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ABBREVIATIONS

CHW Community health worker
DOTS Directly observed therapy (short course)
FP Family planning
MDGs Millennium Development Goals
NGO Non-governmental organization
SCIP Strengthening Communities Through Integrated Programming

Executive Summary

In response to concerns that the Millennium Development Goals (MDGs) will not be met as well as concerns about the increasing health workforce shortage, community health workers (CHWs) are once again being promoted globally (WHO 2008, Haines et al. 2007). Reaching poor and underserved groups is an explicit goal of many CHW programs (Swider 2002), but whether or not they are effective in reaching this goal is not clear (Haines et al. 2007). There is also little evidence on effectiveness (including cost-effectiveness) of integrated programs in which CHWs are asked to provide multiple services, which has been an increasing trend in recent years. Mozambique offers a unique setting in which to investigate the effectiveness of CHW programs, since it has been a leader in government CHW programs since the 1970s and several non-governmental organizations (NGOs), including Pathfinder International, have a history of working with CHWs on a range of health issues.

The Strengthening Communities Though Integrated Programming (SCIP) project in Nampula province, which is led by Pathfinder International, began training CHWs in 2010. Under this project, different intervention packages are implemented in different districts, with each district assigned an intervention package based on their initial health and agricultural indicators at project start-up. Nine districts receive a "Complementary" package of interventions to complement ongoing Title II nutrition programs implemented by Save the Children. Each *animadora* targets 30 women of reproductive age who are pregnant or have a child under age 2 through regular group meetings on selected health topics. Five districts without Title II interventions receive a "Specialized" package of more intensive health interventions, in which each volunteer conducts home visits to 10 targeted households to discuss health topics. Since CHWs in both intervention packages provide integrated services including family planning, the SCIP Project offers an opportunity to investigate key issues regarding integrated CHW programs.

In 2012, Pathfinder conducted a study to explore whether CHWs who are intended to promote family planning as part of an integrated package of services do communicate with beneficiaries about family planning, and what actions women take based on these messages. The study also explored whether CHWs are reaching the poor, marginalized and vulnerable, and examined the costs of implementing the CHW component of the SCIP project. The information gained from this study is intended to support the SCIP program in its work, and provide evidence at a global level on who CHWs reach within the communities they serve as well as what services they provide. The study methodology included a household survey and CHW interviews in Ribáuè (Specialized package) and Mogovolas (Complementary package) districts of Nampula Province; a secondary analysis of SCIP baseline survey data collected in Nampula in 2010; and a costing analysis of the Specialized package of CHW interventions.

The 2012 household survey in Nampula found that approximately half of the women surveyed in Ribáuè (Specialized) and Mogovolas (Complementary) ever had contact with a CHW, with most having had contact in the past year. The percent of women who had contact with a CHW in the past month was higher in Mogovolas (24%) than in Ribáuè (18%), indicating that the Complementary approach of group meetings by *animadore*s may have greater frequency of contact with women than the Specialized approach of household visits by volunteers. However, it is challenging to make this comparison because the Complementary package evolved over time by expanding its target population to all women of reproductive age, increasing program targets from 30 to 50 women reached per CHW, and incorporating periodic home visits for health education and re-supply of pills. This is an inherent challenge in studying project intervention models, which by necessity must be dynamic and adaptable as the project evolves. Estimates of CHW coverage vary widely in the literature so it is difficult to say whether our findings are comparable to other programs or countries, but our results do fall within the range of estimates.

The 2012 survey also found that selected socio-demographic and household characteristics were associated with having contact with a CHW. After adjusting for women's age and education, women living with a partner in informal union were nearly three times more likely in Ribáuè (OR 2.94) and 3 and a half times more likely in Mogovolas (OR 3.57) to be contacted by a CHW than married women, which may reflect CHWs' perceptions of differing needs among these groups. In Mogovolas, women who identified as Muslim were half as likely to be contacted as those who identified as Catholic (OR 0.46), which may reflect cultural norms around discussing sensitive health topics. In Ribáuè, women whose head of household had secondary education were more than 3 times as likely to be contacted as those whose household head had no education (OR 3.15). This suggests that CHWs in Ribáuè may be preferentially reaching households with higher socioeconomic status. A comparison of CHW characteristics to those of women surveyed indicated that CHWs reach women of similar ages and household socioeconomic status to their own. These findings are useful for the SCIP project to understand who is being reached and support the CHWs (particularly in Ribáuè) to target their outreach more effectively to poor and vulnerable households.

The 2012 survey found similar rates of family planning outreach by CHWs in the 2 intervention packages, with 37% of women in Ribáuè (Specialized) and 40% in Mogovolas (Complementary) having contact in the past year with a CHW who discussed family planning. The majority of women who discussed FP with CHWs in Ribáuè and Mogovolas were living with a partner in an informal union, had a primary education, and lived in male-headed households. . Women in households whose head had no education or primary education did receive FP messages, which suggests that CHWs are providing family planning information to women who are most in need. The Specialized and Complementary approaches led to similar rates of FP message recall by beneficiaries: among those who talked with a CHW about family planning in the past year, more than 90% in both districts recalled some discussion content, and 70% felt they learned something new. More women in Ribáuè talked with someone else about the information they learned (60% in Ribáuè vs. 47% in Mogovolas) and reported doing something different to avoid pregnancy (42% in Ribáuè vs. 34% in Mogovolas). This suggests that the Specialized household visit approach may be slightly more effective than the Complementary group meeting approach in encouraging women to take action to prevent pregnancy, though as mentioned earlier the Complementary approach did eventually include some household visits. More women in Mogovolas (42%) than Ribáuè (24%) reported that the CHW also talked with their husband about family planning, which may reflect the differing intervention approaches and/or sociocultural factors in the two districts.

The costing analysis of the Specialized CHW package found that the total program costs increased from US$ 1.34 million in 2010 to US$ 1.58 million in 2011 and US$ 1.67 million in 2012 as the project achieved full deployment of trained CHWs. The breakdown of CHW program costs showed that 53% were recurrent costs (i.e. training, supplies, office and maintenance), 43% were personnel costs (salaries, fringe benefits, etc.), and 4% were capital costs (i.e. equipment, vehicles). Per capita costs (cost per population) remained low at less than US$ 2 per capita in all five districts across project years. In terms of costs per output, the average cost per CHW training course increased from US$ 137 in 2010 to US$ 170 in 2012, and the average cost per household covered decreased from US$ 22.16 in 2010 to US$ 9.34 in 2011 and to US$ 7.59 in 2012, with costs varying across districts. The substantial decrease in cost per household covered reflects the proportionally greater increase in number of households covered by CHWs compared to the increase in program costs. An analysis for Ribáuè district in 2012 found that cost per household visit was US$ 0.10 (each household is visited multiple times), and the cost per direct beneficiary served (woman of reproductive age) was US$ 9.17. The latter is comparable to analyses of similar CHW programs and lower than some of the community- and family-based directly observed therapy short course (DOTS) programs for TB control, indicating that the Specialized CHW model is relatively cost-efficient.

The theoretical costing analysis including minimum wage for CHWs of $45/month highlighted the significant contribution to the health system that CHWs are currently providing on a volunteer basis. The analysis found that paying CHWs a salary would increase the total program costs and cost per capita by almost three-fold in 2010 and almost five-fold in 2011 and 2012, and CHW salaries would represent nearly 90% of program costs in 2012. This is something to consider as governments in various countries explore remunerating CHWs for their efforts, since CHWs may not be able or willing to function on a volunteer basis indefinitely. Future research should examine the impact of salaried CHWs on the overall cost-efficiency and cost-effectiveness of CHW programs.

Background

Community Health Workers

"Community health worker" (CHW) is a broad term used to describe a variety of health aides who are selected, trained and work to provide basic health services in the communities from which they come (Lehman & Sanders 2007). CHWs are defined by Lewin et al. (2005) in their Cochrane review as "any health worker carrying out functions related to health care delivery; trained in some way in the context of the intervention; and having no formal professional or paraprofessional certificated or degreed tertiary education" (Lehman & Sanders 2007). The Alma Ata declaration in 1978 described CHWs as one of the cornerstones of an effective primary healthcare system. The economic recession of the 1980s led to a waning of interest in CHWs, but in recent years there has been renewed global interest in CHWs in response to concerns that the Millennium Development Goals (MDGs) will not be met, as well as concerns about increasing health workforce shortages (WHO 2008, Haines et al. 2007).

To meet the MDGs, developing countries must target health service delivery efforts to those most in need, including poor, underserved, and marginalized populations. These groups are likely to have the worst health outcomes, so overall averages for health indicators will not improve without addressing their needs. Community-based programming, including CHWs, is seen as the only means to reach these populations in many contexts. Reaching poor and underserved groups is an explicit goal of many CHW programs (Swider 2002), but whether or not they are effective in reaching this goal is not clear (Haines et al. 2007). In some cases, evidence shows that the poor have greater access to health services through CHWs (Berman et al. 1987), but in other cases the poor do no better in CHW programs than in the health system as a whole. For example, an assessment of the public-sector Lady Health Worker Program in Pakistan found that households covered by lady health workers were more likely to be of higher socioeconomic status, and more advantaged household members were more likely to be served (Oxford Policy Management 2002). Furthermore, a study in Nigeria found that the poorest community members in one area were more likely to report that CHWs were difficult to access (Onwujekwe et al. 2008).

Historically, CHWs have been engaged in vertical programs focused on a single health area, which have been shown to be effective for a range of health issues (Lewin et al. 2009). In Africa, CHWs have been effective in treating childhood illness (Kidane & Morrow 2000; Hill et al. 2000), decreasing child morbidity and mortality (Brenner et al. 2011), providing prompt and effective malaria case management (Chanda et al. 2011), and improving maternal and newborn health (Shakir 2010). Studies from multiple countries show that women who are visited by a CHW are more likely to use family planning (Zeighami et al. 1997; Phillips et al. 1993; Phillips et al. 1999, White & Speizer 2007), with one study showing that CHW programs resulted in changes in contraceptive use (Phillips et al. 1996). Recently, there has been a move to integrated programs in which CHWs are asked to provide services for multiple health issues. In Ethiopia, 30,000 community-based health extension workers are being trained to provide maternal, newborn and child health, malaria, and HIV services (Haines et al. 2007, Bilal et al. 2011). CHWs in Cuba provide prenatal care, infant vaccination, treatment of diarrheal disease and acute respiratory infection, and diagnosis and treatment of tuberculosis (Mukherjee & Eustache 2007). In Malawi, the Global Fund has invested in training approximately 5,000 salaried Health Surveillance Assistants on immunization, family planning, well-child visits and disease

surveillance. However, there is little evidence about the effectiveness of integrated CHW programs, and some experts have advised that CHWs will likely perform better with clearly defined roles and a limited set of specific tasks, rather than a wide range of tasks with ill-defined roles (WHO 1989; Haines et al. 2007; Prasad & Muraleedharan 2007).

