimes
3. Yes

CB24. Do you feel free to express your feelings with your team member (TBA) about how the work is going and how to improve upon it?

1. No
2. Sometimes
3. Yes

CB25. Do you feel that your team member (TBA) takes over what you consider to be your role?

1. Yes
2. Sometimes
3. No

CB26. Do you feel that your team member (TBA) interferes with your work?

1. Yes
2. Sometimes
3. No

CB27. Do you feel that your team member (TBA) is trying to control the team?

1. Yes
2. Sometimes
3. No

PART B: TEAMWORK (To be administered to only the TBA)

Introduction

The following statements describe certain features and characteristics that may be present in your team. Please indicate what most represents the current situation for your team.

Please answer all questions as openly and honestly as possible.

TB1. Do you make plans together towards achieving the goal of this team which is improving the health of children?

1. No
2. Sometimes
3. All the time

TB2. Do you and your team member (CHW) clearly understand your common goal?

1. No
2. Not sure
3. Yes

TB3. Do you and your team member (CHW) clearly understand your roles and responsibilities in this team work?

1. No
2. Not sure
3. Yes

TB4. Do you make decisions together about the work of your team (CHW)?

1. No
2. Sometimes
3. All the time

TB5. Do you divide your tasks so as not to duplicate efforts?

1. No
2. Sometimes
3. All the time

TB6. Do you check each other's work to ensure that you are each doing what you are expected to achieve your goals?

1. No
2. Sometimes
3. All the time

TB7. Are you and your team member (CHW) working together to achieve the goal of improving the health of children?

1. No
2. Not sure
3. Yes

TB8. Do you think there is mutual respect between you and your team member (CHW)?

1. No
2. Not sure
3. Yes

TB9. Do you feel there is mutual trust rather than suspicion or anxiety in your team?

1. No
2. Not sure
3. All the time

TB10. Do you feel that issues you deal with as a team are strictly confidential?

1. No
2. Not sure
3. Yes

TB11. Do you work through disagreements or conflicts with your team member (CHW) to manage them when they arise?

1. No
2. Sometimes
3. All the time
4. No disagreement/conflict

TB12. Do you enjoy working together with your team member (CHW)?

1. No
2. Sometimes
3. Yes

TB13. How committed are you to the success of this team?

1. No commitment
2. Some commitment
3. Very committed

TB14. How often do you communicate with your team member (CHW)?

1. Never
2. Sometimes
3. Very often

TB15. How available and accessible are you to support your team member (CHW) when there is the need?

1. Never
2. Sometimes
3. All the time

TB16. How often do you consult your team member (CHW) when there is the need?

1. Never
2. Sometimes
3. All the time

TB17. Do you seek help from your team member (CHW) if there is the need?

1. No
2. Sometimes
3. All the time

TB18. Do you openly share with your team member (CHW) information important for the success of the team?

1. No
2. Sometimes
3. All the time

TB19. Do you feel that the teamwork is worthwhile?

1. No
2. Not sure
3. Yes

TB20. Do you have a strong sense of being a member of this team?

1. No
2. Not sure
3. Yes

TB21. Do you motivate your team member (CHW) to work as a team?

1. No
2. Sometimes
3. All the time

TB22. Do you encourage your team member (CHW) to perform agreed upon roles and responsibilities in the team?

1. No
2. Sometimes
3. All the time

TB23. Do you feel free to share your ideas with your team member (CHW) about how the work is going and how to improve upon it?

1. No
2. Sometimes
3. Yes

TB24. Do you feel free to express your feelings with your team member (CHW) about how the work is going and how to improve upon it?

1. No
2. Sometimes
3. Yes

TB25. Do you feel that your team member (CHW) takes over what you consider to be your role?

1. Yes
2. Sometimes
3. No

TB26. Do you feel that your team member (CHW) interferes with your work?

1. Yes
2. Sometimes
3. No

TB27. Do you feel that your team member (CHW) is trying to control the team?

1. Yes
2. Sometimes
3. No

PART C: TEAMING DETERMINANTS (To be administered to only the CHW)

CH1a. Have you received any supervision in your work from the rural health center/DHMT in the last 3 months?

1. No	2. Yes
-------	--------

CH1b. Where did it take place?

1. At the community health post
2. At the health facility
3. At your home
4. Other _____
8. NA

CH1c. Was the supervision for both you and your team?

1. No	2. Yes	8. NA
-------	--------	-------

CH1d. Were you supervised as a team together at the same time?

1. No	2. Yes	8. NA
-------	--------	-------

CH2. The last time you were personally supervised, did your supervisor do any of the following?

CH2.1	Deliver supplies	1. Yes	2. No	8. NA
CH2.2	Check/review your records/registers	1. Yes	2. No	8. NA
CH2.3	Observe you working	1. Yes	2. No	8. NA
CH2.4	Provide any feedback/comments that you are doing your work well	1. Yes	2. No	8. NA
CH2.5	Provide any feedback/comments that you need improvement in one or more areas	1. Yes	2. No	8. NA
CH2.6	Provide updates on technical issues related to your work	1. Yes	2. No	8. NA
CH2.7	Discuss problems you have encountered	1. Yes	2. No	8. NA

CH3. Have you received any payment, cash or/and in kind for the work you do in the last six months?

1. No
2. Cash only
3. In kind only
4. Both cash and in kind

CH4. How satisfied are you with your work as a CHW?

1. Not satisfied
2. Somewhat satisfied
3. Satisfied
4. Highly satisfied

CH5. How motivated are you in performing your work as CHW?

1. Not motivated
2. Somewhat motivated
3. Motivated
4. Highly motivated

CH6. Do you own a bicycle?

1. No	2. Yes
-------	--------

CH7. Do you own a cell phone?

1. No	2. Yes
-------	--------

CH8. Have you received any refresher training on newborn or child care in the last six months?

1. No	2. Yes
-------	--------

CH9. Have you had any discussion with community leaders or other community groups (not NHCs) about your work in the last six months?

1. No	2. Yes
-------	--------

CH10. CHECK THE AVAILABILITY OF DRUGS/SUPPLIES

CH10.1	ACT (Coartem/Lumet)	1. Yes	2. Not available today	3. Never available
CH10.2	Amoxicillin for pneumonia	1. Yes	2. Not available today	3. Never available
CH10.3	ORS packets	1. Yes	2. Not available today	3. Never available
CH10.4	Zinc	1. Yes	2. Not available today	3. Never available

PART C: TEAMING DETERMINANTS (To be administered to only the TBA)

D1a. Have you received any supervision in your work from the rural health center/DHMT in the last six months?

1. No	2. Yes
-------	--------

D1b. Where did it take place?

1. At the community health post
2. At the health facility
3. At your home
4. Other _____
8. NA

D1c. Was the supervision for both you and your team member?

1. No	2. Yes	8. NA
-------	--------	-------

D1d. Were you supervised as a team together at the same time?

1. No	2. Yes	8. NA
-------	--------	-------

D2. The last time you were personally supervised, did your supervisor do any of the following?

D2.1	Deliver supplies	1. Yes	2. No	8. NA
D2.2	Check/review your records/registers	1. Yes	2. No	8. NA
D2.3	Observe you working	1. Yes	2. No	8. NA
D2.4	Provide any feedback/comments that you are doing your work well	1. Yes	2. No	8. NA
D2.5	Provide any feedback/comments that you need improvement in one or more areas	1. Yes	2. No	8. NA
D2.6	Provide updates on technical issues related to your work	1. Yes	2. No	8. NA
D2.7	Discuss problems you have encountered	1. Yes	2. No	8. NA

D3. Have you received any payment, cash or/and in kind for the work you do in the last six months?

1. No
2. Cash only
3. In kind only
4. Both cash and in kind

D4. How satisfied are you with your work as a TBA?

1. Not satisfied
2. Somewhat satisfied
3. Satisfied
4. Highly satisfied

D5. How motivated are you in performing your work as TBA?

1. Not motivated
2. Somewhat motivated
3. Motivated
4. Highly motivated

D6. Do you own a bicycle?

1. No	2. Yes
-------	--------

D7. Do you own a cell phone?

1. No	2. Yes
-------	--------

D8. Have you received any refresher training on newborn or child care in the last six months?

1. No	2. Yes
-------	--------

D9. Have you had any discussion with community leaders or other community groups (not NHCs) about your work in the past six months?

1. No	2. Yes
-------	--------

D10. CHECK THE AVAILABILITY OF SUPPLIES

D10.1 TBA Kits/some materials for delivery or newborn care

1. Yes	2. Not available today	3. Never available
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7.2 Annex 2: LINCHPIN OR Program Learning on Teaming

Step	Main Activities	Products
<u>OR Phase 1:</u> Formative research (October 2010)	<i>Focus group discussions (n=6) with pile sorting with CHW/TBAs and Neighborhood Health Committees to explore the socio-cultural context and identify domains and factors of teaming.</i>	<ul style="list-style-type: none"> • Teaming data collection forms: The formative research identified 18 factors (in 7 domains) of teamwork and vetted 7 activities of taskwork. These informed assessment tools and methods. • Yeboah-Antwi K, Snetro-Plewman G, Waltensperger KZ, Hamer DH, Kambikambi C, MacLeod W, Filumba S, Sichamba B, Marsh D: Measuring teamwork and taskwork of community-based “teams” delivering life-saving health interventions in rural Zambia: a qualitative study. BMC Med Res Methodol 2013, 13: 84. doi: 10.1186/1471-2288-13-84.
<u>OR Phase 2:</u> Training (March-May 2011)	Training of Trainers (8) Workshop (March) and 7 Trainings (April-May) for 47 CHW/TBA teams plus two NHC members each.	<ul style="list-style-type: none"> • Save the Children, Training Effective Teams for a Healthy Community – Training of Trainers Guide, LINCHPIN Project, Lufwanyama District, Zambia: March 12, 2011. This 35-page guide imparts adult learning methods, facilitation skills, and the content of the below training manual for CHW-TBA teams. • Save the Children, Training Effective Teams for a Healthy Community, LINCHPIN Project, Lufwanyama District, Zambia: March 23, 2011. This 67-page training manual imparts the identified teaming knowledge, attitudes, skills (competencies) to future CHW-TBA teams.
<u>OR Phase 2:</u> Assessment of teams (April 2011-March 2013)	(1) Baseline assessment of TBA and CHW demographics and other factors that could influence teaming (April 2011) and (2) assessments of teams every six months (x 4) for availability, teamwork, taskwork, and other factors (June 2011-March 2013).	<ul style="list-style-type: none"> • Yeboah-Antwi K, Hamer DH, Semrau K, Waltensperger KZ, Snetro-Plewman G, Kambikambi C, Sakala A, Filumba S, Sichamba B, Marsh DR. Can a community health worker and a trained traditional birth attendant work as a team to deliver child health interventions in rural Zambia? under review at BMC Health Services Research.
<u>OR Phase 3:</u> Household surveys (2011, 2013)	Population-based baseline (March-April 2011, n=735) and endline (March-June 2013, n=701) surveys of caregivers of children <5 to measure coverage changes in <i>teamed communities</i> .	<ul style="list-style-type: none"> • Yeboah-Antwi K, Waltensperger KZ, Hamer DH, Semrau K, Snetro-Plewman G, Sakala A, Filumba S, Sichamba B, Marsh DR. Integrating community-based newborn and child health services in rural Zambia: effectiveness of teams of community health workers and trained traditional birth attendants, in preparation for PLoS Medicine.
<u>OR Phase 3:</u> Qualitative studies (June 2013)	Endline focus group discussions (n=8) and in-depth interviews (n=29) of caregivers, teams, community leaders and district and provincial managers to explore acceptability of teaming.	<ul style="list-style-type: none"> • Yeboah-Antwi K, Hamer D, Semrau K, MacLeod W, Marsh D, Waltensperger KZ, Snetro-Plewman G, Filumba S, Sichamba B, Sakala A. <i>The Feasibility, Acceptability and Effect of Teaming Community Health Workers and Trained Traditional Birth Attendants to Deliver Newborn and Child Survival Interventions in a Remote Zambian District</i> – 81-page Report of Operations Research, September 2014.

7.3 Annex 3: Pile-sorting Guide

LINCHPIN TEAMING OPERATIONS RESEARCH QUESTION GUIDE FOR PILE-SORTING SESSION

Introduce yourselves (the facilitators), and ask for introductions of those joining the discussion (participants name, age, occupation etc.). Explain the purpose of the discussion. Explain that this will be a participatory discussion and they should feel free to speak freely. Remember that sentences in bold are instruction for facilitators and those in italics are questions for participants.

Facilitator should set the stage for the discussion with the following background.

- 1 We would like to ask you some questions about how you work in your community. We would like for you to think about a football team (or netball team) that you know of. What makes the team work well together? (Allow time for some answers).
Just like a football team, there are times when we work together with others to achieve good results. This discussion is being held so that we all can learn more about what good team work means to you in order to improve woman and child health.*

We hope to record our discussions using a tape recorder so that we can capture the dialogue. Let's get started!

- 2. How long have you been involved in this work (TBA/CHW/NHC)?*
- 3. What motivates you to do this work?*
- 4. How did you get into this work?*
- 5. Who taught you how to do it and where did you learn how to do it?*
- 6. Are there other volunteers/health workers with which you work?*

For each type of person, probe on the specific forms of interaction.

- 7. Please give me an example of a recent situation where another person(s) helped you carry out your work to help mothers and children stay healthy?(or when you worked as a team with someone else?)*

a) Invite participants to work around a horizontal line on the ground, using sticks, stones etc.

b) Let participants know that you will be talking about the event when someone helped them with their health volunteer work.

c) Ensure that note-taker is drawing the timeline in his/her notes and capturing discussion.

d) Ask questions and mark their responses with a symbol from locally available materials (leaf; bottle, etc.)

8. *Now, let's think about all that the person(s) actually did to help you?*

- *How or why did you decide to invite someone to help you?
What was the first thing this person did to help?*
- *What was the next thing they did? (**Continue with each activity they did.**)*
- *Looking back on this timeline what was the most helpful thing this person did?*

9. *Why do you think you worked well as a team? (**Write down factors on cards**)*

10. *What would have made this teamwork better? (**Write down factors on cards**)*

11. *Now, share a time when teamwork did not go as expected?*

12. *What made it not go well? (**Write down factors on cards.**)*

13. *What could have improved the teamwork? (**Write down factors on cards**)*

Allow all participants to share their experiences.

14. *What will make people work well as a team? (**Write down factors on cards**)*

15. *What will make people not work so well as a team? (**Write down factors on cards**)*

Go through the already prepared cards and share the domains that have not been mentioned by the participants. Ask for each one not mentioned how important it is for a good team.

16. *You have mentioned a number of ways in which to improve teamwork or working together. We have reviewed some ways that other people mentioned which you think they are important for encouraging good team work.*

Now, we would like you to work as a team and sort these different factors that make a good team in three categories: “very important”, “important”, and “least important”, explaining your decision as you sort them.

Ensure that note-taker is capturing discussion and taking note of the explanation.

Review the piles with participants and ask them to indicate how they will identify the presence or absence of these factors/domains in a team

17. Do you have any questions for us?

7.4 Annex 4: Household Survey Form

LINCHPIN HOUSEHOLD SURVEY QUESTIONNAIRE

Identification			
Health Facility Code			
Team Number			
Household Number			

Interview			
Interview date		___/___/___ dd/mm/year	
Interviewer Code			
Supervisor Code			

Data Entry		
	Code	Date
First Data Entry		___/___/___ dd/mm/year
Second Data Entry		___/___/___ dd/mm/year

1.0 DEMOGRAPHICS

1.1 How old are you? (99 IF DO NOT KNOW)

1.2 What is the highest level of education that you attained?

1.No schooling	2. Primary	3. Secondary	4. Higher
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1.3 What ethnic group/tribe do you belong to?

1.Lamba	2. Bemba	3. Kaonde
4. Other _____		

1.4 What is your marital status?

1. Single/not married	2. Married	3. Separated/Divorced
4. Widowed		

1.5 How many children under five years do you have?

IF MORE THAN ONE INFORM HER THAT YOU WILL CONCENTRATE ON THE YOUNGEST CHILD FOR THE INTERVIEW

1.6 What is the date of birth of this child

--	--	--	--	--	--	--	--

1.7 What is the sex of this child?

1. Male	2. Female
---------	-----------

1.8 Does the child’s biological father live in this household?

1. Yes	2. No
--------	-------

1.9 Who is the head of this household?

1. Mother (Respondent)	2. Husband/Partner
3. Female relative _____	
4. Male relative _____	

1.10 What is your main occupation?

1. Housewife	2. Farmer
3. Trader	4. Civil servant
5. Other office work	6. Other _____

1.11 About how long does it take you to walk to the nearest health center/post? |

1. Less than one half hour		
2. Between one half hour and one hour		
3. More than one hour. Specify <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table>		

1.12 About long does it take you to walk to the nearest CHW? |

1. Less than one half hour		
2. Between one half hour and one hour		
3. More than one hour. Specify <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table>		

2.0 PREGNANCY, DELIVERY, POSTNATAL

2.1 During your pregnancy with the child, did you see anyone for antenatal care?

1. Yes	2. No
--------	-------

2.2 Did you see any of these at anytime for the antenatal care?

2.2.1 Doctor/Clinical officer	1. Yes	2. No	8. NA
2.2.2 Nurse/Midwife	1. Yes	2. No	8. NA
2.2.3 Traditional Birth Attendant	1. Yes	2. No	8. NA
2.2.4 Other _____	1. Yes	2. No	8. NA

2.3 How many times did you receive antenatal care? (00 IF NO ANC)

--	--

2.4 Which of these did you see most?

1. Doctor/Clinical officer
2. Nurse/Midwife
3. Traditional Birth Attendant
4. Other _____
8. NA

2.5 How many total tetanus injection (injection in the arm to prevent baby from getting tetanus, that is convulsions after birth) did you receive before and during the pregnancy

2.6 When you were pregnant with the child, did you take SP/Fansidar (drug to prevent you from getting malaria)?

1. Yes	2. No
--------	-------

2.7 How many times did you take the SP/Fansidar (0 IF NO FANSIDAR TAKEN)

2.8 When you were pregnant with the child, did you sleep under a long lasting insecticide net or bednet that was treated with insecticide within six months?

1. Yes	2. No
--------	-------

2.9 Where did you deliver?

1. Health facility	2. Home	3 TBA hut
4. Other _____		

2.10 Who was the main person that assisted with the delivery of the child?

1. Doctor/clinical officer
2. Nurse/midwife
3. Auxiliary nurse/nurse aide
4. Other health staff
5. Trained TBA
6. CHW
7. Untrained TBA
8. Relative/Friend
9. Nobody assisted/delivered by self

2.11 After the child was born, did any health care provider or volunteer community health worker check you and your baby's health in the first two days?

PROBE FOR VISITS IN AND OUTSIDE THE HOME WHERE DISCUSSION OR COUNSELLING OR EXAMINATION TOOK PLACE

1. Yes	2. No
--------	-------

2.12. Who checked on you or your baby's health at that time?

1. Doctor/clinical officer	2. Nurse/Midwife	3. Other health worker
4. Trained TBA	5. Untrained TBA	6. Community health worker
7. Other _____	8. NA	

2.13 Where did this check take place?

1. Hospital	2. Health Center/Health Post	3. Private clinic
4. TBA's home	5. CHW Post	6. Your home
7. Other _____		8. NA

3.0 CHILDHOOD ILLNESS

3.1 Sometimes newborns, within the first month of life, have severe illnesses or problems and should be taken immediately to a health facility. What types of symptoms or problem would cause you to take a newborn to a health facility right away? (DO NOT READ RESPONSES: ASK ANYTHING ELSE?)

3.1.1	Convulsions	1. Yes	2. No
3.1.2	Fever	1. Yes	2. No
3.1.3	Poor sucking or feeding	1. Yes	2. No
3.1.4	Fast/difficult breathing	1. Yes	2. No
3.1.5	Feels cold	1. Yes	2. No
3.1.6	Too small or born too early	1. Yes	2. No
3.1.7	Redness or discharge around cord	1. Yes	2. No
3.1.8	Red swollen eyes/discharge	1. Yes	2. No
3.1.9	Yellow palms/soles/eyes	1. Yes	2. No
3.1.10	Lethargy	1. Yes	2. No
3.1.11	Unconscious	1. Yes	2. No
3.1.12	Other _____	1. Yes	2. No

3.2 Sometimes children get sick and need to receive care or treatment for illnesses immediately. What are the signs of illness that would indicate a child needs urgent treatment? (DO NOT READ RESPONSES: ASK ANYTHING ELSE?)

3.2.1	Looks unwell or not playing normally	1. Yes	2. No
3.2.2	Not eating or drinking	1. Yes	2. No
3.2.3	Lethargic or difficult to wake	1. Yes	2. No
3.2.4	High fever	1. Yes	2. No
3.2.5	Fast/difficult breathing	1. Yes	2. No
3.2.6	Vomits everything	1. Yes	2. No
3.2.7	Convulsions	1. Yes	2. No
3.2.8	Other 1 _____	1. Yes	2. No
3.2.9	Other 2 _____	1. Yes	2. No

3.3 Did the child experience any of the following in the past two weeks?

3.3.1	Diarrhea	1. Yes	2. No
3.3.2	Blood in stool	1. Yes	2. No
3.3.3	Cough	1. Yes	2. No
3.3.4	Difficult breathing	1. Yes	2. No
3.3.5	Fast breathing/short quick breaths	1. Yes	2. No
3.3.6	Fever	1. Yes	2. No
3.3.7	Malaria	1. Yes	2. No

IF RESPONSE TO 3.3.1 OR 3.3.2 IS YES, ADMINISTER DIARRHEA MODULE

IF RESPONSE TO (3.3.3 AND 3.3.4) OR 3.3.3 AND 3.3.5) ARE YES ADMINISTER PNEUMONIA MODULE

IF RESPONSE TO 3.3.6 OR 3.3.7 IS YES ADMINISTER MALARIA MODULE

3.4 Did this child also experience any of the following in the past one month?

3.4.1	Looks very unwell or not playing normally	1. Yes	2. No
3.4.2	Not eating/sucking or drinking	1. Yes	2. No
3.4.3	Lethargic or difficult to wake	1. Yes	2. No
3.4.4	High fever with twitching	1. Yes	2. No
3.4.5	Labored breathing with chest wall moving in when the child breaths in	1. Yes	2. No
3.4.6	Vomits everything	1. Yes	2. No
3.4.7	Convulsions	1. Yes	2. No
3.4.8	Redness or discharge around cord	1. Yes	2. No
3.4.9	Red swollen eyes/discharge	1. Yes	2. No
3.4.10	Yellow palms/soles/eyes	1. Yes	2. No

IF RESPONSE TO ANY OF 3.4.1 TO 3.4.10 IS YES ADMINISTER NEONATAL SEPSIS/SEVERE DISEASE MODULE

4.0 MALARIA OR FEVER TREATMENT MODULE

4.1 Did you give any special care or treatment at home to the child when he had the fever or malaria?

1. Yes	2. No
--------	-------

4.2 Did you seek advice or treatment for the fever/malaria outside the home?

1. Yes	2. No
--------	-------

IF THE RESPONSE TO 4.2 IS “1. Yes” CIRCLE “8.NA” FOR 4.3 AND CONTINUE. IF THE RESPONSE TO 4.2 IS “2. No”, ASK 4.3 AND DRAW TWO LINES ACROSS 4.4 TO 4.9

4.3 Why didn't you seek care for your child outside the home?

1. Expecting self-resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

4.4 Where did you go first for advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic (Private)
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner		8. Drug shop/Pharmacy
9. Other _____		88. NA

4.5 How many days after the fever began did you first seek treatment for the child?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA
		9. Do not know

4.6 Did you go anywhere else for advice or treatment?

1. Yes	2. No	8. NA
--------	-------	-------

4.7 Where did you go for this next advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner	8. Drug shop/Pharmacy	
9. Other _____		88. NA

4.8 Did the child have a fingerprick for a malaria rapid diagnostic test when you sought treatment for the fever?

1. Yes	2. No	8. NA	9. Do not know
--------	-------	-------	----------------

4.9 What was the result of the test?

1. Positive	2. Negative	8. NA	9. Do not know
-------------	-------------	-------	----------------

4.10 At any time during the illness did the child take any drugs for the fever/malaria?

1. Yes	2. No
--------	-------

4.11 What drugs did the child take?

4.11.1 ACT (Coartem/Lumet)

4.11.2 SP/Fansidar

4.11.3 Chloroquine

4.11.4 Amodiaquine

4.11.5 Quinine

4.11.6 Paracetamol/Aspirin/Panadol

4.11.7 Antibiotics

4.11.8 Other _____

1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA

IF 4.11.1 IS "1. Yes" ASK 4.12 TO 4.14 OTHERWISE DRAW TWO LINES ACROSS.

4.12 Who gave you the ACT (Coartem/Lumet) that the child took?

1. Health worker at hospital	2. Health worker at health center/health post	3. Health worker at clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Bought at the drug shop/pharmacy		
9. Other _____		

4.13 How long after the fever/malaria started did the child start taking the ACT (Coartem/Lumet)?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	

4.14 How many days did the child take the ACT (Coartem/Lumet)?

5.0 DIARRHEA TREATMENT MODULE

5.1 When the child had the diarrhea how did you breastfeed him/her?

1. Less than usual	2. About same amount	3. More than usual
8. NA (Child is not breastfeeding)	9. Do not know	

5.2 When the child had the diarrhea how did you offer drink to him/her?

1. Less than usual	2. About same amount	3. More than usual
8. NA (Child is exclusive breastfeeding)	9. Do not know	

5.3 When the child had the diarrhea how did you offer food to him/her to eat?

1. Less than usual	2. About same amount	3. More than usual
8. NA (Child is exclusive breastfeeding)	9. Do not know	

5.4 Did you seek advice or treatment for the diarrhea outside the home?

1. Yes	2. No
--------	-------

IF THE RESPONSE TO 5.4 IS “1. Yes” CIRCLE “8.NA” FOR 5.5 AND CONTINUE. IF THE RESPONSE TO 5.4 IS “2. No”, ASK 5.5 AND DRAW TWO LINES ACROSS 5.6 TO 5.9

5.5 Why didn't you seek care for your child outside the home?

1. Expecting self-resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

5.6 Where did you go first for advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner	8. Drug shop/Pharmacy	
9. Other _____	88. NA	

5.7 How many days after the diarrhea began did you first seek treatment for the child?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA
		9. Do not know

5.8 Did you go anywhere else for advice or treatment?

1. Yes	2. No	8. NA
--------	-------	-------

5.9 Where did you go for this next advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner	8. Drug shop/Pharmacy	
9. Other _____		88. NA

5.10 Was the child given any of the following to drink at any time since he/she started having the diarrhea?

5.10.1	Fluid from ORS packet	1. Yes	2. No
5.10.2	ORS liquid	1. Yes	2. No
5.10.3	Homemade fluid	1. Yes	2. No

5.10a Who gave you the ORS that the child took?

1. Health worker at hospital	2. Health worker at health center/health post	3. Health worker at clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Bought at the drug shop/pharmacy		
9. Other _____		8. NA

5.10b How long after the diarrhea started did the child start taking the ORS?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA

5.11 Was the child given any of these to treat the diarrhea?

5.11.1	Antibiotic pill or syrup	1. Yes	2. No
5.11.2	Anti motility pill or syrup	1. Yes	2. No
5.11.3	Zinc	1. Yes	2. No
5.11.4	Unknown pill or syrup	1. Yes	2. No
5.11.5	Injection	1. Yes	2. No
5.11.6	Intravenous	1. Yes	2. No
5.11.7	Home remedies/herbal medicines	1. Yes	2. No
5.11.8	Other _____	1. Yes	2. No

5.12 Who gave you the zinc that the child took?

1. Health worker at hospital	2. Health worker at health center/health post	3. Health worker at clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Bought at the drug shop/pharmacy		
9. Other _____		8. NA

5.12a How long after the diarrhea started did the child start taking the zinc?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA

5.13 How many days did the child take zinc? (0 IF ZINC WAS NOT TAKEN)

6.0 PNEUMONIA TREATMENT MODULE

6.1 Did you seek advice or treatment outside the home for the child when s/he had cough with fast/difficult breathing (suspected pneumonia)?

1. Yes	2. No
--------	-------

**IF THE RESPONSE TO 6.1 IS “1. Yes” CIRCLE “8.NA” FOR 6.2 AND CONTINUE.
IF THE RESPONSE TO 6.1 IS “2. No”, ASK 6.2 AND DRAW TWO LINES ACROSS 6.3 TO 6.6**

6.2 Why didn't you seek care for your child outside the home?

1. Expecting self-resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	
8. NA	

6.3 Where did you go first for advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner		8. Drug shop/Pharmacy
9. Other _____		88. NA

6.4 How many days after the cough/fast breathing began did you seek this first treatment for the child?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA
9. Do not know		

6.5 Did you go anywhere else for advice or treatment?

1. Yes	2. No	8. NA
--------	-------	-------

6.6 Where did you go next for this advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner		8. Drug shop/Pharmacy
9. Other _____		88. NA

6.7 At any time during the illness did the child take any drugs for the cough/fast breathing?

1. Yes	2. No
--------	-------

6.8 What drugs did the child take?

6.8.1	Amoxicillin pill/syrup	1. Yes	2. No	8. NA
6.8.2	Cotrimoxazole (Septrin)	1. Yes	2. No	8. NA
6.8.3	Other antibiotic _____	1. Yes	2. No	8. NA
6.8.4	Cough mixture	1. Yes	2. No	8. NA
6.8.5	Paracetamol/Panadol/Aspirin	1. Yes	2. No	8. NA
6.8.6	Other _____	1. Yes	2. No	8. NA

6.9 How long after the cough/fast breathing started did the child start taking the amoxicillin?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA

6.9a Who gave you the amoxicillin that the child took?

1. Health worker at hospital	2. Health worker at health center/health post	3. Health worker at clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Bought at the drug shop/pharmacy		
9. Other _____		8. NA

6.10 How long after the cough/fast breathing started did the child start taking the septrin?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA

6.10a Who gave you the septrin that the child took?

1. Health worker at hospital	2. Health worker at health center/health post	3. Health worker at clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Bought at the drug shop/pharmacy		
9. Other _____		8. NA

6.11 How many days did the child take the drugs? (0 IF DRUG WAS NOT TAKEN)

6.11.1	Amoxicillin pill/syrup	<input type="text"/>
6.11.2	Cotrimoxazole (Septrin)	<input type="text"/>

7.0 NEONATAL SEPSIS/SEVERE DISEASE MODULE

7.1 Did you seek advice or treatment outside the home for the child when s/he had the severe disease?

1. Yes	2. No
--------	-------

IF THE RESPONSE TO 7.1 IS “1. Yes” CIRCLE “8.NA” FOR 7.2 AND CONTINUE. IF THE RESPONSE TO 7.1 IS “2. No”, ASK 7.2 AND DRAW TWO LINES ACROSS 7.3 TO 7.8

7.2 Why didn't you seek care for your child outside the home?

1. Expecting self-resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

7.3 Where did you go first for advice or the treatment?

1. Hospital	2. Health center/Health post	3. Clinic
4. Community health worker	5. Traditional birth attendant	6. Friend /Relative
7. Traditional practitioner		8. Drug shop/Pharmacy
9. Other _____		

IF THE RESPONSE TO 7.3 ABOVE IS “4. CHW” OR “5. TBA” DO NOT ASK 7.4 AND CIRCLE “8. NA”

7.4 Did you at any time during the illness go to see a CHW or TBA?

1. Yes	2. No	8. NA
--------	-------	-------

7.5 Did the CHW/TBA refer you to the health center/post or hospital?

1. Yes	2. No	8. NA
--------	-------	-------

7.6 Did you go on the referral?	1. Yes	2. No	8. NA
--	--------	-------	-------

7.7 When did you go on the referral?

1. Same day	2. next day	3. Two days
4. Three days	5. Four or more days	8. NA

7.8 Why didn't you go on the referral?

1. Expecting self-resolution of the illness	2. Health facility too far/no transportation
3. Cost of treatment service high	4. Don't trust facility/poor quality of care
5. Family member did not allow _____	
6. Other _____	8. NA

8.0 NUTRITION, VACCINATION AND PREVENTION

8.1 Now I would like to ask you about liquids or foods the child had yesterday during the day or at night.

Did s/he drink/eat:

- 8.1.1** Breast milk
- 8.1.2** Plain water
- 8.1.3** Commercially produced infant/young child formula
- 8.1.4** Solid/semi-solid food

1. Yes	2. No	9. DK
1. Yes	2. No	9. DK
1. Yes	2. No	9. DK
1. Yes	2. No	9. DK

8.2 COPY VACCINATION DATE FROM BOOKLET OR CARD (88 /88/8888) IF CARD NOT AVAILABLE BUT MOTHER INSIST CHILD WAS GIVEN AND 99/99/9999 IF NOT GIVEN

- 8.2.1** Vitamin A
- 8.2.2** BCG
- 8.2.3** DPT 1/Pentavalent 1
- 8.2.4** OPV 1
- 8.2.5** DPT 3/Pentavalent 3
- 8.2.6** OPV 3
- 8.2.7** Measles

8.3 Did the child sleep under a long lasting insecticide net or bednet that was treated with insecticide within six months last night?

