EVALUATION

INNOVATING FOR CHILD HEALTH: AN EVALUATION OF AN INTEGRATED CARE GROUP MODEL IN RWANDA

September 2015

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Photo Credit: Emily Hunn, University of British Columbia. Mothers practice responsive feeding their children with thick porridge at a Nutrition Week session

INNOVATING FOR CHILD HEALTH—AN EVALUATION OF AN INTEGRATED CARE GROUP MODEL IN RWANDA

EFFECTIVENESS OF AN INTEGRATED CARE GROUP MODEL AND OPERATIONS RESEARCH ON NUTRITION WEEKS TO IMPROVE HEALTH AND NUTRITIONAL STATUS OF CHILDREN IN NYAMAGABE DISTRICT, RWANDA

September 15, 2015

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CONTENTS

ACRONYMS

BCC	Behavior Change Communication
CBNP	Community Based Nutrition Program
CG	Care Group
CHW	Community Health Worker
CSP	Child Survival Program
CSHGP	Child Survival Health Grants Program
DIP	Detailed Implementation Plan
FGD	Focus Group Discussions
FY	Fiscal Year
EOP	End of Project
GMP	Growth Monitoring and Promotion
ICSP	Innovation Child Survival Project
ICG	Integrated Care Group
IYCF	Infant and Young Child Feeding
KII	Key Informant Interview
KPC	Knowledge Practice Coverage
LOE	Level of Effort
MCSP	Maternal and Child Survival Project
MNCH	Maternal Newborn and Child Health
MOH	Ministry of Health
NGO	Non Governmental Organization
NW	Nutrition Weeks
OR	Operations Research
PBF	Performance Based Financing
SOW	Scope of Work
UBC	University of British Columbia
USAID	U.S. Agency for International Development
VNC	Village Nutrition Committee
WR	World Relief

Nyamagabe ICSP Evaluation Team

Key Findings:

- **Significant improvements resulting from Nutrition Week interventions on key nutrition and health indicators**
- **Evidence of successful integration of the Care Group model in the existing community based and health system architecture**
- **Improved male participation resulting from community engagement**

Innovating For Child Health—An Evaluation of an Integrated Care Group Model in Rwanda, Executive Summary

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

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Evaluation, Purpose, and Evaluation Questions

The purpose of the World Relief (WR) final evaluation was to make strategic contributions to advance the health system strengthening goal of the Rwandan Ministry of Health. The findings provide key recommendations to achieve sustained improvements in child survival and equitable health outcomes, through innovative, integrated community-oriented and people-centered health care systems.[1] The mixed methods evaluation provides quantitative findings from key performance indicators and evidence of project investments and success from a multi-stakeholder assessment. The primary audience for the findings is the district and national Ministry of Health, the Global Health Initiatives and other development agencies.

A brief synopsis of the evaluation themes are listed below:

1. Describe the achievement of Project Goals and Objectives as illustrated in the Detailed Implementation Plan (DIP), project strategies, outputs and outcomes.
2. Examine key factors that contributed to the outcomes, and project management mechanisms that were effective and challenges in program execution.
3. Specify sustainability factors and implications for scale up of program strategies and interventions.
4. Determine effectiveness of the Integrated Care Groups (ICG) in achieving health outcomes.
5. Describe outcomes of operations research on Nutrition Week (NW) interventions and integration into existing Community Based Nutrition Program Strategy

FINAL EVALUATION EXECUTIVE SUMMARY

Project Background

The goal of the Tangiraneza "Start Well" Innovation Child Survival Project (ICSP) was to reduce morbidity, mortality, and improve nutritional status of children under five and pregnant women in Nyamagabe District, Southern Province, Rwanda. The project's objective was to improve capacity of Ministry of Health (MOH) staff and Community Health Workers (CHWs) to implement high impact maternal, newborn and child health interventions at the community level. Strategies were designed to support the MOH implementation of community health interventions with the following level of effort (LOE): nutrition (40%), maternal newborn care (35%), diarrhea (15%) and pneumonia (10%).

Project Intermediate Results :

1. Improve geographic access to and demand for high-quality maternal, newborn and child health (MNCH) services.
2. Improve coordination and impact of community health activities.
3. Develop Nutrition Weeks (NW) Innovation and conduct Operations Research to test effectiveness.

WR Rwanda (WRR) was one of the Care Group (CG) model pioneers during the first WRR CSP from 2001 – 2006 in Kibogora, eventually scaling up in other districts in modified form. As government CHW cadres were established with specific roles, the *Integrated* CG (ICG) was innovated in Nyamagabe. ICGs include three CHWs, the head of the village, a religious leader, three village leaders in charge of social affairs, information and community development, the women's leader, and a representative of the hygiene club. ICGs were established in the entire Nyamagabe District, both Kaduha and Kigeme hospital zones, to implement maternal, newborn, and child health interventions.

All training materials were developed with the Nutrition Technical Working Group (NTWG) and the district health team and aligned with the community-based nutrition program (CBNP) and global and national standards and priorities. Aside from training, ICSP staff met regularly with the ICGs to review progress, address challenges and institute problem solving measures. Home visits and community meetings were conducted monthly by the ICG team to reinforce the Behavior Change Communication (BCC) messages, improve facility-based service utilization—especially growth monitoring and promotion (GMP)—and promote kitchen gardens.

In collaboration with the University of British Columbia (UBC) and the MOH, the project conducted an Operations Research study to test the Nutrition Weeks (NW) innovation. NW was implemented in Kaduha with Kigeme as the comparison. The NW concept uses a supportive group education technique based on the Positive Deviance/ Hearth Nutrition strategy, but targets all children in the first 1,000 days of life, not just malnourished children. Nutrition Weeks cycles are conducted by the Village Nutrition Committees (VNC), comprised of CHWs and village leaders.

Evaluation Questions, Design, Methods, and Limitations

The project employed both empirically designed quantitative methods using the cluster sampling for annual knowledge, practice and coverage (KPC) household surveys and qualitative research methods using focus group discussions and key informant interviews. The OR study used a quasi-experimental design using standard statistical measures for sample estimations, based on outcome measures with adequate power. The hospital zone with the worst health indicators at baseline was selected for the intervention site. Instruments were designed with stakeholders, translated and field tested. IRB approvals were obtained annually from the Rwanda National Ethics Committee to ensure compliance to all ethical considerations for human subjects research. The KPC surveys were limited by cluster sampling which may be biased towards wealthier households because poorer residents at the periphery of the community may not be selected. In addition, a design effect must be applied to the analysis in order to account for within-cluster homogeneity. Inherent bias due to the purposive selection and subjective responses from qualitative research are known, though information obtained from stakeholder perspectives on the program makes valuable contributions to compliment and triangulate information from quantitative findings.

Findings and Conclusions

Results from the mixed methods evaluation showed that a majority of the child health targets were achieved. Households with soap at the place of handwashing increased from around 40% in both areas to 85% in Kaduha and 77% in Kigeme; point-of-use water treatment increased from 50% to 79% in Kaduha and from 56% to 67% in Kigeme. Infants visited by an appropriately trained health worker within 2 days of birth increased from less than 50% to 97% in Kaduha and 99% in Kigeme; mothers reporting four or more antenatal care (ANC) visits increased from about 47% to about 60% in both areas; those accessing care in the first trimester and skilled birth attendance also increased. Care seeking for pneumonia increased from baselines around 45% to 63% in Kaduha and 66% in Kigeme.

Results from the OR study are impressive and have enormous policy implications for Rwanda's nutrition agenda. A statistically higher proportion of children 6-23 months achieved a Minimum Acceptable Diet[1] (MAD) when exposed to the Nutrition Week intervention, compared to those not exposed [a linear probability model (LPM) found that compared to not being exposed to Nutrition Weeks, the probability of achieving the MAD was 23% greater when a child was exposed to Nutrition Weeks ($p<0.001$). Results for Minimum Dietary Diversity[2] and Responsive Feeding[3] were similarly statistically significant. Minimum Meal Frequency[4] increased to over 60% from baseline levels less than 10% in both intervention and comparison areas. Age appropriate introduction of complementary foods[5] also increased. Complementing the standard MOH CBNP strategies of large group health education and cooking demonstrations during growth monitoring and promotion (GMP) sessions, Nutrition Weeks provided hands on practice and group support to improve feeding practices of children under 2 years. Qualitative findings highlighted the potential financial and management constraints of sustaining the Nutrition Weeks strategy, as it requires intensive efforts initially to establish the community structures for enhancing food availability and feeding practices.

Despite the stated limitations for scale up requiring strategic engagement and oversight of both district health teams and communities, the study indicates the effectiveness of both the ICG and Nutrition Weeks innovation tested in this project. As Rwanda launches strategic innovations to enhance service delivery architecture, the findings offer key complementary mechanisms for achieving a people-centered health care model. Project results were shared with the Rwanda MOH, but it is not clear whether Nutrition Weeks will be added to the CBNP. Nutrition Weeks and Care Groups were included in a 2015 USAID Rwanda Mission RFA for eight districts. Nutrition Weeks has been adapted for use in WR programming in Indonesia and Malawi. The creative engagement of communities, through ICGs, offers unique solutions to the global workforce crises and a viable prototype for adaptation in other health care contexts. With the international efforts for reducing poverty, the alleviation of child malnutrition continues to remain a high priority. The Nutrition Week innovation offers a unique forum for creating community accountability and ownership and joint governance by communities and districts to inspire local solutions.

The Tangiraneza in Nyamagabe District, Rwanda, is supported by the American people through the United States Agency for International Development (USAID) through its Child Survival and Health Grants Program. The Tangiraneza Project is managed by World Relief under Cooperative Agreement No. AID-OAA-A-11-00056. The views expressed in this material do not necessarily reflect the views of USAID or the United States Government.

For more information about *Tangiraneza,* visit: https://icsprwanda.wordpress.com/

[1] BF children 6-23 months who had at least the minimum dietary diversity and minimum meal frequency during previous day. Non-BF children who received at least 2 milk feedings and had at least the min. dietary diversity not including milk feeds and the min. meal frequency during previous day

[2] Proportion of children 6-23m who consume at least 4 of the following food groups the previous day: Grains, roots and tubers; Legumes and nuts; Dairy products(milk,yogurt,cheese); Flesh foods(meat,fish,poultry& liver/organ meats); Eggs; Vit-A rich fruits & vegetables; Other fruits & vegetables

[3] Percent of Caregivers who assist child when eating (of children who consume soft, semi-solid or solid foods).

[4] Proportion of BF and non-BF children 6-23 m who receive solid, semi-solid, or soft foods the minimum number of times or more the previous day. For BF children, the minimum number of times varies with age (2 times if 6-8 mos.; 3 times if 9-23 mos.). For non-BF children, the number of times does not vary by age (4 times for all non-BF children 6-23 mos.) Dairy products only count toward the numerator for the non-BF children.

[5] Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods.