Cost-effectiveness of integrated CHW programs is also still under investigation. In general, CHW programs are thought to be cost-effective because they reach large numbers of previously underserved people with high-impact basic services at low cost (Berman, Gwatkin & Burger 1987). Several studies have examined the cost-effectiveness of vertical CHW programs including primary health care, immunization, and tuberculosis control. For example, a cost-effectiveness study of CHW-led women's groups in Nepal found an incremental cost effectiveness of $211 per life year gained among neonates (Borghi et al. 2005), and a cost benefit analysis of a CHW program for basic health care in Kenya showed a benefit-cost ratio of about nine which indicates the program was a good investment (Wang'ombe 1984). In a review of costs and effects of under-5 immunization efforts in developing countries, CHWs were identified as one of the interventions with the greatest impact on coverage (Pegurri et al. 2005). There have also been several cost effectiveness studies on CHWs in the context of TB control programs, such as a study in South Africa which found that using community-based directly observed therapy (short-course) (DOTS) was more cost effective than hospitalization or sanatorium care on a cost per patient cured basis (Wilkinson et al. 1997). However, there have been minimal studies to date on cost-effectiveness of integrated CHW programs.

Mozambique offers a unique setting in which to investigate the effectiveness of CHW programs. The country has been a leader in CHW programs since the 1970s, first implementing the "Agente Polivalente Elementar" (APE) approach in 1977. Since then, CHWs have been involved in initiatives addressing a range of topics including tuberculosis, Vitamin A distribution, support during pregnancy and delivery, and support for people living with HIV. Although the APE program struggled as a result of the armed conflict in the 1980s, it has recently received renewed attention and a new strategy for APEs is being rolled out. In addition to the government APE program, non-governmental organizations (NGOs) including Pathfinder International have a history of working with CHWs on a range of health issues. Consequently, studying CHW programs in Mozambique offers an opportunity to add to the limited evidence base on effectiveness of integrated CHW programs in sub-Saharan Africa.

SCIP Project Background

The Strengthening Communities Though Integrated Programming (SCIP) project in Nampula province, which is led by Pathfinder International with funding from the United States Agency for International Development (USAID), began training CHWs in 2010. Under the SCIP project, different intervention packages (Complementary and Specialized) are implemented in different districts. The package to be provided in each district was determined prior to project start-up based on assessments of district-level health and agricultural indicators. Because all CHWs under SCIP provide family planning as part of integrated services, albeit under different packages, SCIP offers an opportunity to investigate key issues of interest for CHW programs, both who CHWs reach and what services they provide.

The SCIP Project's "Complementary" package of interventions is implemented in nine districts where Save the Children's Title II SANA program (US government funded Food for Peace Multi-Year Assistance Program) currently implements community-based nutrition, health and agricultural education. SCIP's Complementary package includes a range of interventions to strengthen health systems and change health behaviors, with five of the districts also receiving water and sanitation interventions. Under the Title II SANA program, CHWs (called *animadores)* attend trainings on different topics including nutrition, food security, and immunization. SCIP provides additional training to the *animadores* on family planning and reproductive health and HIV, particularly around support for orphans and vulnerable children (OVC). Each *animadora* reaches approximately 30 households through bi-weekly group meetings with women who are pregnant or have a child under 2 years of age (the target population for Title II interventions). Save the Children was working with *animadores* prior

to SCIP, but they were focused on nutrition and immunization and were not providing information on family planning.

SCIP's "Specialized" package of interventions is implemented in five districts that do not have Title II programs and therefore receive a more intensive package of health interventions. CHWs in Specialized districts work under the SCIP consortium partner World Relief, using its Care Group Volunteer (CGV) model with additional content incorporated (including family planning). Volunteers receive training every 15 days from the *animadores* who supervise them; the topics covered include family planning/reproductive health, maternal health, malaria, diarrhea, pneumonia, tuberculosis, HIV, orphans and vulnerable children (OVC), malnutrition and newborn care (with all topics covered over the course of a 1-year period, varying from 1 to 4 training sessions per topic). Each volunteer is assigned approximately 10 households, and they visit each household once every two weeks to talk with adult household members about the health topics noted above. World Relief did not have a CHW program in the SCIP project areas before the project began.

Study Rationale and Research Questions

The primary aim of this study is to explore whether CHWs who are intended to promote family planning as part of an integrated package of services do, in fact, communicate with beneficiaries about family planning. The study also explored actions taken by women who discuss family planning with CHWs. This is of particular interest and importance, given that much of the literature on effectiveness of CHWs in family planning is based on vertical programs. In addition, the study explored whether CHWs are reaching the poor, marginalized and vulnerable. The information gained from this study is intended to support the SCIP program in its work, and provide evidence at a global level on who CHWs reach within the communities they serve as well as limited evidence on what services they provide. Finally, the study aimed to determine the costs of implementing integrated CHW packages. As there are few costing analyses that have been conducted globally on the use of CHWs, this study will make an important contribution to the literature in this area.

The key research questions for this study were:

1. Which community members are reached by CHWs? How, if at all, do the characteristics of the populations reached by CHWs vary depending on the approach to outreach (household visits vs. group meetings)?
2. Are CHWs who provide an integrated package of health services conveying information about family planning? How do the women who receive these messages take action based on them?
3. How much does the CHW component of SCIP cost under each model?

Detailed study methodologies and tools are described in the chapters on each research question. The study protocol and tools for all methodologies were approved by the Bioethics Committee of the Ministry of Health of Mozambique in June 2012.

Research Question 1: Contact with Community Health Workers

This chapter covers the methodology, results and discussion for the first research question:

1. Which community members are reached by CHWs? How, if at all, do the characteristics of the populations reached by CHWs vary depending on the approach to outreach (household visits in Specialized package vs. group meetings in Complementary package)?

Methods

Methodologies and Tools

In 2012, a household survey was conducted among CHW target beneficiaries in rural areas of two districts in Nampula province.[2] The survey was designed to assess coverage by CHWs in SCIP project areas, whether CHWs in each model disseminated family planning messages to their beneficiaries, and what the recipients did with that information. SCIP districts were stratified by intervention package (Specialized/Complementary), and one district was purposively selected from each stratum in collaboration with SCIP project staff: Ribáuè (Specialized) and Mogovolas (Complementary). Selection criteria included implementation of intervention packages in a similar manner to other districts (no low- or high-performing outliers) and geographic accessibility for the survey team.

Within each selected district, Community Leadership Councils (CLCs – the focus of programmatic activities under SCIP that link communities with facilities) were used as the primary sampling unit for selection of households and CHWs. The SCIP District Coordinators in Ribáuè and Mogovolas provided a list of CLCs in their respective districts that met the following criteria: (1) Functioning CLC with trained volunteers/animadores who were actively conducting household visits/meetings; and (2) No activities by other cadres of SCIP community workers that do similar activities and could therefore be confused with volunteers/animadores). Sixteen CLCs in Ribáuè and 49 CLCs in Mogovolas met these criteria, representing the universe of CLCs from which a sample of 18 CLCs was randomly selected (9 in Ribáuè, 9 in Mogovolas). The number of CLCs selected per district was based primarily on number of households covered per CLC, with the minimum number of CLCs selected to ensure an adequate number of respondents in the household survey to measure key outcomes of interest. Budget/time constraints for CLC mapping were also considered, as was maximizing the number of CHWs for interview.

The required sample of households for the survey was calculated using a formula for estimating a population parameter. The formula used was:

$$n = 4*p*(1-p)*deff/e\hat{}2$$

We assumed alpha = 0.05 and a design effect of 1. Based on the SCIP baseline, we assumed a response rate of 95% or more if the survey was done immediately following the household listing. The prevalence of contact with a CHW (the main outcome of interest) was estimated to be 0.33, based on data from Pathfinder's Child Survival/Reproductive Health (CS/RH) project in Gaza Province (which reflects an area where a CHW project was active at the time of data collection, and is higher than the SCIP baseline estimate so required a larger, more conservative estimated sample size). We estimated needing a sample of just over 350 women in each district (see Table 1). We calculated the number of households required to obtain this sample in each district using 2007 Census and SCIP baseline data to estimate the proportion of people in the target populations (women aged 15-49 in Ribáuè, women aged 15-49 with a child under age 2[3] in Mogovolas) and the average size of a household. In Ribáuè, a sample of 391 households was calculated to be sufficient to obtain the sample of women. In

[2] SCIP works in 14 districts of Nampula. Districts under the Complementary package are Angoche, Namapa-Erati, Meconta, Memba, Mogovolas, Moma, Monapo, Nacala-Porto, and Nacala-Velha. Districts under the Specialized package are Ribáuè, Nampula Rapale, Mecuburi, Malema, and two areas in Nampula City.

[3] Pregnant women are also a target group for animadores in Mogovolas. We decided that we would not take pregnancy into account in the sampling design, but would interview pregnant women if they were otherwise eligible (age 15-49, child under 2).

Mogovolas, a larger required sample of 979 households was calculated. The total sample was calculated as 1,370 households and 708 women aged 15-49 years.

Table 1: Sample size requirements, respondents and households

Strata	Indicator	Target Population	Estimated prevalence	Margin of error	Required sample of women 15-49	Required number of households
Complementary	% of women of reproductive age, with a child < 2, who were contacted by a CHW	Women aged 15-49 w/ child age <2	0.33	0.05	354	979
Specialized	% of women of reproductive age who were visited by a CHW	Women aged 15-49	0.33	0.05	354	391

Based on data from the SCIP baseline, these samples were also determined to be adequate to assess indicators of household socioeconomic status. Table 2 shows the estimated number of women in each group for three potential measures of equity for Complementary and Specialized areas, as determined by applying the frequencies from the SCIP baseline survey to the sample size of 354 respondents (per intervention package) to be included in the household survey. The same sample was used to estimate the proportion of women who had discussed family planning with a CHW and had taken action based on that discussion. The margin of error for these estimates is larger than for the coverage estimates (not shown), but given that this analysis is descriptive in nature, a larger margin of error is acceptable.

