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

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Year 4 Annual Report

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Acronyms and Terms

ACT	Artemisinin Combination Therapy
BCC	Behavior Change Communication
CAC	Community Action Cycle
CCM	Community Case Management
CHAZ	Churches Health Association of Zambia
CHW	Community Health Worker
CSHGP	Child Survival and Health Grant Program (USAID)
DATF	District AIDS Task Force
DHMT	District Health Management Team
DIP	Detailed Implementation Plan
ENC	Essential Newborn Care
FGD	Focus Group Discussions
GMP	Growth Monitoring Program.
HBB	Helping Babies Breathe
HC	Health Center
HF	Health Facility
HW	Health Worker
IDI	In-depth Interviews
iCCM	Integrated Community Case Management
IMCI	Integrated Management of Childhood Illnesses
IR	Intermediate Result
IYCF	Infant and Young Child Feeding
KOICA	Korean International Cooperation Agency
LINCHPIN	Lufwanyama Integrated Neonatal and Child Health Project in Zambia
LUNESP	Lufwanyama Neonatal Survival Project (of Boston University)
M&E	Monitoring and Evaluation
MCD	Ministry of Community Development
MCH	Maternal and Child Health
MDG	Millenium Development Goal
MNC	Maternal and Newborn Care
MNCH	Maternal, Newborn and Child Health
MOH	Ministry of Health
MTE	Midterm Evaluation
MUAC	Mid-upper Arm Circumference
NHC	Neighborhood Health Committee
OR	Operations Research
ORS	Oral Rehydration Solution
PCM	Pneumonia Case Management
PHCU	Primary Health Care Unit
PNC	Postnatal Care
RDT	Rapid Diagnostic Tests
SC	Save the Children
SIDA	Swedish International Development Agency
SMAG	Safe Motherhood Action Group

TBA	Traditional Birth Attendant
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WRA	Women of Reproductive Age
WVI	World Vision International
ZISSP	Zambia Integrated Systems Strengthening Project (Abt Associates – USAID/Zambia bi-lateral project)

I. Introduction, Key Progress, and Main Accomplishments

Introduction To reduce under-5 mortality and advance Zambia's efforts to meet Millennium Development Goal 4, Save the Children is supporting implementation of a USAID/CSHGP Child Survival Project (CS-25 cycle), *Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN),* in partnership with the Lufwanyama District Health Management Team (DHMT), in the Copperbelt Province of Zambia. This integrated, community-based, newborn care and community case management (CCM) package is delivered through an enhanced district-wide community health program linked to health facilities (HFs) and Neighborhood Health Committees (NHCs). It is consistent with Ministry of Health (MOH) and the new Ministry of Community Development, Mother and Child Health (MCD, MCH) plans and policies. The CSHGP interventions include: Maternal and Newborn Care (MNC) at 40 percent, Pneumonia Case Management (PCM) at 20 percent; Prevention and Treatment of Malaria at 20 percent; and Control of Diarrheal Disease at 20 percent. The project runs for five years (from October 2009 to September 2014) with matching support from ELMA Philanthropies, the Crown Foundation, and other private donors such as the Swedish Postcode Lottery and the Swedish International Development Agency (SIDA). Lufwanyama District has a current total population of 87,592 (2010 census) with 17,518 (20 percent) children under five and 19,270 (22 percent) women of reproductive age (WRA). LINCHPIN's strategic objective is to increase the use of curative interventions. Its four intermediate results (IRs) are: IR-1: Increased access to and availability of services; IR-2: Improved quality of services; IR-3: Increased demand for services and health practices; and IR-4: Enabled environment. This is the Year 4 Annual Report covering program activities implemented from October 1, 2012 through September 30, 2013.

Key progress With LINCHPIN now entering its fifth and final year, Save the Children is consolidating its programmatic achievements, leveraging other funds and applying match to meet outstanding district needs, planning for sustainability, and continuing to work at the national level to influence policy and strategy. Save the Children is also working with the district to engage local private businesses, including those in the mining sector, to support health-related community initiatives.