EVALUATION PURPOSE AND EVALUATION QUESTIONS

EVALUATION PURPOSE

The purpose of the final evaluation is to contribute to the global priority for cost effective, innovative strategies to improve child health in disadvantaged communities. More importantly it complements and addresses the health system strengthening goals of the Rwanda MOH for achieving sustained improvements in child survival and health outcomes in vulnerable populations through community-oriented programs and systems. The USAID CSHGP cooperative agreements are structured to demonstrate the evidence of strategic interventions through outcome measures. Findings from the performance evaluation are shared with a wide community of development stakeholders, including policy and program entities in the national and sub-national sectors in the government of Rwanda, multilateral and bilateral donors, including the USAID Mission, NGOs operating in the health sector, the CORE Group consortium of US-based NGOs and other global initiatives.

The evaluation was designed to integrate learning opportunities for all project stakeholders. Project accomplishments and strategic feedback on project value and performance from participants at all levels was obtained. These included mothers and caregivers, other community members and opinion leaders, health workers, health system administrators, local partners, other organizations, and donors. Independent evaluations are rigorously designed to provide unbiased inferences of project performance and help determine the effectiveness of the strategies employed, accounting for all project investments and other contextual factors. The project has been conducting both quantitative and qualitative assessments since the project inception in both intervention and comparison sites. Performance was documented through key nutrition and health indicators annually, along with qualitative assessments to inform program implementation. Though the ICSP project team had already completed the final KPC, the evaluation team leader led the final qualitative evaluation using IRB-approved focus group and key informant interview guides. Draft documents of the KPC report [Annex IV], and operations research study [Annex XIII], were shared with the lead evaluator prior to the field visit. The evaluator was approved by USAID. The final evaluation scope of work [Annex VI] was modified several times, to accommodate recent changes in the USAID evaluation criteria. The evaluator reviewed existing project data and reports prior to conducting the qualitative evaluation with key stakeholders to determine project effectiveness and challenges and provide strategic recommendations for follow up and integration into national priorities.

EVALUATION QUESTIONS

1. To what extent did the project accomplish and/or contribute to the results (goals/objectives) stated in the Detailed Implementation Plan (DIP)?
    - What is the quality of evidence for project results? How were results achieved? If the project improved coverage of high-impact interventions simultaneously, what types of integration enabled this? Specifically, refer to project strategies and approaches and construct a logic model describing inputs, process/activities, outputs, and outcomes. Describe the extent to which the project was implemented as planned, any changes to the planned implementation, and why those changes were made.

2. What were the key strategies and factors, including management issues, that contributed to what worked or did not work?

   - What were the contextual factors (such as socioeconomic factors, gender, demographic factors, environmental characteristics, baseline health conditions, health services characteristics, and so forth) that affected implementation and outcomes? What capacities were built, and how? Were gender considerations adequately incorporated into the project, either at the design phase or midway through the project? If so, how? Are there any specific gender-related outcomes? Are there any unintended consequences (positive and negative) related to gender?

3. Which elements of the project have been or are likely to be sustained or expanded (e.g., through institutionalization or policies)?

   - Analyze the elements of scaling-up and types of scaling-up that have occurred or could likely occur (dissemination and advocacy, organizational process, costs and/resource mobilization, monitoring and evaluation using the ExpandNet resource for reference).*

Additional Questions:

1. How effective are Integrated Care Groups in helping achieve changes in maternal and child health outcomes in their communities? Should ICGs be replicated? What modifications would increase their effectiveness?

   a. Are the members of the ICGs doing what is expected of them, including home visits? (Even the different local leaders?) If not, is a different profile of member needed, or possibly differentiation made between different types of members and their expected duties? (Perhaps some are included because of their influence in other realms and others are included because they will actually be the boots on the ground? Are all households reached?)

      The MOH is looking for ways that heavily burdened CHWs can leverage the energy of others in the community (not just anyone, but "existing structures" – which the ICGs do). Learning from this has the potential to influence the work that MCSP is currently planning in Rwanda as well.

2. Did Nutrition Weeks add value to the MOH Community Based Nutrition Protocol (CBNP), and if so, what were the key elements that made them work?

   a. Were there significant improvements in nutrition outcomes among the households exposed to ICGs alone compared to the households exposed to ICGs and Nutrition Weeks? If so, what are they?

   b. Did Nutrition Weeks improve functioning of the CBNP? If so, how? Considering all Ministry priorities, is there a cost benefit to Nutrition Weeks?

   c. Which parts of the Nutrition Weeks curriculum are most effective? Are there certain parts that have greater impact than others?

   d. Is nutrition information reinforced differently by ICGs in Kaduha compared to Kigeme (since Kaduha has the Nutrition Weeks experience)? If so, how?

*http://expandnet.net/PDFs/ExpandNet-WHO%20Nine%20Step%20Guide%20published.pdf

PROJECT BACKGROUND

RWANDA HEALTH SYSTEM OVERVIEW

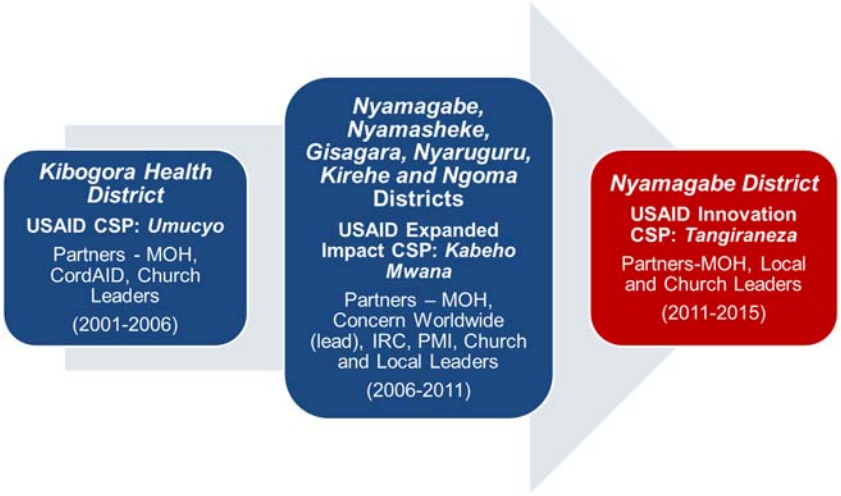
In the past two decades Rwanda has made dramatic improvements in revamping its health infrastructure to deliver high quality health care, resulting in a doubling of life expectancy, 80% reduction in deaths due to Human Immunodeficiency Virus (HIV), tuberculosis (TB) and malaria, and lowering maternal mortality by 60%. Health expenditure per capita is $56 for a population of 11 million people [2,3]. Aside from the enormous investments in equipping hospitals and health centers, Rwanda falls far below the minimum level recommended by the World Health Organization (WHO) of 2.3 providers per 1000 population at 0.83. However, 45,000 CHWs offer basic empirical diagnosis and treatment services, in addition to general health promotion. They have been instrumental in the control of infectious diseases and the reduction of costs. Efforts to successfully enhance service delivery include: 1) universal health coverage through the *mutelle de santé* preventing catastrophic spending by impoverished households at the lowest wealth quintile through subsidies, and 2) effectively addressing equity and quality of care through the performance-based financing system.

However, even with the fastest annual reduction in child mortality in the world, Rwanda still faces challenges of sustaining these gains and addressing the disease burden due to pneumonia and diarrhea. Pneumonia accounts for 18% of under five deaths and diarrhea accounts for 8% [4]. Though Rwanda has demonstrated significant progress towards the Millennium Development Goals, the unfinished agenda for malnutrition and safe water remain. Almost 34% of children under five are anemic [5] and 30% of households do not have access to an improved water source [6]. Chronic childhood malnutrition also remains high at 44.2% for stunting, based on data from 2010.

CARE GROUP MODEL IN RWANDA

The Care Group (CG) model is a successful evidence-based community innovation strategy [7-10]. Rwanda was one of the early pioneers to experiment with the CG model when WR introduced it in 2001, through its USAID Child Survival Program in the former Kibogora health district, eventually scaling up to other districts [Fig 1]. The model has been adapted in over 60 health and nutrition programs by 27 NGOs, in 23 countries [11].

Figure 1. Scale up of Modifications of the CG Model in Rwanda



The model employs an innovative, cost-effective, community-based strategy for universal coverage of health and nutrition education interventions through volunteers selected and managed by communities. Based on the success evidenced in other settings and previous projects in Rwanda, both the Kabeho Mwana project and this project adapted the model in response to MOH requests to support its CHWs and to work exclusively with existing human resources in the community. Each iteration of the model took into consideration what was then current as well as corresponding project goals and objectives. In this project, the CG model was innovated to integrate the existing health system community architecture, by training the MOH staff at the district level, CHWs, and local leaders (Fig 2). The project established 536 Integrated Care Groups (ICG)†, one in each village of Nyamagabe District. Ten members comprised the ICG in each village. Three of the members were MOH CHWs. Two of the CHWs known as *Binomes*, one male and one female, were trained in child health. One CHW was trained in maternal health and known as the *animatrice de santé maternelle* (ASM). Additional members included community representatives most closely associated with behavior change. These are the Social Affairs In-Charge at village level, the elected village leader (usually male), the village Information and Training In-Charge, the village Community Development Leader, the Women's Group Leader, a member of the Village Hygiene Club, and a religious leader (Fig 3). The ICG members met together monthly to receive training on health promotion messages and to support each other.

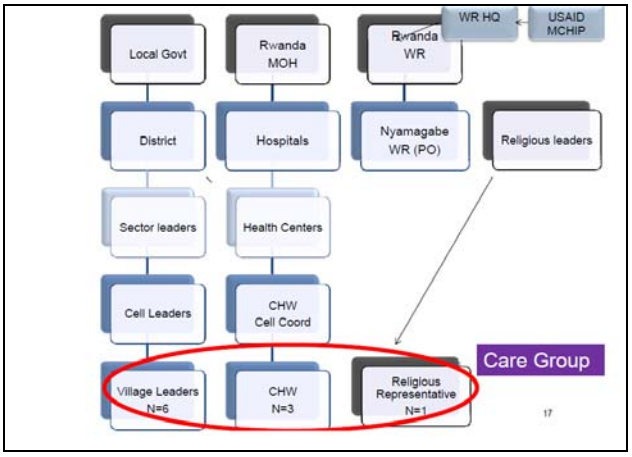


Figure 2. Strategic Stakeholder Engagement

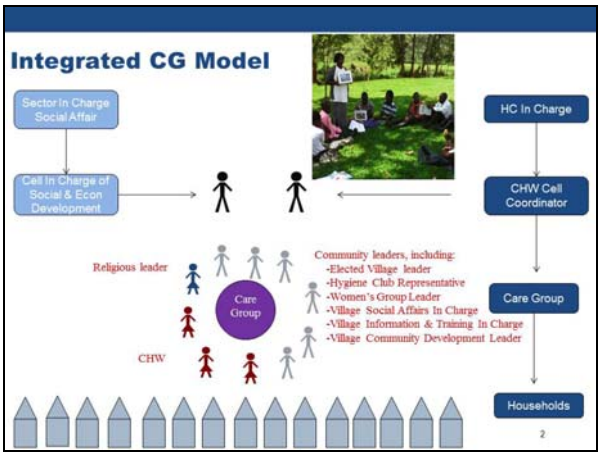


Figure 3. Integrated CG Model

Each CG member is allocated a certain number of households for the BCC home visit and follow up. Their functions also include the collection of vital events data and reporting to the district MOH (Fig 4). Capacity building and supervisory oversight is provided by the district team health and social affairs staff, WR project team and community entities (Fig 5). Data are collected every month by the ICG members, compiled at cell level and shared with the facility in charge. This is used for the CHW cooperatives for the Performance Based Financing (PBF). The data are integrated with the Health Management Information System (HMIS) and sent to the district hospitals. Some data are also collected by rapid SMS through CHW mobile phones. The facility and hospital data are password protected and the WR project teamobtain the information from the district. The project monitoring and evaluation officer maintains the database and synthesizes the information for supervision, problem solving and generation of reports.

