

Applying the Care Group model to tuberculosis control: findings from a community-based project in Mozambique

A. Brown,* P. Ernst,[†] A. Cambule,[†] M. Morrow,[‡] D. Dortzbach,[§] J. E. Golub,[¶] H. B. Perry[#]

*Johns Hopkins Schools of Nursing and Public Health, Baltimore, Maryland, USA; [†]World Relief/Mozambique, Chokwe, Mozambique; [‡]ICF (Maternal and Child Survival Program), Washington, DC, [§]World Relief, Baltimore, Maryland, [¶]Department of Medicine, Johns Hopkins School of Medicine, Center for Tuberculosis Research, Baltimore, Maryland, [#]Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA

SUMMARY

BACKGROUND: We describe the effectiveness of an innovative community-based social mobilization approach called Care Groups to improve the effectiveness of the national tuberculosis (TB) program by increasing TB testing and improving treatment outcomes in six districts of rural Mozambique.

METHODS: The Care Group approach, which was implemented in a population of 218 191, enabled a facilitator to meet every 6 months with 10–12 community health volunteers (forming a Care Group) to share key TB messages and then for them to convey these messages over the subsequent 6 months to 10–12 households. Three household surveys were performed over 5 years to measure population-level changes in knowledge and behaviors.

Data from village TB, laboratory, and district registers were also used to monitor activities and outcomes.

RESULTS: There were substantial improvements in TB-related knowledge and behaviors in the number of patients initiating treatment, in the percentage of patients receiving directly observed treatment, in treatment success, and in TB-related mortality.

CONCLUSION: Care Groups are uniquely suited to address some of the challenges of TB control. This project sheds light on a new strategy for engaging communities to address not only TB, but other health priorities as well.

KEY WORDS: community-based primary health care; community health workers; Care Groups; TB; directly observed treatment

JUST AS DAWN SHEDS LIGHT on new opportunities, the Vurhonga (‘new dawn’) community-based DOTS (CB-DOTS) project sheds light on an innovative strategy to combat tuberculosis (TB). We assessed the effectiveness of a new strategy in Mozambique where, at the time the strategy was implemented in 2010, the country was estimated to have 130 000 new cases of TB annually, only 34% of whom were being diagnosed and treated.^{1,2} We describe the Vurhonga CB-DOTS project, report on its outcomes, and explore the lessons learned for community-based TB management from the implementation of the Care Group approach. Two approaches—Care Groups and community-based TB control—were merged to bring cascading health promotion to every household through community engagement and home visits for social and behavior change communication (SBCC).

COMMUNITY-BASED TUBERCULOSIS MANAGEMENT

TB is a global health priority that threatens the wellbeing of nearly a quarter of the world’s popula-

tion and causes 1.4 million deaths per year.^{1,2} The ambitious End TB goal of reducing TB incidence by 80% and TB deaths by 90% by 2035 cannot be achieved without expanding TB detection and management into communities, as has been done in many successful human immunodeficiency virus (HIV) programs.^{2,3}

Various community-based interventions have been implemented in the context of TB prevention, detection, and treatment. Projects have used community health workers (CHWs) to provide education and social support, screen people with TB symptoms, collect sputum samples, monitor medical appointment attendance, and administer the DOTS strategy for TB.^{4,5} Other community-based projects have trained traditional healers and drug sellers to identify and refer persons with symptoms of TB.⁶

Community-based TB interventions have shown significant increases in case detection and successful treatment completion rates.⁷ Systematic reviews and meta-analyses indicate that the use of CHWs for CB-DOTS has reduced treatment loss to follow-up among patients with multidrug-resistant TB and

Correspondence to: Henry B Perry, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Room E8537, 615 N. Wolfe Street, Baltimore, MD 21205, USA. e-mail: Hperry2@jhu.edu

Article submitted 10 March 2017. Final version accepted 14 June 2017.

improved treatment success rates compared with similar facility-based programs.^{8,9} In light of these successes and the great need to expand TB detection and treatment, innovative community-based approaches to TB management are of strategic importance.

Care Groups

World Relief, a US-based Christian development and relief non-governmental organization, developed the Care Group approach in 1994 to mobilize communities to achieve widespread coverage of proven key child survival interventions through the cost-effective use of volunteers.^{10,11} The standard definition of a Care Group (from which the Care Groups in this project were adapted) is a group of 10–15 community members, typically women nominated by their neighbors, who meet at least monthly with a paid facilitator for training and supervision. Between Care Group meetings, each Care Group Volunteer (CGV) disseminates what she has learned to approximately a dozen of her assigned neighboring households to promote positive health practices. As all relevant households are connected to a CGV, peer-to-peer counseling reaches everyone in the target population on a regular basis.