1. Yes	2. No
--------	-------

9.0 CHW/TBA TEAMING

9.1 Did the CHW and TBA in your zone together help you to take the child to the health center/post on a referral when he/she was sick in the last 12 months?

1. Yes	2. No	8. NA
--------	-------	-------

9.2 Did the CHW and TBA in your zone together help you to go to the health center/post on a referral when you were pregnant with the child in the last 12 months?

1. Yes	2. No	8. NA
--------	-------	-------

9.3 Did the CHW refer you to see the TBA when you were pregnant with the in the last 12 months?

1. Yes	2. No
--------	-------

9.4 Did the TBA refer you to see the CHW when the child was sick in the last 12 months?

1. Yes	2. No	8. NA
--------	-------	-------

9.5 Did the CHW and TBA in your zone make a joint PNC visit to you when the child was 6 weeks old or younger in the 12 months?

1. Yes	2. No	8. NA
--------	-------	-------

9.6 Did the CHW and TBA in your zone visit you together in the last three months?

1. Yes	2. No
--------	-------

9.7 What did they do when they visited you?

- 9.7.1** Advise on referral
- 9.7.2** Check on my child
- 9.7.3** Check on me
- 9.7.4** Introduce each other

1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA
1. Yes	2. No	8. NA

9.8 Did the CHW and TBA in your zone together conduct health talk in your community in the last three months?

1. Yes	2. No
--------	-------

10. ANTHROPOMETRICS

10.1 May I weigh the child? 99.9 IF WEIGHT NOT TAKEN

<input type="text"/>	<input type="text"/>	.	<input type="text"/>	kg
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7.5 Annex 5: CHW Baseline Assessment Form

LINCHPIN CHW ASSESSMENT FORM

Identification			
Health Facility Code			
Team Number			
CHW Number			

Interview			
Interview date		____/____/____ dd/mm/year	
Interviewer Code			
Supervisor Code			

Data Entry		
	Code	Date
First Data Entry		____/____/____ dd/mm/year
Second Data Entry		____/____/____ dd/mm/year

C.1 Sex of CHW

1. Male	2. Female
---------	-----------

C.2 What is your age?

--	--

 years

C.3 What is the highest level of education that you attained?

1. Primary	2. Secondary	3. Higher
------------	--------------	-----------

C.4 What ethnic group/tribe do you belong to?

1. Lamba	2. Bemba	3. Kaonde
4. Other _____		

C.5 What is your marital status?

1. Single/not married	2. Married	3. Separated/Divorced
4. Widowed		

C.6 What is your religion?
 1. Christian (Catholic) 2. Christian (Protestant) 3. Christian (Pentecostal)
 4. Africa Christian Church 5. Muslim 6. Traditionalist

7. Other _____

C.7 Do you belong to any social/religious group in your community?

1. Yes	2. No
--------	-------

C. 8 If yes, what is it? _____

C.9 What do you consider to be your main occupation?

1. CHW	2. Farmer	3. Trader
4. Other _____		

C.10 How long have you been working as a CHW? Years

C.11 About how many hours per week do you spend on CHW work? hours

C.12 What services do you provide for children? READ THE LIST

C.12.1	Health education	1. Yes	2. No
C.12.2	Growth monitoring	1. Yes	2. No
C.12.3	Vaccination /mobilization for vaccination	1. Yes	2. No
C.12.4	Referral of sick children	1. Yes	2. No
C.12.5	Treat diarrhea	1. Yes	2. No
C.12.6	Treat pneumonia	1. Yes	2. No
C.12.7	Treat malaria	1. Yes	2. No
C.12.8	Provide or sell ITNs	1. Yes	2. No
C.12.9	Other _____	1. Yes	2. No

C.13 During the past two years, have you received any pre-service or in-service training on subjects related to child health or illness?

1. Yes	2. No
--------	-------

C.14 Have you received any training on the following topics, and when was the most recent training?

C.14.1	Treatment of pneumonia or ARI	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.2	Diarrhea treatment	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.3	Malaria treatment	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.4	Malaria prevention/Use of ITNs	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.5	Breastfeeding	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.6	Nutrition	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.7	Community IMCI	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
C.14.8	Maternal and newborn care	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years

C.15 How far is it from your community health post to the nearest health center Km

C.16a. How do you normally travel from your post to the nearest TBA?

1. walk	2. bicycle	3. taxi/bus	4. other _____
---------	------------	-------------	----------------

C.16b How long does it take you to go from your post to the nearest TBA by this means? |

1. Less than one half hour		
2. Between one half hour and one hour		
3. More than one hour Specify _____		

C. 17. Do you own a bicycle?

1. Yes	2. No
--------	-------

C.18 What group of people/individuals in your community oversee the work you do?

C.18.1	NHC	1. Yes	2. No
C.18.2	Community leaders/Headman	1. Yes	2. No
C.18.3	Other _____	1. Yes	2. No

C.19 How are you paid for the work you do?

1. No payment	2. Cash	3. Kind
4. Both cash and kind		

C.20. How often do you receive these payments?

1. Every month	2. Every quarter	3. Yearly
4. Once in a while	8. NA	

C.21 How satisfied are you with your work as a CHW?

1. Highly satisfied	2. Satisfied
3. Somewhat satisfied	4. Not satisfied

C.22 What motivates you to do this work?

C.22.1	Service and benefit to community	1. Yes	2. No
C.22.2	Desire to use knowledge gained from training	1. Yes	2. No
C.22.3	Positive outcomes from service (i.e. better health, prevention of disease, change in people's attitudes and behavior)	1. Yes	2. No
C.22.4	Personal and family benefits	1. Yes	2. No
C.22.5	Positive recognition by community	1. Yes	2. No
C.22.6	Incentives and compensation	1. Yes	2. No
C.22.7	Potential employment and other opportunities	1. Yes	2. No
C.22.8	Improved social standing and status in community	1. Yes	2. No
C.22.9	Other 1 _____	1. Yes	2. No
C.22.10	Other 2 _____	1. Yes	2. No

C.23 What de-motivates you?

C.23.1	Lack of incentives and compensation	1. Yes	2. No
C.23.2	Negative comments and attitudes from community	1. Yes	2. No
C.23.3	Lack of support from health workers	1. Yes	2. No
C.23.4	Lack of /inadequate supplies	1. Yes	2. No
C.23.5	Indifference of community leadership	1. Yes	2. No
C.23.6	Lack of recognition of sacrifices by community	1. Yes	2. No

- C.23.7 No long term benefits
- C.23.8 Lack of improved social standing and status in community
- C.23.9 Other 1 _____
- C.23.10 Other 2 _____

1. Yes	2. No

C.24 How close do you work with the TBA(s) in your zone/community?

- C.24.1 Attend meetings together
- C.24.2 Cross-referral of patients
- C.24.3 Counsel patients together
- C.25.4 Work together with health staff during outreach
- C.24.5 Give health talks together
- C.24.6 Assist patients together to go on referrals
- C.24.7 Give feedback on what we do
- C.24.8 Supervised together
- C.24.9 Other _____

1. Yes	2. No

7.6 Annex 6: TBA Baseline Assessment Form

LINCHPIN TBA ASSESSMENT FORM

Identification			
Health Facility Code			
Team Number			
TBA Number			

Interview			
Interview date	<div style="display: flex; justify-content: center; align-items: center;"> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> </div> dd/mm/year		
Interviewer Code			
Supervisor Code			

Data Entry		
	Code	Date
First Data Entry		<div style="display: flex; justify-content: center; align-items: center;"> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> </div> dd/mm/year
Second Data Entry		<div style="display: flex; justify-content: center; align-items: center;"> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 5px;">/</div> <div style="border-bottom: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> </div> dd/mm/year

T.1 Sex of TBA

1. Male	2. Female
---------	-----------

T.2 What is your age?

--	--

 years

T.3 What is the highest level of education that you attained?

1.No schooling	2. Primary	3. Secondary	4. Higher
----------------	------------	--------------	-----------

T.4 What ethnic group/tribe do you belong to?

1.Lamba	2. Bemba	3. Kaonde
4. Other _____		

T.5 What is your marital status?

1. Single/not married	2. Married	3. Separated/Divorced
4. Widowed		

T.6 What is your religion?

1. Christian (Catholic)	2. Christian (Protestant)	3. Christian (Pentecostal)
4. Africa Christian Church	5. Muslim	6. Traditionalist
7. Other _____		

T.7 Do you belong to any social/religious group in your community?

1. Yes	2. No
--------	-------

T.8 If yes, what is it? _____

T.9 What do you consider to be your main occupation?

1. TBA	2. Maintaining a household	3. Farmer	4. Trader
4. Other _____			

T.10 How long have you been practicing as a TBA? Years

C.10a About how many hours per week do you spend on TBA work? hours

T.11 Do you provide any of these services? READ THE LIST

T.11.1	Antenatal care	1. Yes	2. No
T.11.2	Delivery	1. Yes	2. No
T.11.3	Post-partum care	1. Yes	2. No
T.11.4	Postnatal care	1. Yes	2. No
T.11.5	Newborn care	1. Yes	2. No
T.11.6	Growth monitoring	1. Yes	2. No
T.11.7	Vaccination /mobilization for vaccination	1. Yes	2. No
T.11.8	Referral of sick children	1. Yes	2. No
T.11.9	Health education	1. Yes	2. No
T.11.10	Other _____	1. Yes	2. No

T.12 During the past two years, have you received any pre-service or in-service training on subjects related to child health or illness?

1. Yes	2. No
--------	-------

T.13 Have you received any training on the following topics, and when was the most recent training?

T.13.1	Maternal and newborn care	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
T.13.2	Newborn danger signs and referral	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
T.13.3	Breastfeeding	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years
T.13.4	Nutrition	1. Yes in past 1 yr	2. Yes in past 2 yrs	3. No training in past 2 years

T.14a. How do you normally travel from your home to the nearest health center?

1. walk	2. bicycle	3. taxi/bus	4. other _____
---------	------------	-------------	----------------

T.14b How long does it take you to go from your home to the nearest health center by this means?

1. Less than one half hour		
2. Between one half hour and one hour		
3. More than one hour Specify _____		

T.15a. How do you normally travel from your home to the nearest CHW?

1. walk	2. bicycle	3. taxi/bus	4. other _____
---------	------------	-------------	----------------

T.15b How long does it take you to go from your home to the nearest CHW by this means?

1. Less than one half hour		
2. Between one half hour and one hour		
3. More than one hour Specify _____		

T.16 What group of people/individuals in your community oversee the work you do?

T.16.1	NHC	1. Yes	2. No
T.16.2	Community leaders/Headman	1. Yes	2. No
T.16.3	Other _____	1. Yes	2. No

T.17 How are you paid for the work you do?

1. No payment	2. Cash	3. Kind
4. Both cash and kind		

T.18. How often do you receive these payments?

1. Every month	2. Every quarter	3. Yearly
4. Once in a while	8. NA	

T.19 How satisfied are you with your work as a TBA?

1. Highly satisfied	2. Satisfied
3. Somewhat satisfied	4. Not satisfied

T.20 What motivates you to do this work?

T.20.1	Service and benefit to community	1. Yes	2. No
T.20.2	Desire to use knowledge gained from training	1. Yes	2. No
T.20.3	Positive outcomes from service (i.e. better health, prevention of disease, change in people's attitudes and behavior)	1. Yes	2. No
T.20.4	Personal and family benefits	1. Yes	2. No
T.20.5	Positive recognition by community	1. Yes	2. No
T.20.6	Incentives and compensation	1. Yes	2. No
T.20.7	Potential employment and other opportunities	1. Yes	2. No
T.20.8	Improved social standing and status in community	1. Yes	2. No
T.20.9	Other 1 _____	1. Yes	2. No
T.20.10	Other 2 _____	1. Yes	2. No

T.21 What de-motivates you?

- T.21.1** Lack of incentives and compensation
- T.21.2** Negative comments and attitudes from community
- T.21.3** Lack of support from health workers
- T.21.4** Lack of /inadequate supplies
- T.21.5** Indifference of community leadership
- T.21.6** Lack of recognition of sacrifices by community
- T.21.7** No long term benefits
- T.21.8** Lack of improved social standing and status in community
- T.21.9** Other 1 _____
- T.21.10** Other 2 _____

1. Yes	2. No

T.22 How close do you work with the CHW(s) in your zone/community?

- T.22.1** Attend meetings together
- T.22.2** Cross-referral of patients
- T.22.3** Counsel patients together
- T.22.4** Work together with health staff during outreach
- T.22.5** Give health talks together
- T.22.6** Assist patients together to go on referrals
- T.22.7** Give feedback on what we do
- T.22.8** Supervised together
- T.22.9** Other _____

1. Yes	2. No

7.7 Annex 7: Focus Group Discussion Guide

FOCUS GROUP DISCUSSIONS GUIDE

GENERAL INSTRUCTIONS: Most questions below have probes that are follow-up questions. These are to be asked if participants have not yet provided the information requested in the probe. If the answer has already been provided, please skip that probe and go on to the next one. Please ask additional questions if a participant provides an unusual or interesting response.

Facilitator: Before you begin take demographic information (age, education, occupation, marital status, religious denomination, and ethnicity) from the participants. Assign each participant a code so that the note-taker can link the responses with participants.

Next: please read the following to the participants before beginning the FGD.

Save the Children working with the District Health Management Team has been implementing a project in this district which teams up CHWs and TBAs to provide health care to mothers and their children. We will ask you some questions about your views and experiences regarding this team work. I will ask you the questions and my colleague (note-taker) will write down your answers to the questions. We appreciate your answering these questions as honestly as possible. Please ask me if you have any questions or if you do not understand any question.

Have you noticed any changes in the way CHWs and TBAs work in this community?
If so, what are they?

- a. How much do you know that CHWs and TBAs are supposed to work as a team?

Describe a situation where the CHW and TBA worked as a team to help you receive health care for your child or self?

- a. What about the CHW and TBA working as a team to help a neighbor?
- b. What about making a joint home visit to you?
- c. Joint counseling for referral to the health center/post
- d. TBA referring you to see the CHW or the CHW asking you to see the TBA?

Can you recount a situation where the CHW and TBA jointly conducted health education talk in this community?

- a. What was the topic?
- b. How was the attendance? Well attended or poorly attended?
- c. What was responsible for the attendance

How has the CHW and TBA been working together to help this community receive outreach services from the health/post?

- a. What services were they involved in?
- b. How were they involved in getting the message to the community?
- c. How were they involved in the day(s) the outreach services were provided?

Do you think the CHW and TBA in your community are working as a team to provide maternal and child health care?

- a. If yes why?
- b. If not, why not?

From your experience in the last couple of months are there any benefits to you as individual and the community as a whole as a result of the CHW and the TBA working as team?

a. What are they?

From your experience in the last couple of months are there any danger to you as individual and the community as a whole as a result of the CHW and the TBA working as team?

a. What are they?

From your experience in the last couple of months are there some things that hinder the CHW and the TBA working as team in this community?

a. What are they?

From your experience in the last couple of months are there some things that promote the CHW and the TBA working as team in this community?

a. What are they?

In what ways can the team-work between the CHW and TBA be improved to benefit you and the community in the provision of health care?

- a. *What can you as an individual do to help the team work?*
- b. *What can the community do to help the team work?*
- c. *What can the health staff do to help the team work?*
- d. *What can the government do to help the team work?*

How would you rate the team work between the CHW and TBA in your community?

- a. *Will you rate it as above average, average or below average?*
- b. *Why did you rate this team like this?*
- c. *Is this your expectation for the team and why?*

How do you like this idea of CHW working with TBA as a team?

- e. *How acceptable is this idea?*
- f. *Should it continue? Why?*
- g. *Should the Government make it a policy in the whole of Zambia? Why?*

Do you have anything else you would like to tell us about the ways the CHW and TBA work as a team in this community?

7.8 Annex 8: In-depth Interview Guide

IN-DEPTH INTERVIEW GUIDE

GENERAL INSTRUCTIONS: Most questions below have probes that are follow-up questions. These are to be asked if participants have not yet provided the information requested in the probe. If the answer has already been provided, please skip that probe and go on to the next one. Please ask additional questions if a participant provides an unusual or interesting response.

Facilitator: *Before you begin take demographic information (age, education, occupation, marital status, religious denomination, and ethnicity) from the participant.*

Next: *please read the following to the participant before beginning the IDI.*

Save the Children working with the District Health Management Team has been implementing a project in this district which teams up CHWs and TBAs to provide health care to mothers and their children. We will ask you some questions about your views and experiences regarding this team work. I will ask you the questions and my colleague (note-taker) will write down your answers to the questions. We appreciate your answering these questions as honestly as possible. Please ask me if you have any questions or if you do not understand any question.

What changes have you noticed in the way CHWs and TBAs work in this community?

b. How much do you know that CHWs and TBAs are supposed to work as a team?

Describe any situation where the CHW and TBA worked as a team to help a mother or her child receive health care in this community?

e. What about making a joint home visit to a mother or her child?

f. Joint counseling for referral to the health center/post

g. TBA referring a child to see the CHW or the CHW asking a pregnant woman to see the TBA?

Can you recount a situation where the CHW and TBA jointly conducted health education talk in this community?

d. What was the topic?

e. How was the attendance? Well attended or poorly attended?

f. What was responsible for the attendance?

How has the CHW and TBA been working together to help this community receive outreach services from the health/post?

d. What services were they involved in?

e. How were they involved in getting the message to the community?

f. How were they involved in the day(s) the outreach services were provided?

Do you think the CHW and TBA in your community are working as a team to provide maternal and child health care?

c. If yes why?

d. If not, why not?

From your experience in the last couple of months are there any benefits to this community as a result of the CHW and the TBA working as team?

a. What are they?

From your experience in the last couple of months are there any dangers to this community as a result of the CHW and the TBA working as team?

a. What are they?

From your experience in the last couple of months are there some things that hinder the CHW and the TBA working as team in this community?

a. What are they?

From your experience in the last couple of months are there some things that promote the CHW and the TBA working as team in this community?

a. What are they?

In what ways can the team-work between the CHW and TBA be improved to benefit this community in the provision of health care?

- a. *What can you as an individual do to help the team work?*
- b. *What can the community do to help the team work?*
- c. *What can the health staff do to help the team work?*
- d. *What can the government do to help the team work?*

How would you rate the team work between the CHW and TBA in your community?

- a. *Will you rate it as above average, average or below average?*
- b. *Why did you rate this team like this?*
- c. *Is this your expectation for the team and why?*

How do you like this idea of CHW working with TBA as a team?

- e. *How acceptable is this idea?*
- f. *Should it continue? Why?*
- g. *Should the Government make it a policy in the whole of Zambia? Why?*

Do you have anything else you would like to tell us about the ways the CHW and TBA work as a team in this community?

Annex 16: Operations Research Brief

Annex 16, OR Brief, is being withheld by request of CSHGP until further notice.

Annex 17: Stakeholder Debrief

2/1/2015

Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN)

**Final Evaluation
September 1 – 12, 2014**

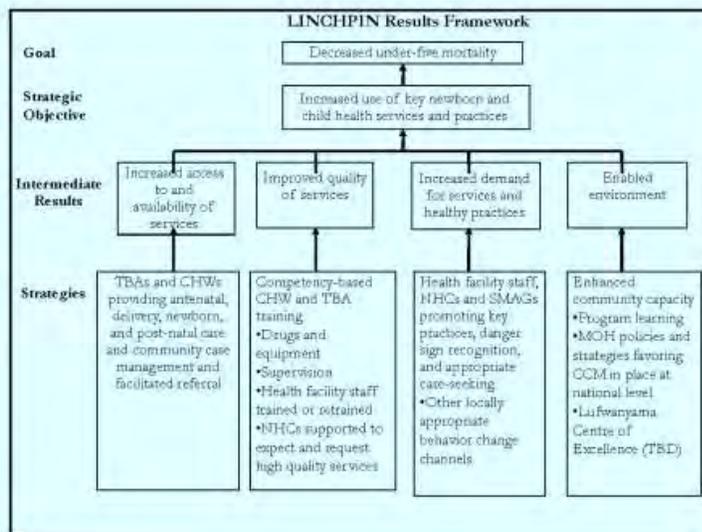
LINCHPIN - Overview

- USAID/CSHGP Child Survival Project (CS-25 cycle)
- October 2009 – September 2014
- Partnership with the DHMT, MOH, and Ministry of Community Development, Mother and Child Health (MCDMCH)
- Additional funding: ELMA Foundation, Towers and Perrin, and Crowne Family Philanthropies.
Complementary funding: SIDA: MDG4,5 and Lottery

1

Methods – Final Evaluation

- Document review – program reports, training and health education materials, monitoring data and before and after HH and HF surveys
- Central interviews –program managers, development partners
- District and sub-district field visits – interviews with provincial and district staff, facility HWs, CHWs, TBAs, NHC members, women of young children



**LINCHPIN – Principal strategies 1
Integrated Community Case Management**

- CHWs assess, classify and manage sick children with suspected pneumonia, RDT confirmed malaria and diarrhea. Use a register for tracking children seen
- Supplied with ACT, RDTs, amoxicillin, ORS, zinc, timer, MUAC tape
- Identify danger signs and refer sick mothers and newborns

**LINCHPIN – Principal strategies 2
Community-based maternal and newborn care**

- Home visits by TBAs along the continuum of care for the mother and newborn – starting at delivery. Use a register for tracking contacts
- Provide ENC and PNC. PNC follow-up visits at 24hrs, 2 days, 3 days and 7 days; and at 2, 6 and 8 weeks
- Identify danger signs and refer sick mothers and newborns

LINCHPIN – Principal strategies 3
Teaming of CHWs/TBAs

- CHWs and TBAs make joint PNC home visits at 2, 6 and 8 weeks – supported by NHCs
- Coordinate health education activities, ensure that sick children are followed-up and facilitate referral
- Ensure that newborns are identified early and tracked, build community acceptance and engagement

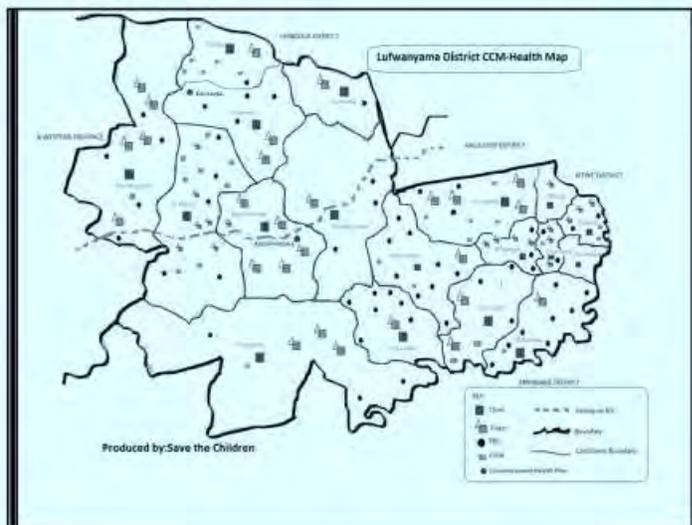
LINCHPIN – Principal strategies 4
Enabling environment

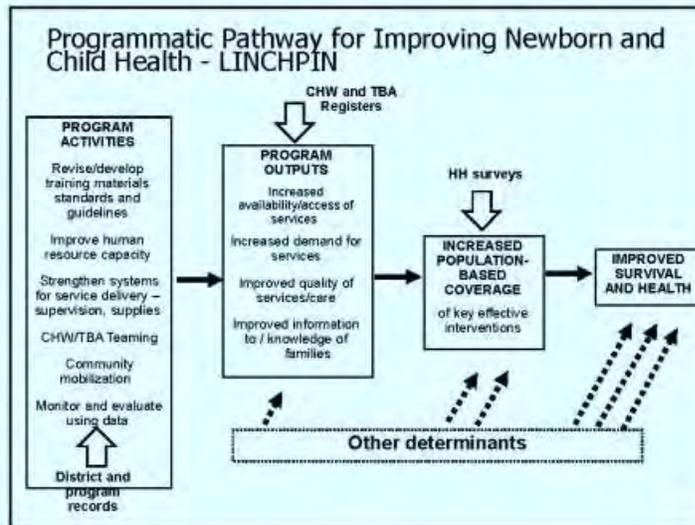
- NHCs trained in community mobilization and the community action cycle
- NHCs develop MNCH action plans and take action to implement these plans – using local and other resources
- Conduct health education sessions, support TBA/CHW teams, assist with referral
- SMAGs trained to support MN health activities

Operations Research on CHW/TBA Teams – Boston University Collaboration

Assess the feasibility and effectiveness of TBA-CHW teams supported by NHCs to deliver high impact integrated newborn and child interventions

1. Formative research – factors for measuring teaming structure, determinants and function
2. Pre- and Post- KPC surveys to measure changes in intervention coverage
3. Qualitative process documentation – to document levels of team function over time and community acceptance





Project Inputs	Activities
<ul style="list-style-type: none"> •Technical support •Materials •Training •CHW bicycles, bag + supplies •Vehicles and fuel for site visits •4 community mobilisers 	<ul style="list-style-type: none"> • Development and testing of training materials (iCCM, MNCH/ENC, CM, supervision) • Development and testing of community registers, forms and supervisory checklists • Training of trainers, CHWs, TBAs, NHCs, SMAGs and supervisors • Monthly supervision with district staff • Compilation and summary of register data • Engagement with district planning

iCCM – access and availability – July 2011- June 2014

- Trained CHWs provided CCM to a total of 30066 sick children (ARI = 3538, RDT confirmed malaria = 22142, diarrhea = 4386)
- Trained CHWs provided care for 87% of estimated cases of ARI and malaria for entire period; and 9% of estimated diarrhea
- High proportion sick children received appropriate care; a high proportion of children referred complete referral

Community-based MNCH – access and availability – July 2011- June 2014

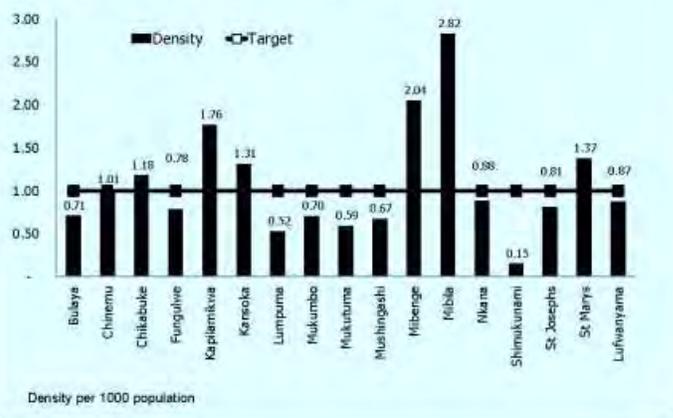
- Trained TBAs registered a total of 6161 pregnant women which represents 72% of expected deliveries (2010 data)
- Of pregnant women registered by TBAs deliveries fell from 68% to 17% and deliveries with SBA rose from 32% to 83%
- A high proportion of TBAs conducting deliveries dried and wrapped the newborn; between 2% and 7% of newborns were referred for danger signs

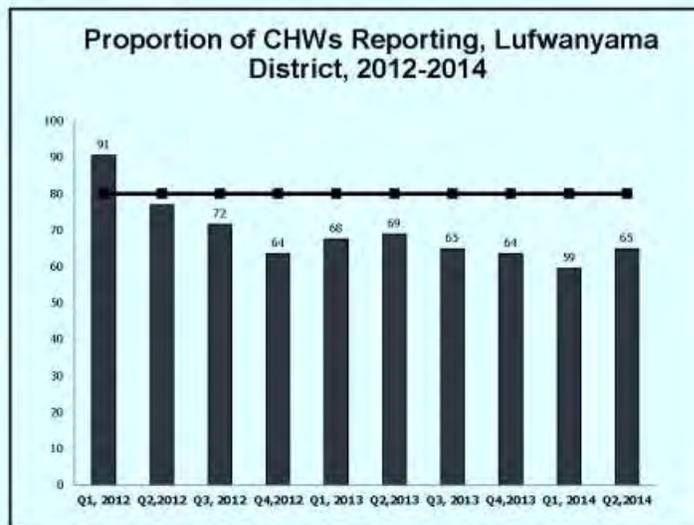
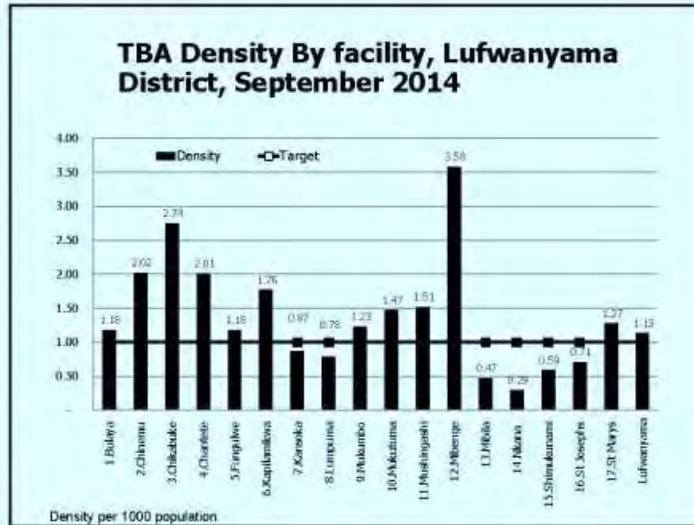
NHCs and SMAGs – Access and Availability, Luftwanyama District, 2010-2014

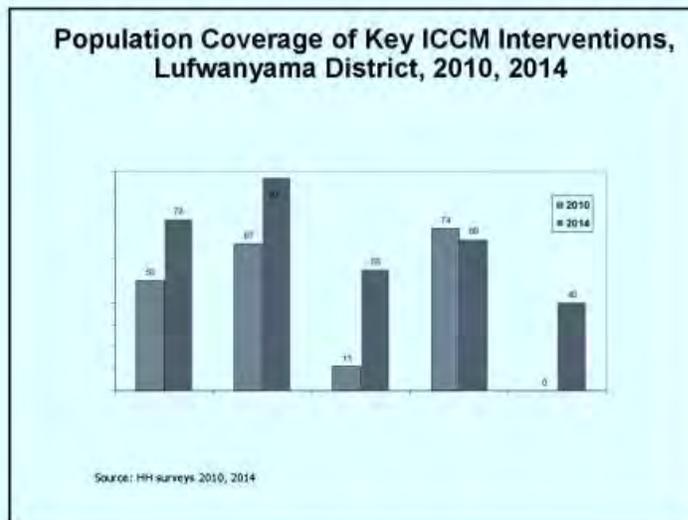
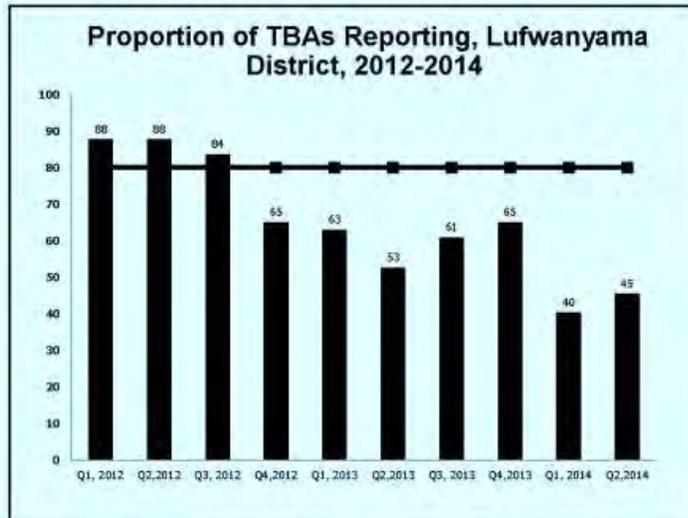
- % of NHCs trained in CM and CAC: 100% (118/118)
- % of NHCs with action plan completed: 100% (118/118)
- % of planned SMAGS established and implementing action plans: 73% (87/118)

High proportion have action plans, meet regularly, include women, have received funding for plans, and have made emergency transport available

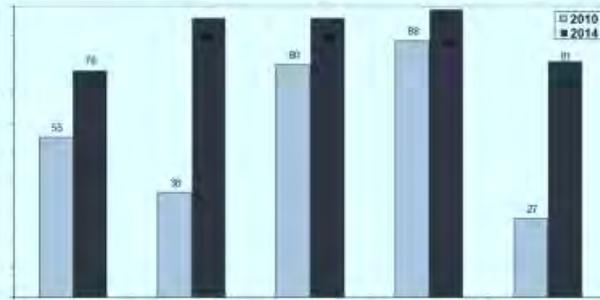
CHW Density By facility, Lufwanyama District, September 2014







Population Coverage of Key Interventions around Delivery, Lufwanyama District, 2010, 2014

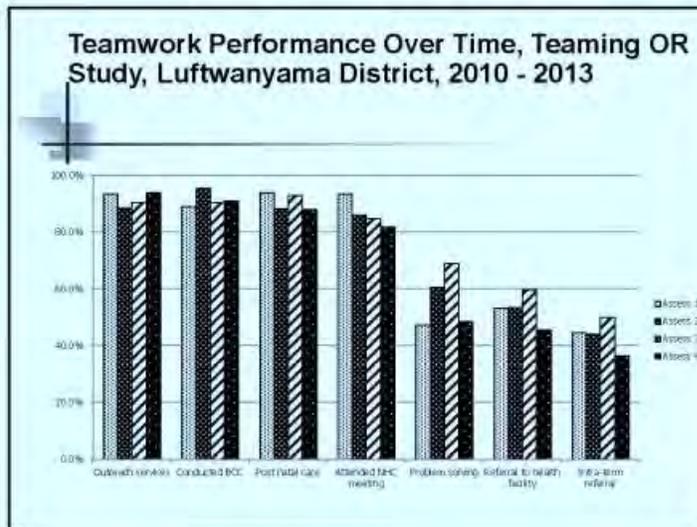
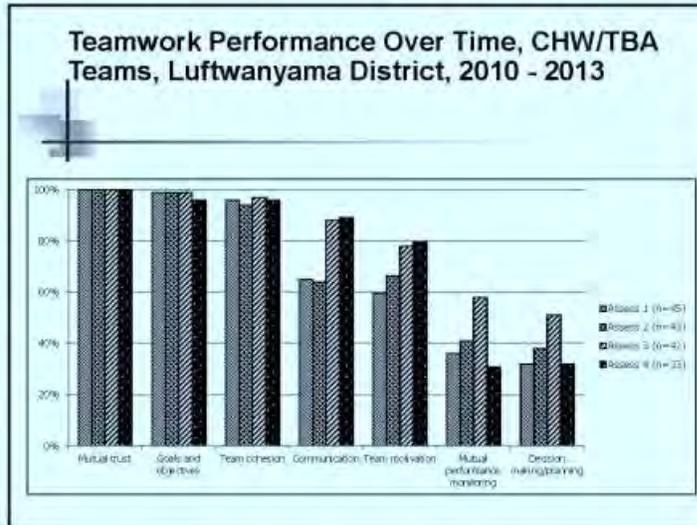


Source: HH surveys 2010, 2014

CHW/TBA Teaming, Luftwanyama District, 2010-2013

- 21 Teams (45%) high functioning
- 12 Teams (26%) low functioning
- 14 Teams (30%) inactive

"high" = mean task work scale ≥ 7 of possible 14, and mean teamwork score $\geq 90\%$; and "low" = task work < 7 or teamwork $< 90\%$.