† The project used the term "Modified Care Group" (MCG) in earlier documents but "Integrated Care Group" better describes the innovation.

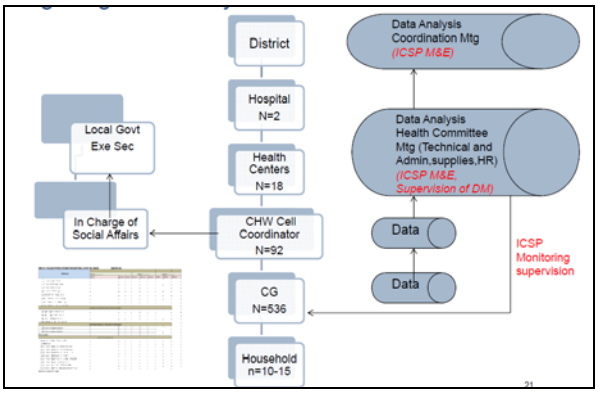


Figure 4. Integrating Community Information in District Statistics

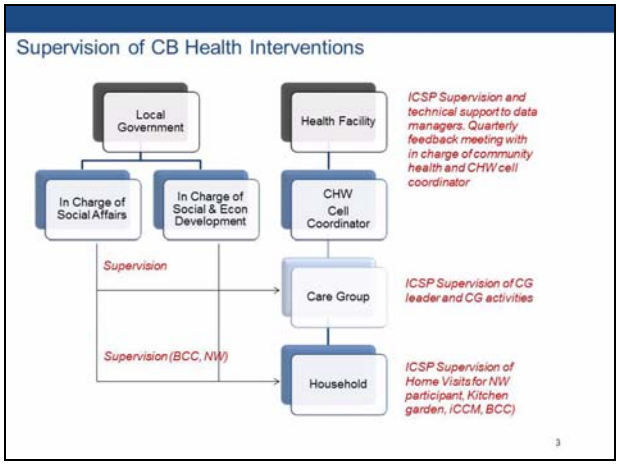


Figure 5. Supervisory and Technical Oversight of Health Interventions

PROJECT AND OR DESIGN

The overall strategy of the Tangiraneza Innovation CSP was to train MOH staff, CHWs and local leaders in ICGs for interventions in nutrition, maternal and newborn care (MNC), diarrhea and pneumonia. As described above, ICG members allocated all the households of pregnant women and children under two years in their villages amongst themselves for home visits and community meetings for BCC. Although CHWs retained their specialized MOH roles, uniting them into an ICG helped them work together, and, with the additional ICG members, they were able to more effectively mobilize the community to adopt key family health practices. The CSP supported MOH policy for vital events data collection: ASM CHWs reported births and pregnancies and Binomes reported under-five deaths. Other ICG members supported them by collecting the data during home visits.

The core interventions in the project's technical approach were: Nutrition (40% LOE, with Operations Research surrounding an innovation for community-based nutrition education called Nutrition Weeks methodology), Maternal and Newborn Care (35%), prevention and treatment of Diarrhea (15%) and prevention and treatment of pneumonia (10%). The overall project goal, strategic objectives, and intermediate results are displayed in Table 1.

Table 1. Project Results Framework

Project Goal: To reduce morbidity, mortality and undernutrition of children under five and pregnant women in Nyamagabe District of Rwanda.		
Strategic Objective: Improve capacity of MOH staff and CHWs to implement high impact maternal, newborn and child health interventions at the community level.		
IR 1. Improved geographic access to and demand for high-quality MNCH services	IR 2. Improved coordination and impact of community health activities	IR 3. Develop Nutrition Weeks Innovation and conduct OR to test effectiveness
Activities:	Activities:	Activities:
1) Build capacity of Community Health Supervisor and Hygienists from all 16 Health Centers as TOT trainers who will train CG in all CSP interventions. 2) Train Cell-Coordinators and Cell Social Affairs in-charges to supervise integrated CG	1) CHWs, religious leaders and community representatives meet monthly in integrated CG to: • Make action plans based on data reported by CHWs;	1) Conduct Operations Research comparing standard CBNP activities vs. CBNP plus 'Nutrition Weeks' intervention. Evaluate impact with regard

comprised of CHWs, village and religious leaders. (3-10 integrated CGs per cell) 3) Train leaders of integrated CG to train their peers in BCC for all interventions: Nutrition, MNC, Diarrhea and Pneumonia. The Social Affairs in-charge at the cell level will train CHWs for Nutrition Weeks, and support the CHW Coordinator in BCC/ community mobilization. 4) Train Kaduha area CBN Village Committees with the 'Nutrition Weeks' innovation. 5) Train 536 maternal health CHWs (ASM) in MNC package.	• Cross-train in BCC for key family practices based on barrier analysis and BCC strategy; • Coordinate regular home visits • Improve referral to appropriate CHW and/or health facility. 2) Build capacity of Sector and Cell level In-Charge of Social Affairs to support BCC. 3) Mobilize churches to assist vulnerable households with kitchen gardens & tippy taps.	to cost and feasibility for scale-up. 2) Participate in Nutrition Technical Working Group; solicit input and share findings. 3) Improve CHWs records and reporting system for nutrition.

The project prioritized nutrition as one of the key interventions for the operations research, as high levels of stunting were reported in Nyamagabe district compared to the already high levels reported nationally (53.5% vs 44%) [12]. In Rwanda, stunting is not restricted to the poorest households, as 26% of the richest households are also stunted. The annual cost of under nutrition is estimated at 503.6 billion Rwandan Francs. As the prevalence of stunting peaks at 18-24 months, the project targeted pregnant women and children between 0-23 months to align with the goal of UNICEF's 1000 day intervention strategy from conception to 23 months [13]. To align with the national policies for eliminating malnutrition, strategies for addressing under nutrition include the Community Based Nutrition Program (CBNP), which focuses on growth monitoring and promotion. However, as in other global experience, the 'promotion' component is weak with few cooking demonstrations primarily due to lack of protocols and district support [14]. CHW training varied greatly and there was little evidence on stunting impact.

Based on the learning and the success evidenced from the integration of the positive deviance Hearth model (PD/Hearth) in previous projects in Rwanda, WR designed an innovative approach for preventing malnutrition using strategic interventions focusing on nutrition education messages, cooking and feeding practice, counseling and follow up home visits, building on the distinctive characteristics of the CBNP and PD/Hearth strategy, while ensuring close supervision. This intervention approach, termed as 'Nutrition Weeks' was implemented only in Kaduha Hospital catchment area, and was tested through an Operations Research Study designed as a quasi-experimental two-arm study with the existing national CBNP program serving as the comparison. In Kigeme Hospital catchment area, the project supported the CBNP by strengthening GMP sessions through CHW training, provision of materials for cooking demonstrations and nutrition education delivered by ICGs.

The Nutrition Weeks strategy targets all households with pregnant women and mothers of children under two years for *prevention* of malnutrition, unlike the PD/Hearth strategy, which targets only malnourished children and their caregivers for community-based recuperation. The Nutrition Weeks strategy also involves fathers and alternate caregivers in some activities. Standard research procedures and informed consent were obtained from all participants, following the IRB protocols. Community meetings were held prior to each cycle and leaders and community members received information on the interventions. Both hospital zones, Kaduha and Kigeme, received the standard CBNP interventions, but Kaduha was purposively allocated to receive the Nutrition Weeks interventions as it had the poorest nutrition indicators. Population characteristics for each hospital zone are described in Table 2.

Table 2. Population Profile for Nyamagabe District by Hospital Catchment Area

	Kaduha	Kigeme	District
Total Population	161,743	168,767	330,510
WRA 15-49y	54,531	56,900	111,431
Children 0-59m	20,218	21,096	41,314
0-11m	4,044	4,219	8,263
12-23m	4,044	4,219	8,263
24-59m	12,132	12,657	24,789

Source: Nyamagabe District Statistics 2011

Aside from addressing the prevention of undernutrition, the Nutrition Weeks strategy differs from the CBNP in many dimensions. In the CBNP strategy, the CHWs are expected to create their own educational messages from their MOH nutrition curriculum materials, have too much information in the curriculum, are not knowledgeable about the nutritive value of foods, and address caregivers of all under five children. Nutrition Weeks focus on key infant and child feeding practices (IYCF), foster participation of mothers and fathers in the cooking demonstrations addressing barriers to adopting behaviors, and, more importantly, phase the educational messages with a step by step implementation guide for CHWs. Nutrition Weeks eventually empower communities as its members begin to build self efficacy in acquiring the food commodities, preparation of foods, and joint problem solving.

The project worked with nutrition experts to review current evidence and also performed rigorous formative research and market surveys to construct the key messages and practices (Box 1). Households with pregnant women or children under two were invited to attend a two hour participatory group education session every day for one week, three times per year, each group consisting of 10-12 participants. At the conclusion of the week, participants also received a poster as a reminder for meal frequencies, food variety, and other nutritional messages. The activities were led by the CHWs with support from the VNC, which included the village leader. This team was responsible for the follow up of these participants. Other community mobilization strategies were designed to engage leaders, including pastors, other community groups etc. Though the cooking ingredients for NWs were purchased by the project during the initial phases, the responsibility was eventually assigned to the community. Some Nutrition Weeks participants (about 17%) formed community associations to produce or purchase the ingredients, though this was not an intended project strategy. This included kitchen gardens and raising small animals for sale or consumption.

Box 1. Nutrition Week Content

Key Messages

- *Prepare thicker porridge with palm oil + three different kinds of flour*
- *Give animal foods if possible*
- *Improve feeding frequency*

Key Practices

- *Making and Eating Thicker Porridge*
- *Eating Fat and Animal-Based Foods*
- *Increasing Frequency of Meals*
- *Eating a Variety of Foods*
- *Improving Hygiene Practices*
- *Infant Stimulation and Feeding*
- *Increasing food intake for pregnant women*
- *Increasing rest for pregnant women*

The comprehensive project strategy had to be executed similar to a symphony orchestra to ensure equity and authentic participation by all concerned stakeholders. The strategy included: ICG, health promotion and education on IYCF, GMP, screening and referral of children, Nutrition Weeks, promotion of kitchen gardens, fruit trees, and small animal rearing, community oversight and supervision with active linkages and information system strengthening with the district team. Capacity building occurred at all levels of the system (Table 3). Partnerships were created with various organizations working in the district but the key partner was the district health team, hospitals and health centers.