Extensive evidence shows that this approach can greatly increase population coverage of key child survival interventions, and can reduce childhood malnutrition and diarrhea, and mortality in children aged <5 years.¹¹ More than 25 organizations in more than 28 countries worldwide have implemented the Care Group approach for improving maternal and child health.¹⁰

Objectives

We describe the effectiveness of application of the Care Group approach to raise awareness about TB and its treatment, increase detection and testing of persons with symptoms suggestive of TB and their incorporation into the treatment program, and improve treatment outcomes. The Vurhonga Community TB Project aimed to increase TB testing and improve treatment outcomes among the 218 191 people living in 42 500 households in six rural districts in the Gaza Province of Mozambique (Figures 1 and 2).

METHODS

Project design

CGVs were previously mobilized through child survival projects in the project area. The TB-specific intervention built on this pre-existing structure. From 2012 to 2014, 10 paid supervisors rotated through 335 Care Groups every 6 months to train 3350 CGVs (approximately 1 CGV for every 12 households) on

four aspects of TB: general information about TB; signs and symptoms of TB; TB and HIV; and TB treatment and prognosis. Each lesson involved training by supervisors of each promoter, reinforced by follow-up supervision and subsequent training of all village Care Groups by promoters. Although adapted from traditional Care Groups, these did not technically meet the standard criteria for Care Groups with regard to supervision, training, and frequency of meetings. CGVs were expected to visit each household in their catchment area every 6 months.

A specialized Focal Point Volunteer (FPV) role emerged from this approach in response to the relatively rare encounter of CGVs with persons needing to be evaluated for TB. Most villages had one FPV (1 per 1500–2500 people) who served as a liaison between the community and district TB services. The FPV guided and accompanied persons with TB symptoms through referral, diagnosis, treatment, and community engagement.

Upon encountering an individual with TB symptoms, CGVs call upon the FPV to assist the community member through the diagnostic process at the health facility. Once a diagnosis of TB has been made, FPVs arrange for community members or CGVs to serve as *padrinhos* (treatment observers) to provide CB-DOTS until the treatment course is completed.

Data collection

As part of this program implementation and evaluation process, quantitative data from primary and secondary sources were collected. Changes in knowledge, practice, and coverage (KPC) were monitored using household surveys at baseline, mid-term, and endpoint. TB-specific outcomes were tracked through routine reports and a TB-specific monitoring and evaluation system, the Modified-District Rapid Assessment Tool (M-DRAT). This health management information system used data from the district TB registers at health facilities, laboratory registers, and village TB registers to track diagnosis and treatment outcome indicators for quarterly analyses.

Using a standard two-stage, 30-cluster sampling method with 10 respondents in each cluster, a sample size of 300 was selected.¹³ Thirty clusters were randomly selected proportional to size from a list of all villages and their populations in the project area. Because some questions were directed toward a subgroup of respondents, sample sizes varied by indicator.*

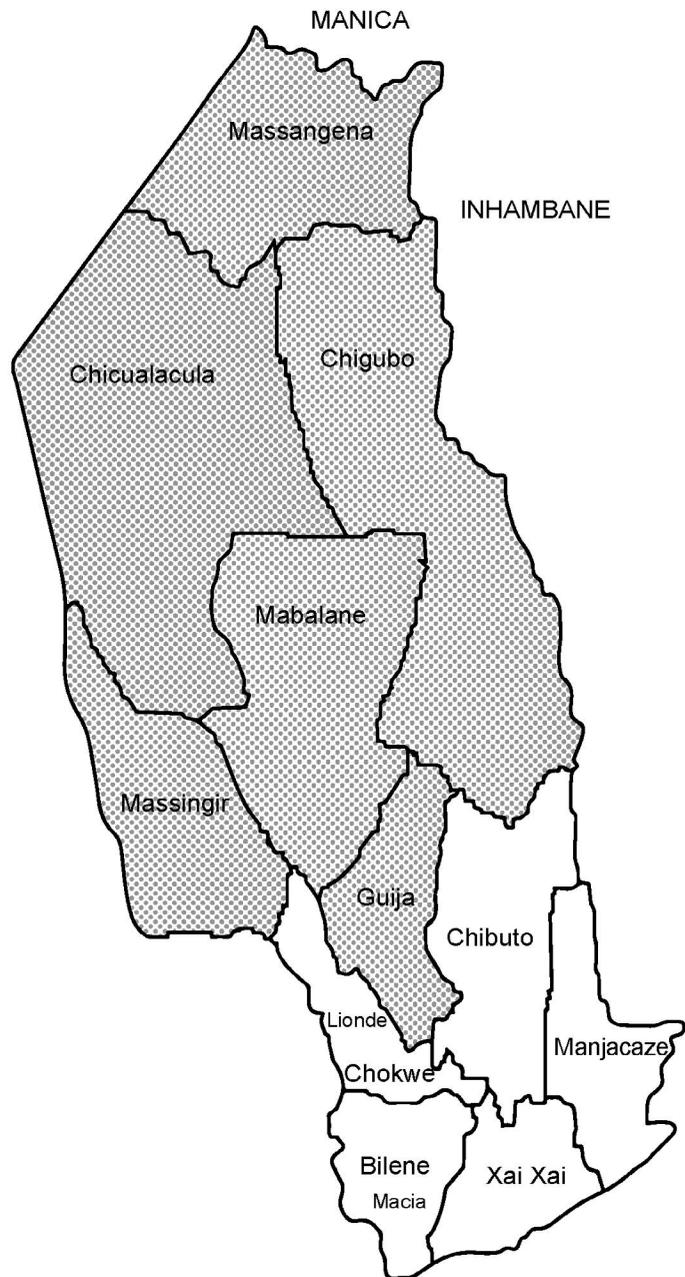
Written informed consent was provided by survey respondents. As the data collected were part of a project evaluation and not for research purposes,

