

The Cost of Integrated Community Case Management in Luapula Province, Zambia

December 2014



Contents

Contents	1
Acknowledgements	3
Acronym List	4
Executive Summary	5
Introduction	8
Background and Country Context: Zambia.....	9
Malaria Consortium’s iCCM Program in Zambia.....	10
Methodology.....	10
Model Design	10
Data Collection	11
Ethics	11
Central and Partner Level Data Collection.....	11
Province, District, and Community Level Data Collection	12
Data Challenges	13
Assumptions and Standard Data Input into the Zambia Model.....	14
Period of Analysis.....	14
iCCM Package of Services.....	14
Population and Geographic Coverage Targets	15
Incidence Rates.....	16
Caseload and Service Delivery Targets	17
CHW Availability & iCCM Service Delivery Assumptions	18
Management, Supervision, Meetings and Trainings	18
Analysis.....	20
Utilization	20
Costs	21
Start-up and CHW Training Costs	21
Recurrent Costs	22
Total Costs	25
Conclusions.....	26
References.....	29

Annexes	31
Annex A. Districts and Health Centers sampled for CHW Questionnaires	32
Annex B. People Contacted	33
Annex C. Standard Treatment Guidelines for iCCM Services	34
Annex D. CHW Questionnaire.....	35
Annex E. CHW Monthly Reporting Form	39
Annex F. CHW Sick Child Reporting Form	40

Acknowledgements

This study was conducted by Management Sciences for Health, with funding from the Bill and Melinda Gates Foundation.

Key collaboration was provided by Malaria Consortium in Zambia. Information on iCCM program costs was gathered, and interviews with CHWs were conducted by MSH staff in Luapula province.

We wish to thank the following people from Malaria Consortium who were instrumental to this study: Helen Counihan, Gráinne Mac Glinchey, Bristol Ntebeka, Chilambwe Chibwe, Michael Banda and Saboi Kwalombota.

The authors of the report are Zina Jarrah, Lauren Corazzini, Keriann Schulkers, and David Collins. Zina Jarrah is a Technical Advisor, Lauren Corazzini is a Budget Officer, and David Collins is a Senior Principal Technical Advisor at Management Sciences for Health (MSH) based in Cambridge, Massachusetts. Keriann Schulkers is an independent consultant.

Suggested citation:

Jarrah, Z., L. Corazzini, K. Schulkers, and D. Collins 2014. The Cost of Integrated Community Case Management in Luapula Province, Zambia.

Key Words: integrated community case management (iCCM), community health workers (CHWs), malaria, diarrhea, pneumonia, costing, financing, Zambia.

Acronym List

ARI	Acute respiratory infection
CHW	Community Health Worker
CIDA	Canadian International Development Agency
DHMT	District health management team
FBO	Faith-based organization
FMOH	Federal Ministry of Health
GHI	Global Health Initiative
iCCM	Integrated Community Case Management
MC	Malaria Consortium
MCHIP	Maternal and Child Health Integrated Program
MDG	Millennium Development Goal
MoH	Ministry of Health
MSH	Management Sciences for Health
NGO	Non-government organization
ORS	Oral rehydration salt
PHO	Provincial Health Office
TRAction	Translating Research Into Action (USAID-funded project)
UNICEF	The United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Executive Summary

Integrated community case management (iCCM) is considered to be an effective strategy for expanding the treatment of diarrhea, pneumonia, and malaria, which are the leading causes of child mortality and result in nearly 44% of deaths worldwide in children under five years old. Despite the success of this strategy in several low-income countries, iCCM programs in many other countries have yet to be implemented or expanded. This is partly due to concern or uncertainty about the costs and financing of iCCM programs.

With support from the Bill and Melinda Gates Foundation, MSH undertook to analyze iCCM costs in several African countries - Cameroon, Democratic Republic of Congo, Sierra Leone, South Sudan and Zambia. The results of these analyses could be compared with the results of impact evaluations of these same programs to review the costs of achieving the impact and will provide a set of baseline studies that may be useful for further analyses. This report describes the results of the costing analysis in Zambia of an iCCM program implemented by Malaria Consortium in Luapula province. It is expected that the costing model and results will be useful to the government and donors planning to implement or scale up iCCM in the country.

The cost analysis was conducted using an iCCM costing model that was adapted from the generic iCCM Costing and Financing Tool developed under the USAID-funded Translating Research into Action (TRAction) project.

Malaria Consortium implemented the iCCM program in Luapula Province with support from the Canadian International Development Agency (CIDA). The program focused on training and supporting volunteer community health workers (CHWs) to provide timely and appropriate treatment to children ages 2 to 59 months for cases of malaria, diarrhea, and pneumonia, free-of-charge.

The program began implementation in four districts in late 2010, then scaled up to all seven districts of Luapula by 2012, serving a population of 741,373. The analysis was conducted for 2011 and 2012, the first full years of the project. Also, while the project ended in mid-2013, we agreed with the Malaria Consortium to make projections for the years 2013 – 2016 to show the resources that would be needed to continue and scale up iCCM services.

The catchment population of children aged 2-59 months was 78,797 in 2011 for the four districts. With the expansion into all 7 districts in 2014, this increased to 137,895. The iCCM package of services comprised treatment of diarrhea, pneumonia, testing with RDT and treatment of confirmed malaria, and referrals. In 2011, a total of 307,410 iCCM services were provided. That figure would increase to 340,185 in 2014 after the expansion into the 3 additional districts.

The numbers of cases treated was an average of 3.90 cases per capita (child 2-59 months) in 2011 and 2.47 in 2012. Based on the expected number of 8.52 episodes per year per child, the utilization level was 46% in 2011 and 29% in 2012. The fall in utilization level was because utilization was lower in the additional 3 districts than in other original 4 districts, possibly because the program did not function for the full year in the additional districts.

Each CHW covered an average catchment population of 109 children aged 2-59 months and each CHW saw on average 8.2 cases per week in 2011 and 4.9 cases per week in 2012.¹ The attrition rate of iCCM CHWs was estimated at 5.1%.

The original start-up costs incurred prior to 2011, together with the cost of training and equipping 37 replacement CHWs came to US\$687,805. Additional start-up costs in 2012 for the new 3 districts, together with the cost of training and equipping replacements came to US\$674,316, although US\$212,981 of this was for surveys and storage. These start-up costs are not included in the recurrent costs.

We estimated the recurrent costs of implementing the iCCM program in Luapula at US\$756,377 in 2011 and US\$1,218,416 in 2012. The largest cost elements in 2011 were 38% for supervision followed by 26% for medicines and 22% for management. The pattern was similar in 2012, apart from the inclusion of refresher training which was 15% of total costs.

For the years 2013-2016, we agreed with the Malaria Consortium to assume an increase in utilization of 2% of need per year and we assumed that the catchment population would continue to grow at 3.2% per year. With these increases, the utilization per capita (child aged 2-59 months) would be 3.1 in 2016, which would be 37% of the expected episodes. Based on this and the assumed inflation and salary increases, the total recurrent cost would increase to US\$ 1.3 million in 2013 and US\$ 1.6 million in 2016. By 2016, the largest cost element would still be supervision (36%) followed by medicines (27%) and refresher training (15%).

In 2011, the most costly service was malaria, at US\$2.76 per service, followed by fever (RDT) at US\$2.56, diarrhea at US\$2.54, pneumonia at US\$ 2.45, and referrals at US\$0.96. The largest increase in cost per service occurs between 2011 and 2012, as a refresher training was added. Based on the projections, the costs per service in 2016 would be US\$3.79 for malaria, US\$3.51 for fever (RDT), US\$3.36 for pneumonia, US\$3.48 for diarrhea, and US\$1.31 for a referral.

It should be noted that all costs presented in this analysis are total costs, not additional costs; therefore, some of these costs are already funded through separate budgets. For example, we include costs of supervision and management provided by government-funded staff at the Provincial Health Office and District Health Offices. Supervision was a significant driver of the program costs, and we considered it important to show the total program costs, not only those funded by Malaria Consortium, to compare alongside the program's impact.

It is important to note that these are standard costs – i.e., the costs that should be incurred for providing the services. They are not the actual expenditures, with possible exception of some of the overhead costs. In the case of medicines, for example, the cost shown here is the cost of providing the medicines needed for the numbers of services provided. It is not the actual expenditure on medicines. As a result it does not take into account shortages or stock-outs of medicines. This is especially important if the costs are used to compare with impact results, such as in cost per death prevented. In addition, we did not conduct any analysis of bottlenecks and do not know, for example, if there were medicine stock-outs during the year and we assumed that would not occur in the projected years. If

¹ There is anecdotal evidence of drug stock-outs which resulted in decreased cases.

there are shortages of medicines this would greatly affect the utilization of services, which would, in turn, affect the unit costs.

In terms of reducing unit costs, there would be room for increasing the utilization rate, which was projected at 37% in 2016, although that would depend on care-seeking behavior and other factors, such as medicines supply. The alternative way to reduce unit costs would be to try to reduce the fixed costs of management, supervision and NGO overhead costs without decreases to frequency or quality. Most donor-funded pilot iCCM projects have high overhead, management and supervision costs – this is part of the investment in developing a viable program. If the program is eventually taken over by the government, however, these costs would be expected to fall significantly, for example with much-reduced overhead costs and by supervisors sharing the costs of visits across more community health activities. That would, however, probably require a strengthened health system, particularly at the primary health care level.