Table 3. Stakeholder Capacity Building Strategies

Project Stakeholders	Project Capacity Building Strategies
National MOH (2012, 2013)	Mebendazole supplies
Hospital Staff (CHS, Nutrition supervisor, M&E, data manager, Hygienist supervisor) Health Center (In charges of CHW, Hygiene, data mangers, nutritionist)	Master Trainer and TOT – Jointly with MOH Technical: MNCH package, iCCM, Nutrition including IYCF, GMP, Nutrition Weeks (Kaduha) Care Group Leader Training, Principles of Adult Education, Community Mobilization Methods, Community based information systems, BCC Workshop for SMS reporting – mhealth, Data Analysis
CHWs	Supplies, Storage Cupboard, Mother counseling cards, posters, educational materials, weighing scale (Unicef), record sheets, vessels for cooking demonstrations
Care Group	Joint Supervision support and Home visits Incentives; Hoe, basins for hygiene, small animals; pig, goats
Community and associations (Hygiene Club, Women's Council, Social Affairs in Charge, Community In Charge, Development in charge, Communication in charge	Recipe for nutrition week participants Mothers association for animal husbandry (for households with children who were malnourished at project midterm) Training of VNC for animal rearing

PARTNERSHIPS/COLLABORATION

USAID Washington and Mission and the MCSP project have been engaged closely since the project inception, supporting the design of the KPC instruments, assistance with programming of the software for tablet data collection, OR guidelines, inclusion of key staff in workshops and webinars, and support from the Evidence Project on developing OR reports and communicating research findings to policy audience. Feedback on final evaluation documents, advocacy and invitation to the theory of change workshop were also critical supportive activities. A site visit by the 3-member USAID Mission team was especially appreciated by the WR staff and the partners.

The project partnered with Dr. Judy McLean, University of British Columbia, as Principal Investigator (PI), and her students, to implement the OR. Dr. Fidele Ngabo, former Director of Maternal and Child Health Unit of the Rwanda MOH, was the other PI of the OR study. The Rwanda MOH Nutrition Technical Working Group was closely engaged in the program design and in submission of the research protocols to the national ethics committee.

PROJECT IMPLEMENTATION

All project activities have been conducted according to the workplan described in the DIP and are summarized in Annex II. However, the MOH requested refresher training on verbal autopsy and death audits, and support to the health centers for follow up on CBNP, hence these were added to the workplan. All educational materials, evaluation tools and instruments used in the project were either validated previously or were reviewed and endorsed by the MOH, IRB and OR researchers. Reports were submitted monthly, quarterly, or annually to various internal and external project stakeholders.

Monitoring of the program activities was routinely performed through various quantitative and qualitative reporting mechanisms, including attendance in meetings, trainings, feedback loops for improving Nutrition Weeks based on experiences, behavior change, and barriers. For example, incorporating three types of flour in weaning food was not feasible for mothers, so the message was changed to one flour (whichever was available); men's attendance in meeting and Nutrition Weeks was low, as they did not perceive the value; and community leaders were mobilized to encourage participation. Tables 4 describes the sequencing of the OR interventions.

Table 4. Sequencing of OR Interventions

Phase	Objective	Product
Desk review of DHS, publications on nutrition from Rwanda	Design of Instruments and analysis plan for qualitative data collection, and determine BCC messages	OR evaluation instruments and analysis plan
Market Survey	Determine availability and cost of local food and related supplies for cooking demonstration	Market survey report, and nutritive values
Positive deviance inquiry using semi structured interviews and observations in the community	Identify mothers with a well-nourished 6-23m child from a low SES and feeding practices	Development of positive deviance tool and process based on standard approaches to Positive deviance
Development of CHW training materials for Nutrition week, pilot testing, and knowledge evaluation instruments	Standardize training materials and knowledge evaluation questions. Pilot testing with 30 CHWs	Training materials designed, pretested and pre-post tests conducted with CHWs
Interviews with mothers from Nutrition Weeks	To refine activities based on mothers feedback	Finalized activity plans
Baseline survey design	Design of instruments	Conduct and analyze KPC results
Implement Nutrition Weeks interventions thrice yearly	Training and support to CHW to conduct Nutrition Weeks	BCC Models
Design Annual KPC	Conduct evaluations	Analyze data and report findings, address gaps in performance

EVALUATION METHODS AND LIMITATIONS

Mixed methods evaluation designs are increasingly popular in both clinical and management research. In this approach, quantitative outcome data is complemented by qualitative research contributions that provide in-depth understanding of contextual and other factors affecting the success or failure of the interventions. Valuable insights are made in understanding program performance and the value of the interventions provided by strategic stakeholders. Hence, in compliance with the USAID evaluation policy, the project team designed a mixed methods evaluation which systematically integrated the standard Knowledge Practice Coverage (KPC) survey and qualitative research.

The KPC surveys were conducted annually using the KPC 2000+ modules, tailored to match project interventions and integrated with the 2008 Rapid Catch indicators. In addition, the indicator for Minimum Acceptable Diet (MAD) was modified to follow more current international standards. However, the annual survey measured only a subset of highest priority indicators relevant to main project activities, while the other indicators were measured only at baseline and final. The final KPC survey was performed by the WR project staff and health center staff and results shared prior to the evaluator's visit. Focus Group Discussion (FGD) and Key Informant Interview (KII) guides were designed based on project interventions and type of stakeholder with engagement by the WR staff and the final evaluator and were submitted to the Rwanda National Ethics Committee (IRB) for review and approval [Annex VIII]. The study design was enhanced through KPC surveys performed annually using cluster sampling unlike other projects which monitor progress through the Lot Quality Assurance Sampling (LQAS) scheme. A truly randomized designed of communities would have provided an even more effective model for examining the effectiveness of the Nutrition Week interventions.

Together with the Principal Investigators, the project designed a quasi-experimental operations research study to test the effectiveness of the Nutrition Weeks strategy using standard statistical measures for determining sample size with adequate power. The design was based on selected outcome measures: proportion of infants and young children 6-23m receiving minimum acceptable diet based on WHO standards (Minimum Acceptable Diet), number of food groups consumed for a 24h period (Minimum Dietary Diversity), minimum meal frequency, timely introduction of complementary food, and proportion of children 6-23m actively fed by caregivers. The evaluation instruments were jointly designed with the stakeholders and translated and field tested prior to the evaluation. IRB approvals were obtained annually from the Rwanda National Ethics Committee to ensure compliance to all ethical considerations for human subjects research. Both the Kaduha and Kigeme hospital zones received the standard CBNP interventions; however, the hospital zone with the comparatively most poor health indicators at baseline (Kaduha) was selected for the Nutrition Weeks intervention.

KPC surveys were conducted in each zone annually, using a sample of 360 in each zone at baseline and final and a sample of 300 in each zone in the monitoring years. The larger samples at baseline and final were to ensure an adequate sample of children 0-5 months needed for certain indicators. The surveys used 30-cluster sampling to provide a sample expected to have the precision of a random sample half as large. Even with cluster sampling the principles of randomness continue to be applicable. However, every individual in the community may not have the chance of being selected if sampling proceeds in a randomly determined direction from a central starting point and includes the next cluster of households. It is likely that residents at the periphery of the community, who could belong to the poorest wealth quintile, may not be selected if this method is employed. Inherent bias due to the purposive selection and subjective responses from qualitative research, non-random selection of participants are known. However, qualitative findings from stakeholder perspectives on program effectiveness make valuable contributions to compliment and triangulate information obtained from quantitative findings. A brief summary of evaluation methods and sample for each stakeholder is provided in Table 5.

The final evaluation team for the qualitative assessments was comprised of project stakeholders, including representatives from the MOH district team, Kaduha and Kigeme hospitals, a representative from the pastor's committee, USAID Maternal and Child Survival Program, Concern Worldwide, University of Rwanda, Anglican Church in Rwanda (EAR), African Christian Church Community (CESA) and Catholic Relief Services (CRS) aside from the WR team. A thirty-six member team participated in the final evaluation and teams were assigned to perform assessments in both hospital zones. The field evaluation schedule is illustrated in Annex XVIII. The evaluator conducted a three-day training on principles and methods of qualitative assessments, field survey and quality control procedures.

Table 1. Sample Frame for KPC and Final Qualitative Evaluation

KPC Evaluation – Caretakers of Children Under 2 years	*Sample Size*		
Baseline and Final Evaluation	720 (2 30X12 Cluster surveys)		
Year2, and 3	600 (2 30X10 Cluster Surveys)		
Final Qualitative Evaluation Stakeholders	*Kigeme*	*Kaduha*	*Total Participants*
Nutrition Weeks participants - Mothers (FGD)	-	3	30
Nutrition Weeks participants - Fathers (FGD)	-	3	29
Nutrition Weeks non-participants – Fathers (FGD)	-	3	30
Fathers (FGD)	2	3	48
Mothers (FGD)	2	3	49
ICG (FGD)	2	3	47 (25F, 22M)
Village Nutrition Committee (FGD)	-	3	13 (7F, 6M)
Sector and Cell leaders (FGD)	2	3	42 (13F, 29M)
Religious leaders (FGD)	2	3	48 (7F, 41M)
Head of Health Center (KII)	2	3	5 (2F, 3M)

Health Center Staff (FGD)	2	3	29 (17F, 12M)
Hospital Teams (Director, nutritionist, CHS) (FGD)	1	1	5 (1F, 4M)
DHMT/Vice Mayor, District Health officer		2 (1M, 1F)	

The measurement instruments focused on multi-stakeholder perspectives and value of the project interventions, potential and challenges to scale up and sustainability, other health care environment factors, and lessons learned for continuing project interventions. Site visits were conducted by the evaluation teams to the hospitals, health facilities and communities to perform FGD and KII, with Integrated Care Groups, leaders, village nutrition committees, participants and nonparticipants of interventions. There were no major impediments to the field implementation schedules and all selected sites were visited. It is also important to note that the Rwandan government had decided to conduct the national nutrition survey during this period and other key stakeholders who had indicated interest in participating in the evaluation were engaged in the planning and execution of the survey. Since the final evaluation was planned in advance, the team solicited the support and permission from the Ministry of Health to conduct the ICSP final evaluation and ensured that there would be no disruption to the ongoing national evaluation.