* The questionnaire used is available from the corresponding author upon request.



World Relief Mozambique TB Project map

Gaza Province Map



KEY

▨ Proposed TB Project - Rural Districts

Figure 1 Project area map. TB = tuberculosis.

approval from an ethics committee was not requested. The Johns Hopkins Institutional Review Board, Baltimore, MD, USA, declared it exempt from human subjects review for the participation of its faculty and students.

Data analysis

Standard protocols were followed for data entry and cleaning. Results of surveys and quarterly M-DRAT data were analyzed using Epi Info (Centers for Disease Control and Prevention, Atlanta, GA,

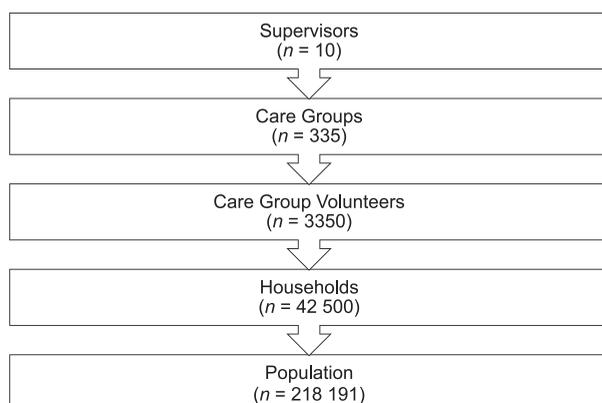


Figure 2 Project cascade.

USA)¹⁴ and STATA (StataCorp, College Station, TX, USA) and compared with previous results for the assessment of trends and progress towards goals. Only baseline and endpoint results are reported here.

RESULTS

Demographic characteristics

Characteristics of respondents in the final KPC surveys were generally similar to those surveyed at baseline (Table 1). However, more respondents were female at endpoint than at baseline and, at endpoint, fewer respondents had attended school. These differences are likely due to seasonal agricultural and employment patterns, with more males at home in

December, when the baseline survey was conducted, than at endpoint, which was conducted in May. There was an upward trend in economic stability indicators, likely due to Mozambique's growing economy during this period.¹⁶

Care Group Volunteer coverage

Data on CGV coverage were not routinely collected, but a survey of a convenient, non-random sample of over 26 000 households in the project area carried out by supervisors and FPVs immediately after the mid-term evaluation noted that 73% of respondents knew their CGV by name, and 50% reported having received a visit from their CGV within the previous 3 months.

Household knowledge, practice and coverage survey results

The percentage of people who reported having received information about TB from any source in the previous 6 months increased by more than two-fold from baseline to endpoint (Table 2). At endpoint, 86% of those who had received information about TB in the previous 6 months identified CGVs as the information source, whereas at baseline friends and relatives were the most common source (cited by 46%).

TB knowledge indicators improved significantly, as did some HIV knowledge indicators (Table 2). The percentage of those who knew how TB was transmitted increased by nearly four-fold from baseline to

Table 1 Socio-economic and demographic characteristics of household survey respondents at baseline and endpoint evaluations

Characteristics	Baseline (December 2009)		Endpoint (May 2014)		P value*
	Total Respondents n	n (%) (95%CI)	Total Respondents n	n (%) (95%CI)	
Male	300	101 (33.7) (28.4–39.0)	300	54 (18.0) (14.0–22.8)	0.0000
Female	300	199 (66.3) (62.0–72.7)	300	241 (80.3) (75.4–84.5)	0.0001
Mean age, years		35.7		36.4	—
Educational level					
Ever attended	300	160 (53.3) (46.2–60.5)	300	101 (33.7) (28.5–39.2)	0.0000
Primary school [†]	160	134 (83.8) (74.5–93.0)	199	140 (70.4) (63.6–76.3)	0.0030
Secondary school [†]	160	25 (15.6) (6.2–25.0)	199	57 (28.6) (22.7–35.4)	0.0035
Higher than secondary level [†]	160		199	2 (1.01) (0.24–4.0)	0.2046
Mean household size (number of inhabitants) [‡]		7.2		8.0	—
Number of rooms in house					
1	300	178 (59.3) (49.7–68.9)	300	180 (60.0) (54.3–65.4)	0.8613
2	300	81 (27.0) (20.1–33.9)	300	65 (21.7) (17.3–26.7)	0.1304
2	300	26 (8.7) (5.2–12.2)	300	43 (14.3) (10.8–18.8)	0.0316
Said income was not enough for food	300	92 (30.7) (21.2–40.1)	300	66 (22.0) (17.6–27.1)	0.0156
Said income was barely enough for food	300	152 (50.7) (43.1–58.2)	300	156 (52.0) (46.3–57.6)	0.7501
Said income was enough for food	200	55 (27.5) (12.5–24.1)	300	78 (26.0) (21.3–31.3)	0.0231
Lived >1-h walk from the nearest TB testing facility [§]	280	117 (41.8) (29.7–53.9)	295	174 (59.0) (53.2–64.5)	0.0000
Lived >1-h walk from the nearest HIV testing center [¶]	268	116 (43.3) (31.0–55.5)	297	131 (44.1) (38.5–49.8)	0.8482