Table 1. Summary of iCCM program utilization and costs, 2011 – 2016, USD

	ACTUAL UTILIZATION		TARGET UTILIZATION			
	2011	2012	2013	2014	2015	2016
Total number of iCCM services	307,410	340,185	375,300	412,313	451,311	492,383
iCCM services per capita (2-59 months)	3.9	2.5	2.6	2.8	3.0	3.1
Total recurrent cost	756,377	1,218,416	1,321,075	1,427,967	1,544,969	1,673,138
Average recurrent cost per capita (2-59 months)	9.60	8.84	9.28	9.72	10.19	10.70
Average recurrent cost per capita (total population)	1.79	1.64	1.73	1.81	1.90	1.99
Cost per diarrhea treatment	2.54	3.60	3.56	3.52	3.49	3.48
Cost per pneumonia treatment	2.45	3.56	3.50	3.44	3.39	3.36
Cost per fever (RDT)	2.56	3.69	3.63	3.57	3.53	3.51
Cost per malaria treatment	2.76	3.90	3.86	3.82	3.79	3.79
Cost per referral	0.96	1.50	1.45	1.40	1.35	1.31

Introduction

Integrated community case management (iCCM) has proven to be an effective strategy for expanding the provision of diarrhea, pneumonia, and malaria services and is accepted by international donors and developing countries as a key strategy to meet Millennium Development Goal 4 on reducing child mortality.

Diarrhea, malaria and pneumonia are leading causes of child mortality and cause nearly 44% of deaths in children under five years old. iCCM, the delivery of timely and low-cost interventions at the community level by community health workers (CHWs) is promoted by the World Health Organization (WHO), The United Nations Children's Fund (UNICEF), United States Agency for International Development (USAID), and Global Health Initiative as an effective strategy to deliver lifesaving interventions for these illnesses. Several developing countries have adopted and promoted policies and programs in which CHWs promote timely care by treating uncomplicated cases of diarrhea, pneumonia, and malaria and referring severe cases to health facilities.

Despite the success of this strategy in several low-income countries, iCCM programs in many other countries have yet to be implemented or expanded. This is partly due to concern or uncertainty about the costs and financing of iCCM programs as well as the quantitative health outcomes that will result from the investment. A comprehensive understanding of costs and financing as they relate to results will help countries who are considering implementing or expanding iCCM programs to advocate for donors and ministries of finance to allocate sufficient funds to appropriate levels of the health system to achieve improved health outcomes. It will also allow for costs to be better monitored and controlled, thus ensuring sufficient use of scarce resources.

In order to better understand the costs of iCCM programs, Management Sciences for Health, with support from the Bill and Melinda Gates Foundation, conducted costing studies of NGO-run iCCM projects in several African countries - Cameroon, Democratic Republic of Congo, Sierra Leone, South Sudan and Zambia.² The results of these analyses could be compared with the results of impact evaluations of these same programs to review the costs of achieving the impact. This report describes the results of the costing analysis in Zambia of an iCCM program implemented by Malaria Consortium in Luapula province. It is expected that the costing model and results will be useful to the government and donors planning to implement or scale up iCCM in the country.

² The reports can be found at <http://www.msh.org/our-work/health-systems/health-care-financing/costing-of-health-services>

Background and Country Context: Zambia

Zambia is a landlocked country in Sub-Saharan Africa with a total population of over 14 million in 2013. With a high total fertility rate and relatively low life expectancy, much of which is due to the HIV/AIDS epidemic, Zambia's population pyramid is heavily weighted towards the youngest age groups. Approximately 50% of Zambians today are under 20 years of age, and children under five make up over 18% of the population, or about 2.6 million children. With its very 'young' population, and with over 60% of people living in rural areas, Zambia has good potential to benefit from integrated community case management (iCCM) programs.

Zambia is administratively divided into ten provinces (Figure 1) and 72 districts. Of the nine provinces, two are predominantly urban – Lusaka and Copperbelt; the remaining provinces are predominantly rural —Central, Eastern, Northern, Luapula, Muchinga, North-Western, Western, and Southern.

Figure 1. Map of Zambia



Source: Zambia DHS 2007

Although Zambia's under-five mortality rate has been declining over the past several decades, it is currently at 83 per 1,000 live births which is still significantly higher than the global average of 51 per

1,000 live births.³ The major causes of mortality in children under five are pneumonia (14% of all child deaths), malaria (13%), prematurity (13%), HIV/AIDS (11%), and diarrhea (9%). Thus, implementation of iCCM programs would address causes of death that result in over a quarter of deaths in children under five.

Malaria Consortium's iCCM Program in Zambia

Malaria Consortium's iCCM work in Zambia capitalizes on the global experience in strengthening community level healthcare delivery and its links with formal health care. The Malaria Consortium's four-year multi-country iCCM project, funded by the Canadian International Development Agency (CIDA) in Luapula Province, delivers life-saving interventions against the three causes of mortality in children under five in Zambia: pneumonia, diarrhea and malaria, where access to health facilities and services is limited. The Malaria Consortium worked closely with the Ministry of Health to help train more than 1,300 community health workers (CHWs) in the management of these three diseases and ensured the supply of diagnostic tests and medicines. As a result of behavior change communication activities, this local level health delivery is now fully supported by the communities.

The work begun by iCCM-CIDA was strengthened by a UK Aid funded research project (COMDIS HSD) which analyzed the use of antibiotics by CHWs and care givers to help clarify whether or not iCCM controls or fuels antibiotic resistance.⁴ The research has been completed and the findings will be shared with the Zambian government on completion of analysis and report.

Through the CIDA-funded program, iCCM was implemented in all seven districts of Luapula province in Northern Zambia, with 1,332 CHWs trained and deployed. This includes Samfya district where the local environment – large swamps and vast lakes where people live on small islands – makes it a particularly challenging area in which to successfully implement health interventions. In addition to funding from CIDA, Malaria Consortium received funding for iCCM implementation in Zambia from the UK Department for International Development (DFID/UKAid).

Methodology

Model Design

The Zambia iCCM costing model was adapted from the generic iCCM Costing and Financing Tool developed under the USAID-funded Translating Research into Action (TRAction) project.⁵ It covers all aspects of iCCM, comprising start-up costs, service delivery costs at the community level, and support, supervision, and management costs at all levels of the health system. Additionally, the tool has a financing element that can be used to show and project financing sources. The tool covers the three key iCCM interventions (diarrhea, pneumonia, and malaria). At the service delivery level, it is a bottom-up activity-based costing tool, in which costs are built up by type of resource (such as medications) based on an estimated numbers of services. Other costs, such as supervision and training, are allocated using a top-

³ Zambia Country Profile, World Health Organization, Accessed at <http://www.who.int/gho/countries/zmb.pdf>.

⁴ http://comdis-hsd.dfid.gov.uk/wp-content/uploads/2013/08/COMDIS_HSD_Zambia-Antibiotics-Study-3.pdf

⁵ See <http://tractionproject.org/content/integrated-community-case-management-costing-financing-tool> or <http://www.msh.org/resources/integrated-community-case-management-costing-financing-tool>

down methodology. The tool uses standard treatment protocols as the base for the standard costs. Malaria Consortium and other iCCM implementing partners in Zambia have implemented the iCCM program according to WHO iCCM guidelines.

The tool contains a need norms section that uses incidence rates to estimate the expected caseload for the population targeted by the iCCM program. The user can also input the actual number of iCCM cases treated in the baseline year, and then estimate the costs of providing these services based on the standard cost assumptions.

Total costs are calculated using a mix of actual and standard data. For example, actual salaries are collected to determine supervision costs, but standard estimates for staff time spent on supervision are used to arrive at the total supervision cost. For trainings and meetings, the actual costs of each are applied to the normative number of each occurrence, assuming that all recurrent meetings and trainings occur as planned. For medications and supplies, the tool assumes that all iCCM cases will be treated according to protocol, and calculates the costs of medicines accordingly.⁶

Data Collection

Ethics

This study received approval from the Government of Zambia, MOH. Oral consent was obtained in advance of all interviews with provincial, district, and health center staff and CHWs. This study was judged to have no risk to participants and any personal data collected was de-identified at the time of analysis. Participants were allowed to terminate the interviews at any time for any reason, without personal detriment.

Central and Partner Level Data Collection

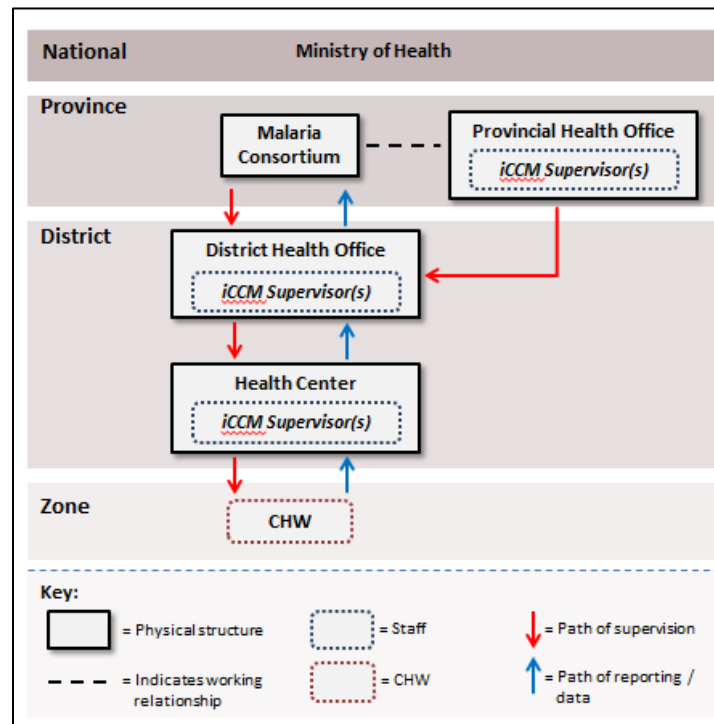
The following data were collected from Malaria Consortium staff:

- Districts in which the Malaria Consortium supports iCCM implementation;
- Names of staff, salaries, and % time spent on the iCCM program (including % of time spent on supervision, trainings and meetings);
- Training data for CHWs and supervisors (including # trained, total costs, and unit cost);
- Supervision data (including total spent per year at each level – district to health center, health center to community – and the unit costs for supervision);
- Costs and quantities of drugs/supplies and equipment provided to CHWs for iCCM (including transport and storage costs);
- iCCM program support costs (including supervision, mentoring, reporting time provided directly from Malaria Consortium staff to districts and health centers).
- iCCM program start-up costs (e.g., trainings, CHW start-up kit);
- Number of iCCM services provided during 2011 and 2012 (malaria, pneumonia, diarrhea); and,
- Any additional program costs, such as operating costs.