Means or percentages with confidence intervals were generated for the descriptive analysis and linear probability models. P-values were calculated for select nutrition indicators. Clustering was not accounted for, and sample size estimates were not generated for all 40 indicators. In addition, p-values were not generated for all indicators, but 95% confidence intervals were provided using a design effect of two to account for homogeneity between clusters. The KPC report (Annex IV) provides detailed information about the sampling strategy and selection of households and participants, indicating full compliance to standard procedures. There were no major issues with data quality in the collection, analysis and reporting for data, as WRR has extensive experience in conducting these surveys since 2001 and WR HQ prior to 2001 using an earlier version of the KPC. The project team employed a mixed methods strategy from inception to evaluation to inform program interventions, activities, and health education interventions. The methods strategy successfully leveraged the technical and research expertise of both country-level and international experts. The information from the qualitative findings was especially successful in contextualizing the Nutrition Week intervention strategies and messages for improving nutrient intake, and in engaging men in the health, nutrition, and well-being of their children. All the data used in this report were generated from primary data collection in this project. Although anecdotal information was obtained from the district mayor's office, hospitals and health centers on service utilization and referrals, the survey teams refrained from disrupting the activities of the ongoing nutrition surveys and did not examine district or health records.

Additional supportive supervision and mentoring measures were instituted to facilitate the activities in communities and cells that experienced greater challenges due to remote locations or inability to acquire ingredients for the cooking demonstrations. Income generating schemes through kitchen gardens and rearing small animals were developed to support community solidarity, ownership and long term sustainability and to address some of the community specific bottlenecks in project implementation.

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

FINDINGS

Evidence from the final KPC report, OR Report, and qualitative evaluation findings indicate that both the ICG model and the innovation of the Nutrition Weeks intervention resulted in successful capacity building and health outcomes in both Kaduha and Kigeme. The improvements were higher in the Nutrition Weeks intervention areas especially for nutrition indicators and significantly higher for three of the five selected to measure effectiveness of the OR strategy.

One-third of those selected for the KPC survey were in extreme poverty and about two-thirds were classified as poor. Over 80% reported *mutuelle* (health insurance) membership with 90% in possession of a health insurance card. This was a remarkable finding, as the hospital director and staff reported anecdotal evidence of increasing registration in the insurance schemes due to the effective mobilization of the ICG. The two hospital zones were comparable in terms of population characteristics (tested with chi-squared and t-tests).

Table 6. Summary of Inputs, Activities, and Outputs that Contributed to Key Outcomes

Project Objective 1: **Improved geographic access to and demand for high-quality MNCH services**			
Project Inputs	***Activities***	***Outputs***	***Outcomes***
MOH partners Trainers Training Materials	TOT and Supervision CHE cell coordinators, cell social affairs in charge, to support 3-10 ICG each 536 Maternal Health CHWs in animatrice de santé maternelle ASM Package Refresher training on iCCM for 1072 CHWs 3 day Master training for facility staff, and 2 day training of CHW in charge – assist health center staff to supervise and support CHWs Train Kaduha CBN Village Committees on Nutrition Weeks interventions	Trained Community health supervisors and Hygienists in 16 health centers Established 536 ICG Trained 5114 ICG members Trained 1608 CHWs	Increased percentage of children breastfed within 1h of birth, increased introduction of weaning foods, and responsive feeding. Increased percentage of mothers reporting 4+ ANC visits, ANC in 1st Trimester, increased skilled birth attendance Increased percentage of households reporting effective water treatment, soap at handwashing stations, safe feces disposal and toilets in good condition
Project Objective 2: Improved coordination and impact of community health activities			
Project Inputs	***Activities***	***Outputs***	***Outcomes***
Community stakeholders CHWs CG Members BCC materials	CHWs, religious leaders and community representatives meet monthly in ICG to create action plans based on data reported by CHWs, Cross-train in BCC for key family practices based on barrier analysis and BCC strategy, Coordinate regular	Action Plans for follow up Improved Referrals Kitchen Gardens Increased number of households reporting CHW visits, ICG member visits Home visit tool	Increased participation in Nutrition Weeks, increased male participation in Nutrition Weeks. Improved referrals (reported by hospital staff) Increased number of

	home visits Improve referral to appropriate CHW and/or health facility. Build capacity of Sector and Cell level In-Charge of Social Affairs to support BCC. Mobilize churches to assist vulnerable households with kitchen gardens & tippy taps.		households reporting CHW visits, ICG member and church member visits Increased number of households reporting improved behaviors around nutrition, hygiene, newborn care and pneumonia Churches mobilized to assist vulnerable families with kitchen gardens, tippy taps and small livestock CHW associations formed in 17% of cells for economic support of Nutrition Week activities
Project Objective 3: Develop Nutrition Weeks Innovation and conduct OR to test effectiveness			
Project Inputs	***Activities***	***Outputs***	***Outcomes***
Training Materials Nutrition Weeks training Curriculum development Cooking demonstration equipment	Design OR study on Nutrition Weeks Participate in Nutrition Technical Working Group; solicit input and share findings. Improve CHWs records and reporting system for nutrition	Communities, reporting Kitchen gardens, rearing of small animals, use of produce from kitchen garden for health care or food Customized Nutrition Weeks curriculum Exit Interview tool	Increased percentage of children in Kaduha reporting minimal meal frequency, minimum dietary diversity, minimum acceptable diet, consumption of iron rich foods. Decreased prevalence of underweight, wasting and stunting

A majority of the indicators targeted by the project exceeded the targets set for the end of project. The most impressive improvements were in nutrition. The intervention area saw a statistically significant improvement in Minimum Acceptable Diet among infants and young children 6-23 months as compared to the comparison area. Following a four year intervention period (three years for the Nutrition Weeks activities), a linear probability model (LPM) found that compared to not being exposed to Nutrition Weeks, the probability of achieving the MAD was 23% greater when a child was exposed to Nutrition Weeks ($p<0.001$) (Fig. 6). Likewise, Minimum Dietary Diversity (MDD) more than doubled in the intervention area from baseline to endline, but decreased in the comparison area. An LPM found that compared to not being exposed to Nutrition Weeks, the probability of achieving the MDD was 30% greater when a child was exposed to Nutrition Weeks ($p<0.001$) (Fig. 7). Minimum meal frequency increased from 7% to 69% in the intervention area and 7% to 66% in the comparison sites, and while these increases were statistically significant, the percent change between the zones was not (Fig. 8). Improvements were evident in age-appropriate introduction of semi solid foods, with no statistically significant differences between

Figure 6. Minimum Acceptable Diet

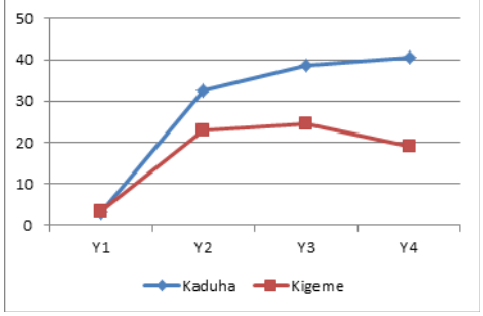
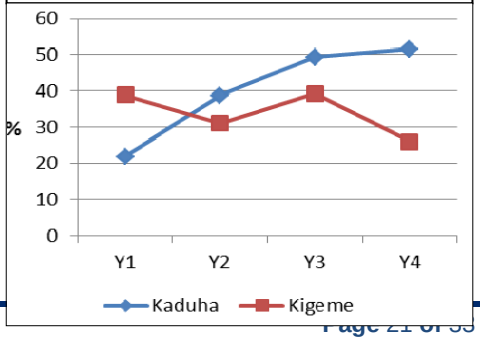


Figure 7. Minimum Dietary Diversity



intervention and comparison sites [Fig. 9]. Responsive Feeding (RF) remained high in both areas, increasing more in the comparison area [Fig. 10]. Breastfeeding within one hour of birth and consumption of iron rich foods also illustrated remarkable improvements in the intervention site, though there was a steady decline in iron rich foods in the comparison site [Fig: 11, 12]. Reported receipt of Vitamin A also declined in both sites in the final evaluation, but this was likely due to the national campaign prior to the baseline which escalated the initial levels [Fig 13]. Anthropometric measures also indicated improvements in percentage of children who were underweight, wasted or stunted in both sites [Fig 14-19].