Table 2: Estimated number of women by sub-group, based on sample size and SCIP Baseline data

	Complementary Package	Specialized Package
	#	#
Sex of household head		
Female headed HH	186	74
Walls		
Natural	78	67
Rudimentary	212	195
Finished	64	88
Education Level		
No education	173	94
Primary or higher	177	257
Total number of women	354	354

The survey used a multi-stage sampling plan beginning with a community mapping process to list households in the geographic coverage areas of each selected CLC (existing household listings were not available for CLCs). CLC boundaries were determined in consultation with CLC leaders and SCIP staff, and boundary coordinates (latitude/longitude) were recorded using handheld global positioning system (GPS) units. GPS coordinates for topographic features and key structures (health facilities, churches, schools) were recorded and mapped. The team recorded latitude/longitude of all households and asked adult members of each household about its composition[4] (number of household

[4] The team did not do a full household listing with individual names, ages, relationships to household head, etc.

members, women aged 15-49, pregnant women, and children under age 2). Rates of missing data on household composition were less than 5% in each CLC included in the sample. Using this information, the study team listed the households with eligible women (2,949 in Ribáuè , 514 in Mogovolas) to use as the sampling frame in each district, negating the need for a larger sample of households in Mogovolas as originally calculated. Proportionally stratified sampling was conducted to randomly select 716 households (359 in Ribáuè, 357 in Mogovolas) from the list of households with eligible women. An additional 5 reserve households per CLC were randomly selected in case of refusal/non-response. In cases where a household had multiple eligible women, one eligible woman was randomly selected using a KISH table. The sampled households were representative of households with members of the target populations in the CLCs, but not the total CLC population. This is appropriate given the exploratory nature of the study.

The household survey questionnaire included questions on household characteristics and a short set of questions for eligible women on whether they had contact with a CHW, discussed family planning with the CHW, and actions taken based on the information received. The demographic questions were standard questions taken from standard DHS/MICS survey questionnaires, and other questions were added to respond to the research questions on exposure to CHW interventions.

In addition, a short quantitative survey was conducted with CHWs in the selected CLCs. The survey included questions on CHW characteristics (age, sex, education, etc.), household socioeconomic status, and experience as a CHW (how long served, volume and timing of visits/meetings, etc.). It also captured the amount of time CHWs devoted to activities for use in the costing analysis (see below).

Data Collection and Management

Data collection for the household survey and CHW interviews was conducted by a local consultant from August to October 2012. Before data collection began, permission was obtained from the National Bioethics Committee of the Ministry of Health, the Provincial Health Directorate and by the administrations of each district covered by the study.

The interviewer training and field test for the household survey and CHW interviews were conducted in Nampula City on August 14-17, 2012. Participants included two supervisors and twenty interviewers who had been identified based on prior survey experience and fluency in the local language (Makua). The training included 2 days of classroom instruction (lectures, presentations, practical demonstrations and practice interviews) and 2 days of field practice in two CLCs of Nampula-Rapale district. Twelve interviewers were selected based on observation of performance and knowledge test scores. There was a delay of several weeks before the start of data collection due to the community mapping which was necessary to design the household survey sample. Consequently, the interviewers received refresher training in mid-September immediately prior to data collection.

Mapping of the selected CLCs was conducted from August 22-September 13, 2012. The team obtained detailed cartography maps for Ribáuè and Mogovolas from the Instituto Nacional de Estatísticas (INE) in order to validate and finalize the CLC maps for use in sampling and data collection. Data collection for the household survey and CHW interviews was conducted by twelve interviewers from September 24-October 25, 2012. Interviewers were overseen by the two field supervisors, and additional supervision was coordinated from the Pathfinder office in Nampula City. There were some substitutions of households in Ribáuè and Mogovolas due to non-availability of respondents or inability to locate households; the list of reserve households was sufficient to accommodate all substitutions. The CHW questionnaire was administered to all CHWs in each CLC who were available and agreed to participate.

Data management in the field was conducted by the local consultant, whose field supervisors controlled and monitored data collection by the interviewers, identified and addressed any issues, and sent daily reports to Maputo. Hard copies of completed questionnaires were sent to the consultant's office in Maputo after completion of data collection in each district. A data quality control officer in Maputo office registered each questionnaire, revalidated the sample and managed the data entry

process under the supervision of an analytical statistical specialist. Household and CHW survey data were entered and processed in CSPro /Lime Survey software and exported to SPSS and Stata for cleaning and analysis.

Data Analysis

All analyses were conducted in Stata, Release 11, Copyright © 2009 StataCorp LP. Analyses for the 2012 household survey were conducted separately for each intervention package (the districts of Ribáuè and Mogovolas represented the Specialized and Complementary packages, respectively). Descriptive statistics were generated for socioeconomic and household characteristics of respondents, and tests of differences in proportions were used to assess whether respondent characteristics differed in Ribáuè vs. Mogovolas. Frequency distributions for categorical variables and mean/standard deviation for ordinal variables were generated to describe the households that were and were not visited by a CHW, and multiple logistic regression analyses were conducted to identify significant predictors for contact with a CHW. Selected measures were used to determine household socioeconomic status and vulnerability, as recommended to account for the complexity of poverty and social exclusion (Bilsborrow et al 1998). These measures were sex of head of household, education of head of household, material of the walls and roof (as a measure of housing quality), and household assets (determined based on items that best discriminated between households in the SCIP baseline survey). All of these were assessed as relative measures within each intervention package/district (Ribáuè=Specialized, Mogovolas=Complementary). Secondary data from the SCIP baseline survey, conducted in October-December 2010 among 2,314 women aged 15-49 in 14 districts of Nampula Province, were also analyzed to further assess who is reached by CHWs (details presented in Annex I).

For the CHW survey, analyses were combined for the two districts due to the small sample of CHWs who were interviewed. Frequency distributions were used to describe the socioeconomic characteristics of CHWs who were interviewed. To determine if CHWs are similar to the households they serve, we used simple tests of proportions to compare frequencies of CHW characteristics to those of women contacted and not contacted by CHWs in Ribáuè and Mogovolas. Mean and median values were generated for several variables on frequency and timing of visits/meetings by CHWs.

Response Rates

For the household survey, a total of 716 women (359 in Ribáuè, 357 in Mogovolas) from the sampled households were approached for interview. Four women (3 in Ribáuè, 1 in Mogovolas) identified themselves as CHWs so were ineligible for further interview. Overall 99.2% of all women approached were eligible and completed the interview. However, at the analysis stage, data on socioeconomic characteristics and contact with CHWs were found to be missing for 49 women in Mogovolas so they were excluded from analyses. In all, 663 respondents (356 women aged 15-49 in Ribáuè, 307 women aged 15-19 with a child under age 2 in Mogovolas) provided complete information on key background characteristics and outcomes of interest (contact with CHW) and were included in the analysis. For the CHW survey, a total of 72 CHWs were interviewed (54 in Ribáuè, 18 in Mogovolas). Based on recent mapping exercises conducted by the SCIP project, we estimate the CHW sample in Ribáuè represents approximately 15% of all CHWs in the 9 CLCs (total of 384). Each CLC in Mogovolas has only one or two CHWs, so it is assumed that nearly all CHWs in the 9 selected CLCs of Mogovolas were interviewed.

Results

Study Population

Table 3 summarizes the composition and characteristics of households in Ribáuè (Specialized package) and Mogovolas (Complementary package) districts of Nampula in 2012. The proportion of households headed by females is higher in Ribáuè (16%) than in Mogovolas (9%). Education levels of household heads differed as well, with 32% of household heads in Mogovolas having no education compared to 16% in Ribáuè. The average household size is larger in Mogovolas, with a higher percentage of households having at least 5 members. The socioeconomic status of households based

on dwelling and assets is relatively low in both districts. Most households (84% in Ribáuè, 89% in Mogovolas) have rudimentary walls, virtually none (<1%) have electricity, and less than half have bicycles (a key mode of transport in rural areas). Slightly less than half of households have radios, and very few have cell phones.

Table 3: Composition and characteristics of households with eligible women in Ribáuè and Mogovolas districts, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)		p value*
Household Composition	N	%	N	%	
Household headship					
Male	302	84.1	324	90.8	0.007
Female	57	15.9	33	9.2	
Household head education level					
No education/don't know	55	15.3	114	31.9	<0.001
Primary	269	74.9	205	57.4	<0.001
Secondary or higher	35	9.8	38	10.6	0.72
Number of usual members					
1-2	38	10.6	1	0.3	<0.001
3-4	126	35.1	127	35.6	0.89
5 or more	195	54.3	229	64.2	0.007
Mean size of household	4.9 (2.0)		5.5 (1.9)		
Household Characteristics	N	%	N	%	
Construction of walls					
Natural walls	22	6.1	16	4.5	0.34
Rudimentary walls	300	83.6	317	88.8	0.04
Finished walls	36	10.0	21	5.9	0.04
Missing	1	0.3	3	0.8	--
Construction of roof					
Grass/Thatch/Palm	343	95.5	347	97.2	0.23
Tin sheet/tile/Lusalite/other	16	4.5	10	2.8	--
Household assets					
Radio	167	46.5	146	40.9	0.13
Cell phone	39	10.9	39	10.9	1.00
Electricity	2	0.6	1	0.3	0.55
Bicycle	162	45.1	149	41.7	0.36
Total	359	100.0	357	100.0	

* p value for test of difference in proportions; p<0.05 considered statistically significant.

Table 4 summarizes the characteristics of the 663 women who were included in the analysis: 356 women aged 15–49 years in Ribáuè and 307 women aged 15-49 years with a child under age 2 in Mogovolas. Respondents in Ribáuè were slightly older than those in Mogovolas, with mean ages of 28.4 years (SD 8.9) and 27.7 years (SD 7.5) respectively. The majority of respondents in both districts were in a relationship: 52% married and 33% living with a partner in Ribáuè, and 59% married and 35% living with a partner in Mogovolas. Respondents in Ribáuè had significantly higher levels of education than those in Mogovolas, with 41% of women in Mogovolas having no education. Religious affiliation also differed significantly, with the majority of respondents in Ribáuè being Catholic (39%) or Protestant (38%) and those in Mogovolas being Catholic (58%) or Muslim (28%).

Table 4: Socio-demographic characteristics of survey respondents in Ribáuè (women aged 15-49 years) and Mogovolas (women aged 15-49 with a child under 2 years) districts, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)		p value*
Respondent Characteristics	N	%	N	%	
Age in Years					
15 - 19	69	19.4	48	15.6	0.20
20 - 24	72	20.2	69	22.5	0.47
25 - 29	72	20.2	65	21.2	0.75
30 - 34	50	14.0	49	16.0	0.47
35 - 39	39	11.0	58	18.9	0.004
40 - 44	29	8.2	12	3.9	0.02
45 - 49	25	7.0	6	2.0	0.002
Marital Status					
Currently married	184	51.7	182	59.3	0.05
Currently living with partner	115	32.3	107	34.9	0.48
Widowed/divorced/single	57	16.0	18	5.9	<0.001
Highest level of education					
No education/don't know	81	22.8	125	40.7	<0.001
Primary	261	73.3	167	54.4	<0.001
Secondary or higher	14	3.9	15	4.9	<0.001
Religion					
Catholic	140	39.3	176	57.3	<0.001
Protestant/Evangelical	134	37.6	26	8.5	<0.001
Muslim/other	29	8.2	91	29.6	<0.001
None	53	14.9	14	4.6	<0.001
Total	356	100.0	307	100.0	

* p value for test of difference in proportions

Contact with Community Health Workers, by Sociodemographic Characteristics of Respondents

Table 5 shows that most respondents in Ribáuè (83%) and Mogovolas (71%) knew of a CHW in their community and most (80% in Ribáuè, 64% in Mogovolas) had seen a SCIP CHW[5] talking about health with women in their community. Overall, 49% of respondents in Ribáuè and 53% of respondents in Mogovolas reported ever having contact with a CHW (from SCIP or otherwise). Among women who ever had contact with a CHW, more than half (50% in Ribáuè, 56% in Mogovolas) had contact with a CHW less than 3 months ago, and nearly 90% in both districts had contact less than one year ago. Overall, 148 of the 356 women in Ribáuè (42%) and 142 of the 307 women in Mogovolas (46%) had contact with a CHW within the past year (0-11 months ago). These findings indicate that the CHWs in Specialized and Complementary intervention packages had similar rates of contact with target populations through their respective outreach models of home visits and group meetings.