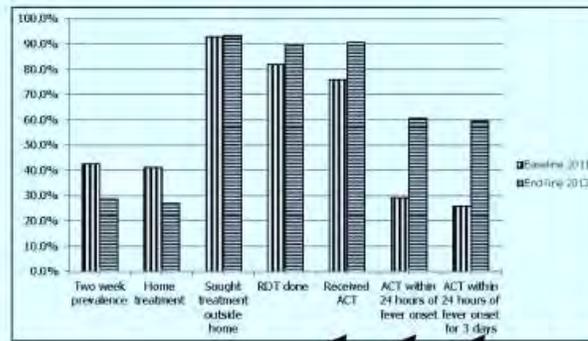


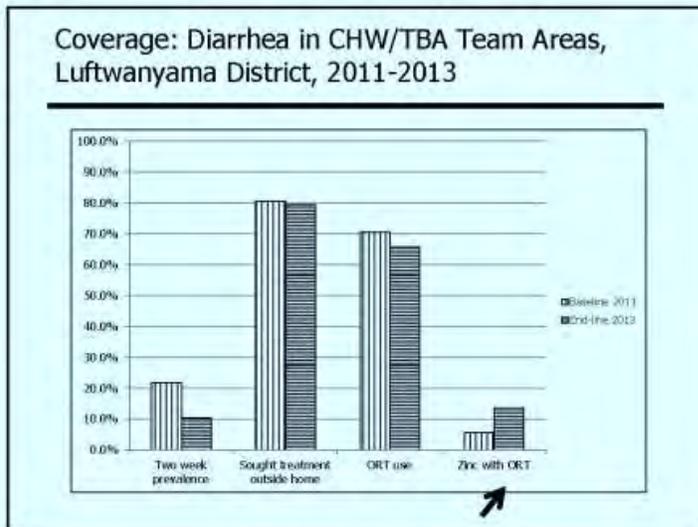
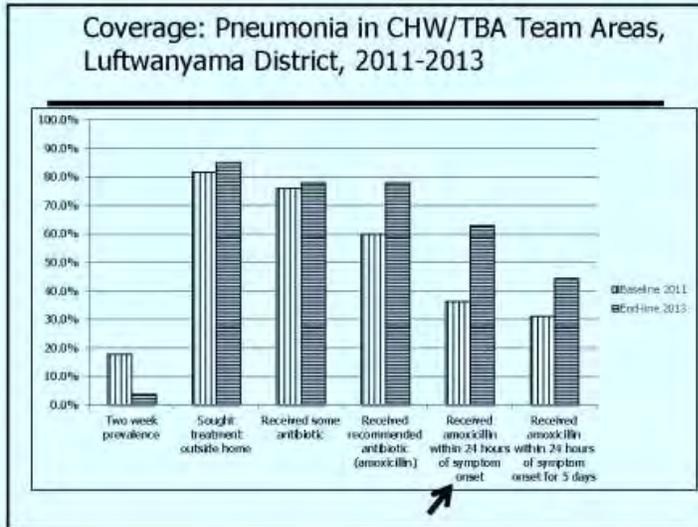
Intervention coverage in CHW/TBA Team Areas, Luftwanyama District, 2011-2013

Variable	Baseline 2011	End-line 2013
Received 4 or more ANC visits	61%	60%
TBA only source of ANC	20%	13% *
Received 2 doses of IPTp	80%	89% *
Health facility delivery	29%	54% *
Skilled birth attendant delivery	27%	46% *
PNC (for < 12 m)	76%	84% **
EBF (for < 6 m)	77%	87% **
DPT 3 coverage	67%	83% *

* p < 0.01, ** p < 0.05

Coverage: Fever/malaria in CHW/TBA Team Areas, Luftwanyama District, 2011-2013





Intervention Coverage and Teaming

Higher measures of teamwork and taskwork were associated with higher intervention coverage for 12 of 14 indicators. The difference in both was statistically significant for the four in the table and for taskwork only for receipt of amoxicillin for pneumonia.

Outcomes	Teamwork Scores by Mothers' Reported Practices		Taskwork Scores by Mothers' Reported Practices	
	Yes	No	Yes	No
Received ACT for malaria within 24 hours	14.2	12.4	8.3	6.7
Received early and appropriate treatment for malaria (ACT within 24 hours and for 3 days)	14.1	12.4	8.3	6.8
Sought care for pneumonia outside home	14.2	9.6	7.7	3.2
Sought care for severe illness outside home	14.0	10.7	8.2	5.0

Limitations to Sustainability (1)

- Stock-outs of essential medicines in many areas. Barriers include distribution practices to CHWs by facility staff and facility drug ordering practices
- % of CHWs that have had no stock-outs of essential medicines in the previous month: range – 3% (zinc) – 36% (ACT) 2014

Limitations to Sustainability (2)

- Coverage with CHWs remains limited in many areas; some CHWs have dropped out – more CHWs needed

- % of CHWs trained in ICCM: 100% (85/85) - 26 dropped out (31%) – 18 additional trained
- % of trained CHWs remaining: 86% (77/85)
- % of TBAs trained in c-MNH: 90% (111/120) – 14 dropped out (13%)
- % of trained TBAs remaining: 87% (97/111)

Limitations to sustainability (3)

- Regular supervision of CHWs and TBAs including clinical observation with observation checklist

- % of CHWs receiving clinical supervision in last 3 months: 100% (2012) (74/74) – 19% 2014
- % of TBAs receiving clinical supervision in last 3 months: 57% (2012) – 13% (2014)

Limits to sustainability (4)

- Quality of first-level facility care

Increasingly important in areas implementing iCCM and CMNH – since more sick newborns and children are referred (demand creation). In many areas CHWs and TBAs provide facility services

Conclusions

- CHW/TBA teaming works to increase MNCH intervention coverage
- Trained CHWs and TBAs increase access to and availability of case management, delivery services, ENC and PNC; community registers are useful job aids
- Support by NHCs/SMAGs and health center-based staff is essential to making community-based care work

Conclusions

- Community health worker attrition is an important problem that will limit program effectiveness in the long term
- Strengthening availability of essential medicines needs continued attention. Stock-outs remain common, particularly for ORS and zinc.

Conclusions

- More attention to quality of care provided by both community-based and facility-based needed
- Routine supervision of CHW and TBA practices does not occur. No data are available on the quality of delivery and sick newborn and child care provided at first level and referral health facilities – and clinical care is not routinely monitored.

Conclusions

- Capacity of the district to finance and manage project activities remains limited
- Sustainability will be limited by lack of district capacity (human and financial) to cover recurrent activities previously supported by the project such as monthly supervision, CHW training, data collection and management and community support (mobilizers).

Next steps:

- Continued support to the district to strengthen DHMT capacity for managing and overseeing iCCM and MNCH activities (collecting, analyzing and using register data, regular supervision, monitoring CHW coverage and re-training)
- - Project extension with Crowne Funds

Next steps

- Use field experience needs to inform the national roll-out of iCCM and implementation of the CMNH package – through national working groups
 - Disseminate experience with teaming and present findings (OR)
 - Disseminate methods and guidelines used and importance of including facility staff, CHWs/TBAs and NHCs/SMAGs
 - Field learning visits to district for national stakeholders and staff from other districts
 - Living University approach based at Luftwanyama
 - National Technical Working Groups – IMCI, CCM, CMNH, RMNCH , Health Cooperating Partners Group

Annex 18: Project Data Form

Child Survival and Health Grants Program Project Summary

Jan-24-2015

Save the Children (Zambia)

General Project Information

Cooperative Agreement Number:	GHS-A-00-09-00013
SC Headquarters Technical Backstop:	Karen Waltensperger
SC Headquarters Technical Backstop Backup:	David Marsh
Field Program Manager:	John Kabongo
Midterm Evaluator:	John Murray
Final Evaluator:	John Murray
Headquarter Financial Contact:	Carmen Weder
Project Dates:	9/30/2009 - 9/29/2014 (FY2009)
Project Type:	Innovation
USAID Mission Contact:	William Kanweka
Project Web Site:	www.savethechildren.org

Field Program Manager

Name:	John Kabongo (Health & Nutrition Program Manager/LINCHPIN Program Manager)
Address:	20 Kudu Road Kabulonga Lusaka , Lusaka Zambia
Phone:	+260 97 679 7694
Fax:	
E-mail:	john.kabongo@savethechildren.org
Skype Name:	

Alternate Field Contact

Name:	Stephen Filumba (LINCHPIN Deputy Program Manager)
Address:	Save the Children Kalulushi , Kalulushi Zambia
Phone:	+260 96 748 8488
Fax:	
E-mail:	stephen.filumba@savethechildren.org
Skype Name:	

Grant Funding Information

USAID Funding: \$1,750,000	PVO Match: \$583,275
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General Project Description

Save the Children, a 2009 Innovation category grantee, is implementing the *Lufwanyama Integrated Neonatal and Child Health Project in Zambia* (LINCHPIN) in Lufwanyama District, Copperbelt Province, Zambia. Principal LINCHPIN partners are the Lufwanyama District Health Management Team (DHMT), and the Ministries of Health (MOH) and Community Development, Mother and Child Health (MCDMCH). The project goal is to decrease under-five mortality by increasing use of life-saving interventions through delivery channels that are accessible, available, high-quality, demanded and supported.

LINCHPIN's strategy is to support an integrated, community-based newborn care and community case management (CCM) package delivered through innovative TEAMS comprised of traditional birth attendants (TBAs) and community health workers (CHWs), supported by Neighborhood Health Committees (NHCs), linked to health facilities, and consistent with national plans and policies.

Project Location

Latitude: -12.91	Longitude: 27.36
Project Location Types:	Rural
Levels of Intervention:	Health Center Health Post Level Community
Province(s):	Copperbelt Province
District(s):	Lufwanyama District
Sub-District(s):	--

Operations Research Information

OR Project Title:	Feasibility and Effectiveness of an Integrated TBA-CHW Team on the Delivery and Use of Treatments for Infections among Children 0-59 Months of Age in Lufwanyama District, Copperbelt Province, Zambia
Cost of OR Activities:	\$199,424
Research Partner(s):	Boston University
OR Project Description:	"Teaming" is a common service strategy in high-income countries, especially in serious outcome settings, such as emergency wards and operating theaters. Health teaming, though not reported in low income countries, seems a sensible strategy to improve outcomes for vulnerable young infants. The LINCHPIN Project aims to train and deploy TBA-CHW teams to provide essential newborn and continuous curative care for infants 0-59 months of age in Lufwanyama District, Zambia, thus closing the gap for infants 0-2 months in the continuum of care.

The level of teaming achieved – both structurally and functionally – will be evaluated and the factors that influence it will be assessed. We will also use service statistics to measure (a) delivery of interventions by TBAs and CHWs before and after teaming training and (b) the association between teaming achieved and the delivery of interventions.

The findings will contribute to the scant teaming literature from low-income countries and, more importantly, may inform strategies to reduce newborn and young infant mortality in settings where TBAs and CHWs are policy-sanctioned.

Partners

Save the Children Sweden (Subgrantee)	\$844,320
Boston University (Subgrantee)	\$199,424
Lufwanyama District Health Management Team (Collaborating Partner)	\$0
Copperbelt Provincial Medical Office (Collaborating Partner)	\$0
Ministry of Health (Collaborating Partner)	\$0
Ministry of Community Development, Mother and Child Health (Collaborating Partner)	\$0

Strategies

Social and Behavioral Change Strategies:	Community Mobilization Group interventions Interpersonal Communication
Health Services Access Strategies:	Emergency Transport Planning/Financing Addressing social barriers (i.e. gender, socio-cultural, etc) Implementation in a geographic area that the government has identified as poor and underserved
Health Systems Strengthening:	Supportive Supervision Task Shifting Developing/Helping to develop clinical protocols, procedures, case management guidelines Developing/Helping to develop job aids Providing feedback on health worker performance Monitoring CHW adherence with evidence-based guidelines Referral-counterreferral system development for CHWs Community role in supervision of CHWs Community role in recruitment of CHWs Review of clinical records (for quality assessment/feedback) Coordinating existing HMIS with community level data
Strategies for Enabling Environment:	Create/Update national guidelines/protocols Advocacy for revisions to national guidelines/protocols Stakeholder engagement and policy dialogue (local/state or national) Advocacy for policy change or resource mobilization Building capacity of communities/CBOs to advocate to leaders for health
Tools/Methodologies:	Rapid Health Facility Assessment
Capacity Building	
Local Partners:	National Ministry of Health (MOH) Dist. Health System Health Facility Staff Health CBOs Government sanctioned CHWs TBAs

Interventions & Components

Control of Diarrheal Diseases (20%) <ul style="list-style-type: none"> - Hand Washing - Feeding/Breastfeeding - Care Seeking - Case Management/Counseling - Zinc - Community Case Management with Zinc (Implementation) - Community Case Management with ORS (Implementation) 	DMCI Integration	CHW Training
Malaria (20%) <ul style="list-style-type: none"> - Training in Malaria CM - Access to providers and drugs - Care Seeking, Recog., Compliance - ACT - Community Case Management of Malaria (Implementation) 	DMCI Integration	CHW Training
Maternal & Newborn Care (40%) <ul style="list-style-type: none"> - Recognition of Danger signs - Newborn Care 	DMCI Integration	CHW Training HF Training
Pneumonia Case Management (20%) <ul style="list-style-type: none"> - Case Management Counseling - Access to Providers Antibiotics - Recognition of Pneumonia Danger Signs - Community Case Management with Antibiotics (Implementation) - Policy Advocacy for CCM of Antibiotics 	DMCI Integration	CHW Training HF Training

Operational Plan Indicators

Number of People Trained in Maternal/Newborn Health			
Gender	Year	Target	Actual
Female	2010	63	
Female	2010		125
Male	2010		1
Male	2010	0	
Female	2011	75	
Female	2011		485
Male	2011		326
Male	2011	95	
Female	2012	400	
Female	2012		184
Male	2012		43
Male	2012	254	
Female	2013	26	
Female	2013		26
Male	2013		60
Male	2013	60	
Number of People Trained in Child Health & Nutrition			
Gender	Year	Target	Actual
Female	2010	35	
Female	2010		13
Male	2010		36
Male	2010	150	
Female	2011	65	
Female	2011		424
Male	2011		388
Male	2011	45	
Female	2012	400	
Female	2012		30
Male	2012		85
Male	2012	254	
Female	2013	91	
Female	2013		91
Male	2013		60
Male	2013	60	
Number of People Trained in Malaria Treatment or Prevention			
Gender	Year	Target	Actual
Female	2010		13
Female	2010	25	
Male	2010		36
Male	2010	50	
Female	2011		514
Female	2011	64	
Male	2011		393
Male	2011	45	
Female	2012		18
Female	2012	400	
Male	2012		54
Male	2012	254	
Female	2013		26
Female	2013	26	
Male	2013		60

Male	2013	60	
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Locations & Sub-Areas

Total Population: 85,033

Target Beneficiaries

	Zambia - SC - FY2009
Children 0-59 months	15,136
Women 15-49 years	18,537
Beneficiaries Total	33,673

Rapid Catch Indicators: DIP Submission

Sample Type: 30 Cluster				
Indicator	Numerator	Denominator	Percentage	Confidence Interval
Percentage of mothers with children age 0-23 months who received at least two Tetanus toxoid vaccinations before the birth of their youngest child	439	465	94.4%	3.0
Percentage of children age 0-23 months whose births were attended by skilled personnel	168	465	36.1%	6.2
Percentage of children age 0-5 months who were exclusively breastfed during the last 24 hours	110	134	82.1%	9.2
Percentage of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall	293	329	89.1%	4.8
Percentage of children age 12-23 months who received a measles vaccination	163	191	85.3%	7.1
Percentage of children age 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey	176	191	92.1%	5.4
Percentage of children age 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey	164	191	85.9%	7.0
Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began	20	178	11.2%	6.6
Percentage of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids	93	126	73.8%	10.9
Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider	48	72	66.7%	15.4
Percentage of households of children age 0-23 months that treat water effectively	196	465	42.2%	6.3
Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	279	465	60.0%	6.3
Percentage of children age 0-23 months who slept under an insecticide-treated bednet (in malaria risk areas, where bednet use is effective) the previous night	237	465	51.0%	6.4
Percentage of children 0-23 months who are underweight (<2 SD for the median weight for age, according to the WHO/NCHS reference population)	93	408	22.8%	5.8
Percentage of infants and young children age 6-23 months fed according to a minimum of appropriate feeding practices	171	329	52.0%	7.6
Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child	255	463	55.1%	6.4
Percentage of mothers of children age 0-23 months who are using a modern contraceptive method	217	465	46.7%	6.4
Percentage of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within two days after birth	127	465	27.3%	5.7

Rapid Catch Indicators: Final Evaluation

Sample Type: 30 Cluster				
Indicator	Numerator	Denominator	Percentage	Confidence Interval
Percentage of mothers with children age 0-23 months who received at least two Tetanus toxoid vaccinations before the birth of their youngest child	416	544	76.5%	5.0
Percentage of children age 0-23 months whose births were attended by skilled personnel	522	543	96.1%	2.3
Percentage of children age 0-5 months who were exclusively breastfed during the last 24 hours	147	150	98.0%	3.2
Percentage of children age 6-23 months who received a dose of Vitamin A in the last 6 months: card verified or mother's recall	305	312	97.8%	2.3
Percentage of children age 12-23 months who received a measles vaccination	134	156	85.9%	7.7
Percentage of children age 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the survey	151	156	96.8%	3.9
Percentage of children age 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the survey	143	156	91.7%	6.1
Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began	18	33	54.5%	24.0
Percentage of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids	87	126	69.0%	11.4
Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider	76	78	97.4%	5.0
Percentage of households of children age 0-23 months that treat water effectively	375	545	68.8%	5.5
Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	352	545	64.6%	5.7
Percentage of children age 0-23 months who slept under an insecticide-treated bednet (in malaria risk areas, where bednet use is effective) the previous night	440	545	80.7%	4.7
Percentage of children 0-23 months who are underweight (-2 SD for the median weight for age, according to the WHO/NCHS reference population)	95	435	21.8%	5.5
Percentage of infants and young children age 6-23 months fed according to a minimum of appropriate feeding practices	207	312	66.3%	7.4
Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child	421	541	77.8%	5.0
Percentage of mothers of children age 0-23 months who are using a modern contraceptive method	314	544	57.7%	5.9
Percentage of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within two days after birth	442	543	81.4%	4.6

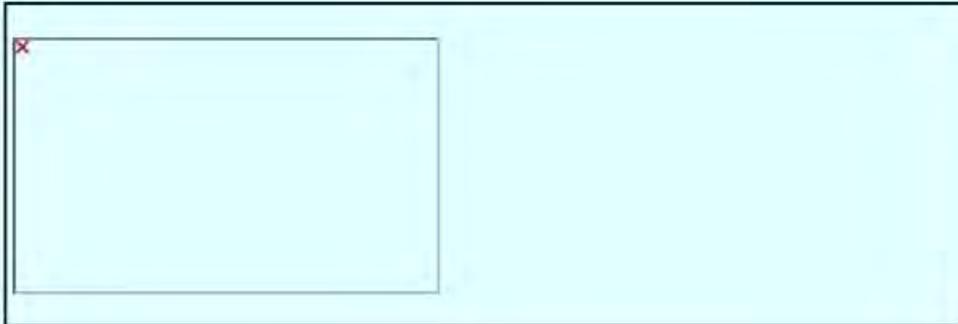
Rapid Catch Indicator Comments

NOTE (23 Jan 2015): We corrected the baseline PNC indicator (numerator and denominator). This did not change the proportion but did change the confidence interval from 14.1% to 5.7%. (Old numerator=21 vs. new numerator=127; old denominator=77 vs. new denominator=465.) We also corrected the endline PNC, EBF, DYCP, Vit A, indicator values where numerators and denominators had initially been misentered.

Sample Size and Sampling

The sample size calculation was based on the least prevalent condition among the key outcomes (indicators) which is treatment for pneumonia. It was assumed that 10% of children aged 0-23 months will have a history of cough and fast and/or difficult breathing (pneumonia) during the last two weeks. The proportion of these children who received antibiotic treatment was 38.8% from the Zambia DHS 2007. The target for this project is to increase the proportion of children receiving antibiotic treatment to 70%. With 80% power at 95% confidence intervals (CI), we will need to enroll 45 children with fast/difficult breathing. Since the prevalence of fast/difficult breathing in children aged 0-23 months was estimated at 10%, we needed to recruit 450 women with children aged 0-23 months in the baseline survey. This sample size calculated from the formula below (Figure 1) would give a high level of precision for the other outcomes since the prevalence of these conditions is higher.

Figure 1



The sample size was recruited from all of the 19 HF catchment areas proportional to their population. In each HF catchment area one or more villages were randomly selected to ensure that no more than 15 households were enrolled from each village.

In each village, households with mothers with young children (0-23 months) were selected systematically. The center of the village was identified with the help of the village headman and a bottle was spun to determine in which direction to select the first house. An integer "n" from 1-9 was randomly selected by the data collector and the nth house along the ray was selected as the first house. The next house selected was the one with the door nearest to the previous selected house and this continued until the number of survey participants for the village which was 15 was attained. If the selected household did not have a mother with 0-23 month old child, it was replaced by going to the next household. If the household has more than two mothers with a child of this age, the first to be introduced will be recruited.

A total of 465 care givers of children 0-23 months were interviewed in all the 19 HF areas ranging from 15 (one village) to 60 (four villages).

Annex 19: Additional Supporting Documents

- A. Project Indicator Table
- B. Learning Brief on CHW attrition
- C. iCCM Summary Table for Lufwanyama District
- D. Published Papers from Project
 - 1. Teaming Feasibility
 - 2. Prevention and Management of Newborn Hypothermia
 - 3. Beyond Distance: An Approach to Measure Effective Access
 - 4. Measuring Teamwork and Taskwork
- E. Community Collective Action for Improved Maternal, Newborn and Child Health in Lufwanyama District LINCHPIN Project

Annex 19A: Project Indicator Table: LINCHPIN Program

Result	Activity area	Indicator	2010	2011	2012	2013	2014	Target
SO: Increased use of key newborn and child health services and practices	Population coverage							
	Deployment of human resources	CHW density/1000	0.5/1000	74/85,033 (0.9/1000)	77/85,033 (0.9/1000)	77/85,033 (0.9/1000)	1/1000	0.5/1000
		TBA density/1000	1/1000	111/85033 (1.3/1000)	97/85,033 (1.1/1000)	97/85,033 (1.1/1000)	1/1000	1/1000
	Service delivery	Proportion of mothers and newborns who received a PNC contact within 2 days of birth	27%				81.4%	60%
		Proportion of children with suspected pneumonia who received amoxicillin	50%				78.2%	70%
		Proportion of children with suspected pneumonia who received amoxicillin within 24 hours of onset of symptoms	13%				32.1%	50%
		Proportion of children with diarrhea who received ORT	74%				69.1%	90%
		Proportion of children with diarrhea who received zinc	0%				40.2%	50%
		Proportion of children with suspected malaria who received ACT within 24 hours of the onset of fever and took appropriate course	11%				54.6%	50%
	Essential newborn care	Proportion of newborns wrapped and dried immediately after birth	80% - D 88% -W				95.6%-D 98.9%-W	95%
IR1: Increased access to and availability of services	Program outputs							
	Training	Proportion of CHWs trained (CCM, teaming) and working	-	87/87 (100%)	87/87 (100%)	76/102 (75%)	76/102 (75%)	100%
		Proportion of TBAs trained (MNCH, teaming) and working	-	111/120 (90%)	111/120 (90%)	97/120 (81%)	97/120 (81%)	100%
		Proportion of NHCs trained (Community mobilization and CAC)	-	80/118 (67%)	80/118 (67%)	118/118 (100%)	118/118 (100%)	75% (89/118)
	Services	Proportion of TBA registered newborns who received a PNC contact within 24 hours of delivery	-	855/1141 (75%)	2271/3111 (73%)	1046/1402 (75%)	411/507 (81%)	100%
		Proportion of TBA registered mothers delivered by trained health workers	-	369/1141 (32%)	1449/3111 (47%)	899/1402 (64%)	419/507 (83%)	100%
	Referral	Proportion of all sick children classified with danger signs	-	73/3120 (2%)	216/11636 (2%)	101/11525 (1%)	30/3785 (1%)	5-10%

Indicator Table: LINCHPIN Maternal, Newborn and Child Health Program

Result	Activity area	Indicator	2010	2011 Jul-Dec	2012	2013	2014 Jan-Jun	Target	
IR2: Improved service quality	Program outputs								
	Newborn care practices – TBAs	Proportion of deliveries attended by a TBA where the baby was dried and wrapped	-	666/772 (86%)	1326/1326 (100%)	368/368 (100%)	57/59 (97%)	100%	
		Proportion of newborns delivered by TBAs receiving assisted breathing	-	42/646 (6.5%)	148/1326 (11%)	27/368 (7%)	11/59 (18%)	6%	
		Proportion of TBA registered newborns who were referred	-	63/1141 (5.5%)	190/3111 (6%)	100/1402 (7%)	12/507 (2%)	1-11%	
	Child treatment practices – CHWs	Proportion of CHW registered cases of suspected pneumonia treated with amoxicillin	-	357/440 (81%)	1371/1535 (89%)	1219/1321 (92%)	223/242 (92%)	100%	
		Proportion of CHW registered cases of RDT-positive malaria treated by CHWs	-	1283/1736 (73%)	7975/8483 (94%)	8655/8734 (99%)	3058/3189 (96%)	100%	
		Proportion of CHW registered cases of diarrhea treated by CHWs with ORT	-	741/944 (78%)	1429/1618 (88%)	1263/1470 (86%)	278/354 (79%)	100%	
		Proportion of CHW registered cases of diarrhea treated by CHWs with zinc	-	517/944 (55%)	274/1618 (17%)	254/1470 (17%)	37/354 (10%)	70%	
		Proportion of children referred by CHWs for any reason who complete referral	-	274/317 (86%)	830/1075 (77%)	859/960 (89%)	210/290 (72%)	100%	
	Systems supports	Proportion of CHWs who received at least 1 supervisory visit in the previous 3 months which included clinical supervision	-	74/74 (100%)	53/76 (70%)	61/76 (80%)	15/76 (20%)	100%	
		Proportion of TBAs who received at least 1 supervisory visit in the previous 3 months which included clinical supervision	-	97/104 (93%)	56/97 (57%)	43/97 (44%)	13/97 (13%)	100%	
		Proportion of CHWs that have had no stock-outs of essential medicines in the previous month	Amoxicillin	-	17/74 (23%)	27/76 (36%)	5/76 (7%)	17/76 (22%)	50%
			ACT	-	33/74 (45%)	30/76 (40%)	22/76 (29%)	28/76 (37%)	50%
			ZINC	-	8/74 (11%)	9/76 (12%)	0/76 (0%)	2/76 (3%)	50%
			ORS	-	28/74 (28%)	19/76 (25%)	20/76 (26%)	22/76 (29%)	50%
	RDT		-	35/74 (47%)	23/77 (30%)	17/77 (22%)	24/77 (31%)	50%	

Indicator Table: LINCHPIN Maternal, Newborn and Child Health Program

Result	Activity area	Indicator	2010	2011 Jul-Dec	2012	2013	2014	Target
IR3: Increased demand for services and healthy practices	Care-seeking	Proportion of caretakers of children with suspected pneumonia who sought care from an appropriate provider	67%				97.4%	90%
	Maternal knowledge of danger signs	Proportion of caretakers who know at last 2 danger signs for seeking care for their sick newborn	11%				40.6%	60%
		Proportion of caretakers who know at least 2 danger signs for seeking care for their sick child	22%				65.3%	70%
Program outputs								
IR4: Enabled environment	Teaming	Proportion of CHW/TBA teams trained in teaming	-	46/47 (98%)	46/47 (98%)	46/47 (98%)	46/47 (98%)	100%
	Community mobilization	Proportion of NHCs trained in community mobilization and CAC	-	80/118 (67%)	80/118 (67%)	118/118 (100%)	118/118 (100%)	75%
		Proportion of planned SMAGS established and implementing action plans	-	23/26 (88%)	23/26 (88%)	87/118 (73%)	87/118 (73%)	100%
	District planning	Annual district plan includes budgeted CCM activities	-	Yes	Yes	Yes	Yes	Yes

Annex 19B: Community Health Worker Attrition

A Case Study in Lufwanyama District, Zambia

Zambia, like many sub-Saharan African countries, is challenged by a critical shortage of trained health professionals. The shortfall is mitigated by a cadre of volunteer Community Health Workers (CHWs) - trained for 6 weeks, certified by the health authorities, and linked to health facilities – who provide a primary health care package to the population. This includes integrated community case management (iCCM) of pneumonia, diarrhea, and malaria, which has rolled out in all 10 of Zambia's provinces and approximately half of the 83 districts.

Save the Children trained 87 certified CHWs (10 men, 7 women) in iCCM in 2010, consistent with Zambia's national Integrated Management of Childhood Illness (IMCI) strategy and in support of the district's program to reduce under-5 mortality. These 87 CHWs represented the district's full complement of certified CHWs serving a total population of more than 85,000. Over the ensuing 3-year period, the district experienced a 30% attrition rate as 26 (23 men, 3 women) of the 87 CHWs dropped out for various reasons. This drastic fall in the number of CHWs compromised availability and accessibility of high-impact interventions for newborns and children. CHW density in Lufwanyama decreased from 0.51/500 in 2010 to 0.35/500 in July 2013. (National standard=1 CHW/500 population.)

The high CHW attrition rate is echoed throughout Zambia and threatens the country's progress in attaining Millennium Development Goal (MDG) 5.

Method

To investigate the factors underlying the high rate of CHW attrition, the LINCHPIN team collected both qualitative and quantitative data using in-depth interviews with facility-based health workers (CHW supervisors), NHCs, and CHWs. Our case study was conducted in the 17 health facilities where CHWs are deployed. We interviewed both CHWs and supervisors to explore both sides of the story, particularly where CHWs and supervisors had had conflicts. Where certain CHWs were unavailable, we interviewed members of the CHW's household. We also interviewed the DHMT Clinical Care Officer to understand the DHMT's view of CHW attrition and the reasons behind it.

Key Findings:

- **Nearly half (46% [12/26]) of CHWs dropped out because they found employment.**
- **Three-quarters (75% [9/12]) of those who found employment were hired as Classified Daily Employees in health facilities.**
- **A fifth (19% [5/26]) of CHWs who left were discharged for disciplinary reasons: "unprofessionalism," lax attitude towards work, conflicts with communities or supervisors.**
- **Another fifth (19% [5/26]) of CHWs withdrew citing personal reasons: relocation; need to search for employment; need to concentrate on farming; and "personal reasons."**
- **Death accounted for 4% (1/26); ill health 8% (2/26); (4% [1/26]) old age.**

Conclusions

Motivating and sustaining volunteers is a well-known and constant challenge. Volunteer health cadres in sub-Saharan Africa have become even more difficult to retain as countries develop, wage labor opportunities increase, and women gain more access to markets.