New Save the Children projects in Lufwanyama include a nutrition program funded by the Swedish Postcode Lottery. Save the Children is a member of the Scaling-up Nutrition in Zambia Task Force, the goal of which is to advocate to government and other partners for the prioritization of nutrition in Zambia. Save the Children is also an MCHIP partner and working at the national level to achieve impact at scale for both newborn and child health.

Main accomplishments

Training of health workers Incorporation of newborn care and the management of sick neonates into the Integrated Management of Childhood Illness (IMCI) initiative in Zambia is contributing to LINCHPIN's goal of reducing under-5 mortality. LINCHPIN trained 24 health workers (HWs) to manage sick children, care for newborns, and make referrals. These HWs supervise 62 active Community Health Workers (CHWs) in Integrated Community Case Management (iCCM) and support 103 trained Traditional Birth Attendants (TBAs), including 47 CHW-TBA teams. Save the Children also trained 12 HWs and 70 TBAs in essential newborn

care (ENC), including HHB, a national approach to increase availability of resuscitation to manage newborn birth asphyxia in low-resource settings. The HWs were drawn from all 17 HFs in the district. TBAs were included as they accompany women for facility deliveries and sometimes find themselves assisting deliveries themselves if no skilled provider is present. Following the training, all 17 HFs were provided with ventilation bags and masks, HBB guidelines, and registers.

Training of Safe Motherhood Action Groups (SMAGs) In support of the national strategy to increase the capacity of NHCs to plan and support MNCH priorities in their communities, LINCHPIN trained 63 SMAG members (19 male, 44 female) to facilitate formation of SMAGs in their respective communities. SMAGs are supervised by HFs and CHWs and are an important link between facility and community. LINCHPIN is using the updated national MAMA-SMAG curriculum.

Contribution of new CHWs In response to high (16/84) CHW attrition that compromised access and availability of community-based care, Save the Children trained an additional 16 CHWs for certification by the district. The new CHWs (5 females, 11 males) were selected with community involvement from the neediest areas, bringing the total number of CHWs back up to 78. The revised CHW curriculum now includes an iCCM module in addition to the basic preventive and promotion package of activities. Before deployment, LINCHPIN provided the new CHWs with bicycles, bags, registers, mid-upper-arm circumference (MUAC) strips and treatment guidelines. (See Annex 4 for a Program Learning Brief (case study) on the topic of CHW attrition.)

Construction of maternity wing and donation of ambulance In partnership with Save the Children Korea and the Korean International Cooperation Agency (KOICA), LINCHPIN used match funding to construct and hand over a fully-furnished and outfitted maternity wing at the rural Mukutum Health Center (HC). The wing will serve a total population of approximately 6,652, including 1,360 children under-5 and 1,496 WRA. It is being staffed by the DHMT and will increase access to quality maternal and newborn health care in the district. Through this Korea partnership, Save the Children was also able to donate a new ambulance and two community-based motorized “tricycles” to the DHMT to facilitate referral of pregnant women and sick newborns and children. The ambulance will be based at the new district hospital, to be opened at year-end in Lufwanyama’s *boma*.

Accelerating MDG 4 and 5 through awards to NHCs Save the Children implemented a SIDA-funded project designed to help achieve Millennium Development Goals (MDGs) 4 (Reduction of Child Mortality) and 5 (Improve Maternal Health). Applying the nationally-recognized Community Action Cycle (CAC) approach, 80 NHCs developed action plans based on identified MNCH priorities. Of these, 20 received sub-grant awards to carry out their plans. Fourteen constructed and/or rehabilitated Primary Health Care Units (PHCUs) in their localities. These are simple community- based structures where CHWs and other volunteers can deliver a basic health care package. Other activities included procurement of bicycles for volunteer transport, protection of 12 shallow wells, and training of NHC members in communication techniques.