Table 5: Knowledge of and contact with CHWs among survey respondents in Ribáuè (women aged 15-49 years) and Mogovolas (women aged 15-49 with a child under 2 years), 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
	N	%	N	%
Knows of a CHW in community				
Yes	295	82.9	218	71.0
No	61	17.1	87	28.3
Don't know	0	0.0	2	0.7
Has seen a SCIP CHW in community	285	80.1	197	64.2
Yes	70	19.7	108	35.2
No	1	0.3	2	0.7
Don't know				
Ever had contact with a CHW				
Yes	173	48.6	163	53.1
No	183	51.4	144	46.9
Total	356	100.0	307	100.0
Last contact with CHW				
<1 month ago	31	17.9	39	23.9
1-2 months ago	56	32.4	52	31.9
3-5 months ago	34	19.7	39	23.9
6-11 months ago	27	15.6	12	7.4
1 year or more ago	19	11.0	12	7.4
Don't know/missing	6	3.5	9	5.5
Total	173	100.0	163	100.0

Table 6 and 7 show results for each district/intervention package on whether the respondent ever had contact with a CHW, by socioeconomic and household characteristics. The majority of women contacted by CHWs in Ribáuè (Specialized package) and Mogovolas (Complementary package) were either married or living with a partner, had a primary education, and lived in households with relatively few assets. Women contacted in Ribáuè primarily identified as Catholic or Protestant, whereas women contacted in Mogovolas were predominantly Catholic or Muslim. Most women who were contacted lived in male-headed households in which the head had primary education.

[5] A CHW wearing a t-shirt or badge with the SCIP logo

Table 6: Percentage of women aged 15-49 in Ribáuè who ever had contact with a CHW, by socio-demographic and household characteristics, 2012

	Specialized Package (Ribáuè)			
	Ever had contact a with CHW		Never had contact with a CHW	
Respondent Characteristics	N	%	N	%
Age in Years				
15 - 19	26	15.0	43	23.5
20 - 24	35	20.2	37	20.2
25 - 29	42	24.3	30	16.4
30 - 34	29	16.8	21	11.5
35 - 39	17	9.8	22	12.0
40 - 49	24	13.9	30	13.4
Marital Status				
Currently married	72	41.6	112	61.2
Currently living with partner	73	42.2	42	23.0
Widowed/divorced/single	28	16.2	29	15.9
Highest level of education				
No education/don't know	36	20.8	45	24.6
Primary	131	75.7	130	71.0
Secondary or higher	6	3.5	8	4.4
Religion				
Catholic	70	40.5	70	38.3
Protestant/Evangelical	69	39.9	65	35.5
Muslim/other	10	5.8	19	10.4
None	24	13.9	29	15.9
Household Characteristics	N	%	N	%
Household headship				
Male	144	83.2	155	84.7
Female	29	16.8	28	15.3
Household head education level				
No education/don't know	28	16.2	27	14.8
Primary	123	71.1	143	78.1
Secondary or higher	22	12.7	13	7.1
Construction of walls				
Natural or rudimentary walls	155	89.6	164	89.6
Finished walls	17	9.8	19	10.4
Missing	1	0.6	0	0.0
Construction of roof				
Grass/Thatch/Palm	165	95.4	175	95.6
Tin sheet/tile/Lusalite/other	8	4.6	8	4.4
Household assets				
Radio	79	45.7	86	47.0
Cell phone	22	12.7	17	9.3
Bicycle	68	39.3	91	49.7
Electricity	2	1.2	0	0.0
Total	173	100.0	183	100.0

Table 7: Percentage of women aged 15-49 with a child under 2 in Mogovolas who ever had contact with a CHW, by socio-demographic and household characteristics, 2012

	Complementary Package (Mogovolas)			
	Ever had contact a with CHW		Never had contact with a CHW	
Respondent Characteristics	N	%	N	%
Age in Years				
15 - 19	26	16.0	22	15.3
20 - 24	31	19.0	38	26.4
25 - 29	40	24.5	25	17.4
30 - 34	30	18.4	19	13.2
35 - 39	25	15.3	33	22.9
40 - 49	11	6.8	7	4.9
Marital Status				
Currently married	79	48.5	103	71.5
Currently living with partner	75	46.0	32	22.2
Widowed/divorced/single	9	5.5	0	6.3
Highest level of education				
No education/don't know	60	36.8	65	45.1
Primary	97	59.5	70	48.6
Secondary or higher	6	3.7	9	6.3
Religion				
Catholic	100	61.4	76	52.8
Protestant/Evangelical	16	9.8	10	6.9
Muslim/other	41	25.2	50	34.7
None	6	3.7	8	5.6
Household Characteristics	N	%	N	%
Household headship				
Male	151	92.6	135	93.8
Female	12	7.4	9	6.3
Household head education level				
No education/don't know	43	26.4	51	35.4
Primary	105	64.4	73	50.7
Secondary or higher	15	9.2	20	13.9
Construction of walls				
Natural or rudimentary walls	155	95.1	134	93.1
Finished walls	6	3.7	10	6.9
Missing	2	1.2	0	0.0
Construction of roof				
Grass/Thatch/Palm	161	98.8	140	87.2
Tin sheet/tile/Lusalite/other	2	1.2	4	2.8
Household assets				
Radio	74	45.4	50	34.7
Cell phone	18	11.0	12	8.3
Bicycle	75	46.0	54	37.5
Electricity	1	0.6	0	0.0
Total	163	100.0	144	100.0

Table 8 shows multivariate logistic regression results for socio-demographic factors associated with contact with a CHW in Ribáuè and Mogovolas. After adjusting for women's age and level of education, women living with a partner were nearly three times more likely in Ribáuè (Specialized) and 3 and a

half times more likely in Mogovolas to be contacted by a CHW than married women. In Mogovolas, women who identified as Muslim were half as likely to be contacted as those who identified as Catholic. In Ribáuè, women whose head of household had secondary education were more than 3 times as likely to be contacted as women whose household head had no education.

Table 8: Multivariate logistic regression results for contact with a CHW, by district, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
Respondent Characteristics	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value
Age	1.01 [0.98-1.04]	0.46	0.99 [0.96-1.03]	0.78
Marital Status				
Currently married	1.00 (ref)	---	1.00 (ref)	---
Currently living with partner	2.94 [1.76-4.92]	<0.001	3.57 [2.05-6.21]	<0.001
Widowed/divorced/single	1.91 [0.82-5.03]	0.19	1.25 [0.29-5.34]	0.77
Highest level of education				
No education/don't know	1.00 (ref)	---	1.00 (ref)	---
Primary	1.27 [0.70-2.29]	0.43	1.05 [0.58-1.90]	0.88
Secondary or higher	0.39 [0.09-1.62]	0.19	0.42 [0.11-1.57]	0.20
Religion				
Catholic	1.00 (ref)	---	1.00 (ref)	---
Protestant/Evangelical	1.06 [0.64-1.75]	0.83	1.18 [0.47-2.91]	0.73
Muslim/other	0.46 [0.19-1.10]	0.08	0.55 [0.32-0.96]	0.04
None	0.71 [0.36-1.40]	0.32	0.54 [0.16-1.77]	0.31
Household Characteristics	Odds Ratio (95% CI)	P value	Odds Ratio (95% CI)	P value
Household headship				
Male	1.00 (ref)	0.63	1.00 (ref)	0.43
Female	0.79 [0.30-2.06]		1.73 [0.44-6.79]	
Household head education level				
No education/don't know	1.00 (ref)	---	1.00 (ref)	---
Primary	0.87 [0.44-1.71]	0.68	1.74 [0.93-3.29]	0.08
Secondary or higher	3.15 [1.05-9.43]	0.04	0.86 [0.32-2.32]	0.76
Construction of walls				
Natural or rudimentary walls	1.00 (ref)	0.99	1.00 (ref)	0.96
Finished walls	1.00 [0.48-2.11]		1.02 [0.34-3.07]	
Construction of roof				
Grass/Thatch/Palm	1.00 (ref)	0.86	1.00 (ref)	0.42
Tin sheet/tile/Lusalite/other	1.10 [0.37-3.30]		0.45 [0.06-3.15]]	
Household assets				
Radio	0.95 [0.58-1.58]	0.86	0.60 [0.35-1.04]	0.07
Cell phone	0.59 [0.28-1.25]	0.17	0.93 [0.36-2.42]	0.89
Bicycle	1.67 [0.99-2.78]	0.05	0.78 [0.45-1.32]	0.35
Total	356	100.0	305	100.0

Are CHWs similar to the women they reach?

Table 9 summarizes the characteristics of the 72 CHWs (54 in Ribáuè, 18 in Mogovolas) who were interviewed vs. the women who were surveyed. Due to the small sample of CHWs, data from Ribáuè and Mogovolas were combined for analysis. The age distribution of CHWs was similar to women they contacted. CHWs had higher rates of primary and secondary education than all the women surveyed, regardless of whether or not they were contacted (this is expected, as CHWs must be able to read and write). CHWs were also more likely to be Protestant, live in female-headed households, and have higher socioeconomic status (head of household education, roof construction and bicycle ownership) than women surveyed. CHWs had similar rates of household assets (radio, cell phone, electricity) as the women they contacted, but more assets than women they did not contact. This suggests that some households with lower socioeconomic status may be missed by CHWs.