Figure 8. Minimum Meal Frequency

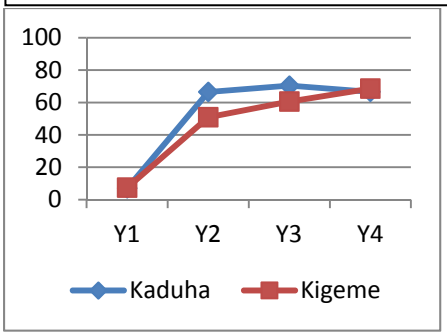


Figure 9. Introduction of Semi solid food

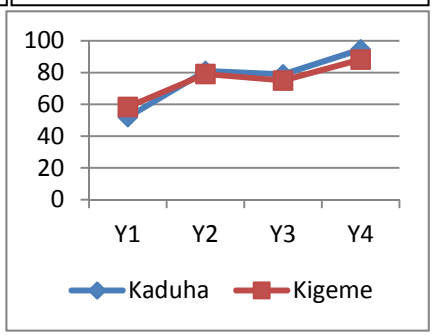


Figure 10. Responsive Feeding

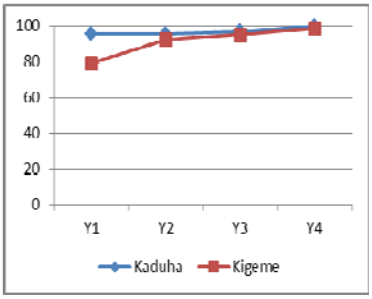


Fig 11: Breast feeding within 1h of birth

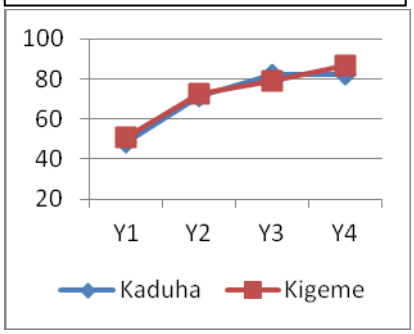


Fig 12: Increased intake of Iron rich foods

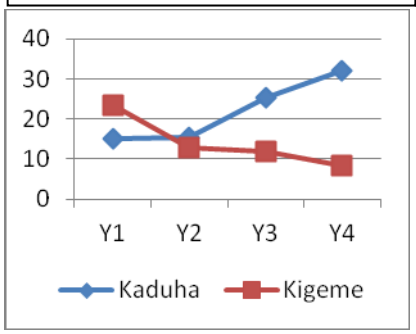


Fig 13: Receipt of Vitamin A

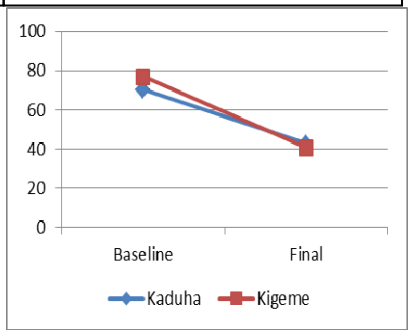


Fig 14: Underweight Prevalence-Moderate

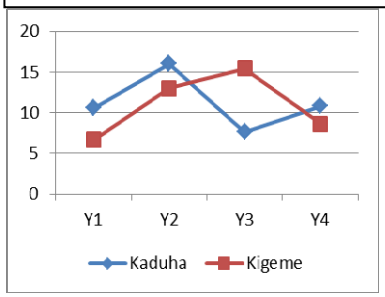


Fig 15: Underweight Prevalence-Severe

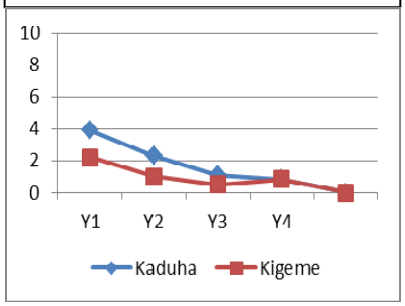


Fig 16: Wasting Prevalence-Moderate

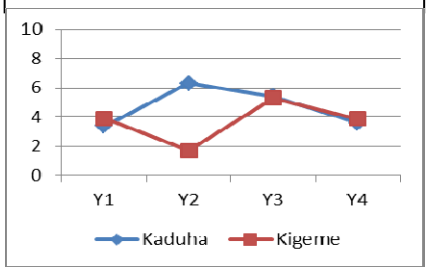


Fig 17: Wasting Prevalence- Severe

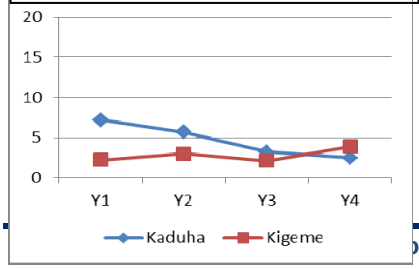


Fig 18: Stunting Prevalence- Moderate

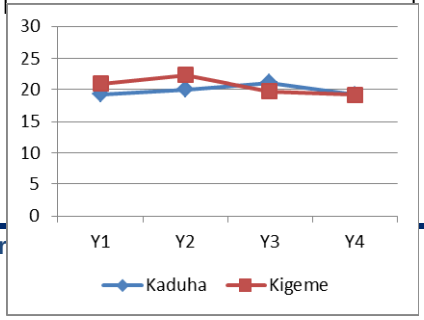
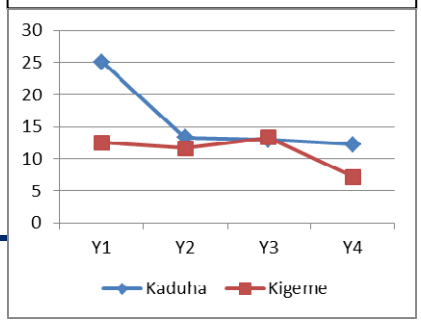


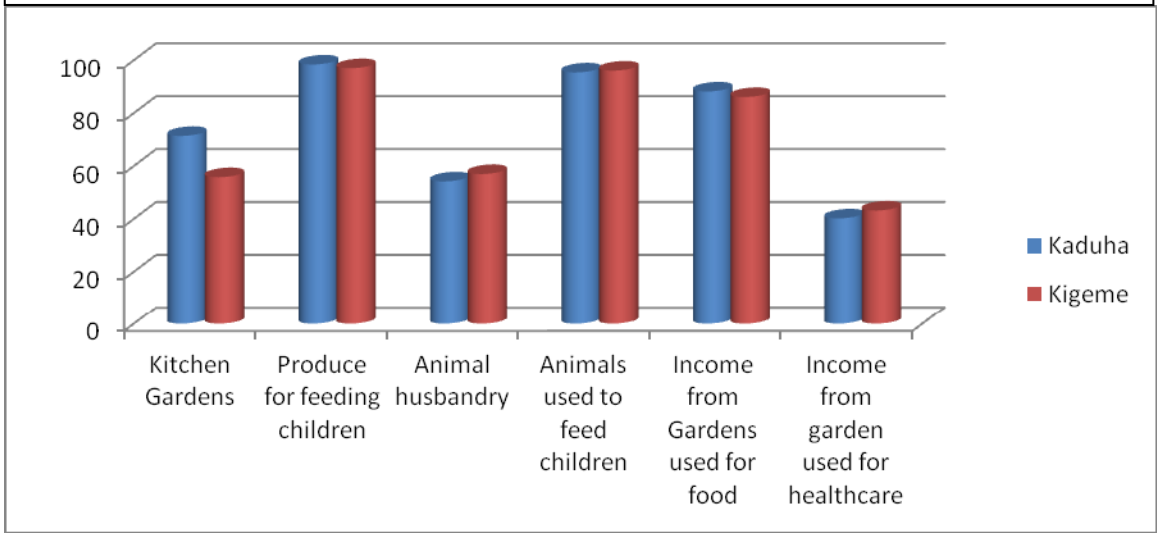
Fig 19: Stunting Prevalence - Severe



These findings provide considerable evidence for the effectiveness of a combined strategy of Nutrition Weeks and the ongoing CBNP strategy. The CNBP with Nutrition Weeks is more effective than the standard CBNP alone at improving the diet of children under two years. Children 6-23 months in the intervention area achieved MAD, the primary outcome of this research, at twice the rate that children in the comparison area did. Additionally, close to half (40%) of the children in the intervention area achieved MAD. Minimum Dietary Diversity more than doubled in the intervention area, but decreased in the comparison area, although not significantly; the 95% confidence intervals from baseline to endline overlapped.

The Nutrition Weeks and CBNP interventions were both successful in establishing kitchen gardens, and a majority of mothers with kitchen gardens reported that the produce was used to feed children. Likewise, the animal husbandry projects were instrumental in providing food sources for children and the income from both these strategies was used for food or health care [Fig 20].

Fig 20: Mother's Reports of Kitchen Gardens and Animal Husbandry Practice at the end of the project



The project also addressed other interventions for maternal and newborn care and hygiene practices. The proportion of mothers reporting four or more antenatal care (ANC) visits increased in both project sites, and those accessing care in the first trimester and skilled birth attendance also increased [Fig 21-23]. Mothers reporting newborn visits within 2 days of birth from an appropriate provider (including ASMs) increased from less than 50% in both areas to 97% in Kaduha and 99% in Kigeme.

Fig 21: Mothers Reporting 4+ ANC

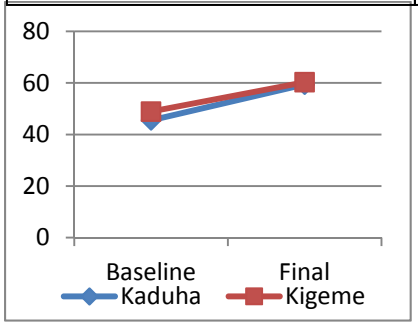


Fig 22: ANC in 1st trimester

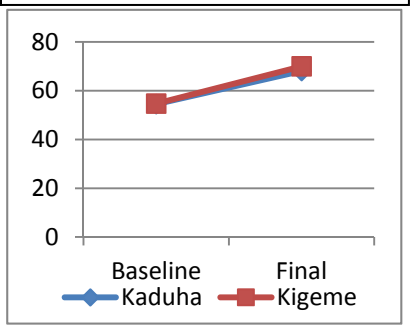
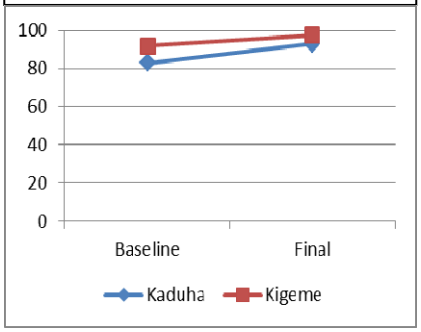


Fig 23: Mothers Reporting SBA



Modern contraceptive prevalence also showed improvements from baseline levels of <60% to more than 70%. Iron supplementation during pregnancy was high at baseline, at 80%, but declined the following year to about 70% and then resumed to 80% during the rest of the project term in both sites.

Effective point-of-use (POU) water treatment showed a sharp increase during the first year (likely due to District emphasis on hygiene during the first year) and declined the following years, though remaining above baseline; the trends in soap at hand washing places also showed a sharp increase in the first year, and thereafter remained the same. Though there was a slight increase in those having functional toilets, it was still below 40% at the end of the project. Safe feces disposal increased from 71% (Kaduha) to more than 80% at the final evaluation. There was a 6% decrease in diarrhea prevalence in children in Kaduha, but prevalence remained the same at 20% in Kigeme. However, a higher percentage of children with diarrhea were reported to receive Oral Rehydration Solution (ORS) or home available fluid at the end of the interventions in both project sites [Fig 26]. The trends were similar for children receiving more fluids in both sites, but zinc treatment during diarrhea declined in the intervention site.

Fig 24: Effective Water Treatment

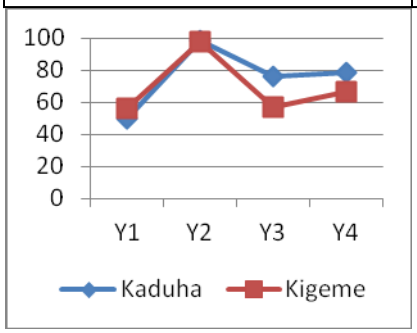


Fig 25: Soap at Handwashing Stations

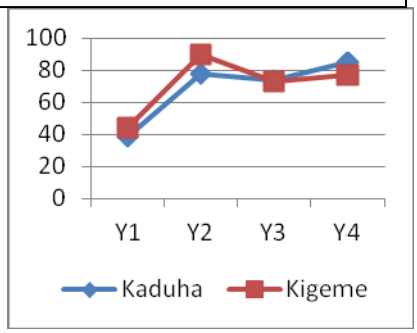
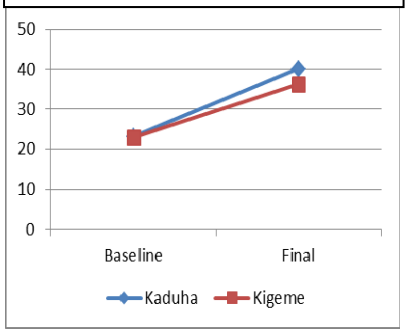


Fig 26: Children with diarrhea receiving ORS



Prevalence of cough and rapid breathing also declined in Kaduha, and care seeking for cough improved following project interventions in both sites [Fig 27, 28]. Immunization levels were already high (>80%) at baseline for Measles, Pentavalent 1 and 2, and showed slight improvements at the final evaluation. Since malaria was not endemic in Nyamagabe, there were no direct project interventions but all tracked indicators illustrated a slight decline from baseline levels for treatment of fever, bednet use etc.

Reports of household visits by CHWs increased progressively every year [Fig 29, 30] and participation in Nutrition Weeks also improved in Kaduha. End of the project survey measured home visits by ICG and delivery of health messages by churches. In Kaduha, 60% of respondents reported having an ICG member visit in the last month, and 39% reported receiving health information from a church, with respondents in Kigeme reporting 38% and 29%, respectively.