⁶ As a result, drug stock-outs are not taken into consideration in the iCCM Costing and Financing Tool.

The following diagram represents the supervision and reporting structure of the program:

Figure 2. Supervision and reporting structure



Province, District, and Community Level Data Collection

As described above, the iCCM costing tool was designed to utilize both actual and standard expenditure and utilization data. While the purpose of the tool is to provide estimates of starting new iCCM programs and scaling-up existing ones, actual data can also be used to estimate costs of existing programs.

Within each district, data were collected at three levels of the health system: district level (District Health Office [DHO]); health center level (HC); and community level (CHWs). At the DHO and HC's, the health staff responsible for the supervision of the iCCM program and CHWs were interviewed. These staff provided catchment population figures, and supervision and management information for the iCCM program. At the community level, CHWs provided information on their time usage, salaries, and supervision, reporting, and meeting requirements.

All data were collected via oral interviews. Where possible, soft copies of documents were collected; if only hard copies existed, photographs were taken for subsequent data entry. A standard questionnaire, which includes a data collection checklist, was applied at each level (See Annex D for the questionnaire templates). Within the Luapula province, all seven districts were sampled; 14 health centers and 36 CHWs were selected for data collection (Table 2).

Table 2: Districts and Health Centers Sampled

District	District Population ⁷	Total # of Zones	Health Center	Type of Health Center	# of CHW's Interviewed
Milenge	49,382	56	Lwela HC	Rural	3
Samfya	186,367	270	Lubwe HC	Rural	3
			Mundubi HC	Rural	3
			Samfya Stage II HC	Rural, Stage II	3
Mansa	225,950	249	Lukola HC	Rural	2
			Chembe HC	Rural	2
			Senama HC	Urban	3
Mwense	121,927	241	Kashiba HC	Rural	3
			Mwense Stage II HC	Rural, Stage II	3
Nchelenge	161,173	123	Kashikishi HC	Urban	3
			Kabuta HC	Rural	3
Chiengi	22,000 ⁸	104	Mukunta HC	Rural	1
Kawambwa	145,286	153	Kazembe HC	Rural	2
			Mukanta HC	Urban	2
TOTAL	912,085	1,196	14	--	36

Within each district, health centers were selected based on catchment population figures, location and availability of staff. Within each health center, CHWs were chosen by the in-charge (either randomly or by convenience). As a result, sampling bias may have occurred. See Annex A for details of actual facilities sampled.

Data Challenges

While the majority of district, health center, and community level staff were very cooperative, there were difficulties in obtaining some information. Given that the majority of data from the model came from the questionnaires, a response bias may have occurred (e.g., the persons interviewed may have responded in such a way that they were providing answers that they thought were desirable, rather than what is actually happening). For example, this may have occurred with the CHW interviews; many of them reported being available 24 hours per day, every day of the week (despite working regularly outside of their home).

During the health center visits, many staff who were said to be involved in the program were recently transferred to other districts or areas. Follow-up via phone with these staff was conducted when possible, though it was difficult to obtain complete information.

Given that the CHWs in these districts were not providing any treatment, they were asked to provide estimates of their time spent on iCCM during an example week in 2012 (using their registers to provide an estimate on the time spent per day providing treatment). This may have slightly distorted the actual time spent on iCCM and other activities.

⁷ District level population data were obtained from each DHO; as such, the numbers differ slightly from the total 2012 population figure obtained from the Central Statistics Office for Luapula.

⁸ This figure is an estimate, provided by the DHO. Actual population figures were not able to be obtained at the DHO level.

Assumptions and Standard Data Input into the Zambia Model

Period of Analysis

The iCCM Costing and Financing Tool can calculate the cost of six iCCM program years: typically, this comprises one baseline year and five projection years. Actual data, in terms of numbers of iCCM cases treated, can be input for the baseline program year. The caseloads for remaining projection years are estimated based on the incidence rate and the target population for each disease.

For this analysis, we adjusted the tool to include actual data for two years, 2011 and 2012. Although Malaria Consortium's iCCM program began in 2010, we used the first full year of implementation, which was 2011. Also, while the CIDA-funded project ended in mid-2013, we agreed with the Malaria Consortium to make projections for the years 2013 – 2016 to show the illustrative resources needed for the program to be maintained and scaled up.

The data collection visit took place in July 2013.

iCCM Package of Services

CHWs are trained to identify and treat non-severe cases of diarrhea, pneumonia, and malaria in children under 5 years; in the event of any danger signs, the CHWs also provide referrals to the nearest health center. Table 3 below shows a summary of the treatment protocols and treatment times for each intervention in the iCCM package (see Annex C for full details on the standard treatment guidelines). The treatment times listed below reflect the average reported time spent diagnosing and treating each of the illnesses based on responses from CHW interviewed. Unit costs for medicines were provided by Malaria Consortium

Although Zambia has not yet developed national level iCCM guidelines, training materials provided by Malaria Consortium were used to determine the standard treatments provided for each iCCM service.

Suspected pneumonia cases are assessed for rapid breathing using a respiratory timer; positive cases are treated with amoxicillin, and negative cases are designated as cough and are not treated. Diarrhea is defined as a child who has 3 or more watery stools within 24 hours. Children 2-59 months with diarrhea are treated with ORS and zinc. Suspected malaria cases – all children with fever – are tested with rapid diagnostic tests (RDTs). Confirmed malaria cases are treated with Coartem® (artemether/lumefantrine), and negative cases are given paracetamol for fever.⁹

Drugs are distributed directly from the Malaria Consortium to the Health Centers, and are earmarked specifically for use by CHWs. Typically, the Malaria Consortium provides drugs to the Health Center on a quarterly basis. When the drugs are delivered to the health centers, CHWs travel to the health centers to collect their drugs, usually available in standard kits that had the same quantities and usually the same brands. Most often, CHWs would pick up drugs at the Health Center at the same time as they submitted their monthly reports, so as to minimize travel. If the CHW ran out of drugs early, some of

⁹ The cost of the paracetamol was not included in the study.

them would be able to return to the Health Center at any time to obtain additional drugs (if available); other CHWs reported having to wait until the end of the month (or quarter) to obtain additional drugs.

When stock-outs occurred, the Health Center would notify the DHO and the DHO would submit a request to the Malaria Consortium for more drugs. Some health centers reported they provide the CHWs drugs from their own supply if no drugs from the Malaria Consortium are available. Conversely, some health centers reported that they only provide the CHWs with drugs directly from the Malaria Consortium, so during stock-outs, the CHWs only tend to refer patients.

Table 3: Treatment protocols and costs per treatment of diarrhea, pneumonia, and malaria)

	Average time to treat one patient (minutes)	Medicines/supplies needed	Average medicine cost per episode (USD)
Diarrhea	37	ORS, Zinc	US\$0.77
Pneumonia	40	Amoxicillin	US\$0.56
Fever (RDT)	40	RDT, paracetamol	US\$0.65
Malaria	40	Coartem	US\$0.85

Note: no medicines were provided for referrals.

Population and Geographic Coverage Targets

The total population for Luapula province was collected at Luapula’s Central Statistics Office (CSO). The total population in 2012 was 999,674 for all 7 districts. We assumed that the iCCM program would primarily target children in remote areas, so we subtracted the population of Mansa, the provincial capital, from the total population of Luapula, arriving at a target population of 741,373. Children between 2 and 59 months are estimated to make up 18.6% of the total population¹⁰; on that basis, the iCCM program covered 137,895 children in 2012. An annual population growth rate of 3.2% was used for this analysis. Table 4 below shows a detailed break-down of population and geographic coverage figures for 2011-2016.

The community level in Zambia is designated as a ‘zone’; there can be anywhere between 5-10 zones per health center, and a zone can comprise one village or more. Typically a CHW covers a zone, although in larger zones there may be 2 CHWs. There were 720 CHWs trained and deployed in 2011 in the four original districts (Kawambwa, Milenge, Nchelenge and Samfya), and when the program scaled up to 7 districts in 2012 (adding Chienge, Mansa and Mwense), an additional 612 CHWs were trained for a total of 1,332 in the province. For the projection exercise, we assumed that the geographic coverage and number of CHWs would be maintained for 2013-2016.

¹⁰ Estimate obtained from Malaria Consortium Endline Survey, 2012

Table 4. Population and Coverage Assumptions, Luapula Province, 2011-2016

	ACTUAL COVERAGE		PROJECTED COVERAGE			
	2011	2012	2013	2014	2015	2016
Number of Districts with iCCM coverage	4	7	7	7	7	7
Number of Health Centers supervising iCCM	77	134	134	134	134	134
Number of Zones providing iCCM	684	1,196	1,196	1,196	1,196	1,196
Population covered by iCCM (all ages)	423,642	741,373	765,097	789,580	814,847	840,922
Population covered by iCCM (2-59 months)	78,797	137,895	142,308	146,862	151,561	156,411
Total Number of CHWs	720	1,332	1,332	1,332	1,332	1,332

Incidence Rates

Incidence rates are input into the iCCM Costing and Financing Tool as the number of episodes per child per year. We used the following incidence rates in the Zambia model: 3.30 episodes of diarrhea per child per year¹¹; 0.46 episodes of pneumonia¹²; 2.89 episodes of fever; and 1.04 episodes of malaria¹³. We used regional estimates for pneumonia and diarrhea because Zambia-specific incidence rates were not available; however, if updated figures are provided these can be input into the model.