* Two-tailed test of proportions comparing level of statistical significance between baseline and endpoint results.

[†] Of those who have ever attended school.

[‡] These results contrast with the 2010 Comprehensive Food Security and Vulnerability Analysis, which reported average household size in Gaza Province to be approximately 4.8.¹⁵

[§] Of those who had heard of TB (see Table 2).

[¶] Of those who knew where they could be tested for HIV.

CI = confidence interval; TB = tuberculosis; HIV = human immunodeficiency virus.

Table 2 Changes in TB-related knowledge and practice from household KPC surveys at the time of baseline and endpoint evaluations

TB-related findings	Baseline (December 2009)		Endpoint (May 2014)		P value*
	Total respondents n	n (%) (95%CI)	Total respondents n	n (%) (95%CI)	
Household member had TB symptoms in previous 3 months	300	82 (27.3) (21.1–33.5)	300	29 (9.7) (6.8–13.6)	0.0000
Sought medical attention for TB symptoms	82	74 (90.2) (83.2–97.3)	29	26 (89.7) (70.9–96.9)	0.9383
Sought medical attention within 1 week of symptom onset	74	31 (42.0) (27.4–56.4)	26	8 (30.8) (15.4–52)	0.3182
Sought medical attention 1–2 weeks of symptom onset	74	14 (19.0) (7.7–30.1)	26	11 (42.3) (24.2–62.8)	0.0177
Sought medical attention after 3–4 weeks of symptom onset	74	18 (24.3) (15.1–35.7)	26	3 (11.5) (3.5–32.1)	0.1679
Sought medical attention after 1–2 months of symptom onset	74	5 (6.8) (1.0–12.5)	26	3 (11.5) (3.5–32.1)	0.4479
Sought medical attention after 3 months of symptom onset	74	6 (8.1) (1.9–14.3)	26	3 (1.9) (0.5–25.4)	0.4592
Waited to seek care due to lack of money	74	15 (20.3) (9.9–30.7)	32	6 (18.8) (9.1–35.0)	0.8589
Respondent had heard of TB	300	280 (93.3) (89.8–96.9)	300	295 (98.3) (96.0–99.3)	0.0023
Respondent knew how TB is transmitted [†]	280	62 (22.1) (12.9–31.4)	295	247 (83.7) (79.0–87.5)	0.0000
Respondent would seek care for TB at health center ^{††}	280	219 (78.2) (70.0–86.4)	295	289 (98.0) (95.5–99.1)	0.0000
Respondent would seek care for TB at <i>socorrista</i> ^{††§}	280	6 (2.1) (0.0–4.6)	295	6 (2.0) (0.91–4.5)	0.9326
Respondent would seek care for TB at TB hospital ^{††}	280	33 (11.8) (5.1–18.5)	295	23 (7.8) (5.2–11.5)	0.1060
Respondent would seek care for TB from traditional doctor/healer ^{††}	280	54 (19.3) (11.7–26.8)	295	8 (2.7) (1.4–5.3)	0.0000
Respondent received information about TB in the previous 6 months [†]	280	101 (36.1) (28.0–44.1)	295	230 (78.0) (72.8–82.6)	0.0000
Respondent received information from volunteers	101	6 (5.9) (0.7–11.2)	228	197 (86.4) (81.3–90.3)	0.0000
Respondent knew TB was curable	300	256 (85.3) (80.0–90.7)	300	295 (98.3) (96.0–99.3)	0.0000
Respondent knew TB medicine was free at hospital	300	119 (39.7) (31.2–48.1)	300	243 (81.0) (76.1–85.1)	0.0000
Respondent did not know how to reduce risk of getting TB	300	119 (39.7) (31.7–47.7)	300	41 (13.7) (10.2–18.1)	0.0000
Respondent did not know how to reduce risk of TB transmission	300	82 (27.3) (20.1–34.6)	300	19 (6.3) (4.1–9.7)	0.0000
Respondent knew someone with TB	300	75 (25.0) (18.8–31.2)	300	88 (29.3) (24.4–34.8)	0.2363
Respondent would visit someone with TB in his/her home	300	271 (90.3) (85.0–95.7)	300	295 (98.3) (96.0–99.3)	0.0000
Respondent believed someone with TB would not try to hide it	300	204 (68.0) (59.0–77.0)	300	250 (83.3) (78.7–87.2)	0.0000
Respondent believed it was shameful to have TB	300	87 (29.0) (23.4–34.6)	300	30 (10.0) (7.1–14.0)	0.0000
Respondent had heard of HIV	300	297 (99.0) (97.5–100)	300	300 (100.0) (100%)	0.0825
Respondent knew where to get tested for HIV [¶]	297	268 (90.2) (86.1–94.4)	300	297 (99.0) (96.9–99.7)	0.0000
Respondent had been tested for HIV [¶]	297	138 (46.5) (39.2–53.8)	300	219 (73.0) (67.7–77.7)	0.0000
Respondent believed someone with HIV should be tested for TB [¶]	297	169 (56.9) (45.4–68.4)	300	235 (78.3) (73.3–82.7)	0.0000
Respondent believed someone with TB should be tested for HIV [¶]	297	176 (59.3) (48.5–70.0)	300	256 (85.3) (80.8–88.9)	0.0000
Respondent knew you were more likely to get TB if you had HIV [¶]	297	185 (62.3) (53.1–71.5)	300	227 (75.7) (70.5–80.2)	0.0004