Fig 27: Cough in the Past 2 weeks

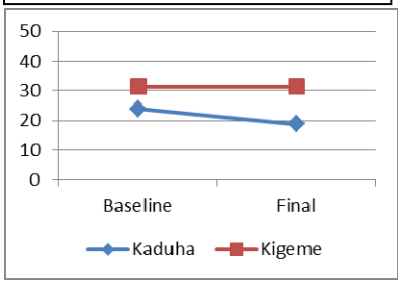


Fig 28: Care seeking for Cough Symptoms

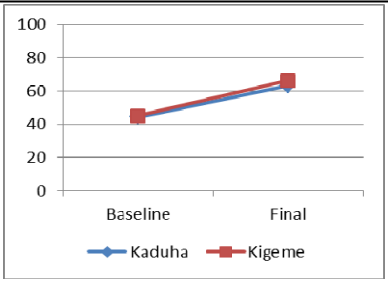
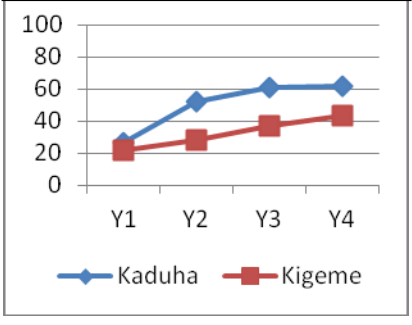
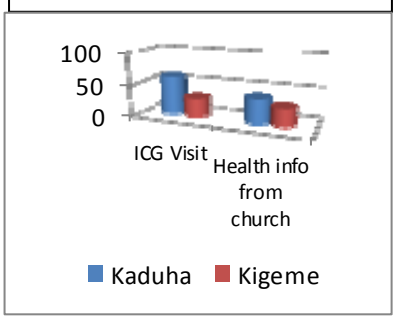


Fig 29: Household Visits by CHWs



Qualitative evaluations conducted with the district health teams and community stakeholders on value and effectiveness of project interventions further amplified the evidence on project interventions. The value of the ICG, CHW and Nutrition Weeks interventions was appreciated by all stakeholders interviewed, generating community-wide interest and engagement. This resulted in solidarity and gender equity with fathers taking responsibility for child rearing, health care, cooking, participation in community based activities (especially in the cooking demonstrations for Nutrition Weeks), and sharing household chores with the women [Annex XVII]. The leadership oversight, health promotion and equity-oriented strategies advocated by the ICG, home visits, with preventive and curative and referral functions of the CHWs strengthened the community health system's capacity. It also enhanced the linkages with the district teams at the hospital and health center level, establishing strategic information systems through SMS, support to campaigns and joint partnerships in achieving the district goals for health improvement. More importantly, in their KIIs, the district team indicated reduced illness incidence, prompt illness care seeking, increased service utilization, and reduced mortality, attributing it to the health promotion efforts of the project. The most impressive outcomes were evidenced for nutrition interventions through the operations research study on Nutrition Weeks, with increased meal frequency, dietary diversity, animal husbandry and the establishment of kitchen gardens. Most of the stakeholder participants remarked that the ICG model was sustainable as it integrated existing community-based and health system entities to engage communities and promote health care. As a CHW from Kaduha remarked *"the savings group empowered us economically to buy livestock, and members in our community who were poor could pay for the medical health insurance. We are thankful for the support of the district leaders and cell leaders; we function as one team. We are selected based on how we practice healthy behaviors: dish racks, clothes line, cleanliness of households, etc. Nutrition Weeks was initially perceived as a strategy for the poor, now they see it as a community activity. Even teachers left school to attend Nutrition Weeks. Before it was women's activities, now men bring children to the Nutrition Weeks and help in cooking demonstrations."*

Fig 30: ICG Visit, Church information



However, the training and supervisory oversight will need to be assumed by the district health system, through existing leadership structures. The role of pastors and other religious leaders was also emphasized to create and enhance trust between communities and health systems and also endorse and triangulate health information during their household visits or at church. The Vice Mayor's perspectives on project contributions further enhanced the value of interventions as he felt that the model should be scaled up in other districts as it achieved both national and district priorities for health policy, especially for nutrition.

The findings from the OR evaluation were shared annually with the communities and the Nyamagabe district and national MOH. Though the district health team is keen on continuing and adapting the strategy, the specific mechanism for integration and supervision oversight has not been determined, as the cooking demonstrations will require appropriate technical support during the initial stages.

The end of project (EOP) goals set for a majority of the indicators were an ambitious target, as baseline levels were quite low for key indicators. Health promotion efforts need to be complemented by other system level investments to ensure access, and to create an enabling environment to foster the behavior change in the communities. Targets for the indicators in the table below were not fully achieved by end of project for either one or both hospital zones, though there was a substantial improvement from baseline levels for most. The end of project evaluation occurred almost five months before the project ended and hence it is likely that some of the targets were achieved. Contextual factors such as extreme

poverty and limited access due to mountainous terrains are a strong impediment to achieving optimal results for exclusive health promotion interventions.

Table 7. Unmet EOP targets

	Kigeme			Kaduha		
	Baseline	Endline	EOP Target	Baseline	Endline	EOP Target
Minimum Dietary Diversity in children 6-23 months	38.9%	27.7%	55%	21.9%	52.9%	60%
Minimum Acceptable Diet for children 6-23 months	3.3%	19.0%	50%	3.0%	40.4%	50%
Children 6-23 months receiving foods rich in iron	23.3%	8.2%	50%	15.2%	31.9%	50%
Pregnant women receiving iron pills	81.4%	89.7%	90%	80.4%	83.2%	90%
4+ ANC visits	48.9%	60.3%	75%	45.5%	59.4%	75%
2 TT during pregnancy	68.3%	80.0%	80%	68.4%	77.3%	80%
ORS or HAF	22.9%	36.1%	70%	23.1%	40.0%	70%
More fluids for diarrhea	40.0%	63.9%	70%	36.9%	67.5%	70%
Zinc treatment for diarrhea	10.0%	20.8%	70%	24.6%	15.0%	70%
care seeking for pneumonia symptoms	45.1%	66.4%	70%	44.2%	63.2%	70%
CHW home visit during the past month	21.9%	43.3%	75%	26.7%	62.0%	75%
participation in Nutrition Weeks in the last 6 months	n/a	n/a	n/a	n/a	76%	80%

With continued support from the district, the generation of savings groups and other community oriented strategies, the integrated package of community interventions will likely have a more profound effect on the health outputs and outcomes in the long term. The results indicate that the complementary Nutrition Weeks strategy was more effective than the ongoing CBNP alone at improving dietary diversity and minimum acceptable diet. Competing health priorities may be a challenge to invest entirely upon nutrition interventions, though it remains a high priority for national policy. Initial outlay of investments will require substantial financial and time investments for district teams, but once established the scale of returns will be evident as communities take initiative and ownership of the systems. Though the Nutrition Weeks strategy has demonstrated great potential for a community owned strategy for addressing malnutrition and health care, contextual considerations will be necessary to determine the opportunity costs and financial investments for the district teams before decisions are made for scale up.

The strategic leveraging of district health system and community leadership through the ICG providing technical capacity, equitable coverage, and management oversight of CHWs offers an excellent mechanism to achieve Rwanda's health system priorities, which require optimal community engagement.

KEY SUCCESS FACTORS

The project benefited greatly by using previous project staff who had experience establishing CG and working with community-based systems. The project team made phenomenal investments throughout the project lifecycle, for establishing robust community-based health systems and creating synergies with the ongoing priorities of the district team supporting their programs and partnering on most of the health initiatives launched by the districts. Training and management oversight of 536 ICG in the entire district was a challenging feat to accomplish within the short period, made more challenging due to limited geographic access to the communities. During the initial stages, Dr Judy Mclean and her students at the University of British Columbia were instrumental in designing the OR research and also assisting with the Nutrition Weeks qualitative research, drawing on their research and nutrition expertise. Dr. Fidele Ngabo, former Director of Maternal and Child Health Unit of the Rwanda MOH, was the other PI of the OR study. The project team capacity building efforts include monthly and quarterly leadership meetings to update on technical and management aspects of the project. As the existing health information system in Rwanda does not obtain information on household behavior change practices on a

routine basis, the project developed a community mobilization tracking system. This provides a record of CHW performance, coverage, hand washing systems, and other behavior change indicators. Exit interviews with mothers following the Nutrition Weeks demonstrations indicated a great enthusiasm for the information and skills obtained. Mothers also met independently to review the content.

The BCC and supervision strategies were specifically designed for each stakeholder group and tools were standardized. Flip charts and counseling cards for BCC, maternal and newborn health, IYCF, posters and songs for prevention of malaria and pneumonia were developed. Posters, summary of IMCI, and Nutrition Weeks recipe booklets were also made available for other community members along with radio spots.

PROJECT CONTRIBUTIONS TO LEARNING AND EVIDENCE

The project team made conscious efforts to create a learning forum for strategic stakeholders based on the evidence. Presentations on findings from evaluations were shared with the national nutrition technical working group, nutrition summits, and other national and district policy makers. Students from University of British Columbia, Future Generations and teams from USAID and UNICEF visited the project site. Subsequent to the launch of the project and dissemination of preliminary findings, WR received funding support from UNICEF for expanding the program in Rutsiro, Gasabo and Rusizi districts. Funding was also provided by FAO for complimentary food security activities in Kitabi and Nkomane sectors. The Nyamagabe district team recommended OneUN (a group of United Nations agencies) to adapt the WR strategy of ICG and Nutrition Weeks for their nutrition program. The project team was also engaged with the MCSP project to learn about the ICG strategy. World Relief's MCH Regional MCH Advisor, Melene Kabadege, was invited to present the findings to 20 Ministers of Health at a meeting in Washington DC organized by USAID.

Other partnerships were forged with the WFP, OneUN, WV, FAO, UNICEF and CRS who were also engaged in food security interventions providing food supplements to pregnant women, as well as micronutrient powder (MNP). The research capacity of the project team and district partners was enhanced through participation in the cluster surveys, qualitative research and operations research study, and the use of smartphone technology for data collection and data analysis.

One of the most profound contributions of the project intervention was the transformation of male community members, who played an active role in child care and assisting women in domestic activities including cooking and kitchen gardening. Though men and women face different obstacles in care seeking and women typically are charged with domestic and childcare responsibilities, this was gradually changing as men were seen taking their children for health care and immunizations.

Components of the research were integrated in other WR grant proposals. In a proposal to TEARfund Australia for WR Indonesia, a Family Days nutrition intervention was designed based on the Rwanda OR. The strategies for nutrition education including cooking demonstration for the whole family to reinforce the messages provided by the churches were integrated in the interventions for the remote highlands of Papua. Nutrition Weeks were also adapted for implementation in a World Bank-funded nutrition project in Malawi which began in 2015. In Rwanda, WR's UNICEF project applied the NW concept for the introduction of MNP. Additionally, both NW and CG were included in a 2015 USAID Rwanda Mission RFA for eight districts, raising the possibility of broad scale-up in the near future.