CHWs also provide referrals to the nearest health when a child presents with danger signs; no initial treatment is provided, so there are no medicine or supply costs for referrals. Since a true incidence rate for referrals could not be determined, a proxy incidence rate was calculated based on the proportion of referrals to cases treated in 2011. With 277,589 cases of pneumonia, diarrhea, fever and malaria in 2011 and 29,821 referrals, this proportion was calculated at 11%. Therefore, the incidence rate used to calculate expected referrals in the projection years was 11% of the combined incidence rates for pneumonia, diarrhea, fever, and malaria, which amounts to 0.83 referrals per child per year.

Table 5 shows the summary of incidence rates input into the tool. The tool allows different incidence rates to be input for each year of the iCCM program – for example, if malaria incidence was expected to decline due to preventive activities such as vector control, this could be reflected in the tool. However, in this case the incidence rates have been kept constant.

¹¹ Fischer Walker et al. Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review. BMC Public Health 2012, 12:220. Accessed at: <http://www.biomedcentral.com/1471-2458/12/220>

¹² Rudan IL, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. 2008. Epidemiology and etiology of childhood pneumonia. Bull World Health Organ 86:408-416.

¹³ WHO World Malaria Report, 2008. Zambia: fever suspected of malaria in children <5, and malaria cases <5

Table 5. Incidence Rates for diarrhea, pneumonia, and malaria (episodes per child year)

iCCM Intervention	Incidence rate used in tool	Source
Diarrhea	3.30	Fischer Walker et al, 2012
Pneumonia	0.46	Rudan et al, 2008
Fever (RDT)	2.89	WHO World Malaria Report 2008
Malaria	1.04	WHO World Malaria Report 2008
Referral	0.83	Proportion of referrals made to cases treated in 2011 (11%)

Caseload and Service Delivery Targets

As described previously, we used actual caseload data for 2011-2012, then projected caseloads for the years 2013-2016 based on hypothetical coverage targets (see Tables 6 and 7 below).

The caseloads for 2011-2012 were provided by Malaria Consortium based on the numbers of treatments provided in each year. We used the following treatments to determine the number of services provided: for diarrhea, ORS treatments; for pneumonia, amoxicillin treatments; and for malaria, coartem treatments. We did not have the number of RDTs used, but calculated fever cases based on the average RDT positivity rate of 80%.

Table 6. Actual iCCM caseloads, Luapula Province, 2011 - 2012

	ACTUAL CASES	
	2011	2012
Diarrhea	15,863	17,915
Pneumonia	31,762	35,416
Fever (RDT)	127,758	145,112
Malaria	102,206	116,501
Referral	29,821	25,241
Total treatments	307,410	340,185

*In the tool, malaria service was defined as treatment only, not diagnosis i.e. no RDT was used. Fever (RDT) cases account for RDT usage

To determine the projected iCCM treatments for the 2013 to 2016, we first calculated the percentage of expected cases that were actually treated in 2012. Expected cases were determined by multiplying the incidence rate for each disease by the target population of children 2-59 months for 2012. For example, with 137,895 children in Luapula in 2012 and a malaria incidence rate of 1.04, the total expected malaria cases were 142,761. There were 116,501 children treated for malaria through the iCCM program in 2012, which amounts to 82% of the expected cases. Similar calculations were done for the remaining diseases, as shown in the “Actual 2012” column in Table 6 below.

Since the provision of treatments through iCCM was relatively high in 2012, we only used modest increases of 2% per year for the projection years.¹⁴ Higher service delivery caseloads are anticipated in projected years as greater efforts will be made around demand generation through targeted IEC/BCC campaigns.

Table 7. Projected iCCM caseloads, 2013 – 2016

	ACTUAL	PROJECTED CASES			
	2012	2013	2014	2015	2016
Diarrhea	4%	6%	8%	10%	12%
Pneumonia	56%	58%	60%	62%	64%
Fever (RDT)	36%	38%	40%	42%	44%
Malaria	82%	84%	86%	88%	90%
Referral	22%	24%	26%	28%	30%

CHW Availability & iCCM Service Delivery Assumptions

CHWs were interviewed to determine their time availability and activities, including the amount of time spent on iCCM activities versus other preventive or promotional activities, supervision visits and monthly meetings at the health facility, and completing registers and reporting. This information was used to determine the total available time for CHWs to spend on iCCM. When using the “Disease Burden and CHW Availability” scenario for the CHW calculation method, this availability is used to determine the number of CHWs that would be needed. However, for this analysis we manually input the number of CHWs based on what was actually done by Malaria Consortium in Luapula province.

An annual attrition rate of 5.1% for CHWs was estimated based on the number of CHWs that left the program after being trained.¹⁵ The loss due to attrition is factored into the tool, so that in order to maintain the current number of 1,332 CHWs in Luapula, 68 CHWs will need to be trained each year to replace this loss. The annual costs of training replacement CHWs has been accounted for in the tool, as part of the program’s start-up training costs.

Given that the CHWs are volunteers, there is no set standard time that they need to be available to provide iCCM services in their community. Based on our questionnaires, CHWs were able to provide services throughout the year, up to 48 hours per week (this figure does not represent the actual time they spend providing services, but the availability to do so).

Management, Supervision, Meetings and Trainings

Costs of management, supervision, meetings and trainings were primarily provided by Malaria Consortium. Management costs primarily comprise salary costs for any staff involvement in the management or the administration of the iCCM program. Although Malaria Consortium receives support through its international, regional, and home offices, we limited the analysis to include only

¹⁴ It can be argued that these referral rate projections are quite high and the target should be to reduce them. The original figure of 11% seems reasonable.

¹⁵ An estimated 68 of the 1,332 CHWs trained by Malaria Consortium left after being trained.

salary costs for staff based in Zambia. Each relevant staff is input into the iCCM tool, in addition to the total annual salary and percentage of time spent on the iCCM program.

Supervision costs are input into the tool in two ways: first, the salary costs for all staff involved in supervision are considered; and second, the costs of supervision visits are input into the tool. Malaria Consortium have one Program Officer and three Field Officers based in Luapula providing supervision to the program. Government staff also provide supervision at each level, from the Provincial Health Office (Provincial Medical Officer, Clinical Care Specialist) to the District Health Office (Clinical Care Officer, District Health Officer) and Health Center (In-Charge, Environmental Health Technician). We included the costs of regular supportive supervision visits to CHWs in their communities.

Meetings are held monthly at the health centers for CHWs to submit their monthly reporting forms and stock up on drugs, if needed. CHWs are not paid per diems for these meetings, so there were no costs incurred to the program. We also included costs of quarterly iCCM drug distributions from district level to the health centers.

Training costs in the iCCM tool are split between start-up trainings and refresher trainings. Start-up trainings are assumed to occur a single time for each new CHW, whereas refresher trainings would be applied to the entire pool of CHWs that are working in a given year. Start-up trainings also include training of trainers and supervisor trainings. Refresher trainings are provided for both supervisors and CHWs, although none were given in 2011. We included a 1-day refresher training for all CHWs and their supervisors in 2012 and maintained that for the remaining projection years.

Operating costs (such as vehicle maintenance and office running costs) for Malaria Consortium's program were included in the costing analysis. Due to the limited involvement of the DHO's and Health Centers, operating costs for these facilities were not taken into consideration. Additionally, the CHWs interviewed did not pay any operating costs, such as rental costs or electricity; rather, most were found to be operating out of their own homes, or using structures such as existing health posts to provide treatment.

While various financing methods exist in other countries, such as collecting user fees and/or insurance premiums, this does not occur in Zambia. All iCCM program costs are funded by the Malaria Consortium, with the exception of staff salaries for government workers who support iCCM activities.

Analysis

Utilization

Table 8 shows the iCCM program utilization figures calculated by the tool based on the assumptions outline in the previous section. The baseline figures from 2011 and 2012 were provided by Malaria Consortium's iCCM coordinator. The projected utilization figures are based on incidence rates, geographic coverage targets, and service delivery coverage targets, as previously described in Tables 5, 6 and 7. Based on these illustrative targets, in combination with the incidence rates and the population covered, the total number of cases is estimated for each program year.

Geographic coverage was not changed, and service delivery coverage was increased slightly, by 2% per year.

This number of cases treated per child was 3.90 in 2011 but fell to 2.47 in 2012 because the project added 3 more districts and actual coverage there was low. The numbers of cases increase over the projected years due to the assumption of increases of 2% of the need per year.

Table 8. Summary of actual and projected iCCM caseloads and cases per capita, 2011-16

	ACTUAL CASES		PROJECTED CASES			
	2011	2012	2013	2014	2015	2016
Population 2-59 months	78,797	137,895	142,308	146,862	151,561	156,411
Total number of iCCM cases						
Diarrhea	15,863	17,915	27,881	38,466	49,700	61,613
Pneumonia	31,762	35,416	37,859	40,421	43,109	45,927
Fever (RDT)	127,758	145,112	157,986	171,535	185,789	200,780
Malaria	102,206	116,501	123,176	130,158	137,461	145,099
Referral	29,821	25,241	28,399	31,733	35,252	38,963
Total iCCM cases	307,410	340,185	375,300	412,313	451,311	492,383
Number of iCCM cases per child (2-59 months)						
Diarrhea	0.20	0.13	0.20	0.26	0.33	0.39
Pneumonia	0.40	0.26	0.27	0.28	0.28	0.29
Fever (RDT)	1.62	1.05	1.11	1.17	1.23	1.28
Malaria	1.30	0.84	0.87	0.89	0.91	0.93
Referral	0.38	0.18	0.20	0.22	0.23	0.25
iCCM cases per child (2-59 months)	3.90	2.47	2.64	2.81	2.98	3.15

The number of CHWs and cases treated per CHW are shown in Table 9. Each CHW treated an average of 8.2 iCCM cases per week in 2011, but this decreased to 4.9 in 2012 with the addition of 3 districts where services were less utilized. We maintained the number of CHWs constant for the 2013

– 2016 projections, but total caseloads increase so the CHWs would be expected to provide more services per week each year. The proportion of CHWs per 1,000 population remains within a range between 1.6 and 1.8 (this translates to an average of 1 CHW for every 590 people). The ratio of CHWs per zone stays constant at just over 1 per zone.