Table 9: Socio-demographic characteristics of CHWs versus women contacted and not contacted by a CHW in Ribáuè and Mogovolas, 2012

	CHWs		Women contacted by CHWs			Women not contacted by CHWs		
Characteristics of CHWs and women surveyed in Ribáuè and Mogovolas	N	%	N	%	P value*	N	%	P value*
Age in Years								
15 - 24	21	29.2	118	35.1	0.34	140	42.8	0.03
25 - 34	24	33.3	141	42.0	0.17	95	29.1	0.48
35+	21	29.2	77	22.9	0.26	92	28.1	0.85
Don't know	6	8.3	--	--	---	---	---	---
Highest level of education								
No education/don't know	8	11.1	96	28.6	0.002	110	33.6	<0.001
Primary	60	83.3	228	67.9	0.009	200	61.2	<0.001
Secondary or higher	4	5.6	12	3.6	0.43	17	5.2	0.89
Religion								
Catholic	34	47.2	170	50.6	0.60	146	44.7	0.70
Protestant/Evangelical	27	37.5	85	25.3	0.04	75	22.9	0.01
Muslim/other	4	5.6	51	15.2	0.04	69	21.1	0.002
None	7	9.7	30	8.9	0.83	37	11.3	0.69
Household headship								
Male	57	79.2	295	87.8	0.05	290	88.7	0.03
Female	15	20.8	41	12.2		37	11.3	
Household head attended school								
Yes	63	87.5	265	78.9	0.10	249	76.1	0.03
No	9	12.5	71	21.1		78	23.9	
Construction of walls								
Natural or rudimentary walls	63	87.5	310	93.1	0.11	298	91.1	0.35
Finished walls	9	12.5	23	6.9		29	8.9	
Construction of roof								
Grass/Thatch/Palm	58	80.6	326	97.0	<0.001	315	96.3	<0.001
Tin sheet	14	19.4	10	3.0		12	3.7	
Household assets								
Radio	39	54.2	153	45.5	0.18	136	41.6	0.05
Cell phone	14	19.4	40	11.9	0.09	29	8.9	0.01
Electricity	2	2.8	3	0.9	0.19	0	0.0	0.002
Bicycle	43	59.7	143	42.6	0.01	145	44.3	0.02
Total	72	100.0	336	100.0		327	100.0	

* P value for test of difference in proportions

Discussion

The 2012 household survey in Mogovolas and Ribáuè found that approximately half of women surveyed in both intervention packages/districts ever had contact with a CHW, with most having had contact in the past year. The percent of women who had contact with a CHW in the past month was slightly higher for the Complementary package (24% in Mogovolas) than the Specialized package (18% in Ribáuè). This suggests that the Complementary approach of group meetings may have greater frequency of contact with women than the Specialized approach of household visits. However, it is challenging to interpret the results because the Complementary intervention package has evolved over time to target all women of reproductive age (not just women with a child under age 2), increased its program targets from 30 women reached per CHW in 2009 to 50 women in 2011, and initiated periodic home visits for health education and re-supply of pills. Project intervention models must be dynamic and adaptable as the project evolves, and hence present an inherent challenge for evaluating their effects.

Estimates of CHW coverage vary widely in the literature, so it is difficult to say whether our findings are comparable to other programs or countries. For example, a study on child health in Mali found that 55% of households had received at least one visit from a CHW in the past 3 months (Perez et al 2009), while in Zambia only 12% of women in rural areas received a visit from a CHW in the past year (White & Speizer 2007). Nonetheless, our results do fall within the range of estimates from the literature.

Selected socio-demographic and household characteristics were associated with having contact with a CHW. The multivariate analysis found that women living with a partner were significantly more likely to be contacted by a CHW than formally married women. In contrast, the secondary analysis of 2010 SCIP baseline survey data (shown in Annex 1) found that married women represented a higher proportion of households visited than not visited. This may reflect changing perceptions among CHWs about the respective health needs of these two groups. In Mogovolas, the significantly lower odds of CHW contact among Muslim women may reflect cultural norms around discussing health topics in group settings. CHWs in Ribáuè (Specialized) were significantly more likely to reach women whose head of household has higher education levels and assets (specifically bicycles). This was not the case in Mogovolas, which could indicate that women's household characteristics are less relevant in the Complementary approach of group meetings. It suggests that things have changed since the SCIP baseline survey analysis, which found that households with improved construction were less likely to have been visited by a CHW in the past month (as shown in Annex 1). The comparison of characteristics among CHWs and women surveyed indicated that CHWs generally have higher socioeconomic status than most women in their communities regardless of whether or not they are reached. These findings are useful for the SCIP project to understand who is being reached and support the CHWs (particularly in Ribáuè) to target their outreach more effectively to poor and vulnerable households.

Limitations

For the household survey, the questionnaires and interview guides were printed in Portuguese because the local language (Makua) is largely spoken rather than written. Translation into Makua was addressed during the trainings, but it was not possible to ensure the consistency of the translations across interviewers. To minimize potential bias, interviewers discussed and agreed on the correct translation of questions and responses during the trainings.

Household listings were not available for the enumeration areas so the study team conducted rapid household mapping in each selected CLC to identify households with eligible respondents. The mapping team was trained to include all households with eligible women, regardless of their geographic location or socioeconomic status. However, it is possible that some households were erroneously included or excluded from the list, since the mapping did not include a full household listing or require visual verification of women or children under age 2. To avoid selection bias in the field, a list of replacement households was provided to the supervisors to be used in case one of the

original sampled households could not be interviewed. The supervisor first made a strong effort to complete the interview for the original sampled household before deciding to replace it. Nonetheless, it is possible that some households were replaced due to being less desirable for interview (i.e. remote location, poor condition of house), which could have biased the sample toward households of higher socioeconomic status. However, as the number of replacements was small, it is unlikely to have had a substantial effect on the results (and the overall socioeconomic status of the sample was low).

Another limitation for the household survey is the missing data for 49 women in Mogovolas, which resulted in the Mogovolas sample having fewer women than we originally calculated were required to look at the key outcome of interest (contact with a CHW). Because the missing data included demographic characteristics on age, marital status, and education, we cannot determine whether these women differed from women who were included in the analysis, and therefore do not know the direction of bias (if any) that may have been introduced.

Finally, the study methodology originally included qualitative in-depth interviews with CHWs in Ribáuè and Mogovolas to further explore the factors influencing who they reach, including how they determine which households to visit/invite to meetings, challenges in visiting some houses, etc. The in-depth interviews were conducted by the local consultant, but Pathfinder was unable to obtain the data from the consultant at the end of the study so we could not include the qualitative analysis in this paper as originally planned. Consequently, we cannot offer the more nuanced analysis of factors influencing CHW coverage that we had hoped.

Research Question 2: Discussion of Family Planning with CHWs

This chapter covers the methodology, results and discussion for the second research question:

2. Are CHWs who provide an integrated package of health services conveying information about family planning? How do the women who receive these messages take action based on them?

Methods

The main data collection method used to address this research question is the household survey conducted in Ribáuè and Mogovolas in 2012 (please see 'METHODS' under Research Question 1 for details). Analyses were conducted among the sub-set of women who reported having had contact with a CHW in the past year in Ribáuè (Specialized intervention package) and Mogovolas (Complementary intervention package). Women whose last contact with a CHW was more than a year ago or who were unsure about timing of last contact were excluded from this analysis due to concerns about accurate recall of discussion content. Frequency distributions were generated and tests of differences in proportions were used to identify significant differences in socio-demographic characteristics of women who discussed family planning versus those who did not. Among women who discussed family planning with a CHW in the past year, the different ways in which they acted on that information were analyzed.

Results

Contact with community health workers who discussed family planning

Overall, 37% of women in Ribáuè (n=130 of 356) and 40% in Mogovolas (n=124 of 307) had contact with a CHW in the past year who discussed FP, indicating relatively similar coverage of the Specialized and Complementary packages. Table 10 shows that among women who had contact with a CHW in the past year, nearly 90% in both districts discussed family planning with the CHW. Of those who talked with a CHW about family planning, more than half (58% in Ribáuè, 65% in Mogovolas) discussed the topic less than 3 months ago, and more than 80% in both districts discussed it in the past 6 months. A higher percentage of women in Mogovolas (42%) than Ribáuè (24%) reported that the CHW also talked with their husband about family planning.

Table 10: Percentage of women in Ribáuè and Mogovolas who had contact with a CHW in the past year who talked about family planning, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
	N	%	N	%
Talked with CHW about family planning	130	87.8	124	87.9
Yes	18	12.2	17	12.1
No/don't know				
Total	148	100.0	141	100.0
Last discussed family planning with CHW	28	21.5	33	27.3
<1 month ago	47	36.2	45	37.2
1-2 months ago	31	23.9	33	27.3
3-5 months ago	24	18.5	10	8.3
6-11 months ago				
CHW discussed FP with husband				
Yes	27	23.5	47	41.6
No	88	76.5	66	58.4
Total	130	100.0	113	100.0

Table 11 and Table 12 show the socio-demographic characteristics of women contacted by CHWs who discussed family planning versus those who did not discuss FP. The majority of women who discussed FP with CHWs in Ribáuè and Mogovolas were living with a partner in an informal union, had a primary education, and lived in male-headed households. Women who discussed FP in Ribáuè primarily identified as Catholic or Protestant, whereas women who discussed FP in Mogovolas were predominantly Catholic or Muslim. Women who discussed FP lived in households where the head had either no education or primary education, in contrast to women who were not contacted by CHWs (household heads had at least primary education).

Table 11: Percentage of women who talked with a CHW about family planning in Ribáuè in the past year, by demographic characteristics, 2012

	Ribáuè			
	Discussed FP with CHW		Did not discuss FP with CHW	
Respondent Characteristics	N	%	N	%
Age in Years				
15 - 24	47	36.2	8	44.4
25 - 34	52	40.0	8	44.4
35+	31	23.9	2	11.1
Marital Status				
Currently married	46	35.4	8	44.4
Currently living with	63	48.5	8	44.4
partner	21	16.2	2	11.1
Widowed/divorced/single				
Highest level of education				
No education/don't know	28	21.5	4	22.2
Primary	98	75.4	14	77.8
Secondary or higher	4	3.1	0	0.0
Religion				
Catholic	52	40.0	9	50.0
Protestant/Evangelical	56	43.1	2	11.1
Muslim/other	7	5.4	3	16.7
None	15	11.5	4	22.2
Household Characteristics	N	%	N	%
Household headship				
Male	108	83.1	16	88.9
Female	22	16.9	2	11.1
Household head education level				
No education/don't know	20	15.4	5	27.8
Primary	95	73.1	13	72.2
Secondary or higher	15	11.5	0	0.0
Total	130	100.0	18	100.0

Table 12: Percentage of women who talked with a CHW about family planning in Mogovolas in the past year, by demographic characteristics, 2012

	Mogovolas			
	Discussed FP with CHW		Did not discuss FP with CHW	
Respondent Characteristics	N	%	N	%
Age in Years				
15 - 24	43	34.7	8	47.1
25 - 34	53	42.7	7	41.2
35+	28	22.6	2	11.8
Marital Status				
Currently married	52	41.9	14	82.4
Currently living with partner	65	52.4	3	17.7
Widowed/divorced/single	7	5.7	0	0.0
Highest level of education				
No education/don't know	47	37.9	5	29.4
Primary	72	58.1	11	64.7
Secondary or higher	5	4.0	1	5.9
Religion				
Catholic	77	62.1	11	64.7
Protestant/Evangelical	13	10.5	1	5.9
Muslim/other	31	25.0	4	23.5
None	3	2.4	1	5.9
Household Characteristics	N	%	N	%
Household headship				
Male	113	91.1	17	100.0
Female	11	8.9	0	0.0
Household head education level				
No education/don't know	36	29.0	0	0.0
Primary	78	62.9	15	88.2
Secondary or higher	10	8.1	2	11.8
Total	124	100.0	17	100.0

Family planning messages recalled and actions taken

Table 13 shows that among those who talked with a CHW about FP in the past year, 73% in Ribáuè and 70% in Mogovolas felt they learned something new about family planning from the discussion, and nearly all (95% in Ribáuè, 92% in Mogovolas) recalled some content from the discussion. Respondents most frequently recalled talking with CHWs about family planning in general, using pills, and using condoms. These results indicate that the Specialized and Complementary approaches had relatively similar effects in terms of message recall among beneficiaries.