In decentralized health systems where health sector wide approaches are integrated, sector monitoring and evaluation systems generally lead to improvement in accountability and learning, which may ultimately lead to better performance and results on the ground [15]. CHWs continue to play a pivotal

role in service delivery and the data routinely generated through their systems are increasingly relied upon for providing information for program management, evaluation and quality assurance [16]. Though the system of using CHWs has been effective, the quality of the data is not always optimal. The project made considerable contributions to instituting effective community-based information systems through the ICG model, which fostered effective information systems and management of health issues at the district level, building capacity for integrated information systems.

PROJECT CHALLENGES AND LIMITATIONS

The project experienced delays due to delays in IRB approvals (more than three months), the development, translation and endorsement of the Nutrition Week curriculum, and leadership replacement due to the departure of key project personnel—including MOH investigators and the WR Director of MCH. There was an initial resistance by men to engage in the Nutrition Weeks. This was overcome by leveraging the community leadership and male ICG members who held community meetings and made home visits to advocate to men for participation. During church services, pastors also encouraged men to participate in Nutrition Weeks. Annual KPC evaluations were also resource and time intensive, especially during the rainy seasons. The existing CBNP strategy was not well designed and initially developed for facility based rehabilitation, and GMP sessions were only held in a few communities with minimal use of data. The project team invested considerable effort during the initial phases to develop the system and design robust monitoring systems for strategic decision making, as these indicators were not previously integrated in the district health information systems. Screening for severe malnutrition by the MUAC method was not standardized resulting in a high volume of errors and poor sensitivity. This was eventually integrated as a module for CHW training. Supervision of the GMP program was also extremely low with less than 30% reporting supervision. Supervision guidelines were also established for appropriate support to the GMP activities.

In the first two years, the project supplied the ingredients required for the NW demonstrations, though eventually the community was requested to generate these food commodities. This was met with initial resistance, but was eventually accepted. About 17% of the Nutrition Weeks groups organically formed income generating support groups to facilitate the interventions, which was not a planned activity.

Changes to the health care environment have to be accounted for and regulated in an operations research study. CRS launched a nutrition program in 2013, providing livestock, prompting kitchen gardens and conducting GMP sessions in two cells (three to four villages each) of the project area. The district and project team intervened to ensure that these interventions were only provided in selected cells to avoid contamination of results in the comparison site. Other interventions in the project area that may have contributed to the results include the integration of the 1000 day national campaign messages and MNP distribution (UNICEF) in 2014, the distribution of livestock in two sectors of the project area by FAO with WR Farmer Field schools in the same sectors, and the distribution of food supplements by WFP through a WV project to families in the lowest two poverty categories.

Referral for children with severe malnutrition was a major challenge initially as the WFP had already predetermined a target figure that could be treated at the health center. Hence children were sent back home if the health center already achieved the target, resulting in adverse perceptions and adherence to CHW or ICG counsel. The project team had to renegotiate these targets and ensure that children received appropriate case management or admission for these cases. Some mothers were reluctant to weigh their child in the UNICEF weighing scales as they were used by other community members and were unhygienic. The project team advocated for toilet seat covers, to accommodate their requests.

CONCLUSIONS

Despite Rwanda's extraordinary progress in the recent years, and winning the 'triple crown' reputation of fast economic growth, poverty reduction and narrowing the equity gap, challenges remain in reaching the goals for an equitable people-centered health care system that addresses the unfinished agenda of malnutrition and emerging trends of non-communicable diseases. Rwanda has launched many successful innovations, and the current evidence on Nutrition Weeks and ICG interventions illustrates a promising future for the country. Emerging initiatives like the USAID's 5-year Maternal and Child Survival Program, which focuses on scaling up successful service integration and capacity building innovations for optimal service delivery in primary care settings, need to consider these local solutions for enhancing community capabilities and ownership for long term sustainability.

The CG Model has been successful in achieving significant improvements in health care seeking behavior and mortality impact in other settings, as it employs an extensive cadre of community based volunteers to focus exclusively in health promotion interventions [7]. However, limited evidence on its sustainability and integration within existing national systems and community-based structures has been a major limitation. The Nyamagabe model of ICG actively engages various community and district leadership in joint training, decision making, and program implementation with the CHWs to ensure quality, equitable coverage, management efficiency, community acceptance and to address barriers to effective execution of interventions. The integrated model did pose some initial challenges as local leaders had other responsibilities and were unavailable for training or lacked the competencies. CHW master trainers were selected to cascade the training to the ICG members including village leaders. The cascade training model resulted in establishing key monitoring systems to ensure communication and information was standardized, to mitigate errors and unrealistic community expectations. This required enormous time investments of project staff during the initial stages of the project.

Results from the KPC surveys and qualitative assessments indicate impressive gains and returns of project investments, with significant differences between intervention and comparison sites for the OR nutrition interventions. Though the EOP targets were too high considering the lack of geographical access to health services, the upward trends indicate that these goals will be eventually achieved with the continued support of the district health team and community entities through the ICGs. Focused niche strategies like Nutrition Weeks are essential for targeting key health behaviors and interventions, especially for nutrition combined with other hygiene and food security interventions to prevent the onset of disease. Results from the Nutrition Weeks intervention demonstrated stronger behavior change results than CBNP, which relies primarily on large group education and demonstration. It is likely that the hands-on practice of cooking foods and feeding children facilitated the increase in dietary diversity among Nutrition Weeks participants.

The People-Centered health care framework proposed by WHO advocates for placing people and communities at the center of the health service planning to ensure that health services are more comprehensive, responsive, integrated and accessible to address diverse population needs [1]. The ICG model is a promising strategy for the delivery of people-centered care as it addresses and accommodates the perspectives of communities and priorities of the health care system building trust, equity, and achieving the goals for universal health coverage empowering people as co-producers of health. The CG model has evolved in Rwanda and has come to a phase of fruition, where community health care initiatives can be tactically integrated within the health system architecture, beyond achievements of short term project goals and objectives. However, government ministries will benefit from continued engagement of NGO's like WR, who have distinctive competencies and experiences in equipping and empowering community entities. Rwanda has witnessed transformational change in the past two decades, driven by major economic, political, social, technological and environmental forces. In

this complex and dynamic environment, health care organizations need to creatively innovate to ensure a resilient, responsive and catalytic service delivery system to meet the needs and expectations of its people. To quote the mothers in Mugano Sector "*It would be very nice to have the Tangiraneza (Start Well) project continued, or to at least start a new project called KOMEZANEZA (Continue Well).*"

RECOMMENDATIONS

The main recommendation for this project is based on the reflections made by the Vice Mayor of Nyamagabe, who was keen to scale up the model in other districts, and use their district as a learning lab, as the model has demonstrated to be an effective strategy to reach the goals for national priorities. To retain the collaborative elements and partnerships, he believed that the district could play a pivotal role in initiating the meetings to plan and design the ongoing initiatives and determine the leadership and management oversight of these community mechanisms. The district letterhead, he remarked, would bring the profile and value for planning the sustainability initiatives. The mobile phone alerts through RapidSMS linking CHWs to nearby facilities for referral and real time information systems, needs to be sustained and integrated into the ongoing district health information system architecture.

Findings from the Nutrition Weeks and ICG model also indicate their potential for long term gains and achieving national priorities. Reported bottlenecks for active engagement in the Nutrition Weeks and supply of essential commodities for the group cooking exercise were successfully addressed in some communities. These best practices must be shared with other sites and WR and NGO projects through photo voice and other media to effectively communicate the problem solving measures instituted in this project. The WR team has already integrated key success elements in other ongoing initiatives and programs in other country contexts, but it should be shared with a wider audience for effective adaptation. The CG model has been experimented widely in many countries, but few have demonstrated successful integration within existing health care systems. A research publication on the potential, limitation and challenges of the ICG would provide key insights for other NGO's adapting the CG model for community-based health care. Effective support systems for optimizing CHW performance, creating contextually appropriate supervisory and incentive systems with local leaders was one of the distinctive features of this project. National CHW movements will benefit greatly from this ICG model, as the CHW workforce can be effectively leveraged to achieve universal and equitable coverage and quality.

Sustaining motivation and performance of CHWs has been a universal challenge, especially in contexts with minimal monetary compensatory mechanisms or incentives. In Rwanda, the PBF initiative has reported remarkable success in achieving health system goals, however the performance payment mechanisms for CHWs continue to pose challenges, posing great risks to the continued performance of CHWs. The CHW savings schemes instituted in Nyamagabe have been successful in some sites, but undocumented in other communities. The key challenges in this mechanism for performance payment and problem solving mechanisms that have been evidenced to be successful, would provide an excellent learning opportunity for other health systems that rely on this volunteer workforce. The ICG meet regularly, and have similar task expectations for home visits, etc, however, it is likely that CHWs are assigned more responsibilities for the ICG expectations. Though this was not evident in any of the qualitative research findings, it would be important to interview and document some of the challenges perceived by CHWs in the ICG model.

Interviews with the project team indicated enormous levels of sacrificial investments to meet project demands and goals engaging with the district team as partners. An internal documentation of promising practices and challenges would enhance organizational and individual learning for WR as they engage in scaling up programs in other health systems globally. The Nutrition Weeks strategy and ICG model are innovative mechanisms for consideration in post conflict and transitional contexts to build trust, solidarity and strengthen linkages with developmental agencies and the national governments.

Table 8. Recommendations

Finding	Conclusion	Recommendation	Action	Who Is Responsible
Effective integration of CHW and local leaders through ICG Model	*Achievement of universal coverage for key MNCH interventions*	*Ensure ongoing implementation in Nyamagabe and scaling up to other projects; maintain RapidSMS system for CHW reporting; research publication on ICG & CHW performance; document CHW savings scheme & CHW challenges with ICG; WR internal documentation of promising practice for consideration in development & post conflict contexts*	*Dissemination of evidence to national and global stakeholders. Research Publication*	*WR HQ, USAID, MCSP, CORE Group*
Evidence of Nutrition Weeks interventions	*Improvements in key nutrition, child feeding and food security indicators*	*Integration in Rwanda's national nutrition policy and CBNP to be complemented with Nutrition Weeks activities, kitchen gardening etc.; share best practices with other sites; share with broader audience & WR internal documentation of promising practice*	*Advocate for uptake of Nutrition Weeks interventions with national technical advisory groups and other global entities including WFP, UNICEF, etc.*	*WR, MOH Technical Advisory Group*
CHW Incentive Systems	*Inadequate documentation*	*Obtain information through informal feedback from CHW*	*15-20 CHW informal interviews to determine effectiveness of incentive systems*	*WR Internal documentation*

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ANNEXES

I. List of Publications and Presentations Related to the Project

II. Work Plan Table

III. Rapid CATCH Table

IV. Final KPC Report

V. Community Health Worker Training Matrix

VI. Evaluation Scope of Work

VII. Data Collection Instruments

VIII. Disclosure of Any Conflicts of Interest

IX. Evaluation Team Members, Roles, and Their Titles

X. Final Operations Research Report

XI. Stakeholder Debrief PowerPoint Presentation

XII. Project Data Form

XIII. Year 3 (MTE) KPC Report

XIV. Qualitative Data Findings

XV. Summary of Project Activities