Table 9. Number of CHWs and cases treated per CHW, 2011-16

	ACTUAL CASES TREATED		PROJECTED CASES TREATED			
	2011	2012	2013	2014	2015	2016
Total Number of CHWs	720	1,332	1,332	1,332	1,332	1,332
Total Number of iCCM Services	307,410	340,185	375,300	412,313	451,311	492,383
Average Number of iCCM Cases per CHW (year)	427	255	282	310	339	370
Average Number of iCCM Cases per CHW (week)	8.2	4.9	5.4	6.0	6.5	7.1
CHWs Per 1,000 Population	1.7	1.8	1.7	1.7	1.6	1.6
CHWs per Zone	1.1	1.1	1.1	1.1	1.1	1.1

Costs

Total iCCM program costs are divided between start-up costs and recurrent costs. Start-up costs are generally incurred at the beginning of the program but may also continue throughout the life of the program—for example, the cost of training new CHWs in iCCM to replace those lost to attrition. Recurrent costs are regularly incurred as part of the running of the iCCM program, such as the cost of medicines, supervision, and management.

All costs were input into the iCCM Costing and Financing Tool in Zambia Kwacha (ZKW). For costs that were provided in USD, these were converted using an exchange rate of 5.47 Zambia Kwacha to US\$1.00. An annual inflation rate of 6.5%¹⁶ was applied to all costs, and an illustrative 5.0% annual increase in salaries was also used.

Start-up and CHW Training Costs

Start-up costs in this exercise comprise two main components: training and equipping CHWs; and start-up activities such as workshops, consultants, and program assessments. Start-up costs can recur throughout the program as additional CHWs are trained, either due to scaling up the program or to replace those lost to attrition. In this case, the number of CHWs is maintained after 2012, but with a 5.1% attrition rate, we estimated that 68 CHWs would be lost each year and would need to be replaced. The start-up costs are shown in Table 10 below and are not included as part of the unit

¹⁶ Inflation rate from : <http://www.africaneconomicoutlook.org/en/countries/southern-africa/zambia/>

recurrent costs per service. For simplicity, we showed the cost of training the initial 720 CHWs in the year 2011, although in reality they were trained in late 2010.

Table 10. Number of CHWs and start-up iCCM Program Costs, 2011-16 (USD)

	ACTUAL COVERAGE		PROJECTED COVERAGE			
	2011	2012	2013	2014	2015	2016
Total CHWs required	720	1,332	1,332	1,332	1,332	1,332
CHWs lost to attrition	37	68	68	68	68	68
Number additional CHWs to be trained and equipped	720	649	68	68	68	68
Start-up Costs						
CHW training	585,244	439,537	52,398	55,804	59,431	63,294
CHW equipment	60,588	21,797	2,432	2,590	2,759	2,938
Other start-up activities	24,973	212,981	58,688	-	-	-
Total start-up costs	670,805	674,316	113,519	58,395	62,190	66,233
Training and equipment cost per CHW	897	711	806	859	915	974

The majority of start-up costs were incurred in 2011 and 2012, when the bulk of CHWs were trained. The total cost of training and equipping CHWs in 2011 and 2012 was estimated at approximately US\$1.1 million. The remaining training costs in 2013 – 2016 are based on replacement of CHWs lost to attrition; requiring a total of US\$241,648 across the four projection years. Start-up activities comprised costs for workshops for planning sensitization, procurement of local and international consultants for technical assistance, costs for storage materials, as well as costs for an endline survey conducted in 2012.

The cost to train and equip one CHW was determined by dividing the total training and equipment costs by the total new CHWs trained each year. In 2011, it cost US\$897 to train and equip one CHW. This figure decreased to US\$711 in 2012, then slowly increases each subsequent year due to increasing costs due to the 6.5% inflation rate input into the tool.

Recurrent Costs

Table 11 shows the total recurrent costs for the iCCM program, based on the actual numbers of services provided in 2011 and 2012 and the coverage targets and assumptions for the other years, as described earlier. Since the CHWs are volunteers and receive no salary, the only direct variable costs of iCCM treatments are medicines. Costs of management, supervision, meetings, trainings, and program overheads do not vary directly by service volume. Starting at approximately US\$0.76 million in 2011, the annual recurrent program cost would increase significantly to US\$1.2 million in 2012, and then US\$1.7 million by 2016. These increases are due to the program's service delivery scale-up and growth in the percentage of the population covered. Additionally, increases stem from a 6.5% annual inflation rate and annual salary increases of 5.0%.

Overall, the majority of iCCM program expenditure was due to supervision costs (38% of total). Other significant contributions to program costs are the cost of medicines (24% of total) and management (15% of total). Medicines costs increase as a function of higher levels of utilization, as well as the increasing price of the medicines due to inflation, and economies of scale mean that the cost of other components such as meetings is spread over more cases.

Table 11. Recurrent iCCM program costs, 2011-2016 (USD)

	ACTUAL COVERAGE		PROJECTED COVERAGE			
	2011	2012	2013	2014	2015	2016
Medicines	200,197	242,069	283,952	331,759	386,251	448,285
% of total cost	26%	20%	21%	23%	25%	27%
Management	167,753	179,322	188,288	197,703	207,588	217,967
% of total cost	22%	15%	14%	14%	13%	13%
Supervision	287,662	491,149	517,833	545,989	575,700	607,053
% of total cost	38%	40%	39%	38%	37%	36%
Meetings	12,455	23,213	24,722	26,328	28,040	29,862
% of total cost	2%	2%	2%	2%	2%	2%
Refresher trainings	-	188,613	206,117	219,514	233,783	248,979
% of total cost	0%	15%	16%	15%	15%	15%
Other iCCM Program costs	88,310	94,050	100,163	106,674	113,607	120,992
% of total cost	12%	8%	8%	7%	7%	7%
TOTAL	756,377	1,218,416	1,321,075	1,427,967	1,544,969	1,673,138

Management costs are generally defined as central level or partner organization salary costs for staff involved in managing the iCCM program. This staff does not directly supervise CHWs, but rather provides support to the iCCM program, such as organizing trainings, attending technical working group meetings, or overseeing medicine supply chains. These costs are calculated by applying a percentage of time spent on iCCM management to the total salary for each staff member. We included costs of management staff from Malaria Consortium based in Luapula, as well as MOH staff at the Provincial Health Office and District Health Office. Since salaries for those providing iCCM services tend to be relatively low in Zambia, these costs were not significant in comparison to other program costs. Based on more recent changes to the new cadre of CHWs in Zambia, especially those on government payroll, these salary estimates may need to be revised depending on whether these CHWs will provide iCCM services.

Supervision costs are the costs of staff at the PHO and DHO who provide supervision to the CHWs, as well as Malaria Consortium's own supervisors. Meeting and training costs are based on standard costs of per diems, transportation reimbursements, lodging, training materials, and other related costs. These costs were provided by Malaria Consortium based on their training budgets.

Other iCCM Program Costs comprise two main costs – vehicle costs (fuel and maintenance), and overhead costs (office rental costs, communications, etc.). Since the program’s vehicles were used to transport medicines from district level to health centers, the costs of drug transport are included within the “Other iCCM Program Costs.”

Table 12 shows the average annual recurrent cost per service and per capita, and per CHW by program year. These care calculated by dividing the total recurrent cost (shown in Table 12) by the total numbers of iCCM services, population, and CHW, respectively. Supervision cost per CHW is calculated by dividing the total cost of supervision (see Supervision row in Table 12 above) by the total number of CHWs each year.

Table 12. Recurrent cost per service, per capita, and per CHW, 2011-2016 (USD)

	ACTUAL COVERAGE		PROJECTED COVERAGE			
	2011	2012	2013	2014	2015	2016
Total recurrent cost	756,377	1,218,416	1,321,075	1,427,967	1,544,969	1,673,138
Total iCCM cases treated	307,410	340,185	375,300	412,313	451,311	492,383
Average cost per iCCM service	2.46	3.58	3.52	3.46	3.42	3.40
Average cost per capita (2–59 months)	9.60	8.84	9.28	9.72	10.19	10.70
Average cost per capita (total population)	1.79	1.64	1.73	1.81	1.90	1.99
Recurrent cost per CHW	1,051	915	992	1,072	1,160	1,256
Supervision cost per CHW	400	369	389	410	432	456

The average cost per service increases sharply from 2011 to 2012 because a refresher training was conducted in 2012 but not in 2011. The changes in cost per service from 2012 through 2016 are due to economies of scale, offset to some degree by inflation and salary increases.

The cost per capita increases steadily from year to year; this is due to the fact that more iCCM services are being provided to each child each year as program utilization increases, and is also due to inflation and salary increase assumptions. The average cost per child (2-59 months) would be US\$9.60 in 2011, increasing to US\$10.70 by 2016.

On average, the supervision cost per CHW was US\$400 in 2011, increasing to US\$456 by 2016. The recurrent cost per CHW, calculated by dividing the total recurrent cost by the total number of CHWs each year, begins at US\$1,051 in 2011 and increases to \$1,256 by 2016.