Table 13: Messages recalled by women who discussed family planning with a CHW in the past year, by district, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
	N	%	N	%
Learned new info on FP from CHW				
Yes	95	73.1	87	70.2
No	35	26.9	37	29.8
Messages recalled about FP*				
Family planning (general)	89	73.6	48	42.5
Healthy timing/spacing of births	4	3.1	8	6.5
Use pills	31	23.8	47	37.9
Use injectables	2	1.5	5	4.0
Use condoms	36	27.7	39	31.5
Other	2	1.5	6	4.8
Don't know/missing	7	5.4	10	8.1
Total	130	100.0	124	100.0

*Percentages add up to greater than 100% because respondents could mention more than one message.

Table 14 shows that of respondents who discussed family planning with CHWs, around one half (60% in Ribáuè, 47% in Mogovolas) reported talking with someone else about what they learned. Of those who talked with someone, most in Ribáuè talked with their husband or a family member, and most in Mogovolas talked with their husband or someone else (not a friend or family member).

Table 14: Percentage of women in Ribáuè and Mogovolas who talked with someone else about FP, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
	N	%	N	%
Talked with someone about FP info learned from CHW				
Yes	78	60.0	58	46.8
No	52	40.0	66	53.2
Total	130	100.0	124	100.0
Person talked with				
Husband	45	57.7	36	62.1
Partner/Boyfriend	4	5.1	4	6.9
Family member	24	30.8	2	3.5
Friend	5	6.4	5	8.6
Other	0	0.0	11	19.0
Total	78	100.0	58	100.0

Table 15 shows that of respondents who discussed family planning with CHWs, 42% in Ribáuè and 34% in Mogovolas reported doing something different to avoid pregnancy as a result of talking with the CHW. Of those who said they did something different, the majority mentioned using family planning in general, and some mentioned using specific methods (most commonly pills and condoms).

Table 15: Actions taken by women Ribáuè and Mogovolas based on FP info learned, 2012

	Specialized Package (Ribáuè)		Complementary Package (Mogovolas)	
	N	%	N	%
Did something different to avoid pregnancy	54	41.5	42	33.9
Yes	76	58.5	82	66.1
No				
Total	130	100.0	124	100.0
Actions taken to avoid pregnancy*				
Use family planning (general)	30	55.6	13	31.0
Use pills	17	31.5	19	45.2
Use injectables	5	9.3	3	7.1
Use condoms	7	13.0	10	23.8
Other	1	1.9	4	9.5
Don't know/Missing	0	0.0	1	2.4
Total	54	100.0	42	100.0

*Percentages add up to greater than 100% because respondents could mention more than one action.

Discussion

The 2012 household survey in Mogovolas and Ribáuè shows that nearly all women contacted by CHWs in the past year received information about family planning, and most had discussed the topic recently. This indicates that CHWs are achieving their mandate of providing FP information to the women they reach. CHWs in the Specialized and Complementary intervention packages appeared to convey family planning information at similar rates, with 37% of women in Ribáuè and 40% in Mogovolas (42%) having contact in the past year with a CHW who discussed family planning. The majority of women who discussed FP with CHWs were living with a partner rather than formally married (the same was true in the secondary analysis of the SCIP baseline survey – see Annex 1), which may reflect CHWs' perceptions about the differing family planning needs of these two groups. Women in households whose head had no education or primary education did receive FP messages, which suggests that CHWs are providing family planning information to women who are most in need.

Most women who talked with a CHW about family planning felt that they learned something new from the discussion, and some recalled basic content/messages on family planning that they discussed with CHWs (e.g., use pills). More than half of women talked with a spouse or partner about what they had learned, and a substantial proportion (42% in Ribáuè, 34% in Mogovolas) reported doing something different to avoid pregnancy (e.g., using family planning in general, or a specific FP method). This suggests that the Specialized approach of household visits may be slightly more effective in encouraging women to take action related to FP than the Complementary approach of group meetings, though the Complementary approach did evolve over time to include some household visits. The difference in outreach to husbands about family planning (42% in Mogovolas vs. 24% in Ribáuè) may be a reflection of the different intervention packages, or may reflect other social and cultural factors in the two districts regarding discussion of reproductive health topics with men.

Ultimately, we want to know whether contact with CHWs in an integrated program affects health outcomes, including use of contraception. At the time of the study, the SCIP project had not been operating long enough to see measurable changes in health behaviors in the target population (i.e. contraceptive prevalence). However, the fact that women in Ribáuè and Mogovolas are taking actions based on their discussions about family planning with CHWs suggests positive steps toward behavior change may be happening more broadly among SCIP target populations. It also indicates that the SCIP project is having the kind of effects that would likely lead to the desired outcome of contraceptive use.

Limitations

The same limitations described under Research Question 1 apply to this research question.

Research Question 3: Costs of the SCIP CHW Specialized Model

This chapter covers the methodology, results and discussion for the third research question:

3. How much does the CHW component of SCIP cost under each model?

Methods

Methodologies and Tools

A retrospective costing analysis of the Specialized package was conducted to estimate the cost of providing CHW services with respect to different output measures as well as costs per beneficiary served. The costing analysis was conducted for the five Specialized districts in Nampula province: Nampula City, Ribáuè, Mecuburi, Nampula Rapale (referred to as Rapale), and Malema. Selected data from the CHW quantitative interviews in Ribáuè were also used. We were not able to cost the Complementary package because financial data could not be obtained from the implementing partner.

Data collection

Data for the costing study were collected over several months in 2012. Cost data were collected from the detailed project budget of World Relief Mozambique for the study period (2010-2012). Cost data from the budget were divided into three main parts. The first was the personnel cost, which covered remuneration for all workers involved in the project (SCIP Central Office in Nampula City and community costs). Annual salaries as well as fixed benefits for each cadre of workers were extracted from the World Relief detailed project budget for 2010 and 2011, and level of effort on CHW activities was estimated for each cadre. The second part of the costing analysis estimated the recurrent costs of the program, which included monthly and yearly costs associated with maintenance and repair of vehicles and motorcycles, gasoline, office supplies, insurance, utilities (energy, telephone, and water), travel costs, printing, waste collection services and training allowances. All recurrent costs were inflated by 10% according to the official inflation rate for Mozambique from the World Bank World Development Indicators[6]. The third part of the costing analysis estimated the amortized capital cost of buildings, motor vehicles, motor bikes and bicycles, and office equipment including computers and software. Capital costs for 2011 were inflated by 10% according to the official inflation rate for Mozambique. Other necessary cost information was gathered through informal interviews and email exchanges with key project officials.

Data on project outputs (number of households covered, number of trainings for CHWs, number of household visited and number of beneficiaries served) were obtained from the SCIP project database and reports. Project personnel provided data on the number of households visited every month by CHWs for all districts in 2012, all districts except Ribáuè in 2011, and only Mecuburi district for 2010. The number of community supervisors and CHWs that worked in each district for 2010, 2011 and 2012 was established using World Relief program data. Selected questions were also included in the CHW interviews in Ribáuè and Mogovolas to determine the time devoted to home visits and other CHW activities to estimate costs for these activities.

Data Analysis

The costing analysis was conducted for the entire Specialized program, as well as separately for each of the five districts. Each costing component was presented along with a per capita cost, using figures based on the most recent 2007 census estimates[7] (http://www.geohive.com/cntry/mozambique.aspx). The first costing analysis included all costing data but assumed CHW were volunteers and did not receive any monetary compensation. The second analysis included an estimated amount for CHW salaries, using the minimum wage for the districts

[6] http://data.worldbank.org/data-catalog/world-development-indicators

[7] Nampula city population estimates are from the 2007 census estimates of two Nampula city neighborhoods, Mutuanha and Namutequeliua, where the World Relief (WR) Specialized Package project is based. The population growth estimate for Mozambique of 2.4% per year from the UN Population Projections was used to estimate future population sizes for each area.

around Nampula City of $45/month (also proposed as a monthly subsidy for CHWs under the National Community Health Worker Program of Mozambique (McGunegill 2012)) and an estimated 39% of CHWs' time spent on activities for SCIP. These two analyses allowed us to calculate the costs potentially saved over the three years by using the CHW volunteering model.

We also calculated the costs per program output (number of households covered, trainings given to CHWs, household visits, and beneficiaries served). The first two outputs were estimated annually for each district using SCIP project data. For all districts and years with available data, we calculated the average number of households covered for the entire year. For districts with missing data (2011:Ribáuè, 2010: Nampula City, Ribáuè, Nampula Ripale, and Malema), we used the ratio of average number of households covered to CHWs in each district in 2012 and the respective number of CHW in each district to estimate the number of households covered. The numbers of households covered for each district for each year were used to calculate the dollar spent per household covered. We calculated the number of trainings given to CHWs in each district for each year, which was used along with cost data to calculate the cost per training given to CHWs for each district for each year.

The last two outputs (number of household visits and beneficiaries served) were estimated only for Ribáuè for the year 2012 based on data from the CHW questionnaires. We used data for the following questions: "How many houses do you usually visit in one day?" and "How many days per week do you normally visit households?" to calculate the total number household visits conducted per year, which was used to calculate the cost per household visit for Ribáuè in 2012. For beneficiaries served, we calculated the average number of women of reproductive age (WRA) per household using the mapping data from Ribáuè. There were 2,949 WRA in 3,745 households, which equated to a ratio of 0.8 WRA per household. Multiplying this ratio by the number of households covered by CHWs in Ribáuè in 2012 produced an estimate of the total beneficiaries of the program. This estimate was used along with cost data to calculate the cost per beneficiary for Ribáuè in 2012.

Results

Program and Per Capita Costs

Table 16 reports estimates of the total Specialized CHW program costs in 2010, 2011 and 2012 as US$ 1.34 million, US$ 1.58 million and US$ 1.67 million respectively. This represents an 18.4% increase in program costs from 2010 to 2011, and a 5.6% increase from 2011 to 2012. The per capita spending (cost per population) increased from US$ 1.52 per capita in 2010 to US$ 1.76 in 2011 and US$ 1.81 in 2012.