We learned through our interviews that some Lufwanyama communities expressed their appreciation to well-liked CHWs by assisting them in their fields. This practice, however, was not widespread. CHWs also told us that refresher trainings and supportive supervision were motivators that made them feel recognized and valued. Throughout the LINCHPIN project cycle, Save the Children has worked closely with the DHMT and NHCs to offer incentives to volunteer CHWs (i.e. bags, bicycles, t-shirts, and other job aids). In addition, the project experimented with livestock (goats and poultry) as an adjunct to support NHCs and CHWs. Notwithstanding; it is evident that the need for income from paid employment or farming was the most powerful factor contributing to attrition. Even the 19% of CHWs who cited personal reasons expressed livelihood needs among them. It is noted that some of the CHWs who left after their iCCM training had been on the CDE employment roll for a long time. It is possible they are still using their case management skills and experience at the health facilities where they now work. Finally, as Save the Children generally had no input into the decisions made by DHMT and communities about CHW discharge, it is difficult to know whether these situations could have been avoided.

Recommendations

To fill the gap of the 26 CHWs who left, Save the Children collaborated with the DHMT, health facilities, and NHCs to identify and train 15 candidates from the neediest areas in the district. The CHW basic training curriculum now includes iCCM. These 15 new CHWs have been certified and are providing services, bringing the full LINCHPIN complement to 76.

Save the Children suggests that an “early warning” approach to CHW disciplinary problems might be developed for the district, to include both NHCs and Save the Children, to intervene and possibly head off avoidable discharge. In response to the need to increase the workforce of frontline health workers and strengthen community-based primary health care, Zambia recently launched a new community-based cadre, the Community Health Assistant (CHA). CHAs are trained for 12 months, compensated by the Ministry of Health (MOH), and will be deployed at scale over the next decade. However, it is worth noting that the monthly compensation package for a CHA is less than that of a CDE.

Annex 19C: iCCM Summary Table for Lufwanyama District

Variable	Summary (provide a brief description of the status of each variable using available project materials and data)
iCCM description within the project	
Syndromes assessed	Fast breathing (Pneumonia), Diarrhea, Fever, Malnutrition
Treatments provided	Amoxicillin for Pneumonia, ACTs for RDT positive malaria, Zinc and ORS for treatment of diarrhea
Referral and counter-referral (protocol, forms, tracking)	Facilitated referral for sick children with danger signs (Community health worker referral form from community to Health facility)
CHW profile (age, sex, literacy)	Resident in a community, respected, able to read and write and either male or female.
CHW salary or incentives	Incentives given to CHWs (e.g. include bicycles, T-shirts, pass on goats)
CHW cadre recognized by MOH	Certified CHW trained for 6 weeks using Ministry of Health approved curriculum
Duration of CHW training (in total and specific to iCCM)	6 weeks
Information Management and Data Quality	
Sick child recording form or case management guide	Sick child recording form used as job aid. Laminated copy kept by each CHW
CHW registers	Under five treatment register
Supervision checklists	CHW mentoring check list kept at the facility administered by health workers (Observation and case scenario)
Monthly reports	CHW monthly reports aggregated at the facility by CHW
Coverage (use): <i>total number of children under 5 in iCCM eligible areas</i>	Under five population : 7,000 (20% of 85,033 District total pop)

Variable	Summary (provide a brief description of the status of each variable using available project materials and data)
Counts (use): <i>total number of cases of children under 5 treated by CHWs for each iCCM condition*</i>	Period July 2011-Jun 2014: suspected pneumonia = 3538, RDT confirmed malaria = 22142, diarrhea = 4386. % of CHW registered cases of suspected pneumonia treated with amoxicillin: 90%, % of CHW registered cases of RDT positive malaria treated with ACT: 95%, % of CHW registered cases of diarrhea treated with ORT: 85%, % of CHW registered cases of diarrhea treated with zinc: 25%
Demand	
Care giver knowledge of danger signs	2010 – 2014, Proportion of caretakers who knew at least 2 danger signs for seeking care for sick newborns rose from 11% to 41%, and knowledge of at least 2 danger signs for seeking care for sick children rose from 22% to 65%.
Care giver knowledge of CHW presence and role	Between July 2011– June 2014, CHWs registered approximately 87% of all expected cases of pneumonia and malaria and 9% of expected cases of diarrhea.
Care seeking (CHW as first source of care)	Early care seeking improved during the life of the project, suggesting that CHWs are increasingly the first provider. Children receiving amoxicillin within 24 hours of symptom onset rose from 13% in 2010 to 32% in 2014 and the proportion of children with fever who received ACT within 24 hours rose from 11% in 2010 to 67% in 2014
Quality	
Quality of case management (<i>necessitates special study, observation, etc.</i>)	Not done
Case load	29698 cases in 3 years. This is approximately 129 cases/CHW/year, or 11 cases per CHW per month
Commodity availability/Stock outs (<i>qualitative information about supply chain or quantitative e.g. average % of CHWs that had a stock out of key iCCM commodities 7 days or more during the project period</i>)	Between 2011 and 2014 stock-outs were reported by between 52% and 93% of CHWs in the previous month for ACT, amoxicillin, ORS or zinc – or of RDTs. Zinc and ORS has been most often out of stock – and treatment of diarrhea is the most likely to be compromised.

Variable	Summary (provide a brief description of the status of each variable using available project materials and data)
Access	
CHW-to-population ratio	77/85,033 (0.9/1000)
CHW attrition or retention (<i>e.g.: % of CHWs trained and deployed that are still active at end of project</i>)	2010-2014: # of CHWs trained in iCCM: 87 - 26 dropped out (30% attrition) 15 additional trained - % of trained CHWs remaining 2014: 87% (76/87)
Referral adherence	July 2011-June 2014: 83% of cases referred for all causes completed referral (2173 /2642)
Environment and other	
National iCCM policies	iCCM is incorporated into the Ministry of Health guidelines which authorize CHWs to administer amoxicillin for fast breathing cases after using Timer, ORS and Zinc for diarrhea and ACTs for RDT positive malaria cases
Community acceptance	CHWs are widely accepted in communities as frontline health workers – they are selected by communities
Other intended effects	Health education, assistance with referral, participation in neighborhood health committees
Unintended effects	None
Strategies, Approaches, and Activities	
To improve access: <i>Mapping</i>	District map is used to map CHWs and TBAs by facility catchment area – and to follow areas where staff drop-out
To improve access: <i>CHW selection</i>	CHW selection done by the individual communities guided by the Ministry of Health criteria
To improve access: <i>CHW deployment</i>	CHW deployed to specific communities where they are resident (MoH policy : 1CHW/1000 total population)

Variable	Summary (provide a brief description of the status of each variable using available project materials and data)
To improve access: <i>Retention strategies</i>	Provision of goats for rearing, Provision of branded T-shirts and bags ,Provision of bicycles and reporting tools, community support (gardening, help with farming)
To improve access: <i>Referral strengthening</i>	Strengthened referral system through teaming of CHWs and TBAs, training of CHWs in identification of danger signs in under five sick children, provision of referral forms and feedback notes from health workers, provision of bicycles.
To assure quality: <i>CHW selection criteria</i>	CHWs selected using the MoH standard: Local resident who is able to read and write; is in good standing with the community; a local resident; elected by the NHC members and endorsed by the health facility staff.
To assure quality: <i>Competency-based training</i>	CHWs were trained in ICCM a competence based training with a minimum passing mark of 85%;those that failed were not eligible for deployment
To assure quality: <i>Training package</i>	Training package for CHW is approved by the MoH and local facilitators are trained by national MOH facilitators
To assure quality: <i>Competency-based certification</i>	Only CHWs who pass both practical and theory exams are certified by the MoH
To assure quality: <i>Competency-based job aids</i>	Standard Job aids are provided by the MoH .The ICCM job aids are kept by each CHWs and used at primary health care units
To assure quality: <i>Competency-based supervisor training</i>	Health workers trained in ICCM underwent a competency based supervisor training using MoH curriculum
To assure quality: <i>Deploying supervisors</i>	CHW supervisors were facility based health workers under the ministry of health
To assure quality: <i>Competency-based supervision of CHWs</i>	Standard clinical checklist is used; CHWs are observed managing cases
To assure quality: <i>Frequency of supervision (plan vs. actual)</i>	Performance Assessment planned every 6 months

Variable	Summary (provide a brief description of the status of each variable using available project materials and data)
To assure quality: <i>Supervision content (clinical, etc.)</i>	Clinical supervision using clinical supervision checklists done through supervisors
To assure quality: <i>Supervision of supervisors</i>	Supervision of supervisors being conducted by District Health management Team every 6 months using a Performance assessment tool
To mobilize demand: <i>Initial sensitization</i>	Work through Neighborhood health committees who mobilize, provide health education and inform community members of the purpose and role of CHWs
To mobilize demand: <i>BCC messages</i>	1) Recognition of danger signs; 2) Early care seeking; 3) Home case-management; 4) Early and exclusive BF; 5) delivery with SBA at facility; 6) Early PNC; strategies for preventing malaria, diarrhea
To mobilize demand: <i>BCC targets</i>	Women of childbearing age, husbands, grandparents, members of village health committees, NHCs, community leaders, religious leaders
To mobilize demand: <i>BCC channels</i>	One-on-one counseling, group education sessions
To mobilize demand: <i>BCC products</i>	-
To enable the environment: <i>Community capacity</i>	NHS community action cycle process ongoing to prioritize problems, develop solutions and action plans and get funding to implement plans – with full community engagement. Has provided bicycles for referral, school construction, water protection etc.
To enable the environment: <i>Policy informing experience</i>	Successful implementation of iCCM has informed national roll-out of iCCM – methods, materials and processes are informing this process through the national technical working group on IMCI

Annex 19D: Published Papers from Project

Annex 19D.1: Teaming Feasibility: Can a community health worker and a trained traditional birth attendant work as a team to deliver child health interventions in rural Zambia?

Yeboah-Antwi et al. *BMC Health Services Research* 2014, **14**:516
<http://www.biomedcentral.com/1472-6963/14/516>



RESEARCH ARTICLE

Open Access

Can a community health worker and a trained traditional birth attendant work as a team to deliver child health interventions in rural Zambia?

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Abstract

Background: Teaming is an accepted approach in health care settings but rarely practiced at the community level in developing countries. Save the Children trained and deployed teams of volunteer community health workers (CHWs) and trained traditional birth attendants (TBAs) to provide essential newborn and curative care for children aged 0–59 months in rural Zambia. This paper assessed whether CHWs and trained TBAs can work as teams to deliver interventions and ensure a continuum of care for all children under-five, including newborns.

Methods: We trained CHW-TBA teams in teaming concepts and assessed their level of teaming prospectively every six months for two years. The overall score was a function of both teamwork and taskwork. We also assessed personal, community and service factors likely to influence the level of teaming.

Results: We created forty-seven teams of predominantly younger, male CHWs and older, female trained TBAs. After two years of deployment, twenty-one teams scored “high,” twelve scored “low,” and fourteen were inactive. Teamwork was high for mutual trust, team cohesion, comprehension of team goals and objectives, and communication, but not for decision making/planning. Taskwork was high for joint behavior change communication and outreach services with local health workers, but not for intra-team referral. Teams with members residing within one hour’s walking distance were more likely to score high.

Conclusion: It is feasible for a CHW and a trained TBA to work as a team. This may be an approach to provide a continuum of care for children under-five including newborns.

Keywords: Teams, Teaming, Teamwork, Taskwork, Continuum of care, Community health workers, Traditional birth attendants, Newborn health, Child health care, Zambia

Background

Zambia has a strained health care system with limited health facilities and human resources, and thus has been using community-based health workers, mostly volunteers, to provide basic health services, especially in rural areas, to confront its high under-5 mortality [1,2]. Two common volunteer cadres are community health workers (CHWs) and trained traditional birth attendants (TBAs). CHWs as per government policy, have been trained to

provide a wide range of services, including preventive and promotive interventions, health education, community mobilization and sensitization, and treatment of common childhood illnesses (fever, diarrhea, and pneumonia) [3]. Trained TBAs have also been trained to provide maternal and newborn interventions, including antenatal and post-natal care, and recognition of and referral for danger signs of pregnant women and newborns. As per government policy, TBAs are no longer trained in clean delivery but are encouraged to accompany women to health facilities to deliver. These community-based providers are supported by Neighborhood Health Committees (NHCs), which link them with both the community and the formal health system. The NHCs are community-based health

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management structures of community members with the responsibility of analyzing health situations and problems and exploring opportunities for solving them. Their roles include supporting community-based agents during implementation of health programs, initiating and supporting developmental activities to improve community and household health, and mobilizing community and local resources for health improvement. They represent communities on health center committees [3]. In this setting the NHCs play key roles in health delivery system and are seen as important partners by both the DHMT and the health center staff.

Trained TBAs and CHWs may reside in the same community, but work independently of each other, leading to inefficiency and missed opportunities for continuity of care. There is a growing recognition that health interventions for newborns should be integrated into child health programs [4] to promote a continuum of care, an approach expected to promote care for mothers and children from pregnancy to delivery, and into the immediate post-natal period and childhood [5].

Teaming (i.e., establishing teams of two or more individuals who work together) is an accepted approach in various settings, including health care, in both developed and developing countries; and it has increasingly become a critical approach in health care delivery [6-8], but it is not practiced with community-based health workers. Characteristically, team members generally have specialized knowledge and specific roles, make decisions, perform interdependent tasks, are adaptable, and share a common goal [9-11]. Benefits of a team include distributing workload, reinforcing individual capabilities, creating the feeling of participation and involvement, making better decisions, and generating a diversity of ideas for a common purpose [12]. *Teamwork* consists of behaviors related to team member interactions to achieve team goals, such as goal comprehension, communication, conflict management, decision-making/planning, leadership, mutual performance monitoring, mutual trust, team cohesion and team motivation [11,13-16]. Teamwork has increasingly been recognized by several organizations as important for improving healthcare [17-19]. *Taskwork*, on the other hand, consists of behaviors performed by individual team members to execute team functions [20,21].

Save the Children in collaboration with the Boston University Center for Global Health and Development (BU/CGHD) and the Ministry of Community Development, Mother and Child Health (MCDMCH), the Ministry of Health (MOH), and the Lufwanyama District Health Management Team (DHMT) is implementing the Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN). LINCHPIN is an integrated, community-based newborn care and community case management package delivered through an enhanced

district-wide community health program linked to health facilities and NHCs in a manner consistent with the Zambia MOH plans and policies and MCDMCH strategies and approaches [2,3]. The project teams CHWs and trained TBAs, supported by NHCs, to provide a continuum of evidence-based essential newborn and curative care for children 0-59 months of age in Lufwanyama District. The rationale for integration and teaming is to achieve efficiency, since the effect of the team will likely exceed the effects of the individuals working alone and also improve social cohesion and sense of community. This paper assessed whether CHWs and trained TBAs can work together in teams to provide integrated care to newborn and sick children in rural Zambia.

Methods

Study location

The study was conducted in Lufwanyama District in the Copperbelt Province of Zambia. Lufwanyama is a large, rural, undeveloped district with an estimated 2011 population of 87,592 [22], with the majority belonging to the Lamba ethnic group. Despite its location in the comparatively urban, industrialized Copperbelt, the district lacks physical infrastructure, and many roads are impassible during the rainy season. It has 12 health centers, five health posts and a newly opened district hospital. The DHMT operated for many years outside the district, but is currently housed at the new district hospital. Many basic health services, including treatment of minor illnesses, health education, antenatal care, family planning services, follow-up of patients with chronic illnesses and referrals, are provided through several categories of minimally trained community workers – trained TBAs, CHWs, male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, and untrained TBAs. The Lufwanyama DHMT, with support from non-governmental partners operating in the district, have trained and deployed CHWs and trained TBAs for over 30 years. CHWs and trained TBAs spend some days in a week working with health center staff at facilities. The health centers provide them with drugs and supplies and health workers supervise their work.

Study design

This prospective study assessed the level of teamwork and taskwork among community-based CHW-TBA teams supported by NHC members. We used an assessment tool developed through formative research with community leaders, health workers, CHWs and trained TBAs [23]. We carried out the assessment every six months from June 2011 to March 2013.

Team creation and training

A CHW and trained TBA working in the same community formed the CHW-TBA team. We did not create teams for communities which had only a CHW or trained TBA. The CHW-TBA team plus two NHC support members were trained in teaming concepts prior to deployment. The training addressed both specific tasks (Table 1) that the teams would undertake as well as the skills and competencies to maintain a functioning team. The teamwork skills and competencies included i) good communication; ii) respectful dialogue and action; iii) each helping the other, mutual support, and working hand in hand; iv) assess, make decisions and manage conflicts; v) trust and confidentiality of care-seekers/community members; vi) together monitor team task and team maintenance abilities; vii) evaluate successes and failures; viii) asking for feedback; and ix) motivate and encourage each other. The specific tasks and skills required for successful community teams were identified during earlier formative research [23]. The training emphasized the importance of performing the joint tasks and the need to document tasks performed. They practiced and demonstrated how to perform these tasks. The training utilized several methods including exercises, practice, demonstrations, role play,

experience sharing brainstorming and real-life scenarios for the teams to acquire the necessary knowledge and skills of teamwork competences for maintaining functioning teams. The training also clarified roles of the NHCs as identified by the MOH guidelines [3].

Baseline data collection

Prior to training, we collected baseline information from team members, including age, gender, education, ethnic group, marital status, religion, membership of a social group (e.g. faith-based fellowships, parent-teacher associations, corporative societies, etc.), length of service, other occupation, and walking time from each other.

Team assessment

An independent, non-LINCHPIN data collector visited the core team members (CHW and trained TBA) and administered a three-part team measurement tool. The first assessment started two months after the teaming training. Part A was administered to both members together and assessed taskwork, i.e., whether the team had jointly performed any of seven agreed specific tasks in the previous three months: 1) meeting with NHCs to discuss work and performance, 2) conducting behavior change communications sessions targeting women on newborn and child care, 3) problem-solving for newborn or child care, 4) participating in outreach services, 5) supporting referral of a pregnant woman or sick child, 6) conducting intra-team referral, and 7) conducting postnatal care visits to a mother with a newborn aged 6–8 weeks. The team scored “0” if a function was not performed, “1” if performed but without documented evidence, and “2” if there was documented evidence of performance. Part B was administered separately to the CHW and trained TBA. It assessed 27 characteristics from eight teamwork processes identified during the formative research [23]: 1) mutual performance monitoring, 2) mutual trust, 3) decision making/planning, 4) team cohesion, 5) team motivation, 6) goals and objectives, 7) communication, and 8) conflict resolution/management. Data were collected from each member about whether, in his/her opinion, the characteristic was present in the team over the previous six months. They scored “1” if a member reported that the characteristic was not or hardly present in the team; “2” if it was present sometimes; and “3” if present all the time. The score for the team was the average score of the two members. Part C – also administered separately to each individual team member – collected information on perceived factors that may influence teamwork such as supervision, refresher training, availability of supplies, incentives, and ownership of bicycle or cell phone.

Team score and classification and analysis

The score for the taskwork of each team at each assessment was the sum of the scores of the seven functions.

Table 1 Taskwork description

Task	Description
Meeting with NHCs	This task requires the team to meet with NHC to discuss CHW/TBA team work and performance including challenges and the support needed.
Conducting behavior change communication (BCC)	Sessions in the community to educate community members in relevant health topics including exclusive breastfeeding, disease prevention, danger signs in pregnancy and childhood illnesses, importance of antenatal and postnatal care, hygiene and sanitation.
Problem solving for newborn and child care	Home visits Including follow-up visits to help and support caregivers in their care of children such as individual counselling, addressing challenges and seeking care
Outreach services	Publicizing dates of outreach, mobilizing caregivers to attend and performing specific activities during sessions.
Support Referral	Convincing caregivers and households on the need to accept a referral and help with mobilizing transport
Intra-team referral	CHW referring pregnant or postnatal women seen at clinic or during a home visit to the trained TBA for follow-up. Trained TBA referring sick child seen on home visit or at postnatal care to CHW for treatment and advice.
Postnatal care visit at 6–8 weeks	Joint home visits to children aged 6–8 weeks in order for the trained TBA to “hand over” care of child to the CHW.

The overall taskwork score for the teams was the mean score of the four assessments. For teamwork, the score for the team at each assessment was the average score of the two members from the twenty seven indicators (expressed as a percent). The overall teamwork score was also the mean score of the four assessments.

A team was categorized "inactive" if unavailable for an assessment and the local NHC confirmed its inactivity and break-up. We categorized the remaining teams "high" if the mean score on the taskwork scale was ≥ 7 of a possible 14, and the mean score on the teamwork scale was $\geq 90\%$; and "low" if the taskwork score was < 7 or teamwork score was $< 90\%$. We decided on the cut-offs prior to data collection, but we modified the categorization based on the distribution of the teamwork scores. In order to evaluate factors that may influence the level of teaming, frequency and proportions were compared with chi-square test; odds ratios (OR) and 95% confidence intervals (CI) were calculated for each characteristic. All data analysis was conducted in EpiInfo software package [24].

Ethical issues

Ethical approval was obtained from the Boston University Institutional Review Board (BU-IRB) and a local Zambian ethical review committee (ERES CONVERGE). Informed consent was obtained from all study participants with a consent form developed in accordance with guidelines of the BU-IRB and the local ethical review committee and translated into Bemba, the language of common communication in the district. During consenting, study personnel explained the purpose and rationale of the study, informed the participants that they were not obliged to participate in the research, and assured them of the confidentiality of the information collected from them.

Results

Team characteristics

The project created and trained 47. There were 74 CHWs operating in the district but some CHWs did not have a trained TBA operating in their communities. The CHWs were predominantly male (80.9%), and the trained TBAs were all female (Table 2). CHWs were younger than the trained TBAs (average age of 44 years vs 53 years). Most CHWs had more schooling than the trained TBAs. Half the trained TBAs were of the local Lamba ethnic group while only a third of the CHWs were Lamba. CHWs were more likely to be currently married than the trained TBAs. Only about a fifth of the CHWs and the trained TBAs reported that being a CHW or TBA was their main occupation.

Overall team categorization

We categorized 21 (44.7%) teams as high, 12 (25.5%) as low, and 14 (29.8%) as inactive. Three teams became

Table 2 Baseline characteristics of team members

Characteristics	CHW (n = 47)	TBA (n = 47)
Age: (years)		
Average (SD)	44.4 (8.8)	53.0 (6.6)
Range	28 - 69	33 - 66
Sex:		
Male	80.9%	0
Female	19.1%	100%
Educational Level		
No education	0	8.5%
Primary	14.9%	68.1%
Secondary	85.1%	23.4%
Ethnic Group		
Lamba	36.2%	50%
Bemba	14.9%	16.5%
Kaonde	2.1%	2.2%
Other	46.8%	41.3%
Marital status		
Single/not married	0	2.1%
Married	91.3%	66.0%
Separated/divorced	2.2%	6.4%
Widowed	6.5%	25.5%
Religion		
Christian (Jehovah witness)	31.9%	19.2%
Christian (Catholic)	12.8%	10.6%
Christian (Pentecostal)	6.4%	10.6%
African Christian Church	25.5%	44.7%
Other	23.4%	14.9%
Main Occupation		
CHW/TBA	23.9%	19.2%
Farmer	76.1%	80.8%
Length of Service (years)		
Average (SD)	9 (5.9)	11.3 (7.7)
Range	1-28	3-40

inactive after the first assessment, four after the second, and the remaining seven after the third. CHW departure, usually to find a new job, was responsible for most of the inactive teams (71.4%) (Table 3). Two CHWs were employed as casual laborers to work at rural health centers, two CHWs stopped because they became frustrated with the work and one trained TBA was forced to stop because some members of the community believed she was not representing community values.

Teamwork performance

All team members reported the presence of mutual trust within their teams during all four assessments (Table 4).

Table 3 Reasons for inactive teams

Reason	CHW (n = 47) n (%)	TBA (n = 47) n (%)	Total (n = 94) n (%)
Found new job	5 (10.6)	0	5 (5.3)
Relocated to another area	2 (4.3)	2 (4.3)	4 (4.3)
Illness/old age	1 (2.1)	1 (2.1)	2 (2.1)
Frustration	2 (4.3)	0	2 (2.1)
Forced to stop	0	1 (2.1)	1 (1.1)
Total	10 (21.3)	4 (8.5)	14 (14.9)

Many team members reported comprehension of team goals and objectives and team cohesion as present most of the time. On the other hand, decision making/planning and mutual performance monitoring were reported lacking in most cases. The teams reported only six conflicts in the four assessments, all of which were satisfactorily resolved or managed. Team motivation and communication were reported to have improved over time while mutual performance monitoring and decision making/planning after initial improvement, declined during the last assessment (Figure 1).

Taskwork performance

Table 5 shows reported and documented joint activities. The most common *documented* joint activity was making a home visit to a mother with a young infant aged about 6–8 weeks where the trained TBA “handed over” the child to the CHW (55.3%), followed by meeting with NHCs to discuss work and performance (36.5%). Less commonly reported joint activities were intra-team referral (e.g., the CHW referring a pregnant woman to the trained TBA or the trained TBA referring a mother with a sick child to the CHW) and joint problem solving (15.6 and 21.6%, respectively). The most common joint activity (documented plus undocumented) was participation in outreach services, including immunization conducted by the supervising rural

Table 4 Teamwork Performance – proportion of teams that exhibited teamwork processes during the four assessments

Teamwork dimension	Average performance
Mutual trust	100%
Goals and objectives	98.1%
Team cohesion	95.7%
Communication	76.3%
Team motivation	70.8%
Mutual performance monitoring	41.3%
Decision making/planning	38.1%

health center staff, and BCC sessions targeting women to educate them about newborn and child care (Figure 2). The least common activities by these criteria were intra-team referral and supporting referral to health facilities.

Factors influencing teaming

Teams with members residing within one hour’s walking distance were more likely to score high (OR = 5.80; 95% CI: 1.52-22.1; p = 0.007). Teams whose members were jointly supervised were also more likely to score high (OR = 3.2; 95% CI: 0.83-12.74; p = 0.05), barely achieving statistical significance (Table 6). Teams whose members were of the same sex and with at least one member receiving some form of incentives (e.g. payment in-kind or cash from the community for services rendered) were likely to score high, but these differences were not significant.

Discussion

This study shows the feasibility of creating and deploying teams of volunteer community-based providers of relatively younger, better schooled, predominantly male CHWs and older, less schooled, female trained TBAs in a rural setting. Most of the important teamwork dimensions – i.e., mutual support, team cohesion, comprehension of team goals and objectives and communication [6,11,25] – were highly present in the teams. Additionally, most teams performed many of the joint tasks. About two-thirds of the active teams were categorized as high performing.

Having a common purpose that all team members are able to articulate is fundamental to team effectiveness. Teams need to involve all members in purpose development, and everyone should be able to articulate and commit to the team’s purpose. If team members have different understandings of what their common purpose is, friction, confusion, and wasted resources and effort are inevitable [26]. In our study, team scores on the comprehension of goal and objectives were high; therefore, these CHW-TBA teams had the potential to be effective in delivering integrated newborn and child care services in a rural setting. Team scores on communication were also high and improved over time, a welcome achievement since team communication failure has been associated with breakdown of teamwork, reduced outcomes, tension, stress and inefficiency [27-32].

The low score for mutual performance monitoring is of great concern. A proposed model of five key dimensions for effective teams includes mutual performance monitoring [33]. Mutual performance monitoring requires sufficient understanding of the environment to monitor other team members to identify lapses. To achieve these five dimensions, team members must respect and trust each other to give and receive performance feedback and must

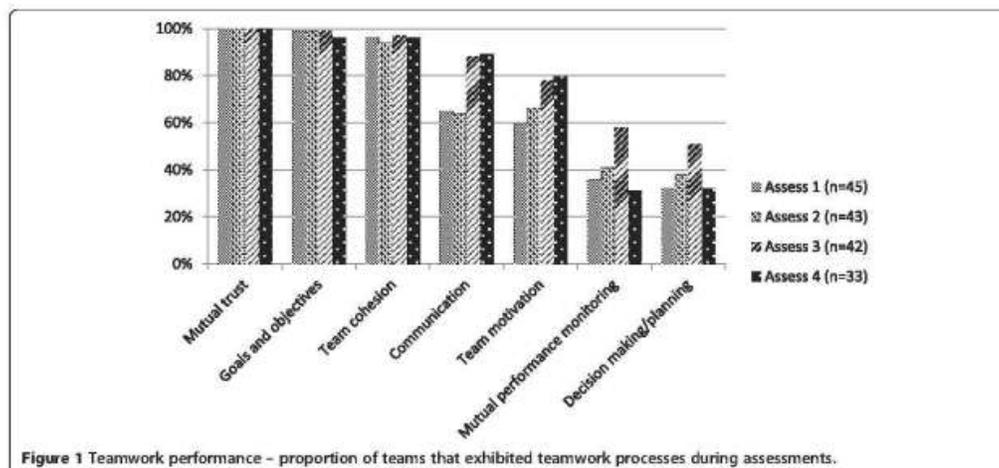


Figure 1 Teamwork performance - proportion of teams that exhibited teamwork processes during assessments.

have good communication skills to convey information accurately [34]. Despite scoring low in mutual performance monitoring, these teams had excellent scores on mutual trust and high scores on communication, so these teams have the potential to improve monitoring.

Postnatal care coverage is low in Zambia, and newborns in rural areas are less likely to have postnatal care especially within the critical first week of life than newborns in urban areas [2]. It was reassuring that one of the most commonly performed tasks was the trained TBA and CHW jointly making home visits for handover at 6–8 weeks. CHWs normally see infants from two months of age and trained TBAs are supposed to carry out home visits soon after a baby's delivery, encourage facility-based postnatal care, assess for danger signs in mother and baby, and make and follow up referrals when necessary. The joint home visits for handing over

care of the young infant has the potential to underscore the importance of and improve the use of facility-based postnatal services and enhance the continuum of care. It is possible that the high performance of this task was because it was related to the responsibilities of both team members (to make home visits) and therefore it was easier to undertake joint activities that are already perceived to be part of their routine activity.

CHW-TBA teams appear to be a viable strategy to implement an integrated community-based newborn and child care interventions; however, 30% team attrition over two years presents a challenge. This is not surprising considering that many teams received few or no incentives from their communities. Annual attrition rates as high as 77% have been reported among volunteer community-based providers [35]. Attrition is largely due to low remuneration, "movement upwards to higher positions in the health system," and finding better positions in other fields [36], similar to what we found. The importance of adequate retention and incentive structures for CHW programs is recognized as a key component of the WHO task-shifting proposal to tackle health worker shortages to contribute to the achievement of several Millennium Development Goals in low-income countries [37]. If teaming is to be implemented, approaches to motivate and retain CHWs need to be adopted [38-41]. The development and implementation of the Zambian government's new National Community Health Worker Strategy, which established a new cadre of community health assistants who will be paid a monthly allowance by the government, may be a step in the right direction [2].

Table 5 Taskwork - proportion of teams that performed the agreed task during the four assessments

Taskwork	Average performance (documented)	Average performance (undocumented)
Attended NHC meeting	36.5%	50.3%
Conducted BCC	31.2%	60.3%
Problem solving	21.6%	34.5%
Outreach services	21.8%	69.8%
Referral to health facility	28.1%	24.9%
Intra-team referral	15.5%	28.3%
Post natal care	55.3%	35.3%

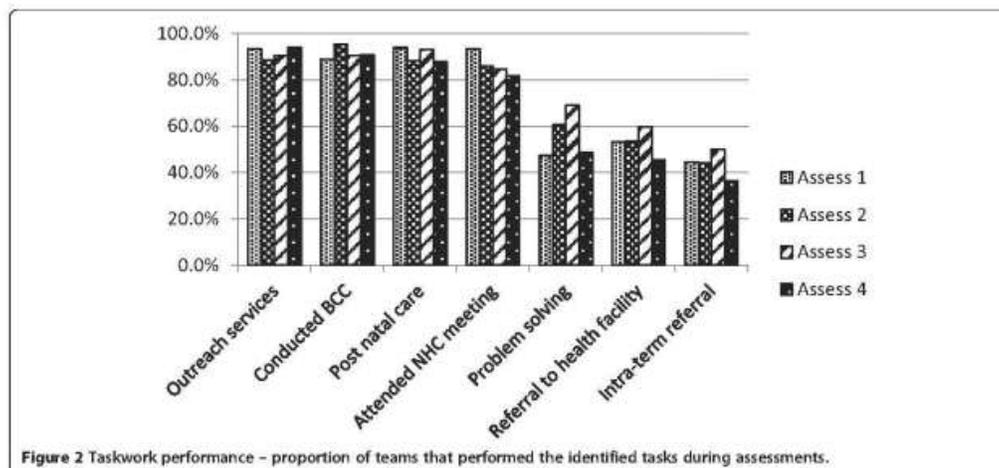


Figure 2 Taskwork performance - proportion of teams that performed the identified tasks during assessments.

Member proximity was the main identified factor positively influencing the level of teaming. It is not surprising since this situation is likely to improve the communication and interaction between team members and thereby improve collaborative efforts.