Table 1: Summary of Major Project Accomplishments

Project inputs	Activities	Outputs	Outcome (only if survey was conducted)
Materials Trainers Venues Funds	Train 20 HWs to manage ill children and make referrals. Train 15 CHW in CCM and ENC.	24 HWs trained to manage sick children & make referrals. 16 CHW trained in CCM and ENC.	
Transport T-shirts IEC materials	Support International Women's Day. Support Child Health Week.	500 WCB were reached with key messages on MNC. 18,292 under-five children were de-wormed and received vitamin A supplementation.	
Monitoring tools Transport Funds Supervisors Stationary Stock control cards	To monitor and facilitate medication and supply system.	62 CHWs supported with drugs by DHMT. 77 CHWs and 104 TBAs received data collection tools.	
	To conduct supportive supervision. To facilitate documentation of community health activities.	62 CHWs and 103 TBAs supervised. 118 NHCs meetings attended and documented. 118/118 NHCs developed action plans.	
Materials Trainers Venues Funds	Conduct NHC roll out trainings	38 NHCs trained in CAC.	
	Train NHC in CM/BCC	118 NHCs trained in community action cycle and key LINCHPIN health messaging.	
	Hold monthly skills building meetings with Community Mobilizers	12/12 monthly meeting held with Community Mobilisers building capacities in report writing skills, data management and documentation.	
Materials Venues Funds Stationary Transport	Hold district stakeholders quarterly meetings.	4/4 meetings were held.	
	Attend National Expert meetings on CCM.	Attended 4/4 CCM expert meetings at national level as part of the Child Health Technical Working Group.	
	Hold monthly meetings with DHMT.	9/12 meetings were held.	
	Conduct and facilitate NHC exchange visits.	4/4 visits conducted.	

II. Discussion of Implementation Activities and Results

Use of key MNCH services and practices increased All 104 existing TBAs received a refresher course in ENC and HBB. During the reporting period, only 70 TBAs consistently submitted reports and were considered "active." The inactive 34 TBAs did not submit the reports due to illiteracy, illness, or absence from the area. LINCHPIN and the DHMT monitored these on a monthly basis. During the reporting period TBAs escorted 334 mothers to deliver at HFs and registered newborns for easy follow-up and subsequent postnatal care (PNC) visits. TBAs

registered a total of 629 newborns (295 males, 334 females) and provided PNC as follows: 469 home visits within 24 hours, 518 on Day 2, 522 on Day 3, and 512 on Day 7.

Figure A: TBA Postnatal Care

Classification	Services	2012 Jan-Dec	2013 Jan-Jun
Postnatal Visits	Visit with 24 hours	1275	469
	Day 2 visit	1422	518
	Day 3 visit	1422	522
	Day 7 visit	1302	512
Pregnant mothers escorted to clinics		794	334

Access to and availability of iCCM increased Sixty-two of the 84 CHWs (linked to 17 HCs) were active during the reporting period and monitored on a monthly basis. During the period January-June 2013, these 62 CHWs managed a total of 6,209 sick children (2,987 males, 3,222 females). Of the 6,209 children seen, 4,663 (75%) were classified as having malaria, 753 (12%) suspected pneumonia, 575 (9%) diarrhea, and 41 (1%) malnutrition. One hundred percent (4,663/4,663) of RDT-positive malaria cases received ACT treatment; 98% (737/753) of suspected pneumonia cases received amoxicillin; and 91% (523/575) of those with diarrhea (523/575) received oral rehydration solution (ORS). However, only 23% (133/575) of children with diarrhea received zinc. Of 5,677 children screened, 1% (51/5,677) was classified as malnourished, 42 with mild or moderate malnutrition. Those with severe malnutrition (4/51) were referred to HFs for management.