* Two-tailed test of proportions comparing the level of statistical significance between baseline and endpoint results.

[†] Of those who had heard of TB.

^{††} Respondents were allowed to select more than one answer.

[§] Village-level CHWs who provide patient care in community health posts and are part of the Ministry of Health health care system.

[¶] Of those who had heard of HIV.

TB = tuberculosis; KPC = knowledge, practice, and coverage; CI = confidence interval; HIV = human immunodeficiency virus.

endpoint. The percentages of those who knew TB was curable and who knew treatment was freely available increased significantly. There was a significant reduction in the proportion of those who did not know how to reduce their risk of getting TB and of those who did not know how to prevent TB transmission.

Notable changes were observed in care seeking among those with TB symptoms, with preferences

shifting away from traditional healers toward health centers. The proportion of respondents who reported that someone in their household had exhibited TB symptoms in the previous 3 months declined significantly. Furthermore, among those with TB symptoms, more people sought medical attention within 2 weeks of symptom onset.

There was a slight decrease in the proportion of patients diagnosed by sputum smear, in contrast with

Table 3 Changes in TB diagnosis and treatment from household KPC surveys at the time of baseline and endpoint evaluations

TB-related finding	Baseline (December 2009)		Endpoint (May 2014)		P value*
	Total respondents n	n (%) (95%CI)	Total respondents n	n (%) (95%CI)	
Household member diagnosed with TB in previous year	300	34 (11.3) (7.0–15.7)	300	31 (10.3) (7.3–14.4)	0.6931
Diagnosed using sputum smear	34	27 (79.4) (62.8–96.1)	44	29 (65.9) (76.1–98.5)	0.1889
Diagnosed using X-ray	34	2 (5.9) (0.0–14.6)	44	13 (29.6) (25.3–60.6)	0.0087
Received results on same day as testing	34	16 (47.1) (33.7–60.4)	31	17 (54.8) (36.5–72.0)	0.5351
Did not pay for testing or diagnosis	34	30 (88.2) (73.5–100.0)	31	29 (93.5) (76.1–98.5)	0.4618
Received TB medication	34	28 (82.4) (68.9–95.8)	31	30 (96.8) (78.4–99.6)	0.0610
TB medications were free	28	22 (78.6) (58.1–99.1)	30	28 (93.3) (75.3–98.5)	0.1048
Received daily DOT	28	12 (42.9) (23.9–61.8)	30	25 (83.3) (64.3–93.2)	0.0014
Treatment observed by health clinic worker	12	2 (16.7) (0–37.6)	25	0 (0.0) (0.0–0.0)	0.0356
Treatment observed by <i>padrinho</i>	12	1 (8.3) (0.0–27.6)	25	15 (60.0) (38.8–78.0)	0.0030
Treatment observed by <i>socorrista</i> [†]	12	1 (8.3) (0.0–27.6)	25	2 (8.0) (1.8–29.1)	0.9750
Treatment observed by volunteer	—	—	25	5 (20.0) (8.0–41.7)	—
Treatment observed by family/friend	12	7 (58.3) (30.6–86.0)	25	3 (12.0) (3.6–33.3)	0.0030
Treatment was completed [‡]	28	23 (82.1) (76.1–95.2)	30	26 (86.7) (68.0–95.2)	0.6288
Cured of TB after completing treatment	23	16 (69.6) (45.7–93.5)	27	25 (92.6) (72.8–98.3)	0.0348

* Two-tailed test of proportions comparing the level of statistical significance between baseline and endpoint results.