Limitations

The study has limitations. The assessment consisted mainly of participants' subjective reports of satisfaction, attitudes, and opinions, and they may have over-rated themselves. The small sample size may have precluded

Table 6 Determinants of level of teaming

Determinants	Team Status		
	High (N = 21) n (%)	Low/Lost (N = 26) n (%)	High vs Low/Lost OR (95% CI), p-value
Same gender	5 (23.8)	4 (15.3)	OR = 1.72 (0.40-7.43) p = 0.36
Same educational level	10 (47.6)	14 (53.8)	OR = 0.78 (0.25-2.47) p = 0.44
Same tribe	6 (28.6)	6 (23.1)	OR = 1.33 (0.36-5.00) p = 0.46
Same marital status	14 (66.7)	13 (50.0)	OR = 2.0 (0.61-6.57) p = 0.20
Same religion	8 (38.1)	10 (38.5)	OR = 0.98 (0.30-3.21) p = 0.61
Belonging to a social group	9 (42.9)	11 (42.3)	OR = 1.02 (0.32-3.27) p = 0.60
Supervised together some of the time ¹	14 (66.7)	10 (38.5)	OR = 3.2 (0.96-10.66) p = 0.05
Team member received some form of payment ²	10 (47.6)	7 (26.9)	OR = 2.46 (0.73-8.34) p = 0.12
Team member owes bicycle most of the time ³	21 (100)	24 (92.3)	OR = Undefined p = 0.30
Team members owe mobile phone most of time ⁴	3 (14.3)	5 (19.2)	OR = 0.70 (0.15-3.34) p = 0.48
Team members have combined meeting with community most of time ⁵	18 (85.7)	22 (84.6)	OR = 1.09 (0.21-5.52) p = 0.62
Team members have supplies most of time ⁶	1 (4.8)	3 (11.5)	OR = 0.38 (0.04-3.98) p = 0.39
Team members some primary occupation apart from being CHW/trained TBA	9 (42.9)	7 (26.9)	OR = 2.04 (0.60-6.9) p = 0.20
Team members within an hour walking distance	17 (80.9)	11 (42.3)	OR = 5.80 (1.52-22.1) p = 0.007

¹ Both the CHW and trained TBA reported being supervised together at least once during the assessments.

² At least one member (either the CHW or trained TBA) reported receiving some form of payment (cash, kind or both) at least once during the assessments

³ At least one member of the team (CHW or trained TBA) reported owing a bicycle more than half of the assessments.

⁴ Both the CHW and trained TBA reported owing mobile phones more than half of the assessments.

⁵ Both the CHW and trained TBA reported having meeting together with the community leaders more than half of the assessments.

⁶ Both the CHW and trained TBA reported having the needed supplies to work with more than half of the assessments.

identifying other factors influencing teaming. Another limitation was that the assessment tool was not validated.

Conclusions

To our knowledge, this is the first attempt to assess the feasibility of community-based teams in a health care setting in a developing country. We measured teamwork using culturally accepted relevant teamwork dimensions and agreed upon tasks the teams were expected to perform. The teams' performances on both the teamwork and taskwork scales were encouraging. Creating, supporting, measuring and adapting teams have the potential to strengthen community capacity to improve health delivery. Communities provide the social, cultural and organizational support and allocate and manage resources to address challenges that affect their members. Teaming is likely a promising potentially sustainable approach to deliver continuous newborn and child health interventions in rural communities and may accomplish development in other sectors. The DHMT, health center staff, community leaders and members, CHWs and trained TBAs were actively involved in the development of the tool. LINCHPIN has started discussion with the DHMT about incorporating the teaming approach in the health delivery system.

Abbreviations

BU-IRB: Boston University Institutional Review Board; CGHD: Center for Global Health and Development; CHW: Community health worker; CI: Confidence interval; DHMT: District Health Management Team; LINCHPIN: Lufwanyama Integrated Neonatal and Child Health Project; MCDMCH: Ministry of Community Development, Mother and Child Health; MOH: Ministry of Health; NHC: Neighborhood Health Committee; OR: Odds ratio; TBA: Traditional birth attendant.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

KYA, DM, DHH and KZW contributed to the conception and design of the study. KYA, DHH, GSP, CK, AS, SE, and BS all participated in study implementation and data collection. KYA, KS and DHH performed data analyses and DM, GSP and KZW assisted with interpretation of the data. KYA, DHH and DM drafted the manuscript. All authors contributed to revisions of the manuscript and read and approved the final manuscript.

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Annex 19D.2: Prevention and Management of Neonatal Hypothermia in Rural Zambia

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PLOS ONE

Prevention and Management of Neonatal Hypothermia in Rural Zambia



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Abstract

Background: Neonatal hypothermia is increasingly recognized as a risk factor for newborn survival. The World Health Organization recommends maintaining a warm chain and skin-to-skin care for thermoprotection of newborn children. Since little is known about practices related to newborn hypothermia in rural Africa, this study's goal was to characterize relevant practices, attitudes, and beliefs in rural Zambia.

Methods and Findings: We conducted 14 focus group discussions with mothers and grandmothers and 31 in-depth interviews with community leaders and health officers in Lufwanyama District, a rural area in the Copperbelt Province, Zambia, enrolling a total of 171 participants. We analyzed data using domain analysis. In rural Lufwanyama, community members were aware of the danger of neonatal hypothermia. Caregivers' and health workers' knowledge of thermoprotective practices included birthplace warming, drying and wrapping of the newborn, delayed bathing, and immediate and exclusive breastfeeding. However, this warm chain was not consistently maintained in the first hours postpartum, when newborns are at greatest risk. Skin-to-skin care was not practiced in the study area. Having to assume household and agricultural labor responsibilities in the immediate postnatal period was a challenge for mothers to provide continuous thermal care to their newborns.

Conclusions: Understanding and addressing community-based practices on hypothermia prevention and management might help improve newborn survival in resource-limited settings. Possible interventions include the implementation of skin-to-skin care in rural areas and the use of appropriate, low-cost newborn warmers to prevent hypothermia and support families in their provision of newborn thermal protection. Training family members to support mothers in the provision of thermoprotection for their newborns could facilitate these practices.

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Background

In Zambia, similar to many resource-limited countries, some progress has been achieved in reducing mortality of children under 5 years of age, but less progress has been made to increase survival of neonates, or infants under the age of 28 days [1]. Globally, neonatal deaths account for 41% of mortality in children under 5 years of age, a rate that has been increasing over recent years [2]. Nearly 3 million newborns are estimated to die every year [3]. Immediately after birth, an infant is at highest risk of dying. About 25–45% of deaths occur during the first 24 hours [4] and 75% during the first week [5]. Neonatal hypothermia, defined as an abnormally low body temperature of under 36.5°C [6], is a risk factor for newborn survival in low and middle income countries, particularly when associated with preterm birth and severe infections [6]. Hypothermia increases the newborn's metabolic

requirements and is associated with hypoglycemia, hypoxia, and ultimately severe infections and newborn mortality [7]. In a recent community-based study conducted in Sarlahi, Nepal, mortality increased by approximately 80% for every 1 degree Celsius decrease in body temperature [8].

Many neonatal deaths, particularly those related to severe infections and prematurity, are preventable with relatively easy interventions to keep babies warm [9]. The World Health Organization (WHO) proposes a “warm chain”, or a series of interlinked procedures to minimize the risk of hypothermia in newborns, which includes warming the delivery place, immediate drying, skin-to-skin care, early and exclusive breast-feeding to promote close warming contact with the mother and provide energy to generate heat, postponing bathing, appropriate clothing and bedding, and placing mother and baby together [10].

However, even seemingly simple strategies such as skin-to-skin care are not consistently practiced in resource-limited settings [11].

Data from facility-based studies in Africa indicate that neonatal hypothermia is very common even in warm climates, with incidence rates at hospitals in Zambia ranging from 44 to 69% and high fatality rates [12,13]. However, newborn care practices in sub-Saharan Africa at the community level, and their potential impact on neonatal hypothermia, are poorly understood.

While hypothermia has long been recognized as a potential threat to newborn survival in resource-limited settings, it has not received sufficient attention [14]. In Zambia, a majority of the estimated 18,000 newborn deaths yearly are attributable to conditions associated with neonatal hypothermia, such as severe infectious (25%) or complications from preterm birth (37%) [1]. Implementing context-appropriate interventions for reducing hypothermia among newborns and might reduce associated risks and adverse health outcomes [15] and address poor neonatal survival in settings such as rural Zambia.

A better appreciation of environmental and local behavioral factors, and traditional practices that place neonates at risk of hypothermia in resource-limited settings in sub-Saharan Africa might improve the design and implementation of interventions to prevent newborn deaths in the communities. Understanding perceived barriers to and potential facilitators for preventing and managing hypothermia is key in ensuring that seemingly simple interventions can be implemented. The objective of this qualitative study was to explore and understand practices and attitudes regarding newborn hypothermia among communities in Lufwanyama District, Zambia, a typical rural area with limited access to health care and a poor infrastructure.

Methods

Design

We conducted focus group discussions (FGD) and in-depth interviews (IDI) from April to November 2010.

Setting

This study was conducted in Lufwanyama District in the Copperbelt Province of Zambia, a large, rural, undeveloped district formerly referred to as Ndola Rural with a population of 78,500 [16]. Lufwanyama District has little physical infrastructure, poorly maintained roads that are frequently impassable during the rainy season; a near complete absence of electricity except that produced locally by diesel generators; and no piped water or sewage. The district health office, located outside the district in the town of Kalulushi, 14 kilometers west of the mining center town of Kitwe, was responsible for 15 formal health facilities (11 health centers and 4 health posts) staffed exclusively by nurses, nurse midwives, and/or clinical officers. At the time of this study, there was a single physician at one of two mission hospitals (St. Mary's, St. Joseph's) serving the district. Neighborhood health committees (NHC) are nationally recognized community structures, composed of volunteers who collaborate with health facilities to address community needs. As a consequence of all of these factors, a high proportion of basic health services are provided through several categories of minimally trained community workers: trained traditional birth attendants (TBAs), trained community health workers (CHWs), male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, family planning agents, as well as untrained TBAs and other volunteers.

Subjects and sampling

We convened six focus groups of mothers of children aged between 0 and 23 months and eight focus groups with grandmothers, all with 10 participants. Inclusion criterion was willingness and ability to share experiences with childbirth and newborn care practices. Exclusion criterion was lack of consent to participate in the study. We randomly selected health facilities (HF) (two health centers and two health posts) as the sampling frame for informants. In each sampling area, we asked our network of TBAs and CHWs to identify mothers and grandmothers for the FGDs from two communities, one less than 5 km from the HF ("near") and the other more than 5 km away from the HF ("far"). For the IDIs, we selected two community leaders (such as chief advisors, church leaders, or members of neighborhood health committees), one of whom was female, and four local health committee members (two from near and two from far communities) from each of the four selected HF catchment areas. A team of community mobilizers trained by Save the Children contacted potential participants, explained the study purpose, and, if the potential study participants expressed interest in taking part, agreed with them on a time and place for the FGD or IDI that was convenient for them. Focus group participants were offered a refreshment drink and the equivalent of USD 5. The majority of potential participants approached agreed to take part in the study. We also interviewed district or provincial level medical officers, who were sampled purposively.

Ethics Statement

Ethical approval was obtained from the Boston University Institutional Review Board (BU/IRB) and the Tropical Diseases Research Centre (TDRC) Ethical Review Committee in Ndola, Zambia. Before the interview took place, on the day of the FGD or IDI, we introduced the study team and obtained written informed consent.

Data Collection

The field study team consisted of four female data collectors (three nurses and a teacher, SK), who conducted the interviews in the participants' native language. All data collectors were Zambian nationals from various tribes, who were not part of the communities they collected data from, but who were familiar with life in rural Lufwanyama from their previous work as nurses and teacher. They were supervised by a male physician (KL, trained in pediatrics, public health, and medical anthropology) with a research focus on maternal and newborn health. All had prior training and experience with qualitative research, and had no relationship with study participants prior to commencement. In addition, data collectors were trained by KL and KY-A, and interview guides were piloted and refined during the training. We conducted FGDs and IDIs at quiet places in the community, each lasting 45 to 90 minutes, and we audio-recorded them in addition to taking written records. All FGDs and IDIs utilized the same semi-structured discussion guide to allow for open-ended responses. The guide did not specifically mention thermal care, but rather asked questions and probed about general neonatal care and post-delivery practices that might reflect the management and prevention of hypothermia in the community, such as the location of births and persons present, the definition of the newborn period, common practices for the newborn immediately after birth, actions for newborns who look smaller than usual, and newborn danger signs. In the FGD, respondents received a number as anonymous identifier and were referred to as respondents 1 through 10. During debriefings at the end of each day, the study

team reviewed the audio and written records, discussed interview strategies and experiences, and assessed data saturation.

Analysis

Interviewers transcribed all audio recordings verbatim, and translated those conducted in Bemba or Lamba into English. One of the authors (S.K.), a bilingual speaker, verified translation into written English transcripts.

We used Nvivo 9.0 software [17] to code and analyze qualitative data. For the content analysis, KL started with open coding of the text to formulate analytic codes, and agreed with second coders (AM, KS) as to which codes to include in the analysis. We coded corresponding to each of the first-level codes (descriptors of important components of the FGD and IDI), using focused coding, guided by a specific thematic issue. We compared codes using theoretical memos and techniques such as systematic comparison and far-out comparisons [18]. We then compared our codes and agreed to refine first-level codes, organizing them into several categories (delivery practices, newborn care, danger signs, care seeking, community needs) to identify higher-level codes, relationships among categories, and to ensure saturation of categories. SK provided feedback on the data and the analytic process.

In order to increase the scientific rigor of our qualitative approach we took, we report our findings following the COREQ [19] and RATS [20] guidelines.

Results

A total of 140 participants, all mothers or grandmothers, participated in FGDs. In addition, we conducted 31 IDIs (13 community leaders, 16 health committee members, and two district or provincial level medical officers).

Hypothermia risk awareness

Respondents commonly voiced concern about exposing a newborn to cold. Mothers, grandmothers (caregivers), and health workers all believe the baby should be kept warm to emulate the conditions and thermal environment in utero:

FGD 03 with mothers, respondent 2 (R2): *When the cord is cut, they wrap the baby properly. Sometimes it is windy, and for a baby who has just been delivered, that is not good. So they quickly cut the cord, wrap it [the baby] in warm clothes and put it on the bed, so that it is kept warm, because the womb where it is coming from is warm.*

FGD 02 mothers, R1: *A baby is not supposed to be in a cold place. [Why not?] R2 It is because it comes from the womb where it is warm, so even outside we need to keep it warm. [What about in hot season?] R1 It is the same; we also keep it in warm clothes.*

IDI 17 with NHC member: *The baby is supposed to be covered because it can catch cold, so by wrapping the baby it is protected, considering that the baby has just come from the womb which is warm.*

Hypothermia preventive practices

Birthplace preparation. Consequently, particularly in cold season, families prepare and warm a birthplace, usually with a charcoal brazier, to prevent the baby from being exposed to cold.

FGD 12 grandmothers: [What are newborns particularly vulnerable to?] R2 *Cold.* R6 *We put a brazier to warm the place where the baby is sleeping.* R1 *We try to protect the newborn from cold.* [Why?] R1 *So that the baby doesn't get a cough.*

Protection from the cold is thought to prevent diseases that result from being exposed to wind and cold without protection. Some diseases are believed to be directly hypothermia related. For example, though not specific to newborns, *akalaso* ["result of being exposed to cold"] is a concept often mentioned in context with newborns being exposed to cold. The term *akalaso* is often translated as "pneumonia". These grandmothers explain the concept of cold and *akalaso* in the newborn:

FGD 08 grandmothers: R5 *Like during this time, in cold season, we put a brazier with charcoal in that space. [What of in hot season, what happens?] R5 We don't use a brazier.* R4 *Oh, if it is in hot season like October, we try to close up the windows to avoid wind and we also clean the place where the delivery is taking place.* R5 *Yes it's important, because a newborn should not be exposed to coldness. The baby might catch a disease like akalaso.*

Drying and wrapping. In Lufwanyama, drying and wrapping are part of newborn routine care. Both caretakers and health workers emphasize the importance of keeping babies warm with this simple measure:

FGD 12 grandmothers: R8 *We cover the baby with warm clothes, and avoid wind from outside.* R1 *Also we try to protect the newborn from coughs, so we warm the place by putting the brazier and also wrapping the baby in warm clothes.*

IDI 13 Neighborhood health committee (NHC) vice chair: [What are common practices for the newborn immediately after birth?] *When the baby is born... just after birth they try by all means to wrap the baby in warm clothes so that it does not catch cold.*

In most cases, caretakers or birth attendants just use a piece of cloth or a *chitenge* (a traditional garment worn by women wrapped around the waist or over the head), if available at delivery, to dry and wrap the newborn. Sometimes, pregnant women are advised in advance to arrange for clothing to be available, as exposure to cold is believed to be potentially fatal:

IDI 02 chief advisor: *Every newborn baby should be wrapped in warm clothes to avoid cold on its body. Otherwise the child can die and that is why we are advised to buy warm clothes in advance before the time of delivery.*

Other thermoprotective practices

Immediate and exclusive breastfeeding. Although respondents did not mention breastfeeding in the context of neonatal hypothermia, newborns are commonly breastfed in rural Lufwanyama. However, in consideration of the strain a delivery puts on a mother, breastfeeding is not consistently practiced immediately after birth:

FGD 03 mothers: R9 *After delivery, you take a bath then you can feed the baby.* R1 *When the baby starts crying, it can be fed.* R4 *With me, when I give birth, if it is at night, I start breastfeeding the following morning. [Why do you do that?] R4 All my babies don't cry, they just sleep, and I do experience severe abdominal pain after delivery so I just let them sleep until the morning.*

FGD 13 grandmothers: R6 *If you deliver at night, you will just sleep until the following day that is when you start breastfeeding. Some babies just don't feed there and then.*

Delayed bathing. Women and grandmothers recalled that newborns used to be bathed immediately after birth, but this is now usually deferred until the day after delivery. Even though it is not always practiced, education from trained TBAs has helped to propagate delayed bathing as a thermoprotective measure:

FGD 13 grandmothers: *R9 Babies are given a bath immediately after delivery. After the cord is cut, they first wrap the baby and boil water and then they bathe the baby. R5 No, what I have seen is that the TBA wipes the baby and leave it like that until the following day. The following morning, the TBA will boil water to bath both the baby and the mother. R1 The way in which TBAs work..... after delivery they don't allow that baby to be given a bath that same day. No, they wrap the baby and emphasize that the baby should not be given a bath.*

Infants born small or prematurely are recognized as needing more intense thermal protection, so that bathing is delayed for longer:

FGD 11 grandmothers: *R9 Long ago, they used to bathe the baby just after birth immediately. R6 Some are too small, premature babies; they don't get bathed. R10. I have seen that with my baby, who was too small. So the TBA told me not to bathe the baby, and the baby took two weeks without a bath.*

In general, premature and smaller babies are recognized as being at higher risk for health complications. Caretakers and health workers agreed that those infants need particular attention, especially thermoprotection, beyond delayed bathing:

IDI 17 NHC member: *When the baby is born prematurely, it will be kept in a warm place until it is strong enough.*

FGD 03 mothers: [Some newborns look smaller than average. Are there any particular or different actions you take to protect these babies?] *R10. When that baby is born like that.... Because the womb is warm, so for that child who is premature to survive, you should look for warm cloths and wrap the baby properly. And the room in which the baby will be kept should be warm. A charcoal brazier should be kept there to keep that room warm, just like the temperature in the womb.*

FGD 05 grandmothers: [Some newborn look smaller than average. Are there any particular or different actions you take to protect these babies?] *R10 Those babies are kept in the house only, warm the room, wrap them in warm clothes, avoid the cold and the wind, and that child will grow. R8 We buy charcoal to light the brazier, which warms the room where the baby is sleeping to avoid it catching the cold which can result in a loss of a baby. R7 No bathing of that baby. It is just wiped and kept warm.*

Handling of mother and newborn

Immediately following the delivery of the newborn, the birth attendant (if present) focuses primarily on the mother. The mother is usually cleaned and taken care of, so that she gets the chance to rest and recover.

FGD 12 grandmothers: *R2 Oh, what happens is that after delivery, the mother is given a massage and a bath, then is dressed in clean clothes. Then the newborn is given to her.*

In the interim, the newborn is sometimes just put aside or laid on the floor, exposing it to environmental cold. In some instances, only after cleaning and caring for the mother, is the newborn taken care of, often placed next to the mother in the bed or on the mat where the mother rests.

FGD 12 grandmothers: [When is the umbilical cord cut, is it before the placenta or after the placenta delivery?] *R7 After the delivery of the placenta. [So what happens if the placenta takes a long time to come out, where is the newborn placed?] R8 The newborn is just placed aside a bit.*

FGD 02 mothers: [Where is the newborn placed before the placenta is delivered?] *R2,9,8 (agrees) Just on the floor where the mother is.*

FGD 14 grandmothers: [Where is the newborn placed before and after the placenta is delivered?] *R7 We just put the newborn baby on the floor after you have spread a cloth. R3 I wrap the baby and put the baby on the bed and after the placenta [is out], I put the baby with the mother.*

A mother's ability to provide thermal care for the newborn over an extended time of the newborn period, as is necessary for premature babies, is often limited by her need to return to work in the house and the fields.

FGD 07 mothers: *R7 When a mother delivers she has to stay at home to rest for some time. [How long is a mother confined?] R5 One month, so that the mother and the baby get strong. R10 We cannot go up to one month. For some of us here at the village, there is a lot of work waiting for you. You have to fetch firewood, water and food. So, you can only be confined at home for one week.*

FGD 01 grandmothers: *R10 Mothers are confined for two weeks or even a month if she has somebody to look for food. But if she is alone, she just stays for a week and starts working. R9 Village life is hard, you cannot be confined for too long, otherwise you could die of hunger.*

Improvised devices to protect premature infants

For smaller babies and those perceived as needing more protection, heated water bottles are commonly used to provide external warmth. Both caretakers' and health workers' narratives reflect that warming babies, particularly premature ones, with warm water bottles at times for weeks and months and feeding them expressed breast milk are believed to foster their growth and development:

IDI 15 church leader: *The premature babies in the village, they take them to big health centres. But if they can't go, then for these babies, they use hot water in plastic containers and cover the baby to make them and cover them properly with blankets.*

IDI 06 female NHC member: *If it's a premature, you wrap the baby in warm clothes. Some get empty 2.5 liter containers [and fill them with warm water]. Then you put the container closer to the baby while the baby is wrapped. Sometimes you even put a brazier in the room to keep it warm. You try to breast feed the baby. If he can't suck, then you press out the milk and feed the baby using a cup. Most of the time, we don't bathe a very small baby until it grows a bit.*

FGD 13 grandmothers: *R1 When a baby is born prematurely at 6 or 7 months, I should put that baby in warm cloths, then I boil water into two bottles... The charcoal brazier in the house should not be put out. The house should be warm, all the time. I will put the baby in*

between the two bottles until 9 months elapses. Changing water regularly. R6 Just to add on, the same TBA who is conducting the delivery will be the one to tell you what to do. Then you run to the hospital when the situation becomes worse. R9 Ah, us we just leave it like that.... If God wishes that it lives, then it will live. But if not, then it can die.

FGD 11 GM: *[Some newborns look smaller than average, are there any particular or different actions you take to protect these babies?] R10 My baby was very small so the TBA used to come in the early mornings and encourage me to boil water and put them beside the baby where he/she used to sleep and when I want to feed her, she just tells or asks me to press in a small cup.*

Discussion

This ethnographic, qualitative inquiry of hypothermia-related practices, attitudes, and beliefs in rural Lufwanyama, Zambia, revealed that community members and health workers are aware of the danger of neonatal hypothermia. Community members report practices such as birthplace warming, drying and wrapping of the newborn, delayed bathing, and immediate and exclusive breastfeeding, which all contribute to keeping newborns warm. However, the warm chain as recommended by the WHO as the standard of care was not consistently maintained during the first hours after delivery, when newborns are at greatest risk and thermoprotection is most essential. Community members in the study area were not familiar with skin-to-skin care and did not practice it. Many mothers in Lufwanyama have to assume household and agricultural labor responsibilities soon after delivery, which makes it difficult for them to provide continuous thermal care to their newborns.

Current practices

In Lufwanyama, there was a general awareness among caregivers and health workers that exposure to cold places newborns at risk for adverse morbidity and mortality. In the past, knowledge and awareness of neonatal hypothermia were poor even among health providers, as suggested in studies conducted in India [21] and in a multinational study [22].

This study's participants perceived heating the birthplace as a critical practice to protect the newborn from cold, particularly in the cold season. These findings are consistent with community-based practices explored in a qualitative study in rural Ghana [23], where most informants knew that keeping babies warm is essential for their health, but where traditional beliefs led to delays in thermal care. In contrast, studies from Nepal reported that the birth place was heated in only slightly over half of the settings [24], often only after birth [25].

In Lufwanyama, newborns were reported to be dried and wrapped, which prevents heat loss from evaporation; bathing was delayed; and particular attention was paid to smaller and premature newborns who were at higher risk of hypothermia. In this study, delays in drying and wrapping were reported with late cutting of the cord, i.e., after delivery of the placenta, and with attention to the mother. In a study in Tanzania, the practice of bathing newborns immediately after delivery was shown to be motivated by concerns about 'ritual pollution' [26]. In Ghana, early bathing was linked to reducing body odor in later life, shaping the baby's head, and helping the baby to sleep and feel clean. Informants felt that changing bathing behaviors would be difficult, especially as babies were bathed early in facilities [23].

Qualitative studies conducted elsewhere indicate that high-risk home delivery and newborn care practices that lead to heat loss

remained common in resource-limited settings both in rural and urban areas. Examples given in studies mostly from South Asia include insufficient heating of the birth place, placing the uncovered newborn on the ground or other cold surfaces, delayed wrapping and early bathing [15,27,28]. A study from Dhaka, Bangladesh explained that babies were typically bathed soon after birth to purify them from the birthing process [29]. In Nepal, less than half of newborns were wrapped within the first 10 minutes after birth, and almost all of them were bathed within minutes or hours after birth [24] [25].

Emerging theory and opportunities to improve thermal care

This study identified opportunities to prevent and manage neonatal hypothermia, with potential implications for similar settings in rural Sub-Saharan Africa (Figure 1). In spite of reports of many beneficial thermal care practices, newborn care practices did not conform to the "warm chain" proposed by the WHO. TBAs reported that they usually place mothers on the floor to avoid soiling the bed. Often, a TBA is the sole birth attendant, and immediately postpartum she needs to focus on the mother. Therefore, the newborn is often just dried after birth and wrapped if something to wrap is available, and then put next to the mother or into a corner of the room without receiving attention until the mother is cared for. In a previous prospective, cluster-randomized, controlled effectiveness trial, we showed that a combination of interventions including immediate simple thermal care, i.e. drying and wrapping the baby, together with neonatal resuscitation could be done by trained TBAs and reduced neonatal mortality almost by half (45%) [30]. Educational messages to promote thermal care in rural areas such as Lufwanyama need to reinforce the importance of immediate thermal care after birth and need to address various potential delays.

This study indicates that delays in drying and wrapping the infant persist. Educational messages should reinforce hazards from early heat loss and aim at early thermal care of the newborn, even before the cord is cut. Likewise, while breastfeeding is commonly practiced, early (and exclusive) breastfeeding should be propagated both to facilitate taking advantage of the mother as active heat source for the infant, and to prevent hypoglycemia, which initiates a vicious circle of depleting energy sources and increasingly insufficient heat generation [7].

Skin-to-skin care (SSC) was not a reported practice in the study area. Continuous thermal care beyond the early period after delivery is often assumed to be beneficial, e.g., for premature infants or those born small for gestational age. In Lufwanyama, women traditionally carry their infants on the back, in a chitenge formed as a baby sling. Several studies conducted in various settings such as Uganda [31], Ghana [23] and India [32] suggested that in the absence of health facilities prepared to deliver essential newborn care, community members would accept the implementation of thermoprotective practices such as skin-to-skin care. Further formative study in Lufwanyama would be necessary to explore the acceptability of skin-to-skin care on the chest, to promote breastfeeding heat transmission from the mother; or alternatively to test the thermoprotective effect and safety of providing skin-to-skin care on the back if practical and culturally preferred by mothers.

A mother's female family members are actively involved in newborn care in Lufwanyama, when available. Training them to support her with thermal care for her newborn might include skin-to-skin care by caretakers other than the mother. Mothers often need to resume their work responsibilities soon after delivery. In these cases, a complementary strategy to skin-to-skin care might be

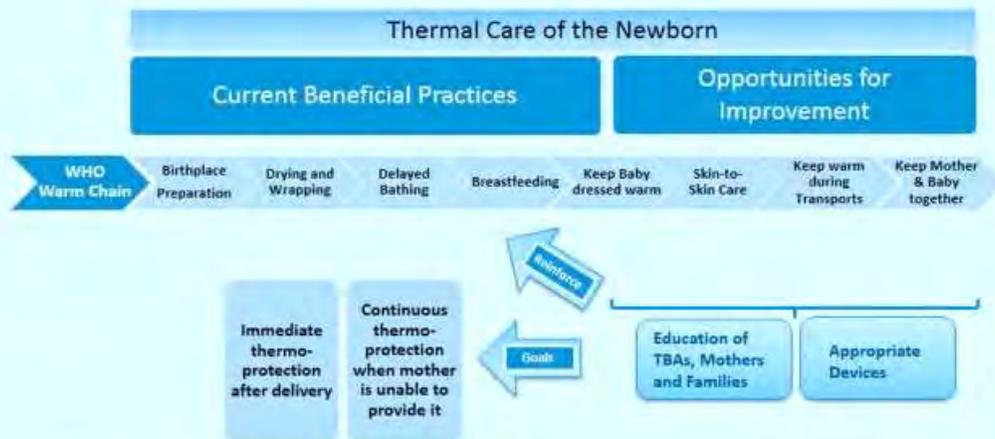


Figure 1. Practices related to thermal care in Lufwanyama, Zambia.
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the use of culturally appropriate, low-cost newborn warmers designed for resource-limited environments to prevent and manage newborn hypothermia [33], such as the Embrace device currently marketed in India [34]. A recent clinical RCT conducted at the University Teaching Hospital in Lusaka, Zambia, demonstrated that preterm and low birth weight infants placed inside a simple, nonmedical polyethylene bag (costing 3 cents per bag) experienced less hypothermia than those with standard thermoregulation care (wrapping with blankets and placed either under a radiant warmer or in an open crib) [35]. Innovative, low-cost devices might particularly prove useful for premature infants, who often have a prolonged time of need for active thermal care [36].

Limitations and further research needed

A discrepancy remains between community members' reported awareness of beneficial practices and the reality that neonatal outcomes in the region studied remain poor. This study focused on neonatal hypothermia; other major underlying factors of newborn care such as resuscitation and clean delivery practices need to be taken into account to explain poor newborn survival and devise optimal strategies and programs to improve newborn survival. The study is based on respondents' narratives, limiting our ability to quantify any practice. Participant observation could further elucidate how recommended practices are implemented, and how current practices could be optimized. Given the indication that trained TBAs have had a beneficial influence on community members in the recent past, an important question to be addressed might be the potential to strengthen the role of TBAs and other community health cadres in newborn care.

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Conclusions

Understanding and addressing community-based practices on hypothermia prevention and management might help improve newborn survival in resource-limited settings. In rural Zambia, possible interventions include the implementation of skin-to-skin care (as currently piloted in Lufwanyama by Save the Children and MCHIP-Maternal and Child Health Integrated Program), training family members to support mothers with thermoprotection, and appropriate, low-cost newborn warmers to prevent and manage hypothermia of infants whose mothers need to return to work soon after delivery. These interventions, once tested in rigorous evaluations based on randomized, controlled trials, have the potential to prevent early newborn deaths and thus save newborn lives in resource-limited settings such as rural Zambia.

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Author Contributions

Conceived and designed the experiments: KL KYA KS DH. Performed the experiments: KL KYA SK. Analyzed the data: KL KYA KS AM DM KW DH. Wrote the paper: KL.

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Annex 19D.3: Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa

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Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa

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Abstract. Health planners commonly use geographic proximity to define access to health services. However, effective access to case management requires reliable access to a trained, supplied provider. We defined effective access as the proportion of the study population with geographic access, corrected for other barriers, staffing patterns, and medicine availability. We measured effective access through a cross-sectional survey of 32 health facilities in Malawi, Mali, and Zambia and modeled the potential contribution of community case management (CCM). The population living within Ministry of Health (MOH)-defined geographic access was 43% overall (range = 18–52%), but effective access was only 14% overall (range = 9–17%). Implementing CCM as per MOH plans increased geographic access to 63–90% and effective access to 30–57%. Access to case management is much worse than typically estimated by distance. The CCM increases access dramatically, again if providers are available and supplied, and should be considered even for those within MOH-defined access areas.

INTRODUCTION

Malaria, pneumonia, and diarrhea remain the leading causes of death in children less than five years of age globally, despite the availability of effective and affordable treatments.^{1–5} Children need reliable access to case management for these illnesses because they can become ill at any time and die quickly. Access is often defined and measured by Ministries of Health (MOHs) and program planners in geographic terms, namely distance to a health facility.^{6,7} However, even families with geographic access can face other barriers such as those that are physical (mountains, rivers), temporary (flooding, rains), security, cultural, social and economic.^{8,9} The normative definition of access better suits preventive than curative interventions because under-staffed and under-supplied facilities can serve as staging points for outreach teams that bring their own personnel to deliver interventions. However, to provide case management, a health facility must be open daily and for sufficient duration; staffed with persons trained to treat sick children; and supplied with essential frontline treatments.