Table 16: Total CHW Program Costs and per capita Costs, by district (in US$), 2010-2012

Districts	2010	2011	2012	Total	% Rise 2010/11	% Rise 2011/12
Nampula	199,734	225,057	236,635	661,426	12.7%	5.1%
Ribáuè	278,357	333,667	349,616	961,640	19.9%	4.8%
Mecuburi	285,252	349,377	371,253	1,005,883	22.5%	6.3%
Rapale	282,635	331,726	349,911	964,272	17.4%	5.5%
Malema	290,866	343,134	364,385	998,385	18.0%	6.2%
Total Cost	1,336,844	1,582,960	1,671,801	4,591,605	18.4%	5.6%
Population	878,575	899,661	921,253	2,699,489	2.4%	2.4%
Per capita	1.52	1.76	1.81	1.70	15.6%	3.1%

Tables 17, 18, and 19 show the personnel, recurrent and capital costs of the CHW program in 2010, 2011 and 2012 in the Specialized districts. Personnel costs increased in all five districts across the three years, mostly due to a 3% yearly salary increase for salaried workers – excluding animadores (who did not receive a raise) and CHWs (who did not receive a salary). Recurrent costs increased slightly in Ribáuè and Mercuburi districts due to recruitment of community supervisors and increased costs associated with motorcycle use, medications distributed, and training needs for community supervisors. Capital costs increased over the three years because of the 10% inflation rate in 2011 and 2012.

Table 17: CHW program costs by category, by district (in US$), 2010

Districts	Personnel	Recurrent	Capital Cost	Total
Nampula	89,403	102,002	8,329	199,734
Ribáuè	123,023	145,147	10,187	278,357
Mecuburi	124,371	150,210	10,672	285,252
Rapale	124,683	147,603	10,349	282,635
Malema	128,003	152,191	10,672	290,866
Total	589,483	697,153	50,208	1,336,844
Population	878,575	878,575	878,575	878,575
Per capita	0.67	0.79	0.06	1.52

Table 18: CHW program costs by category, by district (in US$), 2011

Districts	Personnel	Recurrent	Capital Cost	Total
Nampula	98,786	117,254	9,017	225,057
Ribáuè	145,078	177,528	11,061	333,667
Mecuburi	148,539	189,244	11,594	349,377
Rapale	143,739	176,748	11,239	331,726
Malema	148,539	183,000	11,594	343,134
Total	684,682	843,773	54,505	1,582,960
Population	899,661	899,661	899,661	899,661
Per capita	0.76	0.94	0.06	1.76

Table 19: CHW program costs by category, by district (in US$), 2012

Districts	Personnel	Recurrent	Capital Cost	Total
Nampula	101,017	125,843	9,774	236,635
Ribáuè	146,655	190,939	12,022	349,616
Mecuburi	152,408	206,237	12,609	371,253
Rapale	146,408	191,286	12,218	349,911
Malema	152,408	199,369	12,609	364,385
Total	698,896	913,674	59,231	1,671,801
Population	921,253	921,253	921,253	921,253
Per capita	0.76	0.99	0.06	1.81

Table 20 shows the average overall costs and costs per capita for each Specialized district over the 3 years. Recurrent costs represented 53% of average annual spending, personnel costs 43%, and capital costs 4%. Mecuburi had the smallest population covered by the program and also had the highest per capita costs of all districts, US$ 1.96. Rapale had the lowest average per capita spending of US$ 1.43. The average per capita cost of the program over the three years was $1.70.

Table 20: Average Costs and per Capita Costs of CHW program by district (in US$), 2010-2012

	Nampula City	Ribáuè	Mecuburi	Rapale	Malema	Total
Personnel cost (US$)	96,402	138,252	141,773	138,277	142,983	657,687
Recurrent cost (US$)	115,033	171,205	181,897	171,879	178,187	818,200
Capital cost (US$)	9,040	11,090	11,625	11,268	11,625	54,648
Total (US$)	220,475	320,547	335,294	321,424	332,795	1,530,535
Average population	118,475	204,822	171,142	224,049	181,341	899,830
Cost per capita	1.86	1.56	1.96	1.43	1.84	1.70

Costs per Program Output

Table 21 shows the cost per CHW training course conducted, which increased from an average of US $136.86 in 2010 to US$ 170.81 in 2012 and ranged from a low of US$ 122.53 in Mecuburi in 2010 to a high of US$ 252.82 for Nampula City in 2012. Table 22 shows the cost per household covered by the Specialized CHW program, which decreased from an average of US$ 22.16 in 2010 to US$ 9.34 in 2011 and to US$ 7.59 in 2012, and ranged from a high of US $28.75 per household for Rapale in 2010 to a low of US $6.17 per household for Mecuburi in 2012.

Table 21: Cost per CHW training conducted, 2010-2012

	2010			2011			2012		
Districts	Total Cost (US $)	# of CHW Trainings	Cost/ training (US $)	Total Cost (US $)	# of CHW Trainings	Cost/ training (US $)	Total Cost (US $)	# of CHW Trainings	Cost/ training (US $)
Nampula	199,734	936	213.39	225,057	936	240.45	236,635	936	252.82
Ribáuè	278,357	2040	136.45	333,667	2040	163.56	349,616	1992	175.51
Mecuburi	285,252	2328	122.53	349,377	2328	150.08	371,253	2376	156.25
Rapale	282,635	2136	132.32	331,726	2136	155.30	349,911	2136	163.82
Malema	290,866	2328	124.94	343,134	2328	147.39	364,385	2376	153.36
Total	1,336,844	9768	136.86	1,582,960	9768	162.06	1,671,801	9816	170.31

Table 22: Cost per household covered by CHWs, 2010-2012

	2010			2011			2012		
Districts	Total Cost (US $)	# of HH Covered	Cost/HH covered (US $)	Total Cost (US $)	# of HH Covered	Cost/HH covered (US $)	Total Cost (US $)	# of HH Covered	Cost/HH covered (US $)
Nampula	199,734	9,100	21.95	225,057	25,559	8.81	236,635	22,258	10.63
Ribáuè	278,357	17,669	15.75	333,667	49,611	6.73	349,616	47,681	7.33
Mecuburi	285,252	19,096	14.94	349,377	28,683	12.18	371,253	60,146	6.17
Rapale	282,635	9,832	28.75	331,726	27,602	12.02	349,911	42,485	8.24
Malema	290,866	13,522	21.51	343,134	37,970	9.04	364,385	47,582	7.66
Total	1,336,844	60,336	22.16	1,582,960	169,425	9.34	1,671,801	220,152	7.59

Table 23 shows the cost per household visit made throughout the year and cost per beneficiary served by the program for Ribáuè district in 2012. The cost per household visit in Ribáuè is US$ 0.10, while the cost per beneficiary (woman of reproductive age) served in Ribáuè is US$ 9.17.

Table 23: Cost of CHW program per household visit and per beneficiary served for 2012, Ribáuè

Output Indicator	Total Cost (US$)	Output	Cost/output (US $)
HH visits made/year	349,616	3,503,555	0.10
Beneficiaries Served	349,616	38,145	9.17

Estimated Financial Contribution/Value of Volunteers

Table 24 reports results from the theoretical analysis of program costs if CHWs were paid for their services, using $45/month as an estimate for their wages. The table shows the theoretical CHW program costs with CHW salaries, all personnel costs (including CHW salaries and personnel costs for other workers as described in Tables 17-19), and total program costs for years 2010, 2011 and 2012. Adding in minimum wages for CHWs increases the total budget significantly, with CHW salaries contributing close to 80% of the total CHW program costs on average. In 2012, compensating CHWs at the minimum wage would result in personnel costs increasing from 42% to 87% of total program costs (data not shown).

Table 24: Estimated CHW Salary costs by district, with CHW minimum wage (in US$), 2010-2012

	2010			2011			2012		
Districts	CHW Salaries	Total Personnel	Program Cost	CHW Salaries	Total Personnel	Program Cost	CHW Salaries	Total Personnel	Program Cost
Nampula	219,219	308,623	418,954	615,689	714,475	840,746	591,615	692,633	828,250
Ribáuè	444,617	567,640	722,974	1,248,421	1,393,499	1,582,087	1,199,847	1,346,503	1,549,464
Mecuburi	609,084	733,455	894,337	1,710,507	1,859,046	2,059,884	1,643,825	1,796,233	2,015,078
Rapale	469,330	594,013	751,964	1,317,659	1,461,399	1,649,385	1,266,316	1,412,724	1,616,228
Malema	501,499	629,502	792,364	1,408,202	1,556,741	1,751,335	1,353,450	1,505,858	1,717,835
Total Cost	2,243,749	2,833,232	3,580,593	6,300,477	6,985,160	7,883,438	6,055,054	6,753,950	7,726,855
Population	878,575	878,575	878,575	899,661	899,661	899,661	921,253	921,253	921,253
Per capita	2.55	3.22	4.08	7.00	7.76	8.76	6.57	7.33	8.39

Table 25 compares the total cost of the program without CHW salaries (as already described in Table 16) and with CHW salaries, showing that including salaries for CHWs would increase the total cost of the program and cost per capita by almost three times in 2010 and almost five times in 2011 and 2012.

Table 25: Total CHW Program Cost by district, with and without CHW salaries (in US$), 2010-2012

	2010		2011		2012	
Districts	No CHW Salary	With CHW Salary	No CHW Salary	With CHW Salary	No CHW Salary	With CHW Salary
Nampula	199,734	418,954	225,057	840,746	236,635	828,250
Ribáuè	278,357	722,974	333,667	1,582,087	349,616	1,549,464
Mecuburi	285,252	894,337	349,377	2,059,884	371,253	2,015,078
Rapale	282,635	751,964	331,726	1,649,385	349,911	1,616,228
Malema	290,866	792,364	343,134	1,751,335	364,385	1,717,835
Total Cost	1,336,844	3,580,593	1,582,960	7,883,438	1,671,801	7,726,855
Population	878,575	878,575	899,661	899,661	921,253	921,253
Per capita	1.52	4.08	1.76	8.76	1.81	8.39

Discussion

The costing analysis of the Specialized CHW package found that the total program costs increased from 2010 to 2012 as the project achieved full deployment of trained CHWs, with the majority of program costs being recurrent and personnel costs. Per capita costs (cost per population) remained low at less than US$ 2 per capita in all five districts across project years. In terms of costs per output, the average cost per CHW training course did increase, but the average cost per household covered decreased substantially, reflecting the proportionally greater increase in number of households covered by CHWs compared to the increase in program costs. The cost per beneficiary served (US$ 9.17) was somewhat comparable to analyses of similar CHW programs. For example, one study in Mozambique estimated the average yearly expenditure of CHW per person covered to be US $6.88 for 2012-2015 (Earth Institute report 2012), and an economic analysis of CHW programs in Cape Town province of South Africa found the cost per home visit ranged from R26-R65 (Makan & Bachmann 1997) which is equivalent to approximately US$ 8 to US$ 21 (in 2012 US$). The costs for the Specialized CHW program are lower than some of the more expensive community based and family based DOTS programs which have been found to be in the range of US$ 76.2 and US$ 84.1 per patient (Mirzoev et al. 2008).