Table 13 shows the recurrent cost for each type of service in the iCCM package. As mentioned previously, direct variable costs, comprising medicine costs, increase with each additional service provided. Management and supervision costs do not vary with the volume of services provided, but may vary as a result of adding more CHWs or scaling up to additional districts.

The remaining years show fluctuation in the cost per service – initially, there is an increase due to inflation, but eventually the cost per service decreases due to economies of scale that overcome the increases from inflation.

In 2011, the most costly service was malaria, at US\$2.76 per service, followed by fever testing (RDT) at US\$2.56, diarrhea at US\$2.54, pneumonia at US\$ 2.45, and referrals at US\$0.96. Although no medications are provided for referrals, CHWs still have to take the time to diagnose and refer the patients; this time is used as a basis of allocation of program costs such as supervision, management, and training.

The largest increase in cost per service occurs between 2011 and 2012, as refresher trainings were added. The projected cost per service in 2016 would be US\$3.79 for malaria, US\$3.51 for fever (RDT), US\$3.36 for pneumonia, US\$3.48 for diarrhea, and US\$1.31 for referral (including inflation and salary increases).

Table 13. Recurrent cost per iCCM service, 2011-2016 (USD)

	ACTUAL COVERAGE		PROJECTED COVERAGE			
	2011	2012	2013	2014	2015	2016
Diarrhea	2.54	3.60	3.56	3.52	3.49	3.48
Pneumonia	2.45	3.56	3.50	3.44	3.39	3.36
Fever (RDT)	2.56	3.69	3.63	3.57	3.53	3.51
Malaria	2.76	3.90	3.86	3.82	3.79	3.79
Referral	0.96	1.50	1.45	1.40	1.35	1.31

Total Costs

Total costs of Malaria Consortium’s iCCM program in Luapula are summarized in Table 14 below. The total program cost was US\$1.4 million in 2011 (which included some prior-year start-up costs) and US\$1.9 million in 2012. Based on the projections, this would increase to US\$1.7 million in 2016. The projected increases in recurrent costs from 2013 onwards are due to population growth, increases in utilization targets, inflation of 6.5% per year and salary increases of 5% per year. The projected increases in start-up costs are due to training and equipment costs for replacement CHWs as a result of attrition, which was estimated at 5.1%, indicating that 68 replacement CHWs need to be added annually.

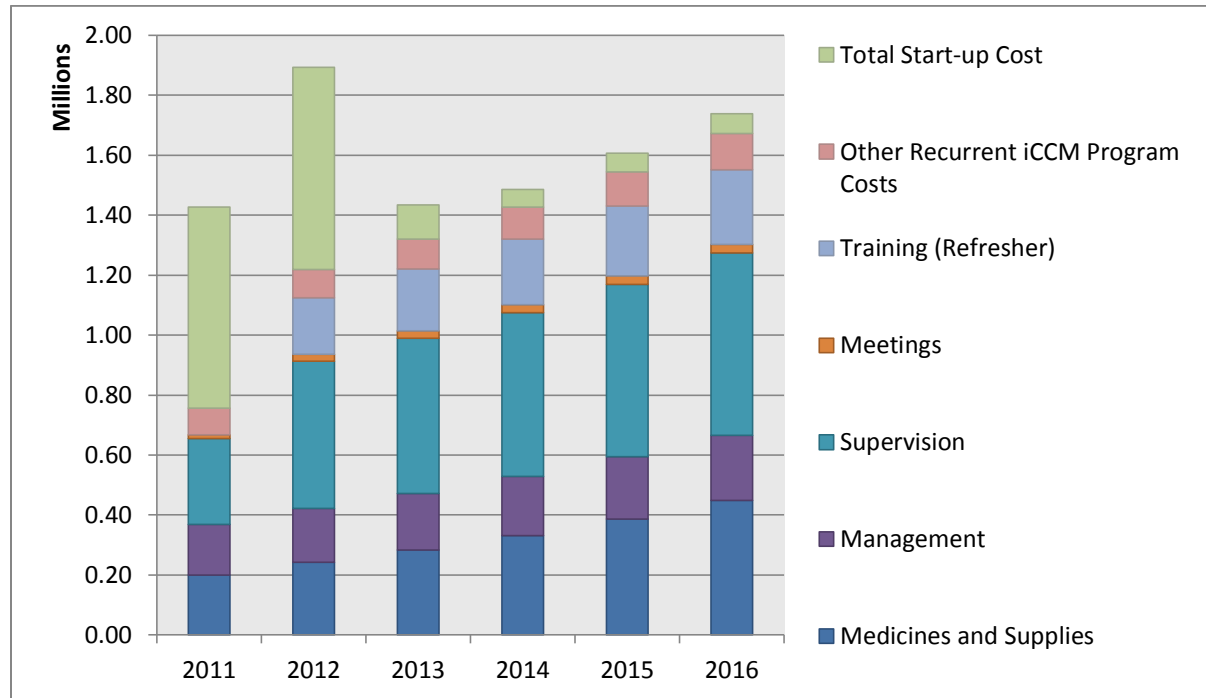
Table 14. Total iCCM Program costs, 2011 – 2016 (USD)

	2011	2012	2013	2014	2015	2016
Total Recurrent Cost	756,377	1,218,416	1,321,075	1,427,967	1,544,969	1,673,138
Total Start-up Cost	670,805	674,316	113,519	58,395	62,190	66,233
Total Cost	1,427,182	1,892,731	1,434,593	1,486,361	1,607,159	1,739,371

Figure 3 below summarizes the total iCCM program costs for 2011 – 2016. This includes both start-up costs and recurrent costs reported in Tables 13 and 14, respectively.

As discussed previously, supervision costs, as well as medicines and management, were the key cost drivers of the iCCM program. As the volume of services provided increases slightly from year to year, the cost of medicines also increases, but fixed costs stay the same, resulting in economies of scale on a per service basis.

Figure 3. Total iCCM Program costs, start-up and recurrent, 2011 – 2016 (USD)



Conclusions

This goal of this study was to cost the Malaria Consortium’s iCCM project in Zambia’s Luapula Province.

The catchment population of children aged 2-59 months was 78,797 in 2011 for the four districts. With the expansion into all 7 districts in 2014 this increased to 137,895. The iCCM package of services comprised treatment of diarrhea, pneumonia, testing with RDT and treatment of confirmed malaria, and referrals. In 2011 a total of 307,410 iCCM services were provided. That figure would increase to 340,185 in 2014 after the expansion into the 3 additional districts.

The numbers of cases treated was an average of 3.90 cases per capita (child 2-59 months) in 2011 and 2.47 in 2012. Based on the expected number of 8.52 episodes per year per child, the utilization level was 46% in 2011 and 29% in 2012. The fall in utilization level was because utilization was lower in the additional 3 districts than in other original 4 districts, possibly because the program did not function for the full year in the additional districts and due to stock-outs that influenced utilization levels.

Each CHW covered an average catchment population of 109 children aged 2-59 months and each CHW saw on average 8.2 cases per week in 2011 and 4.9 cases per week in 2012.¹⁷ The attrition rate of iCCM CHWs was estimated at 5.1%.

The original start-up costs incurred prior to 2011, together with the cost of training and equipping 37 replacement CHWs came to US\$687,805. Additional start-up costs in 2012 for the new 3 districts, together with the cost of training and equipping replacements came to US\$674,316, although US\$212,981 of this was for surveys and storage. These start-up costs are not included in the recurrent costs.

We estimated the recurrent costs of implementing the iCCM program in Luapula at US\$756,377 in 2011 and US\$1,218,416 in 2012. The largest cost elements in 2011 were 38% for supervision followed by 26% for medicines and 22% for management. The pattern was similar in 2012, apart from the inclusion of refresher training which was 15% of total costs.

For the years 2013-2016, we agreed with the Malaria Consortium to assume an increase in utilization of 2% of need per year and we assumed that the catchment population would continue to grow at 3.2% per year. With these increases the utilization per capita (child aged 2-59 months) would be 3.1, which would be 37% of the expected episodes. Based on this and the assumed inflation and salary increases the total recurrent cost would increase to US\$ 1.3 million in 2013 and US\$ 1.6 million in 2016. By 2016 the largest cost element would still be supervision (36%) followed by medicines (27%) and refresher training (15%).

In 2011, the most costly service was malaria, at US\$2.76 per service, followed by fever (RDT) at US\$2.56, diarrhea at US\$2.54, pneumonia at US\$ 2.45, and referrals at US\$0.96. The largest increase in cost per service occurs between 2011 and 2012, as refresher training was added. Based on the projections, the costs per service in 2016 would be US\$3.79 for malaria, US\$3.51 for fever (RDT), US\$3.36 for pneumonia, US\$3.48 for diarrhea, and US\$1.31 for a referral.

It should be noted that all costs presented in this analysis are total costs, not additional costs; therefore, some of these costs are already funded through separate budgets. For example, we include costs of supervision and management provided by government-funded staff at the Provincial Health Office and District Health Offices. Supervision was a significant driver of the program costs, and we considered it important to show the total program costs, not only those funded by Malaria Consortium, to compare alongside the program's impact.

It is important to note that these are standard costs – i.e., the costs that should be incurred for providing the services. They are not the actual expenditures, with possible exception of some of the overhead costs. In the case of medicines, for example, the cost shown here is the cost of providing the medicines needed for the numbers of services provided. It is not the actual expenditure on medicines. As a result it does not take into account shortages or stock-outs of medicines. This is especially important if the costs are used to compare with impact results, such as in cost per death prevented. In addition, we did not conduct any analysis of bottlenecks and do not know, for example, if there were medicine stock-outs during the year and we assumed that would not occur in the projected years. If there are shortages of medicines this would greatly affect the utilization of services, which would, in turn, affect the unit costs.