There is no single agreed framework or even definition for access to health care.^{8–11} Terms such as access, accessibility, and availability are used commonly but inconsistently.¹¹ Many theories and frameworks have been developed to better define and standardize what is meant by access to care, but none have been fully adopted.^{9,11} A point of consistency across these various theories and framework is the notion that access to health care is multi-dimensional and requires interplay of demand and supply side factors.^{8–11} In this study, we focused on the supply side, exploring factors that influence travel to a health facility and receiving treatment services once there.

We coined the term effective access to case management of child illness to mean access to a trained provider and to

appropriate medicines. The primary purpose of our study was to measure levels of effective access to case management of child illness at health facilities in Malawi, Zambia, and Mali and to describe the influence of selected factors on effective access. A secondary purpose was to explore the potential contribution of community case management (CCM), in which community-based health workers (CBHWs) are trained and equipped to provide case management for common child illnesses closer to the home.

MATERIALS AND METHODS

Study site and context. The study was conducted in three districts, one each in Malawi, Mali, and Zambia, where Save the Children (SC) supports the MOH to improve integrated case management services at the community level (Table 1). All study areas are rural and under-served and have limited roads, public transportation, and electricity. Our study focused on public health facilities that provided case management services for children less than five years of age. The MOH definition of access to health care varied: ≤ 5 km (Zambia) versus ≤ 8 km (Malawi) versus ≤ 10 km (Mali). In Zambia and Malawi, facility-based health services were managed at the district level and provided free. In Mali, health facilities were managed by local health committees who charged user fees to deliver and maintain services. All three districts lacked private sources of standard case management. Data collection for the study was completed as part of routine programmatic activities and did not involve the collection of any individual identifiable data.

The design and implementation stage of CCM programs varied by country. In Malawi, the MOH was scaling up CCM through a cadre of paid, centrally recruited health surveillance assistants (HSAs) and targeting hard-to-reach areas (> 8 km from a health facility). In Zambia, CCM was delivered through unpaid community health workers selected by their communities, although the policy was under review. In Mali, the MOH recently created a new cadre of paid, CBHWs, Agents de Santé Communautaire, to deliver CCM supported through local health committees.

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TABLE 1
Characteristics of the study districts*

Parameter	Malawi	Mali	Zambia
District	Mulanje, Southern Region	Bougouni, Sikasso Region	Lufwanyama, Copperbelt Province
Population (source year)	525,429 (2008 census)	459,509 (2009 census)	87,592 (2010 census)
Size (population density/km ²)	2,056 km ² (256)	20,028 km ² (23)	8,774 km ² (10)
Ministry of Health definition of access	≤ 8 km	≤ 10 km	≤ 5 km
Health facility infrastructure	23 facilities (1 district hospital, 1 mission hospital, 18 health centers, 2 dispensaries, and 1 maternity center)	140 facilities (1 district hospital, 34 health centers, and 105 maternity centers)	15 facilities (11 health centers and 4 health posts)
CBHW cadre for CCM	Health surveillance assistants (HSAs) centrally recruited and assigned to hard-to-reach areas (> 8 km from HF); Each HSA serves approximately 1,000–1,500 population	Newly introduced cadre Agent de Santé Communautaire recruited by local government/health committees to serve areas > 5 km from health facility and with a population of at least 1,500	CHWs and/or TBAs, both which are identified by communities, trained centrally for 6 weeks to serve hard to reach communities in clinic catchment areas. A CHW is expected to cater for a population of 1,000, and a TBA serves 500
Age group and conditions covered by CCM	Treat children 2–59 months of age for malaria (ACTs), pneumonia (cotrimoxazole) and diarrhea (ORS and zinc)	Treat children 2–59 months of age for malaria (ACTs), pneumonia (amoxicillin) and diarrhea (ORS and zinc)	Treat children 2–59 months of age for malaria (ACTs), pneumonia (amoxicillin) and diarrhea (ORS and zinc)
No. CBHWs trained in CCM at time of study	81	35	59

*CBHW = community-based health worker; CCM = community case management; HF = health facility; CHW = community health worker; TBAs, traditional birth attendants; ACT = artemisinin-based combination therapy; ORS = oral rehydration salts.

Study design and sampling. We conducted a cross-sectional assessment of health services in study areas, including all 15 health facilities in Lufwanyama, Zambia; all 10 health centers in the SC intervention areas of Mulanje, Malawi (representing approximately half the district population and health facilities); and all seven health centers in the health zones of Bougouni, Mali, where SC was implementing CCM (representing nearly one-third of the district's population).

Study tools and data collection. Save the Children staff collected data through structured interviews with the health facility in-charge and other staff during July–October of 2010 as part of baseline assessments and program planning. Relevant district authorities granted permission, and all respondents provided consent upon being informed of the study purpose.

We designed survey tools to collect the following information at each facility: number of staff trained in case management of childhood illness; number of hours during the previous week the trained staff was available (either on-site or on-call) to provide case management; and availability of first-line antimalarial drugs (artemisinin-based combination therapy), antibiotics (amoxicillin or cotrimoxazole) and oral rehydration salts. In Malawi and Mali, we determined the number of stock-out days for each medicine in the last month. In Zambia, we observed availability on the day of the survey. Respondents also listed all villages in their catchment area, specifying for each total population, distance to health facility in kilometers, and presence of CBHWs providing CCM either then or in the near future. For villages with MOH-defined geographic access, we assessed other barriers that would affect reaching a health facility: permanent physical (mountains, rivers), temporary physical (flooding), and security (check-points, insecure areas). Permanent physical barriers referred to features such as mountains or rivers that increased travel time by foot (carrying a sick child) beyond the times implied by the MOH distance definitions (e.g. > 1 hour for 5 km, > 1.5 hours for 8 km, or > 2 hours for 10 km). For temporary physical or security barriers, respon-

dents estimated the number of months per year that travel to the facility was affected.

Data analysis. Data were entered in Microsoft (Redmond, WA) Excel (Malawi/Zambia) and Microsoft Access (Mali) and analyzed by using Microsoft Excel. We defined geographic access as the proportion of the total study population living within the MOH-defined distance to a health facility. We then calculated an annualized adjustment factor to account for other barriers to reaching a health facility for this population. This factor was the proportion of annual person-months the population with official access actually had access to the facility after accounting for permanent and temporary physical barriers or security barriers. The denominator of annual person-months was the study population living within MOH-defined access areas multiplied by 12 months.

The numerator was the denominator minus the number of person-months over a 12 month period during which access was affected by any of the barriers. We then multiplied geographic access by the annualized adjustment factor to obtain adjusted geographic access.

We defined effective access as adjusted geographic access to a facility plus available trained staff, with available essential frontline medicines. Thus, effective access was the product of (adjusted geographic access) × (staff availability) × (medicine availability). Staff availability was the proportion of time one or more staff trained in case management was available. The numerator was the total number of hours a trained provider was available, within the denominator of the 84 hours defined by 8:00 AM to 8:00 PM seven days per week. The definition of medicine availability varied by setting. In Malawi and Mali, medicine availability was calculated as 100% less the sum of reported stock-out days in the past month for three essential case management medicines (artemisinin-based combination therapy, antibiotic, and oral rehydration salts) divided by a total of 90 potential stock-out days (three medicines × 30 potential stock-out days/medicine) expressed in percentage. In Zambia,

TABLE 2
Geographic and adjusted geographic access by study area

Parameter	Mulanje, Malawi	Bougouni, Mali	Lufwanyama, Zambia
Health facilities sampled	10	7	15
Study population*	269,305	147,095	119,799†
Population within Ministry of Health-defined access limits (access limit)	133,657 (≤ 8 km)	76,573 (≤ 10 km)	22,148 (≤ 5 km)
Geographic access	50%	52%	18%
Population affected by permanent physical barriers (no. months affected)	2,735 (12 months)	0	2,756 (12 months)
Additional population affected by temporary physical barriers (no. months affected)	802 (5 months)	1,498 (3 months)	0
Population affected by security barriers	0	1,363 (2 months)	0
Total no. person-months affected over one year	36,830	7,220	33,072
Annualized adjustment factor‡	98%	99%	88%
Adjusted geographic access	48%	52%	16%

*Based on facility estimates of their catchment population.

†Lufwanyama facilities use headcount figures for population estimates that tend to be higher than official census figures.

‡Calculated among the proportion of the population with geographic access. Denominator = population within Ministry of Health-defined access limits × 12 months; numerator = denominator - number of person-months affected by physical, cultural, or security barriers.

medicine availability was 100% less the sum of the number of health facilities with stockouts for each type of medicine divided by the total number of health facilities times the number of medicines (15 health facilities × same three medicines) expressed as a percentage. All access variables were calculated for each health facility and then for each study area by weighting each health facility's value according to its population size.

To explore the potential contribution of CCM, we calculated the proportion of the study population with potential geographic access and with potential effective access to case management once CBHWs trained in case management were deployed. In each study area, we used MOH data on the number and location of CBHWs already trained or scheduled for training in CCM. We ran two scenarios. The first assumed that deployed CBHWs would be available continuously and fully stocked with necessary medicines (ideal), and the second applied levels of likely availability of CBHWs (75%) and medicines (60%) based on data from separate monitoring studies conducted around the same time (U.S. Agency for International Development/Malawi Community Case Management Evaluation).

RESULTS

The catchment areas of the 32 surveyed health facilities included 541 villages with a population of 536,199. Our sample

represents approximately half of the combined population of the three study districts. The impact of geographic and other factors that influence reaching a health facility is shown in Table 2. More than half (57%) of the total study population lived beyond MOH-defined access limits, which varied from ≤ 5 km in Zambia to ≤ 10 km in Mali. Among those with geographic access, other barriers such as mountains or rivers and temporary factors like flooding had little additional effect on access. Only 4% (range = 3–12% by district) of those living within MOH-defined access areas across study districts were affected by year-round or temporary physical barriers. Security barriers were not reported for any village in the study.

Although nearly all health facilities were mandated to provide case management, availability of trained staff was uneven (Table 3). In Mulanje, trained staff was available an average of 30 hours per week across facilities, and only 36% were available the desired 84 hours/week. In Bougouni, staff availability varied highly across facilities (range = 6–99%). In Lufwanyama, four facilities had no staff trained in case management, and one facility reported a single trained staff member who was absent the entire week before data collection; staff availability in the remaining 10 facilities ranged from 36% to 88%.

Frontline medicines for case management of malaria, pneumonia, and diarrhea were available in most facilities in Mulanje and Lufwanyama. In Mulanje, five health centers had stockouts in the previous 30 days, mostly for oral rehydration

TABLE 3
Staff availability and medicine availability at health facilities by study area*

Parameter	Mulanje, Malawi	Bougouni, Mali	Lufwanyama, Zambia
Health facilities sampled	10	7	15
No. HF's with ≥ 1 staff trained in case management	9	7	12
Total no. staff trained in case management available across HF's	18	8	16
Average hours per week CM services available	30	36	45
Staff availability†	36%	42%	47%
No. HF's with stockouts (total no. stockout days)			
ACTs	1 (3)	7 (185)	0 (NA)
Antibiotics	1 (5)	0	2 (NA)
ORS	4 (62)	1 (30)	0 (NA)
Medicine availability‡	91%	66%	93%

*HF = health facility; CM = case management; ACT = artemisinin-based combination therapy; ORS = oral rehydration salts.

†Denominator = 7 days × 12 hours = 84 hours/week.

‡Malawi and Mali calculation: (Total no. stockout days for all medicines/total no. potential stockout days, where total no. stockout days = 30 days × 3 medicines); Zambia calculation: (Total no. health facilities with stockout × no. medicines with stockouts/no. health facilities × no. medicines).

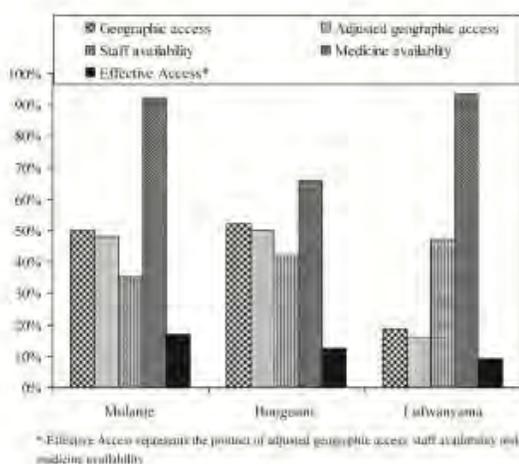


FIGURE 1. Effective access to case management for childhood illness at facility level by study area.

salts and ranging from 14 to 21 days. In Lufwanyama, two facilities lacked amoxicillin on the day of the survey. Stockouts for antimalarial drugs were pervasive in health facilities in Bougouni, where all seven facilities reported stockouts of antimalarial drugs in the past 30 days (average = 26 days).

Effective access. Effective access was low (< 20%) in all settings (Figure 1). Full details by facility are shown in Table 4. In Mulanje, half of the study population had geographic access, but case management was only available at the facilities 34% of the time, mainly because of shortages of trained staff; medicines for case management were generally available. As a result, effective access was only 17%, just one-third of geographic access.

Similar patterns were observed in Bougouni. Effective access was only 13%, just 25% of geographic access. Among the population within 10 km of a health facility with no additional barriers, access to a trained provider equipped with all necessary medicines to treat malaria, pneumonia, and diarrhea was available only 24% of the desired time. In Lufwanyama, the overall pattern of access was also similar, but a greater proportion of the population did not have geographic access, partly because of the stricter MOH definition of access. Among those living within 5 km of a health facility, access to trained staff averaged approximately 47%, which was higher

TABLE 4
Access indicators and effective access by study district and health facility

District and health facility	Total population	Geographic access	Annualized adjustment factor	Adjusted geographic access	Staff availability	Medicine availability	Effective access
Mulanje, Malawi							
Mulomba	51,067	23%	100%	23%	33%	100%	8%
Thuchira	34,072	65%	93%	60%	36%	97%	21%
Bondo	21,670	28%	82%	23%	42%	79%	8%
Mimosa	22,655	71%	100%	71%	37%	78%	21%
Mpala	25,494	82%	98%	80%	50%	100%	40%
Chambe	45,968	40%	100%	40%	42%	77%	13%
Dzenje	8,583	86%	100%	86%	0%	0%	0%
Kambenje	21,854	46%	100%	46%	42%	92%	18%
Milonde	14,833	28%	100%	28%	33%	100%	9%
Chinyama	23,109	72%	100%	72%	41%	100%	30%
Total	269,305	50%	98%	48%	36%	92%	17%
Bougouni, Mali							
Keleya	25,515	56%	98%	55%	99%	67%	36%
Domba	11,773	34%	100%	34%	19%	67%	4%
Koumantou	28,542	44%	100%	44%	6%	67%	2%
Fatagouaran	15,086	54%	97%	52%	40%	83%	18%
Bougouni-ouest	28,367	61%	100%	61%	32%	67%	14%
Garalo	18,457	42%	100%	42%	93%	33%	13%
Kologo	19,355	66%	99%	65%	7%	78%	4%
Total	147,095	52%	99%	52%	42%	66%	13%
Lufwanyama, Zambia							
Bulaya	4,503	14%	100%	14%	88%	100%	11%
Chikaboko	3,416	30%	100%	28%	36%	100%	11%
Chinemu	11,585	21%	100%	18%	76%	100%	16%
Fungulwe	5,345	23%	81%	23%	88%	100%	17%
Kapilamikwa	5,800	14%	0%	14%	0%	100%	0%
Limpuma	6,107	26%	100%	26%	88%	100%	23%
Mibenge	4,142	34%	100%	34%	0%	100%	0%
Mibila	10,500	7%	100%	7%	0%	100%	0%
Mukumbo	10,859	20%	89%	20%	88%	100%	16%
Mkutuma	5,752	7%	100%	7%	0%	67%	0%
Mushingashi	13,382	11%	34%	11%	52%	100%	2%
Nkana	4,917	65%	100%	0%	48%	100%	31%
Shimukutami	9,272	33%	84%	32%	67%	100%	18%
St. Joseph's	10,353	11%	100%	11%	76%	100%	8%
St. Mary's	13,866	5%	100%	5%	0%	67%	0%
Total	119,799	18%	88%	16%	47%	93%	9%

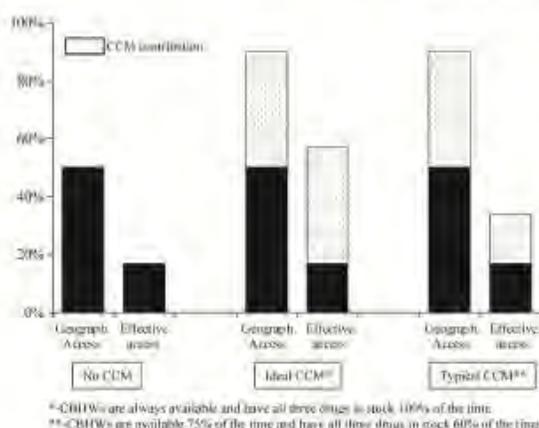


FIGURE 2. Model of geographic (geograph.) and effective access to integrated case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Mulanje study area. CBHWs = community-based health workers.

than the other study areas. In total, effective access was only 50% of MOH-defined access.

Potential contribution of CCM. Results for Mulanje are shown in Figure 2. The addition of the 81 CBHWs trained in CCM increased the proportion of the population with potential geographic access to case management in Mulanje from 50% to 90%. The ideal CCM scenario where CBHWs are always available and fully stocked showed that potential effective access overall tripled from 17% to 57%. However, the addition of CCM in the hard-to-reach areas alone did not address the limited availability of trained staff and supplies at the health facility. As a consequence, there was a facility service gap for the 50% of the population who had MOH-defined access, constraining potential effective access for the total population. Potential effective access under typical CCM conditions in Mulanje (75% availability of CBHWs and 60% availability of medicines) reached 35%, barely half of the ideal CCM scenario, but twice the level without CCM. The addition of CCM as per MOH plans in Bougouni and Lufwanyama increased potential geographic access to 69% and 63% and potential effective access under ideal CCM conditions to 30% and 58%, respectively; full details are shown in Figures 3 and 4 and Table 5.

DISCUSSION

This study showed that official measures of access based on distance overestimate the proportion of the population with access to integrated case management by between two- and three-fold. The distinction between access to a service site and access to life-saving case management cannot be overstated. Access to a trained provider supplied to treat malaria, pneumonia, and diarrhea was less than one-third among those who lived within MOH-defined access areas.

Effective access is the product of several factors, low levels of most will yield a low overall value. In our study, limited availabilities of trained staff at health facilities in particular translated into low effective access. Even if all necessary med-

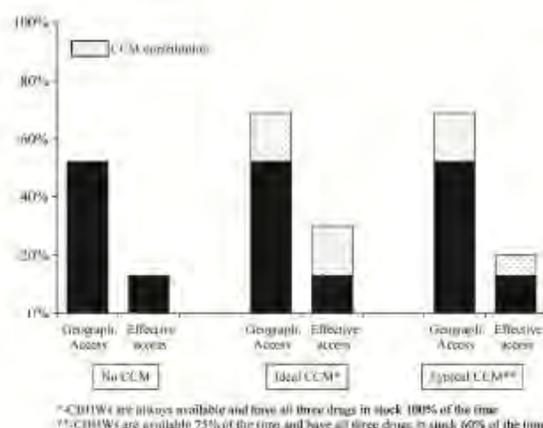


FIGURE 3. Model of geographic (geograph.) and effective access to integrated case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Bougouni study area. CBHWs = community-based health workers.

icines were available at the health facilities studied, effective access would remain less than 20% for the total population and range between 28% and 48% for those living within the MOH-defined access across the study areas. A simultaneous household survey in Lufwanyama District showed that the proportion of children receiving antibiotics for likely pneumonia (13%) and fever/malaria (12%) was nearly equal the level of effective access (9%) and was much lower than the proportion who reported seeking care for these illnesses, highlighting the gaps at facility level (Yeboah-Antwi K and others, unpublished data). Families may consider what care may or may not be available at a health facility before committing their time and resources to care-seeking. The poor human resource availability at health facilities in developing countries is well documented.^{7,12-14} A recent study in Malawi reported that only 49% of the expected clinical staff was available in

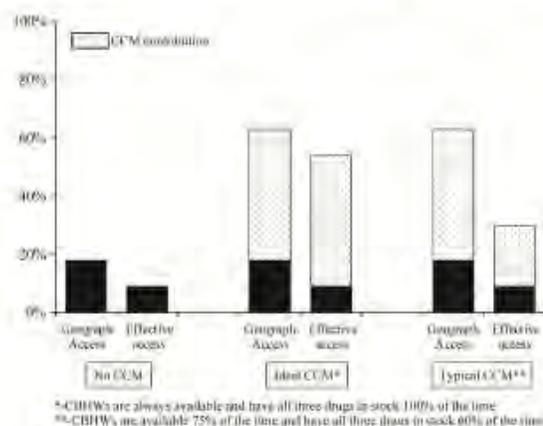


FIGURE 4. Model of geographic (geograph.) and effective access to integrated case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Lufwanyama study area. CBHWs = community-based health workers.

TABLE 5
Geographic access and effective access with addition of CBHWs trained in CCM by study district and health facility*

District and health facility	Total population	Geographic access, no CCM	Effective access, no CCM	CBHWs trained in CCM	Potential geographic access	Potential effective access, ideal†	Potential effective access, typical‡
Mulanje, Malawi							
Mulomba	51,067	23%	8%	16	80%	65%	33%
Thuchira	34,072	65%	21%	11	99%	54%	36%
Bondo	21,670	28%	8%	9	100%	79%	40%
Mimosa	22,655	71%	21%	2	80%	29%	24%
Mpala	25,494	82%	40%	4	100%	58%	48%
Chambe	45,968	40%	13%	18	88%	61%	34%
Dzenje	8,583	86%	0%	1	100%	14%	6%
Kambenje	21,854	46%	18%	10	99%	70%	41%
Milonde	14,833	28%	9%	5	81%	62%	33%
Chinyama	23,109	72%	30%	5	87%	45%	36%
Total	269,305	50%	17%	81	90%	57%	35%
Bougouni, Mali							
Keleya	25,515	56%	36%	6	73%	53%	44%
Domba	11,773	34%	4%	4	47%	17%	10%
Koumantou	28,542	44%	2%	5	61%	19%	9%
Faragouaran	15,086	54%	18%	3	60%	24%	20%
Bougouni-ouest	28,367	61%	13%	5	75%	27%	20%
Garalo	18,457	42%	13%	6	63%	34%	22%
Kologo	19,355	66%	4%	6	94%	31%	16%
Total	147,095	52%	13%	35	69%	30%	21%
Lufwanyama, Zambia							
Bulaya	4,503	14%	13%	4	59%	58%	33%
Chikabuke	3,416	30%	11%	1	48%	29%	19%
Chinemu	11,585	21%	16%	2	79%	74%	42%
Fungulwe	5,345	23%	17%	2	70%	63%	38%
Kapilamikwa	5,800	14%	0%	2	74%	60%	27%
Lumpuma	6,107	26%	23%	6	70%	67%	43%
Mibenge	4,142	34%	0%	4	100%	66%	30%
Mibila	10,500	7%	0%	4	100%	93%	42%
Mukumbo	10,859	20%	16%	2	39%	35%	25%
Mukutuma	5,752	7%	0%	1	11%	4%	2%
Mushingashi	13,382	11%	2%	6	19%	10%	6%
Nkana	4,917	65%	31%	0	65%	31%	31%
Shimukunami	9,272	33%	18%	5	52%	38%	27%
St. Joseph's	10,353	11%	8%	10	70%	67%	35%
St. Mary's	13,866	5%	0%	10	91%	86%	39%
Total	119,799	18%	9%	59	63%	54%	30%

*CBHW = community-based health worker; CCM = community case management.
†CBHWs are always available and have all three drugs in stock 100% of the time.
‡CBHWs are available 75% of the time and have all three drugs in stock 60% of the time.

health centers because of unfilled positions and to staff absences related to trainings and leave time.¹⁴

At the time of the study, medicine availability on the whole was quite good at the health facilities we assessed. However, medicine stocks fluctuated and lengthy stockouts were common, as shown by antimalarial drug stockouts in Bougouni and other studies in Malawi and Zambia.^{14,15} In Lufwanyama, we measured availability of medicines on the day of the survey and did not capture reports of stockouts; and in Mulanje and Bougouni, a stockout of one of the three medicines only contributed one-third of a stockout day. Thus, we may have overestimated the availability of medicines.

We did not commonly identify permanent or temporary physical barriers or security barriers to reaching the facilities in these study districts. In other settings, such as South Sudan where rainy seasons are lengthy and disruptive or Somalia where insecurity is rife, these barriers would be more important. In the few study areas that did report additional year-round or temporary physical barriers, they often affected most of a given facility's catchment area, highlighting the importance of identifying such areas so that solutions can be tailored.

This study showed that even those living near health facilities often lacked access to trained staff and medicines. These observations can help explain the often contradictory findings regarding influence of distance on access to health care and shed light on why those living nearby facilities still face poor health outcomes.^{8,16-18} These findings reinforce the need to consider options to mitigate access barriers for those living within MOH-defined access areas. In instances where staffing problems are caused by lack of training in case management (as opposed to staffing shortages and operational hours), training of existing staff in IMCI is sensible. However, addressing staff shortages at health facilities will take more time and resources. The CBHWs can be trained to treat common childhood illness in as little as six days, but CCM involves similar if not greater inputs for supply chain management and supervision. Typically, CCM programs target communities beyond the MOH-defined access areas, but MOHs could consider redefining the catchment areas so that more CBHWs could be deployed, even in areas traditionally considered to have access as a complementary strategy to help ensure reliable access to case management. Families living at the margins of these MOH-defined access areas often have

limited alternatives for care and venturing on foot even 4 or 5 km to seek care is a significant time and resource gamble.

Our exploration of the potential contribution of CCM showed that training CBHWs to provide case management nearer to the home can reduce the geographic barriers for those living beyond the traditional access areas. However, the modeled results depended on the MOH implementation plan, underscoring the need to ensure that CCM policy makers, planners, and managers consider how to optimize distribution and availability of CBHWs within defined target areas. Furthermore, our study showed that under typical conditions of CCM programming at scale CBHWs are not always available because of other responsibilities or turnover and stockouts can be common. Thus, the potential increase in effective access from CCM is not fully realized. In Malawi for example, CBHWs (HSAs) are encouraged by the MOH to operate their village health clinics for at least two days per week, in recognition of the other tasks HSAs are expected to perform. In addition, although HSA basic training guidelines request HSAs to reside in their catchment areas, this requirement is not consistently enforced, and hard-to-reach areas targeted for integrated CCM (iCCM) tend to be the most difficult to staff. The competing demands on HSAs' time, combined with the reality that many do not reside in their catchment areas, limit the availability of case management at the community level in Malawi. Policies that support availability of CBHWs to deliver CCM on a routine basis, including for emergencies after hours and on weekends, are needed to help protect against erosion of services.

Another challenge concerns medicine availability. At present, iCCM programs in most settings are supported by partners who provide additional inputs, such as medicines and support to the government supply chain to improve medicine availability at the community level. As a result, availability of medicines for iCCM in areas wholly dependent on government supply chain would in some settings likely be even lower than the 60% we modeled. Strategies for supply chain management and effective human resources management for CCM programs operating at scale are essential to optimize the returns on investments in CCM.

We designed a simple, rapid method to measure effective access to iCCM that can be conducted by program planners with limited time and financial resources. Although more sophisticated methods exist to precisely measure distance to a health facility and to quantify other access barriers, they require additional human and financial resources and may be more difficult to communicate to decision-makers.^{19,20} Our experience in Malawi demonstrated that the process of systematically considering access barriers for each village within a facility catchment area was valued by district health officials and led to areas not previously considered hard-to-reach being so identified and targeted for CCM (Chimuna T, unpublished data).

The study has limitations. The study settings were under-served, rural districts of three countries in Africa where availability of facilities, trained staff, and supplies were probably lower than typical. Governments often ask implementing partners to program in under-served areas. The study was cross-sectional and captured effective access at a single point in time and from a supply perspective only. Collection of data at multiple time points would strengthen the reliability of an annualized estimate. Estimates of distance and whether villages faced physical or security barriers were based on reports by facility

staff, which may have underestimated the communities' perspective. Furthermore, the quality of case management and availability of essential supplies, such as timers, to provide case management were not assessed. Other documented barriers to effective access from the demand side, such as cultural, economic, and social constraints, were not captured. Likewise, we did not measure clients' expectations. Experiencing an understaffed facility or a stockout of even one essential medicine could discourage future care seeking for sick children, not only by the family in question, but also by neighbors. In light of the off-setting biases (relatively under-served districts versus overestimations of access), the findings probably do represent much of rural Africa.

This study demonstrates that access to case management is much worse than officially estimated once the contribution of physical barriers, staff availability and stockouts are accounted. We also proposed a method to account for intermittent barriers. In study areas, less than 50% of the population had geographic access (i.e., lived within 5, 8, or 10 km of a facility), and less than 20% had effective access. Our findings highlight the important distinction between access to a health facility and access to case management. Poorly staffed and supplied facilities cannot save the lives of sick children, and planning for curative services should look at how to improve effective access for the total population, including those who live within MOH-defined access areas. Although CCM typically targets areas that do not have geographic access, CCM can also be considered even in those areas near to facilities to overcome other access barriers such as physical barriers and limited staff availability. However, CCM will only improve effective access if CBHWs are adequately distributed and supported.

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Annex 19D.4: Measuring teamwork and taskwork of community-based “teams” delivering life-saving health interventions in rural Zambia: a qualitative study

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RESEARCH ARTICLE

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Measuring teamwork and taskwork of community-based “teams” delivering life-saving health interventions in rural Zambia: a qualitative study

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Abstract

Background: The use of teams is a well-known approach in a variety of settings, including health care, in both developed and developing countries. Team performance is comprised of teamwork and task work, and ascertaining whether a team is performing as expected to achieve the desired outcome has rarely been done in health care settings in resource-limited countries. Measuring teamwork requires identifying dimensions of teamwork or processes that comprise the teamwork construct, while taskwork requires identifying specific team functions. Since 2008 a community-based project in rural Zambia has teamed community health workers (CHWs) and traditional birth attendants (TBAs), supported by Neighborhood Health Committees (NHCs), to provide essential newborn and continuous curative care for children 0–59 months. This paper describes the process of developing a measure of teamwork and taskwork for community-based health teams in rural Zambia.

Methods: Six group discussions and pile-sorting sessions were conducted with three NHCs and three groups of CHW-TBA teams. Each session comprised six individuals.

Results: We selected 17 factors identified by participants as relevant for measuring teamwork in this rural setting. Participants endorsed seven functions as important to measure taskwork. To explain team performance, we assigned 20 factors into three sub-groups: personal, community-related and service-related.

Conclusion: Community and culturally relevant processes, functions and factors were used to develop a tool for measuring teamwork and taskwork in this rural community and the tool was quite unique from tools used in developed countries.

Keywords: Teams, Teamwork, Taskwork, Community health workers, Traditional birth attendants, Newborn and child health care, Zambia

Background

Zambia has high under-five mortality and is not on track to achieve Millennium Development Goal 4, which calls for a two-thirds reduction in under-five mortality from 1990 levels by 2015 [1]. Zambia's strained health care system with few health facilities and insufficient human

resources is inadequate to confront its unacceptably high newborn and under-five mortality [2]. As a consequence of insufficient human resources, many basic health services, especially in rural areas, are provided through several categories of minimally trained community-based providers including community health workers (CHW) and traditional birth attendants (TBA). CHW responsibilities include providing preventive interventions, treatment of common childhood illnesses (fever, diarrhea, and pneumonia), health education and community mobilization and sensitization, as well as supporting

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outreach services by the rural health staff. TBAs provide maternal and newborn interventions including antenatal care, postnatal care, recognition of and referral for danger signs of pregnant women and newborns. Neighborhood Health Committees (NHCs) selected by the communities support these cadres of health workers as per the Ministry of Health (MOH) community-based delivery strategy [3].

The Center for Global Health and Development (CGHD) of Boston University in partnership with local partners, including the District Health Management Teams (DHMTs) conducted two community-based research projects in Zambia that showed the feasibility and effectiveness of using CHWs and TBAs to provide integrated community case management (CCM) and newborn care [4,5]. Currently TBAs and CHWs may reside in the same community, but work independently of each other, leading to inefficiency and missed opportunities for continuity of care. Experts suggest that health interventions for newborns should be integrated into child health programs [6]. The continuum of care approach is expected to promote care for mothers and children from pregnancy to delivery, the immediate postnatal period and childhood [7].

Save the Children in collaboration with CGHD, the MOH, and the Lufwanyama DHMT is implementing the Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN), which teams CHWs and TBAs, supported by NHCs, to provide essential newborn and continuous curative care for children 0–59 months of age in rural Zambia. LINCHPIN is an integrated, community-based newborn care and CCM package delivered through an enhanced district-wide community health program linked to health facilities and NHCs in a manner that is consistent with MOH plans and policies. The rationale for the integration and the teamwork is to close the gap in the continuum of care and increase the likelihood that the effect of the team will exceed the effects of the individuals working alone.

Teams occur in many settings, including health care, in both developed and developing countries. There is a general agreement that a team consists of two or more individuals who have specialized knowledge, have specific roles, make decisions, perform interdependent tasks, are adaptable, and share a common goal [8–10]. Benefits of a team may include distributing workload among team members, reinforcing individual capabilities, creating the feeling of participation and involvement, better decision-making and generating a diversity of ideas for a common purpose [11]. Two general categories of behaviors are often used to distinguish a team: teamwork and taskwork. Teamwork consists of behaviors that are related to team member interactions and are necessary to establish coordination among individual

team members in order to achieve team goals whereas taskwork consists of behaviors that are performed by individual team members and are critical to the execution of individual team member functions [12,13].