Figure B: **Classification of CCM Illnesses and Appropriate Treatment**

Classification	Cases Treated	2012 Jan-Dec	%	2013 Jan-Jun	%
Malaria	*Cases with fever*	*10,896*		*5806*	
	RDT tests done	*9,941*	*91%*	*5190*	*89%*
	RDT +ve Cases	*8,092*	*81%*	*4663*	*90%*
	ACT Treatment	*7,711*	*95%*	*4663*	*100%*
Diarrhea	*Cases*	*1497*		*575*	
	ORS treatment	*1343*	*90%*	*523*	*91%*
	Zinc Treatment	*274*	*18%*	*133*	*23%*
Suspected Pneumonia	*Fast breathing Cases*	*1411*		*753*	
	Amox. Treatment	*1346*	*95%*	*737*	*98%*
Screening for Malnutrition	*Screened with MUAC*	*10,870*		*5677*	
	Mild malnutrition	*144*		*42*	
	Severe Malnutrition	*23*		*4*	

Facilitated referral CHWs recommended 491 cases for referral. Cases requiring referral included severe malnutrition, convulsions, chest in-drawing and signs and symptoms requiring attention of qualified HWs. CHWs followed up 2,487 cases with home visits, assessing treatment compliance and looking for improvement of conditions. TBAs also conducted PNC home visits

to assess wellbeing of mother and newborn, support breastfeeding, and identify danger signs. As a result of home visits, 302 referrals were made. LINCHPIN's success hinges on a strong linkage between the community and HFs and facilitated referrals are a critical action to ensure proper case management.

Service quality LINCHPIN and DHMT staff provided supportive supervision, reviewed registers, and verified data in all 17 HFs during the reporting period. All 62 CHWs received routine supervision, while half (36) received clinical supervision. Twenty-four CHWs and 31 TBAs with identified service delivery problems received special mentoring. An average of 70% (32/46) of CHWs recorded information correctly and consistently in their registers.

iCCM drug supply LINCHPIN also monitored the availability of essential drugs, which continues to be a bottleneck. In June, 38% of CHWs reported no stock-outs of amoxicillin, 53% reported no stock-outs of ACTs, 19% reported no stock-outs of zinc, 34% reported no stock-outs of ORS, and 40% reported no stock-outs of RDTs.

Support of National Child Health Week Save the Children supported national bi-annual Child Health Weeks to increase immunization and screening coverage of children under-5. During this year's July Child Health Week, the pneumococcal vaccine (PCV10) was given for the first time and LINCHPIN is working to drive demand for this important vaccine.

Local partner collaboration and capacity building Consensus and solidarity among convinced stakeholders are key facilitating factors for the success of LINCHPIN. District stakeholder meetings have increased project visibility in the district, and the DHMT has taken the lead in convening the meetings of all health partners and private businesses, facilitating an enabled environment. The four meetings held during the reporting period yielded good results, including the donation by local business partners of 10 mobile phones for CHWs to use in the field and fuel to support the ambulance services on a monthly basis.

Progress toward sustainability Save the Children continues to coordinate with the DHMT and the Ministry's Child Health Unit in all planned activities. iCCM is now part of the costed national Six-year Strategic Plan and the Lufwanyama DHMT Five-year Strategic Plan. LINCHPIN is working within the new Ministry of Community Development, Mother and Child Health (MCD, MCH) operating systems. LINCHPIN's reporting system is fully incorporated into that of MCD, MCH and no parallel system has been created. At the community level, the project works with CHWs, TBAs and NHCs who are firmly linked to the HC. Finally, LINCHPIN collaborates with the USAID/ZISSP bi-lateral project to strengthen capacity and community linkages.

Implementation lessons learned

LINCHPIN is operating in one of the most rural, under-served, and isolated districts in Zambia and addresses a wide range of challenges, including some that continue to impede progress. As LINCHPIN enters its final year, the priority is to develop a realistic strategy to overcome some of the following challenges:

- Under-staffing in HFs, a situation that affects focused clinical supervision;

- Long distances between HFs and poor road networks, affecting technical supervision due to long traveling hours;
- High illiteracy levels among TBAs, compromising data integrity;
- Inadequate transportation for community-based volunteers to enable them to conduct prompt referrals and home visits to clients in their catchment areas;
- Irregular supply of CCM drugs to CHWs;
- Lack of privacy in HFs due to inadequate space, affecting clinic deliveries by skilled staff; and
- Low number of potential local businesses with financial means and social responsibility to fill gaps where Save the Children cannot help.