[†] Village-level CHWs who provide patient care in community health posts and are part of the Ministry of Health health care system.

[‡] Of all those who had received TB medication.

TB = tuberculosis; KPC = knowledge, practice, and coverage; CI = confidence interval; DOT = directly observed treatment; CHW = community health worker.

a significant increase in the proportion diagnosed by chest X-ray (CXR) (Table 3). The proportion of TB patients receiving any DOTS nearly doubled from baseline to endpoint. Of those who received DOTS at endpoint, the majority reported that their treatment observer was a *padrinho* and, at endpoint, none of those receiving DOTS reported that their treatment observer was a health clinic worker. There was a significant increase in the percentage of those who reported being cured of TB after completing anti-tuberculosis treatment.

Modified district rapid assessment tool results

The number of TB patients diagnosed using sputum examination and started on treatment increased by

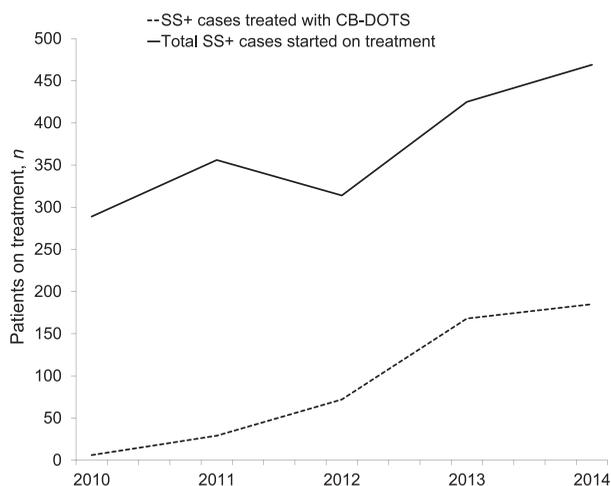


Figure 3 Number of SS+ patients on CB-DOTS by year of project. CB-DOTS = community-based DOTS; SS+ = sputum smear-positive.

62% over the life of the project, from 289 patients in the first year to 469 patients in the final year (Figure 3). The percentage of newly diagnosed TB cases treated with CB-DOTS increased from 2% in the first year to 39% at the end of the project. Universal preventive therapy with cotrimoxazole for TB patients with HIV was maintained (100% at baseline and endpoint), and HIV testing for newly diagnosed TB patients increased from 95% at baseline to 100% at endpoint.

Mortality among TB patients under treatment decreased by 76% over the life of the project, from 143 per 1000 sputum smear-positive patients enrolled in 2011 to 34/1000 at project end in 2014 (Figure 4).

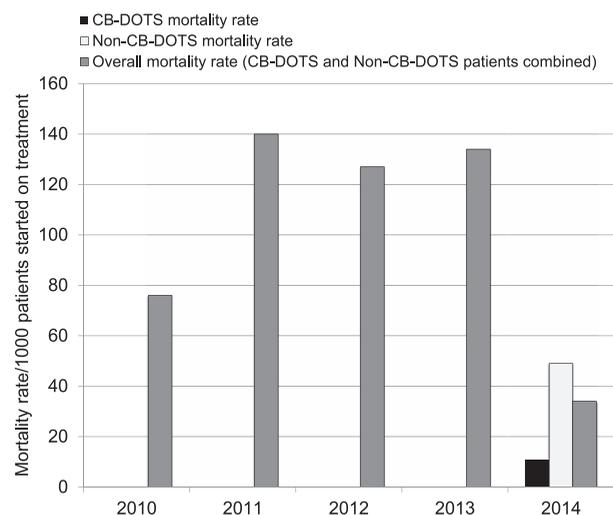


Figure 4 Mortality among TB patients by year of completion of treatment. M-DRAT = Modified-District Rapid Assessment; CB-DOTS = community-based DOTS; TB = tuberculosis.

Similarly, the cure rate increased from 71% at baseline to 88% at endpoint. Although data for mortality risk among those who participated in CB-DOTS and those who did not were not available until the final year of the project, these results showed a considerably lower mortality rate for those in CB-DOTS (11/1000) than for those who were not (49/1000) (Figure 4).

DISCUSSION

The findings of this evaluation suggest that the Care Group approach is an effective way to identify members of the population with symptoms suggestive of TB, motivate them to go to a facility for assessment, and support newly diagnosed patients during their treatment (including facilitation of DOTS).

The improved knowledge about TB is notable in the light of the prevailing misinformation concerning TB from traditional beliefs that had to be overcome. CGVs also raised awareness about the close relationship between HIV/AIDS (acquired immune-deficiency syndrome) and TB, and effectively reduced the stigma associated with TB, as evidenced by changes in beliefs about the shamefulness of TB. The relative increase in the diagnosis being made using CXRs, and conversely the decrease in the diagnosis being made by sputum smear, highlights the difficulties faced in diagnosing the many patients who were co-infected with HIV and the lack of diagnostic supplies at health centers, exacerbated by the absolute increase in demand for diagnosis.