Assessments of the impact of teamwork have occurred in medical settings such as operating rooms [14] and emergency departments [15]; furthermore, teamwork has been linked to patient safety [16] in well-resourced settings. Measuring teamwork to ascertain whether the team is performing as expected to achieve the desired output is rare in health care settings in developing countries. Our review of the literature revealed one report in which the MOH and *Médecins sans Frontières* formed community health teams comprised of community health agents, community health volunteers and TBAs in Mozambique's Angónia District to improve coverage of basic health services including tuberculosis and HIV care [17]. Team members received joint five-day initial training and were provided the necessary drugs, supplies and job aides. Although the report lacked measures of teamwork or evidence of effect at the beneficiary level, the authors asserted that the teams had advantages over a "vertical CHW" approach in the areas of mutual accountability, joint problem-solving, improved delivery of preventive and curative health services, and consistent health education messages. They concluded that the team approach improved accountability, acceptability, and access to care.

In cases where teamwork has been measured, dimensions of teamwork or processes that comprise the teamwork construct such as: goal comprehension, communication, conflict management, decision-making/planning, leadership, mutual performances monitoring, mutual trust, team cohesion and team motivation have been used, [10,16,18–20]. This paper describes the process of developing a measure of teamwork and also taskwork for community-based health teams in rural Zambia.

Methods

Study location

The study was conducted in Lufwanyama District in the Copperbelt Province of Zambia. Lufwanyama is a large, rural, undeveloped district with a population of 85,033 [21]. Despite its location in the comparatively urban, industrialized Copperbelt, the district lacks physical infrastructure, and most roads are frequently impassible during the rainy season. It has 11 health centers and four health posts, but no district hospital - indeed the district health office is currently outside the district pending completion of a new district seat. Many basic health services including treatment of minor illnesses, health education, antenatal care, family planning services, follow up of patients with chronic illnesses and referrals are provided through several categories of

minimally trained community workers –TBAs, CHWs, male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, as well as untrained TBAs.

Study design

This formative research employed a qualitative methodology using a combination of group discussion and pile-sorting to explore and identify processes and domains for measuring teamwork and functions for measuring taskwork. The pile sorting technique engages participants in sorting cards with words into piles that represent how they think about and categorize elements on interest [22]. Six sessions were conducted, three with NHC members and three with CHW-TBA pairs. Each NHC session was made up of the chairperson, the secretary and four other members including at least two women. The CHW –TBA sessions were made up of three CHWs and three TBAs. We purposively selected three NHCs considered as “highly effective” by the DHMT (held regular meetings and had strong, dynamic chairpersons). The CHWs and TBAs came from the selected NHC areas. A total of 36 individuals were involved. This number may be small but sample sizes of 30–40 have been shown to have adequate reliability and found acceptable for validity in card sorting tasks [23,24].

Group discussions and pile sorting

Each session conducted in the form of a focus group discussion (FGD) had a facilitator and a recorder and was held at a quiet place in the community lasting about 1.5 to 2 hours. The session was audio-recorded, and the recorder also took written notes of the discussions. All sessions were facilitated in the local language, Bemba.

Each session had three parts.

The first part was a group discussion. We used a discussion guide with open-ended questions and a timeline activity to identify local concepts, perceptions and experiences of teamwork processes. The guide was pretested to ensure that the questions were clear and understandable to the people involved since the guide was translated into the local language. The timeline activity initiated dialogue on teamwork. Participants were asked to give examples of a recent situation where they worked with someone else to help mothers and children stay healthy. The events were plotted on a timeline on the ground using sticks, stones, and leaves. Probe questions included: *How or why did you decide to invite someone to help you? What was the first thing this person did to help? What was the next thing they did? Looking back on this timeline, what was the most helpful thing this person did? Why do you think you worked well*

as a team? What would have made this team work better? What made your team work well? Now, share a time when the team's work did not go as expected? What made it not go well? What could have improved the team's work? The same guide was used in all the six sessions and the questions were asked in the same order.

During the discussions, participants were asked to identify processes that helped or hindered teamwork. The processes that participants indicated as important for teamwork were written on cards by the facilitator. We wrote cards ahead of time of processes (from the literature, our experience and pre-formative discussion with the community) that we consider as important for teamwork. The purpose was for the facilitator to ask the participants if these processes were not mentioned in the discussion to indicate whether they were important for teamwork.

The second part was the pile sorting, during which the processes written on cards were then sorted. Participants were given the cards and asked to work as a team to sort the cards into three groups: “very important”, “important” and “least important”. After the sorting, the facilitator took each of the cards in the “very important” group and asked the participants to explain why they considered it as “very important”. The reasons given were recorded by the note taker.

During the third part, a list of seven functions prepared prior to the sessions by the investigators through consultation with health workers, community based workers and NHCs was introduced. The purpose was to ascertain whether the participants agree that TBAs and CHWs need to jointly perform these pre-determined functions so that they could be incorporated into the tool to measure taskwork. We asked participants to indicate and explain which of the functions they considered important for the CHW and TBA to perform jointly in order to assist them in providing life-saving integrated newborn care and CCM interventions.

Data analysis

We used a weighting system to select factors for measuring teamwork from those identified and sorted by the participants. Five points were given for “very important”, three for “important” and one for “least important”. A factor was selected if it scored 22 or more points out of a possible 30 points. We chose a score of at least 22 to ensure that a factor is selected if at least two FGDs indicated it as “very important” and the remaining four FGDs indicated it as “important”. We further categorized the selected factors into dimensions of teamwork, or processes that comprise the teamwork construct. There were some factors which were identified and sorted by the participants but which we thought that they do not necessarily measure teamwork but rather may influence

the way the team performs. These were termed as determinants and may explain why teams engage in effective teamwork. We categorized these factors (determinants) into three groups: personal, community-related and service-related.

Ethical issues

Ethical approval was obtained from the Boston University Institutional Review Board (BU-IRB) and Zambia's ethical review committee (ERES CONVERGE). Informed consent was obtained from all study participants. A consent form developed in accordance with guidelines of the BU-IRB and the local ethical review committee was translated into Bemba, the local language.

Results

Participant characteristics

The NHC participants included 12 males and 6 females. Male participants were older than female participants (average age 46.9 [range 34–59] vs. 35.5 years [range 28–53]) and had attained higher education levels than their female counterparts (Grade 10 and above: 70% vs. 33%). All NHC participants were farmers except for two female members who were business women. CHW-TBA participants comprised 7 males and 11 females. Two CHWs and all the TBAs were females. TBAs were older than the CHWs (average age 52.6 [range 46–58] vs. 46.5 years [range 35–65]). CHWs were more educated than the TBAs. All CHWs had attained grade 9 or above while most TBAs had only reached grade 7 or below. Two TBAs had no schooling. All CHWs and TBAs were farmers.

Processes and factors for teamwork

Seventeen factors identified by the participants that scored 22 or more were selected to measure teamwork. We categorized these factors into dimensions of teamwork or processes that comprise the teamwork construct (Table 1). All the six FGDs identified three of the 17 factors as "very important," and five FGDs identified six as "very important". One factor "motivating each other" was considered "very important" by only two of the six groups, one NHC and the other CHW-TBA. Two groups (one NHC and the other CHW-TBA) considered all the seventeen factors as "very important" for measuring teamwork. Factors which scored below 22 and therefore not selected included "leadership"; "similar vision", "mutual support" and "coordination among members". All six FGDs indicated that leadership was not important in a two person team. Reasons participants sorted some of the factors into the "very important" group are shown in Table 2.

Table 1 Processes and factors of teamwork

Process	Factors
1. Mutual performance monitoring	1) Consulting each other 2) Seeking help from each other 3) Checking each other's work and giving feedback
2. Mutual trust	4) Confidentiality 5) Respect 6) Trust
3. Decision making/planning	7) Making decisions together 8) Making a plan together 9) Dividing tasks so not to duplicate effort
4. Team cohesion	10) Interest and commitment 11) Members available and accessible
5. Team motivation	12) Motivating each other 13) Encouraging each other
6. Goals and objectives	14) Having a common goal
7. Communication	15) Good communication 16) Sharing information
8. Conflict resolution/management	17) Ability to manage conflict

Jointly performed functions for taskwork

Participants indicated that all of the seven pre-determined functions presented to them were essential for the CHWs and TBAs to perform jointly if they were to provide life-saving integrated newborn care and CCM interventions effectively. The functions were:

1. Joint monthly meetings with NHCs to discuss work and performance.
2. Joint behavior change communications sessions targeting women on newborn and child care.
3. Joint problem solving with regard to newborn or child care.
4. Joint participation in outreach services including child welfare clinics and immunization conducted by the supervising rural health center staff.
5. Collaboration to refer a pregnant woman or a mother with a sick child to the rural health center or hospital if necessary.
6. Intra-team referral (referral between team members, for example, CHW referring a pregnant woman to the TBA or TBA referring a mother with a sick child 0–59 months to the CHW).
7. Joint postnatal care visits to a mother with a newborn aged about 6–8 weeks where the TBA "hands over" the child to the CHW.

We used these functions to measure taskwork.

Table 2 Importance and illustrative quotations of teamwork factors

Factors	# Groups indicating factor as "very important"	Illustrative Quotation
Confidentiality	6	<ul style="list-style-type: none"> • Many NHCs have stopped functioning because there was lack of confidentiality among members. • Many mothers refused to go to CHWs because of lack of confidentiality. • If there is no confidentiality among us as team members, the community will be scared to access the needed services from us. • Lack of confidentiality in a team can lead to dismantling of the team.
Having a common goal	6	<ul style="list-style-type: none"> • A common goal gives direction to a team. • A team without a common goal has no direction.
Making a plan together	6	<ul style="list-style-type: none"> • Making a plan together is the ingredient for achieving the goal of a team.
Good communication	5	<ul style="list-style-type: none"> • Anytime we do not communicate among ourselves, we feel our team is collapsing.
Seeking help from each other	4	<ul style="list-style-type: none"> • If we cannot help each other when the need arises, how can we work together? It's like going in different directions.
Members available and accessible	4	<ul style="list-style-type: none"> • How can you work as a team if members are not available when needed?
Checking each other's work and giving feedback	4	<ul style="list-style-type: none"> • It is important to learn from each other what happened, our mistakes and successes. • If we are not giving feedback, how can we learn from the past? • Not learning from the past will affect the performance of the team.
Dividing tasks so not to duplicate effort	4	<ul style="list-style-type: none"> • Duplicating efforts can cause conflict in the team.

Determinants of teamwork

We selected 20 factors identified by the participants as determinants of teamwork. These factors may explain why teams engage in effective teamwork. We categorized these factors into three sub-groups: personal, community-related and service-related. Most of the factors belonged to the personal and service-related sub-groups (Table 3).

Discussion

This formative research employing group discussion and pile sorting enabled community-generated processes, functions and factors to be elicited to measure teamwork and taskwork, and determinants of teamwork in this setting. We used this methodology because of its ability to promote consensus among group members [22]. Pile sorting has been used in public health settings to capture local definitions of disease [25,26], to study relationships between symptoms and disease severity [27]; and to investigate the acceptability of interventions [28,29]. In our case the pile sorting was constrained, as participants organized the cards according to categories provided to

them [30]. Relatively few studies have used pile sorting in focus groups similar to ours [31,32].

The 17 factors identified for measuring teamwork were categorized under eight of the processes that comprise teamwork construct: 1) mutual performance monitoring, 2) mutual trust, 3) decision making/planning, 4) team cohesion, 5) team motivation, 6) goals and objectives, 7) communication and 8) conflict resolution/management. Three of our processes were included in the Team Development Measure constructed by Mahoney and Turkovich to measure the level of development of a team in health care setting in the developed world [18]. Communication was also part of the TeamSTEPPS Teamwork Attitudes Questionnaire, a measure designed to assess attitudes towards the core components of teamwork in healthcare [10]. Factors that affect a team's processes identified by a WHO Working group on patient safety [16] were similar to what we found.

Most of the seventeen factors we identified for measuring teamwork belong to teamwork attitudes and behaviors and this underscores their importance in team performance in this rural setting. Leadership, commonly an important

Table 3 Factors for measuring the determinants of teamwork

Personal	Community-related	Service-related
• Age	• Presence of and links to NHCs	• Training
• Gender	• Distance between CHW and TBA families	• Experience
• Education	• Distances among , CHW and rural health center	• Supervision and support by relevant community and health system structures
• Socio-economic status		• Payment or in-kind compensation
• Language		• Motivation
• Tribal affiliation		• Availability of means of transport (eg. bicycle)
• Religion		• Possession of a cell phone
• Employment		• Availability of various supplies and drugs that the CHW and TBA might need to provide the defined services
• Membership in an association		

construct for measuring teamwork, was considered unimportant in this setting. Indeed, participants indicated that the team would likely fail if one member imposes him/herself as a leader of the team, perhaps because of team composition and small size and/or the relatively egalitarian rural culture. The seven functions identified for measuring taskwork emphasize the importance of strong relationship between the community-based workers and the community leadership in charge of health on one hand, and the community-based workers and the beneficiaries of their services on the other.

The 20 factors identified as determinants of teamwork will assess the relationship between the level of team performance and personal, service-related and community-related factors. Community and social systems are often integrated and linked; therefore assessing the relationship between the level of teamwork and these determinants, especially the community related determinants such as the supportive role of the NHC to the CHW/TBA team is important. The personal factors include age and gender which research in developed world has not typically found to have any relationship with teamwork. We however think since we are dealing with a rural community where age and gender are very sensitive issues and our teams are composed of two persons, these factors may be important.

The developed tool (Additional file 1) has three parts. Part A is administered to both the CHW and TBA jointly and measures taskwork. It assesses whether the team jointly performs and documents the seven functions in the previous three months. The team scores "0" if a function is not performed, "1" if performed but there is no documentary evidence and "2" if there is documentary evidence. Part B is administered separately to the CHW and the TBA and measures teamwork through 27 characteristics/indicators derived from the 17 factors selected for teamwork. This elicits the team's opinion

whether the characteristic is present in their team over the previous six months. Each characteristic has three responses "No" or "never; ii) "sometimes" and iii) "Yes" or "all the time" and the scores 1, 2 and 3 respectively. The score for the team is the average score of the two members. Part C collects information on the determinants of teamwork and is administered separately to each individual team member to explain why teams engage in effective teamwork.

The tool is intended to be used by the supervisors (the rural health center staff and the DHMT) of the community-based workers to assess the level of teamwork and taskwork and their relationship to the utilization of the services being provided by the teams. The processes of teamwork and taskwork functions represent unique skills, and together form integral part of an effective community based team. These processes and functions can serve as competencies to be strengthened during refresher trainings to improve team performance.

This tool is unique that it measures community based healthcare volunteers' views of teamwork and taskwork. Most of the existing tools are not aligned with what the literature advocates as the core components of teamwork. For example, the Safety Climate Survey tool measures perceptions of organizational commitment to patient safety such as commitment to safety, leadership, interpersonal interactions, attitudes towards stress and knowledge of how to report adverse events [33]. The Safety Attitudes Questionnaire also measures attitudes about teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions and stress [34]. Another tool, the Team Climate Assessment Measurement Questionnaire was developed to enable teams in health and social care to review aspects of their team that are believed to affect patient safety and error management [35].

A limitation of this study was the purposive selection of well-functioning NHCs. We needed to be able to draw on "functional" NHC prior experience working with community members to solve health problems and identify existing "best practices". This was essential because there would be no point in studying a disorganized, dysfunctional setting where teamwork was unlikely to have been present. We also acknowledge the complexity of measuring some of the determinants such as socio-economic status, motivation and links with NHCs. Another limitation of the study is the small number of participants.

Conclusion

To our knowledge, this is the first tool developed to assess teamwork and taskwork in a community-based health care setting in a developing country, and the first tool to assess a two-person team. We used a qualitative participatory methodology involving the population (community health workers and committees) the tool is targeted for in the process of developing the tool. We believe that this approach may contribute to making the tool acceptable to the target population. The method was simple and proved highly valuable for identifying community and culturally relevant processes for measuring teamwork and functions for measuring taskwork. The simplicity of this method and its value in identifying community- and culturally-relevant processes and functions are strengths of this approach. We believe our tool can be adapted to measure teamwork and taskwork in other health settings and in situations where there are more than two members of a team.

Additional file

Additional file 1: Team Measurement Tool.

Abbreviations

BU-IRB: Boston University Institutional Review Board; CCM: Community Case Management; CGHD: Center for Global Health and Development; CHW: Community Health Worker; DHMT: District Health Management Team; LINCHPIN: Lufwanyama Integrated Newborn and Child Health Project; MOH: Ministry of Health; NHC: Neighborhood Health Committee; TBA: Traditional Birth Attendant.

Competing interests

All other authors declare that they have no competing interests.

Authors' contributions

KYA, DM, DHH, KYA, KZW, and WM contributed to the conception and design of the study. KYA, DHH, GSP, CK, SF, and BS all participated in study implementation and data collection. KYA, DHH and WM performed data analyses and with DM, GSP and KZW assisted with interpretation of the data. KYA, DHH and DM drafted the manuscript. All authors contributed to revisions of the manuscript and read and approved the final manuscript.

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Community Collective Action

Improved Maternal, Newborn and Child Health in Lufwanyama District, Zambia



2009-2014



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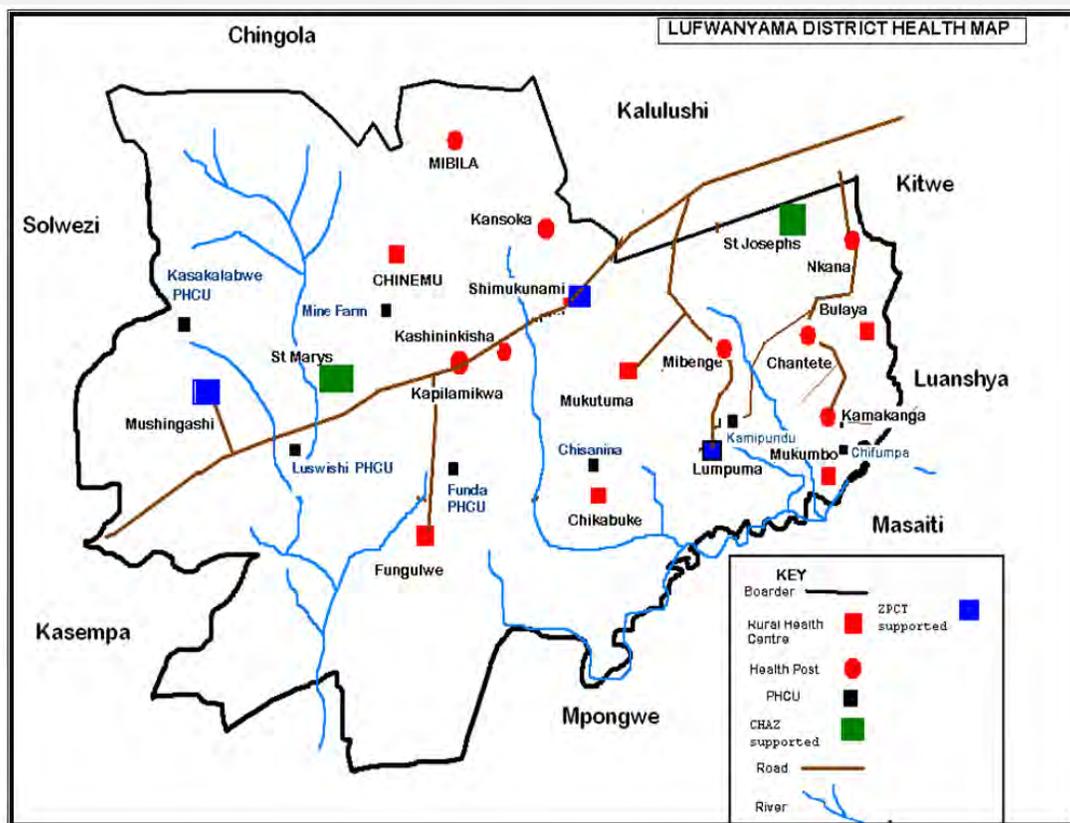
ACRONYMS

CAC	Community Action Cycle
CBO	Community-based Organization
CCM	Community Case Management
CDF	Constituency Development Fund
CHW	Community Health Worker
CSHGP	Child Survival and Health Grant Program
CSO	Civil Society Organization
DHMT	District Health Management Team
DHO	District Health Office
ENC	Essential Newborn Care
HIV	Human Immunodeficiency Virus
ITN	Insecticide-treated Net
LINCHPIN	Lufwanyama Integrated Newborn Child Health Project
MDG	Millennium Development Goal
MNCH	Maternal Newborn and Child Health
MoH	Ministry of Health
MOHCC	Ministry of Health and Child Care
NHC	Neighborhood Health Committee
ORS	Oral Rehydration Salts
PNC	Postnatal care
RDT	Rapid Diagnostic Test
RHC	Rural Health Center
SMAG	Safe Motherhood Action Group
TBA	Traditional Birth Attendant
USAID	United States Agency for International Development

INTRODUCTION

The Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN) was a five-year Innovation Project (CS-25 cycle) running between 1 October 2009-30 September 2014. The project was co-funded by the United States Agency for International Development (USAID) Child Survival and Health Grant Program (CSHGP) and ELMA Philanthropies, with matching funding from Towers and Perrin and the Crown Family Philanthropies.

The LINCHPIN Project was implemented in Lufwanyama District in the Copperbelt Province in north-central Zambia. The province covers the mineral-rich Copperbelt and adjacent areas to the south, and borders the Katanga Province in the Democratic Republic of the Congo, to its north. Lufwanyama is a recently-created, large, rural, undeveloped district with an estimated population of 85,123. Despite its location in the mostly urban and industrialized Copperbelt,



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rural Lufwanyama District is plagued by deplorable physical infrastructure, poorly maintained dirt roads that are frequently impassable during the rainy season, a near complete absence of electricity, and no piped water or sewage. Lufwanyama's district seat is located just outside the district in Kalulushi, 17 kilometers west of the mining center town of Kitwe.

The strategic objective of the project was to increased use of key newborn and child health services and practices. In order to reach this objective, four intermediate results aimed to increase access, availability, quality and demand for newborn and child health care services. These also contributed to an enabled environment designed to support effective delivery of newborn and child health interventions. All project activities were implemented in Lufwanyama District in close collaboration with the District Health Office (DHO) and several local partners.

The project targeted a total population (2009) of 85,123 with 13,992 (20%¹) children under five and 17,159 (21.8%) women of reproductive age. Its four main components included: 1) **Community Case Management (CCM):** Community Health Workers (CHWs) trained to assess, classify and treat sick children 2 to 59 months old with malaria, pneumonia and diarrhoea – and to refer children and newborns with danger signs; 2) **Community-based maternal and newborn care:** Traditional Birth Attendants (TBAs) trained to make home visits to mothers and newborns starting at delivery. If the newborn was delivered at home, the TBA provided Essential Newborn Care (ENC), including newborn resuscitation. Postnatal care (PNC) home visits are then conducted at 24 hours, 2, 3 and 7 days and at 2, 6 and 8 weeks postpartum. Mothers and newborns with danger signs were referred to the health facility; 3) **Teaming of CHWs and TBAs:** CHWs and TBAs were trained to work as community teams. Teaming bridged the gap between the care provided at delivery and the early newborn period (usually

¹ Updated data from DHMT, Nov.16, 2010.

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provided by the TBA), and care in infancy and childhood (usually provided by the CHW). The teaming approach taught CHWs and TBAs to conduct joint PNC home visits at 2, 6 and 8 weeks postpartum, conduct joint health education and promotion activities, encourage mutual support and problem solving, and promote and facilitate referral of sick mothers, newborns and children, when necessary. Neighborhood Health Committee (NHC) members were also trained to support teams; and 4) **Create an enabled environment for maternal, newborn and child health (MNCH):** NHCs were trained in community mobilization for MNCH and in CHW/TBA teaming. The intention was to give NHCs and communities skills to improve their long-term capacity to identify and address health-related problems – and to use improved community demand to help drive improvements in quality, access and availability of health services.

Telling the stories

In 2011, the LINCHPIN team embarked on an exciting initiative to document the many stories happening every day in the community. The team received training on how to successfully write and document project success stories and lessons learnt in order to help communities document their own experiences. Following the training, LINCHPIN Community Mobilizers began documenting success stories on a monthly basis, took photos to accompany stories, and identified promising practices. The stories and thoughts that follow are a collection of what the Community Mobilizers saw and heard every day on the job.

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Summary of Project Results: All 118 NHCs in the district were trained, re-organized and mentored to conduct participatory planning. Key findings include:

Organization and planning: NHCs

- 24% now have women as their Chairperson; 89% of NHCs have women as part of the Executive Committee structure; and 58% of NHCs had women representing 60% of their membership.
- 100% have written roles and responsibilities in the form of a constitution; 80% NHCs meet monthly with minutes in place, and have a representative on the *Health Centre Management Committee*.
- 100% have written Action Plans, of which 100% have implemented at least one of their planned activities.
- 77% have developed emergency transport plans for women in labor and sick children.
- 90% have Safe Motherhood Groups in place (107 total SMAGs) with members trained in referring and accompanying pregnant for ANC; skilled delivery and post-natal follow-up. 100% of SMAGs also have an action plan.
- 55% have hosted or participated in community-to-community exchange visits

Resource mobilization and implementation of plans: NHCs

- 75% of NHCs raised internal or external resources to support their action plans. Over \$33,442¹ USD was raised by NHCs to improve MNCH services – from family contributions, or in-kind labour and services. Activities included refurbishing health centers, purchasing bicycles, community gardening and school development.
- A high proportion of NHCs provide support to CHW/TBA teams, including working in their gardens, provision of in-kind incentives, and problem solving.
- External linkages made with six traditional chiefs, and the *Chieftdom Development Fund*.

COMMUNITY MOBILIZATION

Community mobilization was a supportive strategy of the key CCM and *teaming* approaches of the LINCHPIN Project. Community mobilization was defined “*a capacity-building process through which community members, groups, or organizations plan, carry out, and evaluate activities on a participatory and sustained basis to improve their health and other conditions, either on their own initiative or stimulated by others*” – Save the Children’s Operational Definition². The intent of this strategic approach was to ensure an enabling environment for MNCH community-generated action that would support positive maternal and newborn health behaviors. It also worked to strengthen community capacity to organize, explore, plan and act together, skills which can be applied to a variety of community priorities. Applying this definition of community mobilization required a shift in attitude and aims among technical staff to move away from unidirectional ‘messaging’ and instead promote reflection, action, ownership and inclusive participation of those most affected and interested in MNCH.

The general goal of community mobilization within LINCHPIN was to ‘increase communities’ capacity to collectively analyze, plan, implement, and evaluate actions to improve maternal and neonatal health, and prevent maternal and neonatal morbidity and mortality in Lufwanyama District.

Specific community mobilization objectives under LINCHPIN were:

- To empower Neighborhood Health Committees (NHCs)³ in particular and the community in general to make informed decisions regarding maternal and neonatal health care;
- To strengthen and/or develop community-based referral systems to increase demand for CHW/TBA ‘teams’ applying CCM, and/or other trained health workers and/or health facilities for antenatal, postnatal care, safe delivery and newborn/child health;

²How to Mobilize Communities for Health and Social Change, Save the Children, Health Communication Program(2003)

³ Ministry of Health and Child Care (MOHCC) supported community groups organized to support and enhance improved family health practices and access to services.

COMMUNITY ACTION CYCLE

- To increase collective efficacy to respond to newborn, child health and obstetric referrals and emergencies;
- To help change social norms that result in or are related to harmful practices; and
- To strengthen the social-support networks/systems for pregnant women.

LINCHPIN applied Save the Children's **Community Action Cycle (CAC)**⁴ - a proven community mobilization approach which fosters individual and collective action to address key health program goals and related outcomes. Applied to improve health outcomes, the CAC worked to increase access to, and demand for, health services,

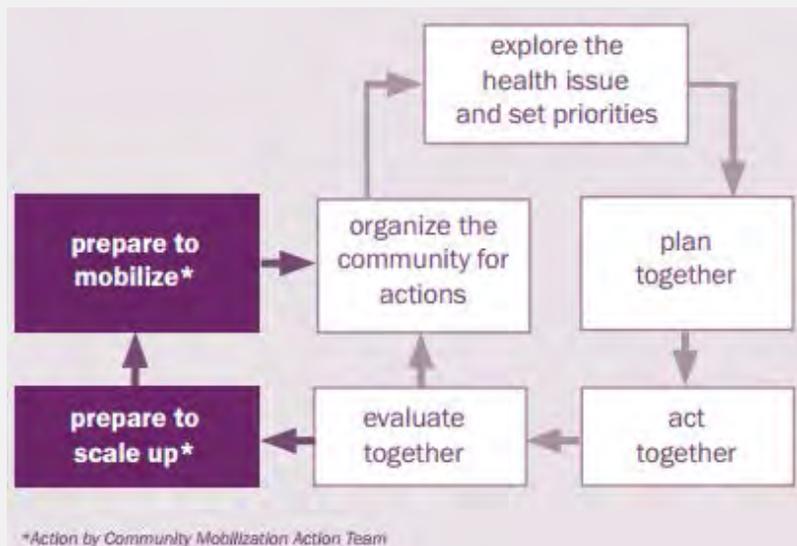


Figure 1: Phases in the Community Action Cycle

especially where gender and other socio-cultural barriers exist. The CAC approach, used successfully around the world, helped to foster individual and collective action for sustained community participation in achieving MNCH health outcomes.

The CAC approach promotes a *community-lead* process through which those most affected by and interested in, organize, explore, set priorities, plan and act collectively for improved health. Phases in the CAC include *preparing to mobilize; organizing for action; exploring the issues affecting*

⁴ Ibid.

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access and demand for health and setting priorities; planning together, acting together, evaluating together, and “scaling up” successful efforts. Each phase of the CAC has a series of related steps which guide communities and facilitating partners. When applied to health, each phase and its related steps lead to greater community ownership and sustained collective action after the end of the project as a result of the capacity-building of community groups.

With USAID support in 2002, Save the Children compiled its experience in mobilizing local communities into a field manual entitled, *“How to Mobilize Communities for Health and Social Change”*. The manual guides its users through the phases and steps of the CAC and the accompanying tools are written for program managers of community-based programs and their teams. The CAC phases include: preparing to mobilize; organizing for action; exploring the health issues and setting priorities; planning, acting, and evaluating together, and “scaling up” successful efforts (see Figure 1).

By working through the CAC, communities and individuals identify the socio-cultural barriers/enhancers, resources, and risk factors (especially for those most community members who are marginalized) to access health services and begin to work towards positive change. They also identify bottlenecks to accessing services, and link with internal and external partners to address these barriers. The CAC Approach recognizes that people do not change their behaviour based on information alone, but rather as a result of the combination of having the information, as well as the confidence and an enabling environment to make positive choices, collectively and individually, while also addressing the underlying social norms.

Through the application of the CAC by multiple partners at the community, district and provincial levels, community mobilization as an empowering approach to social change:

- Increased community level decision-making required by decentralization and democratization;

COMMUNITY ACTION CYCLE

- Addressed the different needs, problems, assets, beliefs and practices of diverse communities through greater ownership and understanding;
- Built mechanisms and systems through which communities can sustain an enabling environment for social change, and link effectively with education and economic systems to support themselves;
- Brought additional resources that may not be available from government or donors;
- Helped communities advocate and participate in improving the quality of health services; and
- Worked to change social structures and norms in order to improve the quality of life for those most affected, especially for women and other more marginalized groups.

“We thought development can only be realized by support from the government, but we are the government and can make our own actions come true. I have learnt that everyone is responsible for their health - we are acting as a vehicle to help our community reach the desired level of health.”

Chunda - Mibenge NHC

The Ministry of Health (MoH) in Zambia, values the “need for communities to be involved in the prevention of illness and delivery of health care, and therefore established the NHCs platform through an act of Parliament. NHCs work in conjunction with the other community based organizations (CBOs) to achieve better health in the communities.” (Health Communication Partnership Zambia, Health Care within the Community). NHCs are comprised of a chairman, secretary, treasurer, community leaders, school teachers, extension workers, and general community members. They include a mix of women, youth and disabled people. The main function of the NHC is to be the link between the community and the health

COMMUNITY ACTION CYCLE

“I’m really happy with the lessons I’ve learned. I don’t have very much formal education, but participating in Community Action Cycle training has helped me feel confident in my capacity to initiate, organize, and implement action plans. I thought that to properly organize this type of activity, you had to be an intellectual or health worker.”

The problem tree using the BUT WHY concept is so practical that I can use it in my home to find the root cause of any problem and use the apex cause to find immediate solutions to the problems. I look forward to seeing Save the Children and their work continue.”

Chairperson - Kapilamikwa Health Center Committee

The CAC training supported community members and groups to explore, plan and act collectively. Based on the idea that community members know what they need best, CAC provided a space for neighborhoods

care system, and to work with health workers, CBOs and other community members to identify local health problems and solutions.