In terms of reducing costs there would be room for increasing the utilization rate, which was projected at 37% in 2016, although that would depend on care-seeking behavior and other factors, such as

¹⁷ This probably meant that the CHWs in the original 4 districts continued to see around 8 cases per week but the CHWs in the 3 new districts only saw around 1 case per week.

medicines supply. The alternative would be to try to reduce the fixed costs of management, supervision and NGO overhead costs. Most donor-funded pilot iCCM projects have high overhead, management and supervision costs – this is part of the investment in developing a viable program. If the program is eventually taken over by the government, these costs would be expected to fall significantly, for example with much-reduced overhead costs and by supervisors sharing the costs of visits across more community health activities. That would, however, probably require a strengthened health system, particularly at the primary health care level.

References

- Basic Support for Institutionalizing Child Survival (BASICS). *Scaling Up Community-Based Treatment in Senegal*. Washington, DC: BASICS and USAID, 2006.
- Childhood Diarrhea in Sub-Saharan Africa: Child Health Research Project Special Report*. Volume 2, Number 1, April 1998. Accessed from: <http://www.harpnet.org/doc/spec2.pdf>.
- CORE Group, Save the Children, BASICS, and MCHIP. *Community Case Management Essentials: Treating Common Childhood Illnesses in the Community. A Guide for Program Managers*. Washington, DC: CORE Group, 2010.
- Demographic Health Survey, Zambia, 2007. Ministry of Health, Zambia, and Macro International Inc. Calverton, Maryland, USA.
- Fischer Walker et al. Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review. *BMC Public Health* 2012, 12:220. Accessed at: <http://www.biomedcentral.com/1471-2458/12/220>
- International Drug Price Indicator Guide, accessed from: <http://erc.msh.org/mainpage.cfm?file=1.0.htm&id=6119&temptitle=Introduction&module=dm p&language=English>
- Jarrah, Z., Lee, A., Wright, K., Schulkers K, and D. Collins 2013. *Costing of Integrated Community Case Management in Rwanda*. Submitted to USAID by the TRAction Project: Management Sciences for Health.
- Jarrah, Z., Lee, A., Wright, K., Schulkers K, and D. Collins 2013. *Costing of Integrated Community Case Management: Malawi*. Submitted to USAID by the TRAction Project: Management Sciences for Health.
- Jarrah, Z., Wright, K., C. Suraratdecha, and D. Collins 2013. *Costing of Integrated Community Case Management: Senegal*. Submitted to USAID by the TRAction Project: Management Sciences for Health.
- Lukacik, Marek, Ronald L. Thomas, and Jacob V. Aranda, "A Meta-analysis of the Effects of Oral Zinc in the Treatment of Acute and Persistent Diarrhea." *Pediatrics* 121 (Feb. 2008): 326–36. <http://www.pediatrics.org/cgi/doi/10.1542/peds.2007-0921>.
- Morel, C., Ngo Duc Thang, Nguyen Xuan Xa, Le Xuan Hung, Le Khan Thuan, Pham Van Ky, Annette Erhart, Anne J Mills and Umberto D'Alessandro. "The economic burden of malaria on the household in south-central Vietnam." *Malaria Journal* 2008, 7:166
- One Million Community Health Workers: Technical Task Force Report*. New York: The Earth Institute, Columbia University, 2011.

Rudan, Igor, Cynthia Boschi-Pinto, Zrinka Biloglav, Kim Mulholland, and Harry Campbell.
“Epidemiology and Etiology of Childhood Pneumonia.” *Bulletin of the World Health Organization* 86 (May 2008): 321–416.

Annexes

Annex A. Districts and Health Centers sampled

Annex B. People Contacted

Annex C. Standard Treatment Guidelines

Annex D. CHW Questionnaire

Annex E. CHW Monthly Reporting Form

Annex F. CHW Sick Child Reporting Form

Annex A. Districts and Health Centers sampled for CHW Questionnaires

District	District Population ¹⁸	Total # of Zones	Health Center	Type of Health Center	# of CHW's Interviewed
Milenge	49,382	56	Lwela HC	Rural	3
Samfya	186,367	270	Lubwe HC	Rural	3
			Mundubi HC	Rural	3
			Samfya Stage II HC	Rural, Stage II	3
Mansa	225,950	249	Lukola HC	Rural	2
			Chembe HC	Rural	2
			Senama HC	Urban	3
Mwense	121,927	241	Kashiba HC	Rural	3
			Mwense Stage II HC	Rural, Stage II	3
Nchelenge	161,173	123	Kashikishi HC	Urban	3
			Kabuta HC	Rural	3
Chiengi	22,000 ¹⁹	104	Mukunta HC	Rural	1
Kawambwa	145,286	153	Kazembe HC	Rural	2
			Mukanta HC	Urban	2
TOTAL	912,085	1,196	14	--	36

¹⁸ District level population data were obtained from each DHO; as such, the numbers differ slightly from the total 2012 population figure obtained from the Central Statistics Office for Luapula.

¹⁹ This figure is an estimate, provided by the DHO. Actual population figures were not able to be obtained at the DHO level.

Annex B. People Contacted

Name	Title, Organization
Helen Counihan	Regional iCCM-CiDa Programme Coordinator, Malaria Consortium
Gráinne Mac Glinchey	Africa Regional Programme Officer, Malaria Consortium
Bristol Ntebeka	Project Manager, Malaria Consortium
Chilambwe Chibwe	Finance and Admin Officer, Malaria Consortium
Michael Banda	Independent Consultant
Saboi Kwalombota	Independent Consultant
Dr. Chibwe	Clinical Care Specialist, Provincial Medical Office
Lazarous Mwanza	District Health Information Officer, Milenge District Medical Office
Tom Banda	Senior Clinical Care Officer, Mansa District Medical Office
Macleod Chalibonena	District Health Information Officer, Kawambwa District Medical Office
Brian Ngulube	Public Health Officer, Mwense District Medical Office
Masautso Chibwe	Acting Pharmacist In-Charge, Nchelenge District Medical Office
Litia Lubasi	Pharmacy Technologist, Chiengwe District Medical Office
Mr. Amoyo	Environmental Health Technician, Samfya District Medical Office
Jasmine Chinamawa	District Health Information Officer, Mansa District Medical Office
Mambwe Reagan	In-Charge, Lwela Health Center
Miriam K. Zulu	Environmental Health Technician, Lubwe Health Center
Regina Walubita	In-Charge, Mundubi Health Center
Victor Mwape	In-Charge, Samfya Stage II Health Center
Leah Shapi	Environmental Health Technician, Mwense Stage II Health Center
Abraham K. Pongwe	In-Charge, Chembe Health Center
Aloysius Kakungu	In-Charge, Sanama Health Center
Osborne Chewe	Environmental Health Technician, Kashiba Health Center
Bernard Njovu	Environmental Health Technician, Lukola Health Center
Mildred Kapelembe	Nurse/CHW Supervisor, Kashikishi Health Center
Mcberth Wapachole	Environmental Health Technician, Kabuta Health Center
James Champo	Registered Midwife/In-Charge, Mukunta Health Center
Chilombo Humphry	Registered Nurse/In-Charge, Mukanta Health Center
Judith Mwila	CHW Supervisor, Kazembe Health Center

Annex C. Standard Treatment Guidelines for iCCM Services

Zambia currently does not have standard treatment guidelines for iCCM. As such, the CHW's relied on the training manual provided by the Malaria Consortium (and developed in concert with Zambia's Ministry of Health) to obtain instructions on treatment procedures for diarrhea, malaria and pneumonia.

Drug	Number of times/day	Number of days	% of cases treated	Units per dose	Total units	Unit cost USD	Total cost USD
Diarrhea (37 minutes per case – diagnosis and treatment)							
ORS	1	2	80.0%	2.00	3.20	0.09	0.29
ORS	1	2	20.0%	1.00	0.40	0.09	0.04
Zinc (20mg)	1	14	80.0%	1.00	11.20	0.04	0.39
Zinc (20mg)	1	14	20.0%	0.50	1.40	0.04	0.05
Pneumonia (40 minutes per case – diagnosis and treatment)							
Amoxicillin 125mg (pack of 15 tabs)	3	5	20.0%	1.00	3.00	0.03	0.08
Amoxicillin 125mg (pack of 30 tabs)	3	5	80.0%	2.00	24.00	0.02	0.48
Fever (RDT) (40 minutes per case – diagnosis and treatment)							
Malaria Rapid Diagnostic Test	1	1	100.0%	1.00	1.00	0.65	0.65
Paracetamol tablets 100mg	1	1	20.0%	1.00	0.20	0.01	0.00
Malaria (40 minutes per case – diagnosis and treatment)							
COARTEM (Arthemeter/Lumefantrin) 20/120mg for 4 to 36 months	2	3	20.0%	1.00	1.20	0.08	0.09
COARTEM (Arthemeter/Lumefantrin) 20/120mg for 36 to 84 months	2	3	80.0%	2.00	9.60	0.08	0.76

Annex D. CHW Questionnaire

COMMUNITY HEALTH WORKER (CHW) QUESTIONNAIRE	
CHW #	
Date of interview:	
Name of interviewer:	
Location of interview:	
Start time of the interview:	
Name of CHW being interviewed:	
Sex (Male/Female):	
Name of village or community:	
PHU:	
Chiefdom:	
District:	
Province:	
Month and year the person began working as a CHW?	
Period of analysis:	
Start Date (MM/YY)	
End Date (MM/YY)	
A) Population served by CHW	
1)	What is the population of the households that you serve?
2a)	How many children (0-5 years) are included in this population?
3)	Is there more than one CHW working in this village?
3)	If yes:
3a)	Do you divide the population between the CHWs, or cover the entire population but alternate? How do they divide up the households in the village?
3a)	What is the population of the households that the other CHW serves?
B) CHW Time	
1)	In general, how many hours per day are you available to work as a CHW?
2)	In general, how many days per week are you available to work as a CHW?
3)	In general, do you work as a CHW all year, or are there days/months that you take off?
Fill out ANNEX 3: CHW TIME by asking the following questions	

1)	Please list all the activities that are typically done as a CHW? (If they are not already listed in ANNEX 3 then add to the blank spaces, rows 18-21)
2)	Was the last week a typical week for you as a CHW?
	If yes, proceed with the following questions. If no, ask them to think of a 'typical' week in terms of their activities as a CHW.
3)	List the different types of activities you did as a CHW in the previous week:
3a)	How many hours did you take for each activity?
3b)	For each activity, where did you go?
3c)	For each activity, how long did it take to travel (i.e. to or from a household)?
3d)	For each activity, was this specifically relating to iCCM, or just for CHW activities in general?