Programmatic implications

The role of the FPV developed in this project provided support for patients as they attempted to navigate the National TB Program's (NTP's) assessment and treatment system. The FPV role could also be expanded into contact tracing, which was not a part of our project.

The cascading strategy of modified Care Groups for NTPs shows promise as a potentially sustainable cost-effective mechanism for knowledge saturation and universal coverage, with one paid low-level supervisor training approximately 35 modified Care Groups (with a total of 350 CGVs reaching 3500 households and 14 000–18 000 beneficiaries). Operational research has demonstrated low CGV turnover during projects and sustained activity of Care Groups several years after project termination.^{11,17} The trust fostered by peer-to-peer education through frequent home visits is an important component of efforts to reverse fundamental misbeliefs about TB and to promote behavior change.

The pro-equity feature of Care Groups, which allow SBCC to reach nearly every household regardless of its financial standing or its distance from a

health facility, has unique significance for TB, which tends to be concentrated in the most marginalized segments of the population.² The effectiveness of Care Groups for TB offers encouragement for its application more broadly to topics such as HIV, mental health, diabetes mellitus, hypertension, and even social issues.

Although DOTS was the official policy of the NTP from the beginning of the project, an overburdened health system and the distance between communities and health centers hindered the effectiveness of facility-based DOTS. This project allowed the NTP policy on DOTS to be scaled up and effectively implemented in practice through the mobilization of volunteers, who could observe treatment in the communities. Provincial and district Ministry of Health (MOH) staff joined supervision visits, and World Relief was invited to a national-level meeting to share information about the success of their strategy. As the MOH recognized the importance of volunteers, provincial TB registers were updated to incorporate data collection on referral sources. However, financial constraints led to a continued reliance on partners to implement CB-DOTS, highlighting the need for cost-effectiveness studies on community-based interventions to make the case for the feasibility of integrating CB-DOTS into the health system.

Migration (which contributed to difficulties in accurate population estimation), poor uptake, lack of diagnostic supplies and personnel at the health centers, and health information system failures, limited the implementation and evaluation of this project. More rigorous research should follow this project-based evaluation to test the conclusions made here.

CONCLUSION

To address the complex global threat of TB, innovative approaches that extend beyond clinic and hospital walls are needed. The Vurhonga CB-DOTS project sheds light on one possible effective community-based approach—Care Groups. By modifying the Care Group approach to include FPVs, who guide persons with TB symptoms through diagnosis and treatment, and assigning treatment observers to those diagnosed with TB, the Vurhonga CB-DOTS project was able to expand knowledge about TB in the project population, identify and motivate persons with TB symptoms to undergo assessment, increase the number of patients diagnosed and treated, and increase the proportion of diagnosed TB patients who receive DOTS. With further application of the Care Group approach for TB control, we could be one step closer to seeing the sun set on the scourge of TB.

Acknowledgements

The authors thank the US Agency for International Development (USAID), Washington DC, USA, for project funding; C James for

technical assistance with the figures; and H Eggen for leading the midterm and final evaluations for the project.

This project was implemented by World Relief, Baltimore, MD, USA, and funded by the USAID Child Survival and Health Grants Program.

Conflicts of interest: none declared.