Under the LINCHPIN Project, the CAC was implemented at the catchment area level by the NHCs through 118 NHCs in 118 catchment areas in Lufwanyama District. The district has 140 health zones, which represent either a single village or small cluster of closely spaced villages. The broader NHC membership made up of local church groups, civil society organizations (CSOs), CHW/TBA representatives; women’s group representatives, etc. played a key role in advancing the NHC community action plan.



Mukutuma Chairman General Mr. Samuel Bukama participates in the “explore” phase of CAC training.

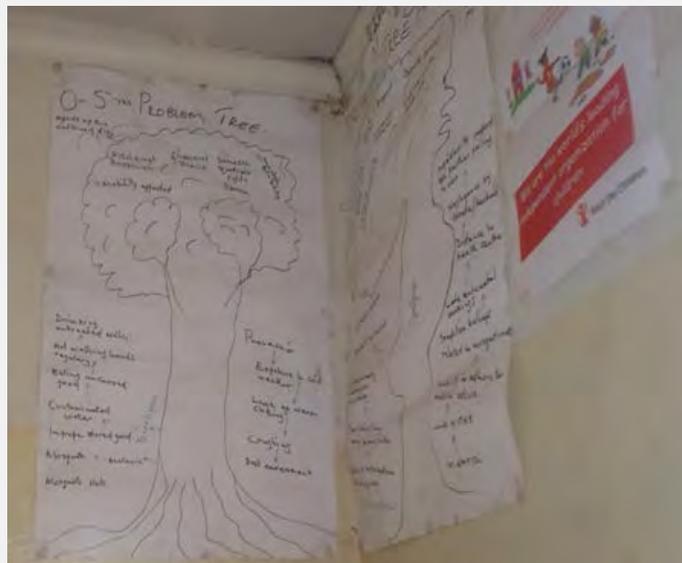
COMMUNITY ACTION CYCLE

to discuss and prioritize their different health needs - ranging from health education to distributing bed nets for children and pregnant women.

LINCHPIN worked with six Community Mobilizers to facilitate the CAC within the 118 NHCs in the selected catchment areas, by building the capacity of District Health Management Team (DHMT) point persons, working closely with the DHMT NHC Focal Person and Environmental Health Officer, and jointly planning community mobilization activities on a monthly basis. Each Community Mobilizer worked strategically within their catchment areas to ensure that NHCs received the support and capacity building necessary to develop and implement their action plan.

LINCHPIN's interactive community based trainings help community members build skills in planning and participatory community planning, while also providing follow up support to help implement their own health initiatives. According to one of LINCHPIN's Community Mobilization Officers, *"our goal is to develop the ability of individuals, so they can address the difficulties they face living here in Lufwanyama."* Over time, CAC training strives to build a foundation for NHCs so that they are able to plan and coordinate health activities in their Lufwanyama communities.

The CAC in Action: One of the key lessons learned in implementing the LINCHPIN Project was the importance of participatory planning, where everyone involved has a voice. The NHC members



A problem tree developed by NHCs at Shimukunami rural health center, Lufwanyama District.

COMMUNITY ACTION CYCLE

in this project used their training in the CAC to engage with community members to bring about positive change. One way they accomplished this was by using a 'problem tree', where community members identified maternal and child health problems in their communities. The process started with developing problem trees in the "*Explore Together*" Phase of the CAC. NHCs then used a preference ranking method for prioritizing activities to be included in the community action plan, which was developed jointly with the NHC and community members. The NHC and community worked together to implement the activities in the action plan, by applying various skills learned through capacity building trainings provided by LINCHPIN.

TELLING THE STORIES: NHC CAPACITY BUILDING

Improving capacity of community based volunteers: Monta Richard has been a member of the Kapilamikwa NHC since 2005, as well as the chairman general of all eight NHCs of Kapilamikwa Rural Health Center (RHC) catchment area. Through training from the LINCHPIN Project, Mr. Richard learned about the CAC, advocacy, leadership and basic financial management skills. He also received training on important topics in reducing maternal and child mortality, such as infant young child feeding, good nutrition, safe delivery and prompt care seeking for sick children. Mr. Richard was thankful for the support from Save the Children and the Lufwanyama DHO and said that these skills helped him *“to work well as a leader of the NHC and contributed positively to the smooth running of the NHC and health center at large”*.



Monta Richard – NHC Chairman General Kapilamikwa RHC.

NHC CAPACITY BUILDING

Building skills among NHC members: Blackson Lubumbe, the NHC secretary, has been working as a volunteer at Chinemu RHC in Lufwanyama District since 2006. He helped staff clean the surrounding area and keep records of outpatient cards, and attended meetings. Following a training on the CAC through the LINCHPIN Project, Mr. Lubumbe became familiar with the various phases of the CAC. He also received leadership training and additional support on growth monitoring and promotion, infant and young child feeding, nutrition and Human Immunodeficiency Virus (HIV) counselling. He has greatly benefited from these trainings, which have improved his personal development. He is a vital link between the community and health facility, and supports health care activities in the community. Mr. Lubumbe was able to orient others on the CAC, help the NHC develop strong action plans focusing on improving MNCH, and document monthly meeting minutes. Mr. Lubumbe is thankful to Save the Children for the knowledge he has acquired.



Blackson Lubumbe. NHC Secretary. Chinemu West RHC.

NHC CAPACITY BUILDING

Mibeshi NHC appreciates Save the Children: Philip Kasombe is the chairperson of the Mibeshi NHC. When he joined the NHC Committee in 2009, he had little knowledge of the functions of the NHC; then he attended a meeting organized by the LINCHPIN Project. He learned about the various steps in the CAC and is now able to conduct outreach sessions in the community on key health messages, such as danger signs for sick newborns, prompt care seeking for malaria, pneumonia, diarrhoea, disease prevention, and safe motherhood. He is grateful to LINCHPIN for the skills he has gained, and says that “*Mibeshi community recognizes Save the Children for all the support it has given*”.



Philip Kasombe, NHC Chairperson, addresses the community during a meeting.

NHC SUPPORT

Appreciating the work of TBAs: The performance of community volunteers such as CHWs and TBAs, is often affected by low motivation. Kapimbe NHC, under Lumpuma RHC in Lufwanyama District assisted TBAs and CHWs to cultivate their fields, as a way of appreciating and motivating them for improving the health of the community. Following community capacity training conducted by the LINCHPIN Project, the NHC and community wanted to show support and appreciation to the health workers who spend their time attending to mothers and children, by helping with the cultivation of their fields. Wevy Chululuka is a TBA whose field was cultivated by community members. As a result, she felt encouraged, supported and motivated by this initiative, and realized that her community truly values the work she does. Such actions by the NHC and community are essential to bring about long term sustainability for maternal and child health activities in Lufwanyama District.



TBA Wevy Chululuka is encouraged by the support her community has shown.

NHC SUPPORT

Working together helps to improve health: The Kamupundu NHC worked with community members to implement the CAC to identify and prioritize health problems affecting the community. They identified delays in care seeking as one of the main challenges. The NHC worked with Safe Motherhood Action Groups (SMAGs) to reinforce recognition of danger signs needing immediate attention. A young mother in the community said that ever since she learned the key practices through the NHC, she is able to recognize danger signs and seek appropriate care promptly.

Chantete NHC received training on the CAC, as well as trainings on their roles and responsibilities. With funds from Save the Children, the NHC was able to buy bicycles to use to carry out community awareness raising, support health providers in the community, and work closely with SMAGs. The NHC decided to give one bicycle to each SMAG member to be used as emergency transportation for pregnant women (or women in labor with complications). As a result, this helped to motivate SMAG and health volunteers, who began to feel that NHC members were taking a strong interest in supporting their plans and activities. The SMAG and NHC members are working as a team to achieve their goals and make their community a better one.



SMAG dancing after a health session.

NHC SUPPORT



Mothers of children under five line up for child health week services at Shimukunami RHC.

NHCs mobilize community for child health activities: The LINCHPIN Project works closely with NHCs to conduct community skills-building for caregivers on issues related to pregnancy, childbirth, postnatal care, family planning, growth monitoring and recognition of danger signs in infants and pregnant mothers. Through the NHC activities, many caregivers appreciate and support child growth monitoring activities during child health week every year and are well equipped with knowledge on healthy MNCH practices. During under-five clinics, NHCs and other community based volunteers also conduct cooking demonstrations, infant and young child feeding counseling and health education. The community members report seeing a difference in the health of their children, through the work of LINCHPIN, and community based volunteers are eager to support additional programs to improve the health of the community.

NHC SUPPORT



Community members gather at the 'Gifts for Goats' event.

Providing incentives at the community level: Lufwanyama District is facing a human resource crisis with less than 70% of the healthcare workers in place who are needed to meet the communities' health needs. Given the high level of personal commitment and dedication, combined with the proper education and skill needed to be an effective CHW, the LINCHPIN team, together with the DHO, explored ways to retain motivated and capable CHWs. Some initiatives included purchasing bicycles, printing t-shirts, and regular capacity building. However, the incentive that worked best was “pass on” component of the ‘Gift for Goats’. The idea is that the offspring of the goats that are distributed to NHC members are “passed on” as gifts to other community members; ultimately, everyone benefits!

IMPLEMENTING ACTION PLANS



A maternity wing being constructed in Kapilamikwa community.

Mobilizing resources in Kapilamikwa community: In 2012, all NHCs were trained in the ‘act together’ phase of the CAC. This included trainings on resource mobilization so that communities could use their skills to mobilize local resources and implement their planned activities. Kapilamikwa NHC’s community action plan included the construction of a staff house, maternity wing, and mother’s shelter. The NHC mobilized the community to make 4,000 bricks for constructing a staff house, and Save the Children supported plans to construct a maternity wing. The NHC approached the District Commissioner and Council Chairperson to provide electricity for the maternity wing, and was encouraged to apply for the Lufwanyama District Constituent Development Fund (CDF). The combination of strong relationships between all the stakeholders and NHC members’ skills in resource mobilization, were essential in implementing the community’s action plan.

IMPLEMENTING ACTION PLANS



NHC members of Filando/Kamuchanga in Shimukunami RHC catchment area have a community meeting.

Shimukunami NHC applies resource mobilization skills: In early 2013, NHCs from Shimukunami RHC reviewed their action plans, and decided that in order to improve maternal health and promote safe motherhood, they would like to construct a mothers' shelter. Community members were briefed and were supportive of this idea, because of the long distances pregnant women had to travel for safe delivery during labor. The community members volunteered their time to build the mothers' shelter.

With the support of the Chairman General and health center staff, a project proposal was submitted to the Lufwanyama District CDF Committee for financial support. In May 2013, the CDF Committee visited the planned construction site and was impressed to see that the community had already managed to mold bricks and raise K3,000 from the community and the Shimukunami chiefdom. The CDF Committee members asked that the NHC team to send

IMPLEMENTING ACTION PLANS

them a list of items and quantities needed for construction, and decided to support this initiative financially. By using their skills in resource mobilization, the Shimukunami NHCs were able to successfully implement their action plans for improving maternal and newborn health.

Fyachitwa NHC successfully constructs a primary health care unit: The Fyachitwa NHC located in Shimukunami's catchment area, planned to construct a primary health care unit as part of their action plan, in order to improve community health care services and reduce the distance mothers walk to reach the health center. The NHC mobilized community members to mold and fire/burn bricks. They also used the resource mobilization skills learned through trainings from the LINCHPIN Project, to garner support from the Catholic Church. After observing the commitment from the community, the church provided cement, timber and iron sheets for the construction of the health care unit, while community members contributed the necessary labor.



Primary Health Care Unit in Fyachitwa community provides a clean and safe space for health activities.

IMPLEMENTING ACTION PLANS

All community health activities now take place in the primary health care unit; these include under five clinics, antenatal clinics, and child health week. The NHC plans to construct housing for staff at the health center, with the hopes that the government will provide a nurse to staff the health center, as there are currently no trained staff nearby. The community has shown real ownership, commitment and teamwork, for addressing challenges that arise.



Mukumbo NHC members help to cultivate nutritious foods for children.

Community based nutrition support in Mukumbo: Mukumbo NHC prioritized the improvement of nutrition among infants and children in their action plan. After identifying the number of children suffering from malnutrition, the NHC planned to raise funds to purchase food supplements for twenty undernourished children. The NHC members raised funds by

IMPLEMENTING ACTION PLANS

moldings bricks, landscaping and cultivating their fields with soybeans and maize to feed the children. By working and acting together, the NHC members and the community were able to make real strides in addressing the nutritional needs of children within the community.



Caregivers eat together after a community cooking demonstration.

Managing malnutrition in Kafyanga community: The Kafyanga NHC identified malnutrition as a major challenge that needed to be addressed in the community. With the help of a local CBO, the NHC wrote a project proposal for submission to the local government for financial support. The proposal was approved and the NHC received K25 million, which they used to purchase a hammer mill. The hammer mill was used as an income generating activity, and funds raised were used to supply malnourished children with food supplements. NHC members are growing vegetables and soya beans for additional nutrition support, as well as conducting health education sessions and cooking demonstrations for caregivers, so that they are better able to manage malnutrition at home.

IMPLEMENTING ACTION PLANS



Emergency vehicle used by community members to take pregnant mothers to the hospital for safe delivery.

An emergency transport system becomes a reality: Three well-performing, active NHCs were selected to participate in the Accelerated Millennium Development Goal (MDG) 4/5 project, embedded within the LINCHPIN Project. The Kapilamikwa Funda turn off and Bimbe NHCs developed strong action plans directly aimed at reducing child mortality and promoting safe motherhood and maternal health in their catchment areas. They received K48 million to implement activities from their action plans. Through discussions with health center staff, these NHCs decided to focus on developing an emergency transportation system to transport sick patients from the community to the health facilities. They also purchased a tricycle from Saro Zambia Limited to serve as the primary vehicle. This tricycle has a mattress for patients to lie on, and a bench for relatives to sit on. The community members now use this life-saving tricycle to take mothers to the hospital for safe delivery, sick children for further health care management, and referred cases from the health facility to the district hospital.

IMPLEMENTING ACTION PLANS



Kapilamikwa NHC members undergoing training in financial management.

Kapilamikwa NHC’s action plan attracts K48 million: The Kapilamikwa NHC participated in Save the Children’s MDG 4/5 Project, embedded within the LINCHPIN Project. During the plan together phase of the CAC, the NHC developed a strong action plan, which was selected by Save the Children for financial support through a sub-grant of K48 million. The NHC developed a budget for the activities, began acquiring the materials needed, and received training on financial reporting needed to ensure accountability of funds. The NHC members purchased bicycles to carry out community education activities in the catchment area and

IMPLEMENTING ACTION PLANS



Community members participate in a Local to Global Advocacy meeting at the Kapilamikwa rural health center.

bought t-shirts with key health messages to promote positive health actions. It was also decided that an income generating activity was necessary. The NHC purchased a hammer mill for milling grains and constructed a shelter for storage of grains. The NHC successfully completed their CAC activities, and have also developed skills in collaboration, planning and implementing their activities, and strong financial management.

Kapilamikwa NHC members use advocacy skills: The Kapilamikwa NHC received funds from Save the Children in August 2013 to support the implementation of its action plan, through the MDG 4/5 Project. The NHC prioritized conducting community advocacy meetings,

IMPLEMENTING ACTION PLANS

following a training they received in advocacy skills. An advocacy committee was created and included NHC members, school representatives, agriculture officers, chiefs, church leaders, children and community members. The committee held two meetings and invited district officials to participate. During these meetings, the NHC presented the need for the health center to have electricity, a clean, running water supply and a staff house. The District Commissioner and Council Chairman were supportive. They advised the committee to submit an application letter for a borehole, a list of supplies needed for the construction of a staff house, and a price quote from the electricity board. The support from the local government members has been extremely helpful, and has encouraged the committee to collaborate with the government to address MNCH issues.

APPLYING SKILLS FROM CAPACITY BUILDING



Mrs. Mofya and her daughter – grateful for the services of the CHW.

CHW saves lives in Kansoka RHC: Inness Mofya recognized that her child needed immediate attention after suffering from several episodes of diarrhoea. She recalled learning how dangerous diarrhoea could be for young children from a health education session she had attended in the community, and decided to visit the CHW - Mr. Masilio. The CHW correctly identified the problem and gave the child a dose of Oral Rehydration Salts (ORS) and zinc. He observed the child's condition, and then sent them home with ORS and zinc tablets, along with important advice to continue offering food and fluids. The child's condition improved the next day and Mrs. Mofya said, *"I was not expecting my child to get better and thought I would have to take her to Kansoka rural health post located 35 kilometers away from my home. I wish to thank the CHW for the great job he is doing to save the lives of children and my appreciation to Save the Children for equipping CHWs with such knowledge."*

APPLYING SKILLS FROM CAPACITY BUILDING



Mr. Mwape taking care of a sick child.

CHWs making a real difference: Mr. Mwape is a CHW in Chantete Health Center. Before receiving training in CCM from the LINCHPIN Project, he used to give patients Panadol and refer them to the health facility, no matter how sick the patient was. Mr. Mwape explained that after CCM training, his clinical skills in managing childhood illnesses has improved. Now he knows how to use a timer to diagnose pneumonia, manage malaria and diarrhoea cases, and health center staff also support him. Mrs. Musumali, a mother in the community says, *“It is a great benefit to have a CHW in the community because the CHWs are able to treat children and only refer serious cases to the health center.”* Mrs. Musumali mentioned that the health education sessions she attended in the community are really helping mothers because they are able to learn how to take care of children, recognize danger signs, and seek care quickly. Mr. Mwape is proud to say that the community members had developed real confidence in him as a CHW!

APPLYING SKILLS FROM CAPACITY BUILDING

Improving CHW skills: Roy Mwape is a CHW at Chantete health post, 25 kilometers away from the Lufwanyama District Health Administration.

Mr. Mwape was trained as a CHW in CCM, ENC, teaming, leadership and child rights programming, through the LINCHPIN Project. Mr. Mwape provides case management services, to diagnose and treat children with signs of malaria, pneumonia, diarrhoea and malnutrition. Through his teaming training, he learned leadership skills, how to work with TBAs and NHC members to make joint referrals, and how to mobilize the community for community health actions. Mr. Mwape says, *“Capacity building trainings have helped me become competent and confident in my work. I have become organized and share responsibilities with other community based health promoters.”*

Through LINCHPIN activities, the community members in Chantete are much more actively engaged in health related events, seek care promptly for sick children and can correctly recognize danger signs among children. Mr. Mwape notices that, *“There is collective action by the community in problem identification, mobilization of resources, implementation and monitoring of progress, resulting from their involvement in their own health actions.”*



Mr. Mwape assesses a child for pneumonia.

Community member appreciates newly trained CHW:

Godfrey Matukula's wife was very sick one night. He remembered that a CHW had recently been trained in the village, so he decided to take his wife there. The CHW, Rosemary Nkumbula quickly asked what the problem was, and decided to test for malaria using a rapid diagnostic test (RDT). The test was positive, so the CHW gave antimalarial medicines. After two days, Godfrey's wife recovered.

Godfrey has since developed an interest in the activities of the CHW and NHC, and feels they are really saving lives in the community. Mr. Matukula thanked Save the Children for the capacity building support and encouraged Rosemary to continue saving lives in the community with an open heart, despite being a volunteer.

APPLYING SKILLS FROM CAPACITY BUILDING

Bringing care closer to home: Mrs. Chitambala lives in Twatotela Village in Nkana health center catchment area. One day, her four-month old child developed a cough and could not breathe properly. She quickly took her baby to the CHW in the village. The CHW asked for the history of the illness, examined the baby, looked carefully at the child's chest and used a timer to check the respiratory rate. He immediately gave medicine to the baby and explained how to take the rest of the medicine at home. The CHW explained that the child had pneumonia and advised the mother how to care for the baby at home, and what action to take in case the condition became worse. By the next morning, the child's breathing and overall condition had improved. After a few days, the child had fully recovered.

Mrs. Chitambala was happy that her child was treated by a CHW rather than being referred to the health facility that was far away. She said that their CHW is able to handle most of the cases at the community level because of the trainings he received through the LINCHPIN Project. In the past, CHWs gave Panadol and referred cases to the health facilities, which were very far away. She said, *"Thanks to the work of the NHC, more people are now aware of the health issues and community members are taking positive steps to support CHWs."*



Mrs. Chitambala with her healthy baby.

APPLYING SKILLS FROM CAPACITY BUILDING

CHW acts quickly to save lives: Two-year old Mutale and his family live 37 kilometers away from the Lumpuma Clinic. One day, he became sick and for the next two days he stayed at home because his parents believed that someone had practiced witchcraft on him. Luckily the CHW, Prisca Bwalya, heard about the sick child and visited Mutale's home. She examined the child and tested him for malaria using an RDT. The test was positive, so she gave Mutale the first dose of antimalarial tablets. However, Mutale's condition deteriorated, so Mrs. Bwalya helped the mother take the child to the Lumpuma RHC. Mutale had severe malaria and was referred to the Kitwe Central Hospital. Prisca accompanied the family to the hospital where Mutale was admitted for two days, and thankfully, recovered.

Prisca's knowledge from the trainings she received through the LINCHPIN Project taught her to quickly identify danger signs, and refer the child to the hospital. This was invaluable as it helped the parents understand the importance of prompt care seeking and very likely saved Mutale's life.



Prisca visits Mutale after he recovers from malaria.

APPLYING SKILLS FROM CAPACITY BUILDING

Supporting CHWs in Kapilamikwa RHC: Mr. Chishimba Ntutuma is a CHW at the Kapilamikwa Rural Health Post. He received training in CCM and integrated management of childhood illnesses in 2011 through the LINCHPIN Project. Prior to this training, Mr. Ntutuma was unable to handle some cases of sick children, and he would refer them to the health facility. However, following the training in CCM that he received, he now feels confident managing cases of malaria, diarrhoea and pneumonia. Mr. Ntutuma has also received training in infant and young child feeding, community-based growth monitoring promotion and nutrition training, and he is an active member of the Kashininkisha Nutrition Support Group. Mr. Ntutuma mentioned that he “...looks forward to receiving more training from Save the Children to continue saving the lives of children and mothers of Kapilamikwa”. Mr. Ntutuma was provided with a bicycle to use when visiting his clients, collecting drugs from the health center and dropping off monthly reports. In addition, he received two goats, a t-shirt and a bag from Save the Children, which he feels have motivated him to keep working as a CHW.



Mr. Ntutuma provides CCM services at his health post. He also provides support at the health facility.

APPLYING SKILLS FROM CAPACITY BUILDING

Skin to skin care saves baby Irene's life: Baby Irene was born prematurely, at 34 weeks. By the time the TBA, Mebby Chisenga, arrived at her home, baby Irene's mother, Mrs. Kachana, had already delivered her; she was a very small baby. The TBA quickly dried the baby and put her on her mother's chest in the skin to skin position, as she had learned during her training. Next, Mebby took the mother and baby to the health center immediately. The nurse on duty called for an ambulance, and transferred Baby Irene and her mother to the Kitwe Central Hospital for further management. Though the baby stayed in the hospital and nursed in an incubator for one month, she continued to be cared for with skin to skin care. The TBA followed up with Mrs. Kachana in the community to see how she was doing and was very pleased to see a happy and healthy mother and baby. Good coordination between the TBA, SMAG and the health facility helped Baby Irene receive the right care in a timely manner. The LINCHPIN Project has trained 111 TBAs and 65 SMAG in ENC - with a special emphasis on providing skin to skin care for warmth, as a critical element in a baby's survival and wellbeing.



Healthy baby Irene and her mother are happy to be home.

APPLYING SKILLS FROM CAPACITY BUILDING



Mrs. Mutinta and baby Miriam spending quality time together.

Teaming initiative – a life saver: Baby Miriam Kandundu was born two months early. She did not cry immediately at birth and had trouble breastfeeding. TBA Mebby Chisenga helped to with her delivery in the Kapilamikwa RHC in Lufwanyama District and recalled the importance of skin to skin care for premature babies from the trainings she participated in through the LINCHPIN Project. The TBA asked the mother, Mrs. Mutinta, to wrap the baby close to her chest to regulate the baby’s temperature. The TBA made joint weekly visits with the CHW and two NHC members to check on the baby, and a month later, baby Miriam started to show real signs of progress. Mrs. Mutinta was very grateful to the TBA and the team members for their support; looking back she said, *“Had it not been for this initiative, my child could have died.”*

APPLYING SKILLS FROM CAPACITY BUILDING

Saving Lives at birth – A TBA’s passion: Alice Londaisha is a TBA in the Chantete Health Center at the far end of Lufwanyama District. Chantete is a community with no public transportation and no motorized vehicles of any kind. In November 2011, Alice escorted a pregnant woman on foot 5 kilometers to the health center for delivery, in accordance with the new role for TBAs in the district.

Upon arrival at the health center, she found that the center’s trained nurse-midwife had travelled to Kitwe - four hours away. However, two CHWs were attending the facility in the nurse-midwife’s absence. When Alice took the pregnant woman to the labor ward to examine her, she found the woman was pregnant with twins—and both babies were in a breech position. This was an obstetrical emergency demanding care at a higher-level facility. Alice immediately alerted the health workers that the woman needed to be transferred to the hospital in Kitwe.

This example of coordination of services is a hallmark of the LINCHPIN Project. The new approach teams birth attendants, CHWS, and NHCs to improve access, availability, quality, and high-impact newborn care with CCM interventions.

“As a team, we decided we had to make personal contact with the nurse. But none of us had a cell phone, so one of us rushed to the nearby house of a teacher who let us use hers. We got in touch with the nurse who called the Lufwanyama DHO to get the ambulance,” recounts Alice. “Throughout the four-hour journey, I stayed with the woman and monitored and reassured her. When we reached the [health office], a nurse-midwife was assigned to join us the rest of the way to the Kitwe Central Hospital. The next day, the health center’s nurse got in touch to let me know the twins had been delivered by caesarean section and that the mother and babies were all fine.”

Not too long after that, Alice was called to escort a pregnant woman to the clinic. However, the labor was so advanced that by the time she met the mother, she had no choice other than

APPLYING SKILLS FROM CAPACITY BUILDING

to help deliver the baby. The baby was very small, and Alice immediately realized that the baby needed to go to the clinic. She quickly instructed the mother to practice skin to skin care to keep the baby warm, using what she had learned during trainings through the LINCHPIN Project. Alice and some relatives took the mother to the health facility, where a nurse weighed the baby and called for an ambulance to take the baby to the hospital.

Baby Dorcas is doing well and her mother is thankful to Alice for saving both their lives. Alice is glad to have the knowledge to save lives in her community through the capacity building she received.

LINCHPIN is sharing lessons learned with the MoH and other partners at the national level. The project is also helping to coordinate the national effort to standardize CHW tools and job aids, and improve monitoring and evaluation.



TBA Alice Londaisha is a TBA in the Chantete Health Center. Here she visits a healthy Baby Dorcas and her mother.

APPLYING SKILLS FROM CAPACITY BUILDING



Mrs. Joyce Manjimela with her baby girl, Mapalo.

Working together to improve maternal and newborn health: As soon as Mrs. Joyce Manjimela began to feel the first signs of labor, she called for the TBA. The TBA arrived and sent for Mr. Manjimela, and together, they all went to the health post. The health center staff realized that there were complications with the labor, and decided to refer Mrs. Manjimela to the Kitwe Central Hospital. The team worked fast – they contacted the DHO, who sent an ambulance. Mrs. Manjimela was rushed to the hospital and delivered a healthy baby girl, Mapalo. Mrs. Manjimela said that, *“Many mothers used to die before, during and after delivery, and in some cases many families could not afford to hire a vehicle to go to the hospital. Thanks to Save the Children, everyone is working together to save the lives of mothers and children in Lufwanyama.”*

APPLYING SKILLS FROM CAPACITY BUILDING



Data manager mentoring a health worker in the health facility.

Supervision improves CHW/TBA reporting: Although supervision of CHWs and TBAs is considered to be one of the most important elements in the successful implementation of CCM programs, it is one of the most neglected strategies in rural districts like Lufwanyama, due to critical human resource shortages. LINCHPIN's focused on improving the quality of services by strengthening the facility-community continuum of care by building health facility staff capacity to support community-based providers, with monitoring and supervision. The LINCHPIN supervision strategy involves routine and systematic monthly supervision during outreach at under five clinics. However, infrequent supervision, insufficient time for the supervisor to carry out focused mentoring and a lack of reporting tools, has had a direct impact on the morale, motivation and performance of CHWs.

LINCHPIN's role in supervision is to build capacity and mentor supervisors in best practices. The project introduced supervision and mentoring checklists to improve the quality of supervision. It also built health facility staff capacity through trainings in routine and clinical supervision, mentoring and the use of supervision tools and registers.

APPLYING SKILLS FROM CAPACITY BUILDING



A CHW fills the treatment register while assessing a sick child.

Between 2011 to 2012, data from monthly treatment and follow-up visits demonstrated improved from 35% to 80% for TBAs and from 43% to 83% for CHWs. The reports showed improved treatment and follow-up for women after delivery, newborns and children and provided an indication of activity levels of the CHW or TBA. The introduction of mentoring forms also helped to improve skills in the use of basic diagnostic equipment such as timers, RDTs, Mid Upper Arm Circumference strips and treatment registers. These are used to monitor consistency and completeness of recording.

During monthly field visits, Save the Children conducted joint visits with a clinical officer from the DHMT to ensure sustainability and ownership. Supervisor's checklists and registers were also provided to all health facilities and community volunteers. As a result of the enhanced supervisory visits, LINCHPIN generated data that the DHMT was able to use in their health center performance assessment, to measure community volunteers' performance, and use the data for decision making to make improvements. This approach to supervision has significantly improved the quality of services that CHWs and TBAs in Lufwanyama are able to provide.

APPLYING SKILLS FROM CAPACITY BUILDING

Male role models pave the way: The Bulaya Health Facility is working with the NHC to encourage men to participate in MNCH care through male motivator groups. By accompanying pregnant mothers to the health facility for antenatal care or taking care of sick children, men can play a supportive role in MNCH. However, it is not common for fathers to take their children to the under-five clinic or to the health facility when the child is sick, as men who do so are often perceived as weak.

Emmanuel Mbewe lives in Bulaya community and has been working closely with the community to encourage male involvement in MNCH. He practices the key messages of the LINCHPIN Project on a daily basis. One day, when his wife was away, his child developed severe diarrhoea which needed urgent attention. Mr. Mbewe took initiative, put the child on his back, and cycled 8 kilometers to the health facility to seek medical care. Mr. Mbewe knew that he could not wait for his wife to take the child to the clinic. He said, *“Had I not rushed my child to the hospital thinking that people will laugh at me, my child would have died, because my wife could not have ridden as quickly as I did.”*



Mr. Mbewe on his bicycle takes his son to the clinic

BUILDING PARTNERSHIPS

LINCHPIN partners with Save the Children South Korea: Sound community mobilization through the LINCHPIN Project has helped the Mukutuma community construct a maternity wing. Through capacity building and community participation, NHCs identified health problems in their communities, and prioritized the construction of a maternity annex for skilled deliveries. Households in the community unanimously agreed to contribute 25% towards the project and worked closely with the MoH and his Royal Highness, Chief Mukutuma. The health center committee raised funds toward the construction of a maternity wing and a well-wisher contributed 1,000 bricks. The LINCHPIN Project team noted a high level of community commitment and involvement, and linked the community to Save the Children South Korea for financial support. The new facility has more room for prenatal care and family planning, and offers delivery and recovery space which is separate from the general ward where newborns spend their first hours. Since health center births have increased by nearly 30% since 2011, the LINCHPIN team has high hopes for the immediate and long term impact of a dedicated maternity ward. In March 2013, the Mukutuma Maternity Ward opened its doors for the first time. Hours before the official inauguration, healthy twin girls were delivered - they just could not wait until the official opening!



The new Mukutuma Maternity Ward.

BUILDING PARTNERSHIPS



The LINCHPIN team and her Royal Highness, Shimukunami work together to improve MNCH in Lufwanyama.

Traditional leaders come together to demand access to health services: One of the areas LINCHPIN focuses on is collaborating with the government and other stakeholders to bring positive improvements to the health system. The team initially worked with the local community radio to develop programs on MNCH and conducted discussions through community neighborhood groups to explore the ways in which Save the Children and community members can interact with, and influence the health system.

Through close engagement with community leaders, the LINCHPIN team has been able to attain the support of six chiefs from the Lufwanyama District, who have embraced this project. The LINCHPIN Project has greatly benefited from her Royal Highness Shimukunami's support. Her Royal Highness has spoken on radio programs and holds traditional meetings about investing in maternal health, using her influence to facilitate maternal referrals in her chiefdom. The influence of such community leaders is truly remarkable.

BUILDING PARTNERSHIPS

Partnering with the Rotary Club: The LINCHPIN team formed a successful partnership with the Rotary Club of Kalulushi to support the fight against malaria in the communities of Lufwanyama. Through a \$53,250 Rotary Matching Grant Project, 100% bednet coverage was provided for nearly 2,000 households in 10 rural communities within the districts of Kalulushi and Lufwanyama. This was a great step forward for the NHCs under the Nkhana Rural Health Facility, who had been struggling to find resources to procure and distribute insecticide treated nets (ITNs), as part of their community action plan.

Target communities received 5,400 long-lasting ITNs, and education sessions on proper use and retreatment of nets with the help of the community radio station - Cengelo. Strong collaboration between the LINCHPIN team, stakeholders and the NHC leadership has helped to effectively bring and deliver such services to Lufwanyama District.



Caregivers receive a bednet at a distribution session.