The theoretical cost analysis including minimum wage for CHWs of $45/month highlighted the significant contribution to the health system that CHWs are currently providing on a volunteer basis. The analysis found that CHW salaries would represent nearly 90% of program costs in 2012, and including their salaries would increase the total program costs and cost per capita by almost three-fold in 2010 and almost five-fold in 2011 and 2012. This is something to consider as governments in various countries explore remunerating CHWs for their efforts, since CHWs may not be able to function on a volunteer basis indefinitely, especially if they have other means of income generation that limit their willingness to volunteer. Future research should examine the impact of salaried CHWs on the overall cost-efficiency and cost-effectiveness of CHW programs.

Limitations

The main limitation of the costing analysis was the inability to obtain financial data on CHW program costs from the implementing partner in Complementary districts, thus leaving us unable to answer the original research question comparing costs of two intervention packages (Specialized and Complementary). NGOs that are not full consortium partners are under no obligation to divulge financial information or budgets, and may in fact consider this information proprietary. In addition, the costing analysis used several assumptions which could not be verified conclusively by project staff, and therefore may have affected the accuracy of the costing results. For example, the level of effort for

all personnel included in the analysis was estimated through key informant interviews and not officially calculated with validated surveys, and certain assumptions were made for recurrent costs related to the number of CHW kits used by each district and the number of trainings conducted each year. If these costs were over- or under-estimated, the calculated costs may be correspondingly too high or low.

Conclusion

This study found that that coverage of CHWs is relatively high in SCIP project areas and does not vary significantly by intervention package (Specialized vs. Complementary). Several sociodemographic and household characteristics were significantly associated with contact with a CHW, indicating that CHWs may be preferentially reaching women living with partners (in informal unions) in both intervention packages, as well as women whose ages and household socioeconomic status are similar to their own. These findings are useful for the SCIP project to understand who is being reached and support the CHWs (particularly in Ribáuè) to target their outreach more effectively to poor and vulnerable households. Future studies should explore whether other factors not measured in this study, such as cultural norms and social stigma, also influence who CHWs reach.

The study also found that CHWs can successfully convey family planning information as part of a package of integrated services and a substantial proportion of women receiving the messages do discuss family planning with their spouses or friends and/or adopt contraception. The findings suggest that the two intervention approaches are equally effective in conveying family planning messages, but the Specialized household visit model may be slightly more effective than the Complementary group meeting model in encouraging women to take action to prevent pregnancy. Further study is needed to assess whether integrated CHW services can effectively contribute to improved contraceptive prevalence among the target population.

The results of the costing analysis show that using CHWs to deliver integrated services can be relatively cost-efficient compared to other community-based programs in relation to specific outputs (cost per capita, cost per household covered and cost per beneficiary served). These results are interesting in light of the future of health systems around the globe, as many countries currently rely on CHWs or are beginning to incorporate them into their health systems. Further study is needed on cost-effectiveness of integrated CHW programs in terms of health outcomes (i.e. cost per CYP or unwanted pregnancy averted), which was not addressed in this study. The results also highlight the significant contribution that CHWs are currently providing to the health system on a volunteer basis, since paying them a minimum wage in 2012 would have increased the total program costs nearly five-fold. This may be helpful for countries to bear in mind as they explore the possibility of remunerating CHWs in relation to ensuring long-term sustainability of programs.

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Annex 1: Secondary Analysis of SCIP Project Baseline Data

Methodology

As noted in the methodology section for Research Question 1, secondary data from the SCIP baseline survey, conducted in October-December 2010 among 2,314 women aged 15-49 in 14 districts of Nampula Province, were analyzed to further assess who is reached by CHWs. Descriptive statistics were generated for each characteristic, and frequency distributions for categorical variables and mean/standard deviation for ordinal variables were generated. Two variables were generated as proxies for household socioeconomic status: an asset index and an 'improved construction' variable. The asset index was constructed per DHS guidance[8] and entailed making all SES variables binary and performing a principle component analysis (PCA) with one component (factor) specified in order to derive weights. PCA was also used to generate the improved construction variable using a subset of household variables (type of latrine, flooring, ceiling and walling).

Results

Characteristics of households and respondents in the SCIP baseline survey were similar to those of respondents in Nampula Province in the 2011 DHS. The majority of households (81%) were headed by males, and the average household had just over four members. Only 9% of households had electricity and 13% owned a mobile phone; 40% owned a radio and 46% owned a bicycle. The mean age of respondents was 29.4 years (SD 9.5), and the majority of respondents were married (39%) or living together (43%). Education levels were low: 40% of respondents had no education and 51% had only primary education. The predominant religion was Catholic. Characteristics varied by intervention package, most notably for age (respondents in Complementary areas were slightly older), education level (Specialized respondents were more highly educated), religious affiliation (higher proportion of Muslims in Complementary areas) and marital status (higher proportion of women living with a partner in Complementary areas).

Table 26 shows the findings for women visited and not visited by a CHW in the past month, by socioeconomic characteristics. These results reflect general coverage by CHWs in Nampula regardless of the project for which they worked, because no SCIP CHW activities had begun at the time of the survey. Overall, 13% of women (n=291) received a visit from a CHW in the past month (13% in both Specialized and Complementary districts). Young women aged 15-19 represented a lower proportion of those visited by a CHW compared to those who were not visited. Married women represented a higher proportion of households visited than not visited. Households with improved construction were less likely to have been visited by a CHW in the past month. Education level, religious affiliation and household assets did not differ markedly among households visited versus not visited by a CHW.

[8] http://www.childinfo.org/files/DHS_Wealth_Index_(DHS_Comparative_Reports.pdf

Table 26: Characteristics of women visited and not visited by a CHW in the past month, 14 districts in Nampula Province, SCIP Baseline Survey 2010

Characteristic	HH visited by CHW in past month	HH not visited by CHW in past month
	% (n) or mean (SD, n)	% (n) or mean (SD, n)
District		
Specialized Districts	40.7 (136)	40.9 (1049)
Complementary Districts	59.3 (155)	59.1 (974)
Total	100.0 (291)	100.0 (2023)
Age in years		
15-19	12.2 (39)	17.6 (373)
20-24	20.8 (63)	17.6 (351)
25-29	11.3 (32)	16.8 (334)
30-34	21.3 (60)	15.1 (306)
35-39	19.5 (52)	15.1 (297)
40-44	9.5 (30)	10.0 (205)
45-49	5.4 (15)	7.8 (156)
Total	100.0 (291)	100.0 (2022)
Highest level of education completed		
None/DK	42.2 (123)	39.9 (819)
Primary	49.5 (146)	51.9 (1035)
Secondary or Higher	8.3 (20)	8.2 (155)
Total	100.0 (289)	100.0 (2009)
Religion		
Catholic	43.6 (128)	46.4 (976)
Protestant/Evangelical	9.1 (28)	8.6 (201)
Muslim	40.5 (113)	39.0 (704)
None	4.6 (15)	4.4 (92)
Other	2.2 (7)	1.6 (47)
Total	100.0 (291)	100.0 (2020)
Marital Status		
Never Married	3.9 (10)	6.8 (149)
Married	47.4 (141)	37.7 (814)
Living Together	34.8 (104)	44.1 (829)
Widowed/Divorced/Separated	13.9 (36)	11.5 (231)
Total	100.0 (291)	100.0 (2023)
HH asset measure		
Range: -2 (few assets) to +14 (many assets)	-0.16 (2.59, 247)	0.05 (6.26, 1676)
HH has improved construction		
Range: -1 (poor construction) to +6 (improved constr.)	-0.18 (1.61, 251)	0.02 (3.91, 0.10)
HH number eligible women (15-49)	1.025 (0.20, 253)	1.015 (0.16, 1710)

Table 27 shows findings from the SCIP baseline on women visited and not visited by a CHW who discussed family planning in past year, by socio-demographic characteristic. Overall, 19% of women (n=438) had been visited by a CHW who discussed family planning in the past year, with variation by intervention package (12% in Specialized districts and 26% in Complementary districts). Young women aged 15-19 constituted a lower proportion of women visited by a CHW who discussed family

planning vs. those not visited. Women living with a partner represented a higher proportion of households visited by a CHW who discussed family planning. Education level, religious affiliation and household assets did not differ markedly among households visited versus not visited by a CHW who discussed FP.

Table 27: Characteristics of women visited and not visited by a CHW who discussed family planning in the past year, 14 districts in Nampula Province, SCIP Baseline Survey 2010

Characteristic	HH visited by CHW in past year who discussed FP	HH not visited by CHW in past year who discussed FP
	% (n) or mean (SD, n)	% (n) or mean (SD, n)
District		
Specialized Districts	27.8 (147)	44.3 (1038)
Complementary Districts	72.2 (291)	55.7 (838)
Total	100.0 (438)	100 (1876)
Age in years		
15-19	10.3 (52)	18.6 (360)
20-24	21.2 (91)	17.2 (323)
25-29	17.3 (71)	15.8 (295)
30-34	21.1 (88)	14.6 (278)
35-39	16.3 (69)	15.5 (280)
40-44	7.0 (36)	10.7 (199)
45-49	6.7 (31)	7.7 (140)
Total	100.0 (438)	100.0 (1875)
Highest level of education completed		
None/DK	38.4 (173)	40.6 (769)
Primary	53.8 (235)	51.0 (946)
Secondary or Higher	7.8 (29)	8.4 (146)
Total	100.0 (437)	100.0 (1861)
Religion		
Catholic	41.7 (192)	47.1 (912)
Protestant/Evangelical	8.8 (39)	8.6 (190)
Muslim	43.9 (182)	37.9 (635)
No Religion	4.2 (18)	4.5 (89)
Other	1.4 (7)	1.8 (47)
Total	100.0 (438)	100.0 (1876)
Marital Status		
Never Married	2.4 (12)	7.4 (147)
Married	37.6 (177)	39.2 (778)
Living Together	49.2 (203)	41.2 (730)
Widowed/Divorced/Separated	10.7 (46)	12.1 (221)
Total	100.0 (438)	100.0 (1876)
HH asset measure		
Range: -2 (few assets) to +14 (many assets)	-0.15 (sd=2.63, 388)	0.07 (sd=6.45, 1535)
HH has improved construction		
Range: -1 (poor construction) To +6 (improved constr.)	-0.14 (sd=1.56, 395)	0.02 (sd=4.08, 1546)
HH number eligible women (15-49)	1.00 (sd=0.06, 398)	1.02 (sd=0.18, 1565)

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