Reference

- Houben R M, Dodd P J. The global burden of latent tuberculosis infection: a re-estimation using mathematical modelling. *PLOS MED* 2016; 13: e1002152.
- World Health Organization. Global tuberculosis report, 2016. WHO/HTM/TB/2016.13. Geneva, Switzerland: WHO, 2016.
- Salam R A, Haroon S, Ahmed H H, Das J K, Bhutta Z A. Impact of community-based interventions on HIV knowledge, attitudes, and transmission. *Infect Dis Poverty* 2014; 3: 26.
- Soares E C, Vollmer W M, Cavalcante S C, et al. Tuberculosis control in a socially vulnerable area: a community intervention beyond DOT in a Brazilian favela. *Int J Tuberc Lung Dis* 2013; 17: 1581–1586.
- Chowdhury A M, Chowdhury S, Islam M N, Islam A, Vaughan J P. Control of tuberculosis by community health workers in Bangladesh. *Lancet* 1997; 350: 169–172.
- Colvin C, Mugyabuso J, Munuo G, et al. Evaluation of community-based interventions to improve TB case detection in a rural district of Tanzania. *Glob Health Sci Pract* 2014; 2: 219–225.
- Arshad A, Salam R A, Lassi Z S, Das J K, Naqvi I, Bhutta Z A. Community based interventions for the prevention and control of tuberculosis. *Infect Dis Poverty* 2014; 3: 27.
- Toczek A, Cox H, du Cros P, Cooke G, Ford N. Strategies for reducing treatment default in drug-resistant tuberculosis: systematic review and meta-analysis. *Int J Tuberc Lung Dis* 2013; 17: 299–307.
- Wright C M, Westerkamp L, Korver S, Dobler C C. Community-based directly observed therapy (DOT) versus clinic DOT for tuberculosis: a systematic review and meta-analysis of comparative effectiveness. *BMC Infect Dis* 2015; 15: 210.
- Perry H, Morrow M, Borger S, et al. Care Groups I: an innovative community-based strategy for improving maternal, neonatal, and child health in resource-constrained settings. *Glob Health Sci Pract* 2015; 3: 358–369.
- Perry H, Morrow M, Davis T, et al. Care Groups II: a summary of the child survival outcomes achieved using volunteer community health workers in resource-constrained settings. *Glob Health Sci Pract* 2015; 3: 370–381.
- World Health Organization. Global tuberculosis control, 2011. Geneva, Switzerland: WHO, 2011.
- Sarriot E, Winch P, Weiss W M, Wagman J. Methodology and sampling issues for KPC surveys. Washington DC, USA: Child Survival Technical Support Project, 1999.
- Dean A, Arner T, Sunki G, et al. Epi Info™, a database and statistics program for public health professionals. Atlanta, GA, USA: Centers for Disease Control and Prevention, 2011.
- World Food Programme. Mozambique comprehensive food security and vulnerability analysis. Maputo, Mozambique: United Nations World Food Program, 2010.
- United Nations Statistics Division. Mozambique Country Profile. New York, NY, USA: UN, 2017; <http://data.un.org/countryprofile.aspx?cname=mozambique#Summary>.
- Davis T P, Jr, Wetzel C, Hernandez Avilan E, et al. Reducing child global undernutrition at scale in Sofala Province, Mozambique, using Care Group Volunteers to communicate health messages to mothers. *Glob Health Sci Pract* 2013; 1: 35–51.

RESUME

CONTEXTE : Cet article décrit l'efficacité d'une approche innovante à base communautaire de mobilisation sociale appelée Care Groups (groupes de soins) afin d'améliorer l'efficacité du programme national tuberculose (TB) en augmentant la recherche de TB et en améliorant les résultats du traitement dans six districts du Mozambique rural.

METHODES : L'approche Care Group a été mise en œuvre dans une population de 218 191 personnes. Cette approche a permis à un facilitateur de rencontrer tous les 6 mois 10 à 12 travailleurs de santé communautaires (formant un Care Group) afin de partager les messages TB clés pour que ceux-ci à leur tour transmettent ces messages pendant les 6 mois suivants dans 10 à 12 foyers. Trois enquêtes en foyers ont été réalisées en 5 ans pour mesurer les modifications des connaissances et des

comportements au niveau de la population. Les données émanant des registres TB du village, du laboratoire et du district ont également été utilisées afin de suivre les activités et les résultats.

RESULTATS : Il y a eu des améliorations substantielles en termes de connaissances et de comportement liés à la TB, de nombres de patients mis sous traitement, de pourcentage de patients bénéficiant d'un traitement sous observation directe, de succès du traitement et de mortalité liée à la TB.

CONCLUSION : Les Care Groups sont parfaitement adaptés à certains défis de la lutte contre la TB. Ce projet met en lumière une nouvelle stratégie d'implication des communautés afin d'affronter non seulement la TB mais également d'autres priorités de santé.

RESUMEN

MARCO DE REFERENCIA: En el presente artículo se describe la eficacia práctica de una estrategia comunitaria innovadora de movilización social denominada Care Groups (Grupos de Atención), cuyo objeto es optimizar la eficacia del programa nacional contra la tuberculosis (TB), al aumentar las pruebas diagnósticas y mejorar los desenlaces terapéuticos en seis distritos rurales de Mozambique.

MÉTODOS: La iniciativa de los Grupos de Atención se introdujo en una población de 218 191 personas. En el marco de la estrategia se habilitaba a un facilitador para reunirse cada 6 meses con 10–12 voluntarios comunitarios de salud (que conformaban un Grupo de Atención), con el fin de compartir mensajes claves relacionados con la TB, que ellos difundirían luego en 10–12 hogares en los siguientes 6 meses. Se llevaron a cabo tres encuestas domiciliarias durante un período de 5 años con el objeto de medir las modificaciones en

materia de conocimientos y comportamientos a escala de la población. En el seguimiento de las actividades y los resultados se utilizaron además los datos de los registros de TB de las aldeas, los laboratorios y los distritos.

RESULTADOS: Se observaron progresos notables en los conocimientos y los comportamientos relacionados con la TB, el número de pacientes que iniciaban el tratamiento, el porcentaje de pacientes que recibían tratamiento directamente observado, el éxito terapéutico y en la mortalidad causada por la TB.

CONCLUSIÓN: Los Grupos de Atención constituyen una iniciativa muy apropiada cuando se abordan algunas de las dificultades que plantea el control de la TB. El presente proyecto aporta claridad sobre una nueva estrategia encaminada a lograr la participación de las comunidades en la respuesta a la TB y también a otras prioridades de salud.