C) Supervision and Reporting

1a)	How often does the CHW supervisor come to visit you?
1b)	How often does the CHW supervisor come to your house to collect your reports?
2)	With what frequency do you fill out regular CHW or iCCM activity reports?
3)	With what frequency does your supervisor provide you with drugs and supplies?
4)	How long does it take to go to the health center, and how far away is it? (one way)
5)	Do you spend the whole day to go to the health center (round trip)?
6)	When was the last time you received a supervision visit by your supervisor?

D) Meetings and Trainings

Fill out ANNEX 2. Meeting and Training by asking the following questions:

1)	Please make a list of the different trainings and meetings you had in the last year (2012).
2)	For each training (fill out in the appropriate section if it's a meeting or a startup or refresher training)
2a)	Who was the meeting or training funded by? (if the CHW doesn't know, leave blank)
2b)	Where was the meeting or training held?
2c)	How frequent is the meeting or training (if refresher)?
2d)	How long was the meeting or training?
2e)	Was the CHW paid a per diem or incentive? If yes, how much?

E) iCCM Services

1)	What iCCM treatments are you able to provide now?
1a)	Were you providing the same treatments in 2012?
2)	For each iCCM service, list the approximate amount of time that is required to provide the treatment:

2a)	Diarrhea
	Treatment
	Follow-up
2b)	Pneumonia
	Treatment
	Follow-up
2c)	Malaria
	Treatment
	Follow-up
2d)	Malnutrition Screening
	Assess/ Diagnose
2e)	Referrals
	Treatment
	Follow-up
	Accompanying referral
2f)	(Other treatment, if provided)
	Treatment
	Follow-up
3)	When a patient is referred to the health center, do you record the patient in your register?
3a)	Do you accompany the patients to the health center?
3b)	Do you provide an initial treatment to the patient before referring them?
4)	How do you test to make a diagnosis for pneumonia?
4a)	If the test is negative, what do you do? Do you provide any treatment?
4b)	If the test is negative, how do you record the patient in your register?
4)	How do you test to make a diagnosis for malaria?
4a)	If the test is negative, what do you do? Do you provide any treatment?
4b)	If the test is negative, how do you record the patient in your register?

F) Periodic CHW activities

1)	Do you participate in any periodic activities relating to community health, such as vaccination campaigns or distribution of insecticide-treated nets?
2)	If yes, list the events and their frequency.

G) Medications, supplies and equipment

1)	For the following medications, have you received these in the past year, and have you had any issues with stock-outs (more than 7 days)?
a	ORS
b	Zinc
c	ACT infant

e	ACT toddler
e	Amoxicillin
f	
g	

2)	For the following equipment, have you received these, and have you had any issues with stock-outs?
a	Medicine Box
b	Respiratory Timer
c	Beads (Infant and Toddler)
d	Mid-Upper Arm Circumference (MUAC) Tape
e	Patient Register
f	Referral Cards
g	Pictograms / job aid
h	Flashlight / torch
i	Jugs (ORS)
j	Spoons
k	Cups

H) Payment and Incentives	
1)	Do you receive any forms of payment for your services as a CHW?
1a)	If yes, from what source is the payment, and how much?
2)	Do you receive any incentives "in kind" for your services as a CHW? (buckets, t shirt, umbrella, sleeping mats, etc.)
2a)	If yes, from what source is the incentive, and how much?
3)	Do you receive any incentives from your community?
3a)	If yes, what incentives do you receive?

	End time of the interview:
	Duration (minutes / hours) of the interview:

Annex E. CHW Monthly Reporting Form

CHW Register: Patients
Zambia Ministry of Health Community Case Management Programme

Name of CHW: 200603...KALLES
 CHW No. 200603...KALLES
 Zone: E
 Health Centre: ...D.LAB...TUMBUKA
 District: ...KALLES
 Month & Year: MAY 2013

Institution consortium

Table A-PATIENTS
Please record all patients you see (EXCEPT patients you see at the health facility)

No.	Date of visit	Patient's name	PATIENT INFORMATION			PATIENT'S SYMPTOMS (If YES, tick in the appropriate column)					ACTIVITIES CARRIED OUT (If YES, tick in the appropriate column)				TREATMENT					
			Age	Sex	Days since onset (or 1-3, 4-7)	Headache	High fever	Low fever	Other (Specify)	Respiratory rate	Diagnosis	Treatment given	Paracetamol (5-10 mg)	Antibiotics (5-7 days)	Antimalarials (3-7 days)	Other	Referred to health facility			
21	05/05/2013	Getruk Mungu	5	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	05/05/2013	Bert Mungu	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	05/05/2013	Lavy Kalaba	7	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24	05/05/2013	Chimby Nkhundwe	11	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	07/05/2013	Siza Mungu	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	07/05/2013	Jackson Chibwe	6	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	10/05/2013	Fritah Chibwe	11	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	11/05/2013	Joseph Bwalya	5	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	13/05/2013	Moses Kunda	5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	15/05/2013	Alan Mungu	2	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
31	18/05/2013	Phyllis Mungu	4	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32	18/05/2013	Leslies Mungu	5	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	19/05/2013	Wilson Chibwe	6	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34	19/05/2013	Shepard Chibwe	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	19/05/2013	Bejamin Chibwe	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	19/05/2013	Elvis Chibwe	11	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37	19/05/2013	Jackson Kasanda	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	22/05/2013	Bitha Bwalya	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
39	22/05/2013	Hamba Nkhundwe	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40	24/05/2013	Paulina Kunda	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
41	26/05/2013	Milani Mungu	4	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
42	26/05/2013	Esther Mungu	4	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
43	27/05/2013	Rajocoby Mungu	3	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
44	27/05/2013	Thomas Mungu	8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	30/05/2013	Patricia Kasanda	6	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TOTALS			15	10	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Annex F. CHW Sick Child Reporting Form

Sick Child Recording Form
(for community-based treatment of child age 2 months up to 5 years)

Date: ____/____/20____ CHW: _____
(Day / Month / Year)

Child's name: First _____ Family _____ Age: ____Years/____Months Boy / Girl

Caregiver's name: _____ Relationship: Mother / Father / Other: _____

Address, Community: _____

1. Identify problems

ASK and LOOK	Any DANGER SIGN or other problem to refer?	SICK but NO Danger Sign?
ASK: What are the child's problems? If not reported, then ask to be sure. YES, sign present → Tick <input checked="" type="checkbox"/> NO sign → Circle <input type="checkbox"/>		
<input type="checkbox"/> <input checked="" type="checkbox"/> Cough? If yes, for how long? ____ days	<input type="checkbox"/> Cough for 21 days or more	
<input type="checkbox"/> <input checked="" type="checkbox"/> Diarrhoea (3 or more loose stools in 24 hrs)? IF YES, for how long? ____ days.	<input type="checkbox"/> Diarrhoea for 14 days or more	<input type="checkbox"/> Diarrhoea (less than 14 days AND no blood in stool)
<input type="checkbox"/> <input checked="" type="checkbox"/> IF DIARRHOEA, blood in stool?	<input type="checkbox"/> Blood in stool	
<input type="checkbox"/> <input checked="" type="checkbox"/> Fever (reported or now)? If yes, started ____ days ago.	<input checked="" type="checkbox"/> Fever for last 7 days or more	<input checked="" type="checkbox"/> Fever (less than 7 days) in a malaria area
<input type="checkbox"/> <input checked="" type="checkbox"/> Convulsions?	<input type="checkbox"/> Convulsions	
<input type="checkbox"/> <input checked="" type="checkbox"/> Difficulty drinking or feeding? IF YES, not able to drink or feed anything? <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> Not able to drink or feed anything	
<input type="checkbox"/> <input checked="" type="checkbox"/> Vomiting? If yes, vomits everything? <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> Vomits everything	
<input type="checkbox"/> <input checked="" type="checkbox"/> Any other problem I cannot treat (for example, problem breast feeding, injury, burn)? See 5 If any OTHER PROBLEMS, refer.	<input type="checkbox"/> Other problem to refer:	
LOOK:		
<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Chest indrawing? (FOR ALL CHILDREN) IF COUGH, count breaths in 1 minute: _____ breaths per minute (bpm)	<input checked="" type="checkbox"/> Chest indrawing	
<input type="checkbox"/> <input checked="" type="checkbox"/> Fast breathing: Age 2 months up to 12 months: 50 bpm or more Age 12 months up to 5 years: 40 bpm or more		<input type="checkbox"/> Fast breathing
<input type="checkbox"/> <input checked="" type="checkbox"/> Unusually sleepy or unconscious?	<input type="checkbox"/> Unusually sleepy or unconscious	
For child 6 months up to 5 years, MUAC strap colour: _____	<input checked="" type="checkbox"/> Red on MUAC strap	
<input type="checkbox"/> <input checked="" type="checkbox"/> Swelling of both feet?	<input type="checkbox"/> Swelling of both feet	

2. Decide: Refer or treat child
(tick decision)

If ANY Danger Sign or other problem, refer to health facility

If NO Danger Sign, treat at home and advise caregiver

1 GO TO PAGE 2