Specific information requested
Not applicable.

Table 2: Summary of Key Analysis and Use of Findings

Expected Results	Actual Results	Analysis (what worked, what didn't, and why)	Stakeholders Engaged in Analysis	Lessons Learned and Recommendations	Use of Findings (for course corrections, policy, etc.)
Developed approach to improving management of the sick newborn at first-level facilities.	Trained 24 HC staff in management of the sick newborn. Conducted and support field clinical supervision	Due to collaboration with ZISSP the training of 24 staff in management of the sick newborn worked well. The use of HC supervisors was practical in reaching out to all CHWs. Engagement of National and Provincial Clinical Care Specialist in supervision of iCCM project sites did not work due to financial constraints.	DHMT ZISSP NHCs	Partnership approach if well-coordinated can help leverage the limited resources.	Project and stakeholders use the findings to plan and source for more funds.
On-going support for iCCM, MN home visits, teaming and community mobilization through existing mechanisms.	Provided clinical support to 62 CHWs and 104 TBAs and 118 NHCs were mentored on action plan development.	Integrated support for iCCM, MN home visits and teaming worked well.	DHMT NHCs CHWs TBAs	Synchronization of field activities helps to leverage limited resources and a broader community is accessible at once for benefits.	It is cost effective to integrate activities.
Training of 35 NHCs to meet training coverage targets – and continue community mobilization support.	38 remaining NHCs trained in CAC.	NHC training was conducted at community based training centre hence managing to train 38 members. The selection of participants was easily done by DHMT.	DHMT NHCs	Community engagement and participation levels increase.	Scale up community mobilization training in new NHCs.
Improved CHW coverage.	Trained 16 CHWs.	Partnership with ZISSP worked well to support this six-week training. Advocacy with other partners to support CHW training did not work well as they did not have budgetary allocation.	ZISSP DHMT World Vision UNICEF	CHWs are essential frontline health service providers and should be supported with in-kind incentives for motivation.	Continue working through partners to train more CHWs.
Developed approaches to improving drug and logistics supply.	Improved local ordering practices. HF staff using	District therapeutic committee meets to determine main barriers to drug and logistical supplies	DHMT CHAZ	If CHWs are supplied with drugs HC record reduced levels of patient work load	Reinforce simple methods for drugs and logistics

	community register data to estimate monthly CHW drug needs.	DHMT allocates 4% emergency drug funds to supplement HC kits.			requisitions at HC level. Advocate for and support MOH to implement the CHMIS.
Improved quality of care provided by TBAs.	Adapted the WHO/UNICEF/SC community-based MNC guidelines and used these during TBA refresher trainings.	TBAs are escorting pregnant mothers to HCs for deliveries. *The procurement of resuscitation equipment for TBAs did not work as TBAs have been stopped from conducting home deliveries.* *Printing of new TBA registers did not happen due financial limitations.*	DHMT	TBAs are still able to conduct emergency deliveries at home and most referred cases are attended to by TBAs at the HCs.	Advocate for procurement of newborn resuscitation equipment for TBAs from DHMT.
Capacity built for national and district level MOH staff.	24 HWs trained in IMCI 17 HWs trained to provide clinical support to CHWs and 15 staff to TBAs with ENC.	District has a pool of trainers of trainers for CHW/TBAs, NHCs and SMAGS.	DHMT WVI DATF NHCs	Due to capacity building program ownership is created and participation is enhanced.	Advocate for use of local resource personnel to consultancy.

III. Operations Research Annual Progress

Key FY13 activities included an endline household survey to measure outcomes in use of key services and practices to compare with baseline measurements to assess the effectiveness of CHW-TBA teams to deliver high-impact interventions. Seven hundred and thirteen (713) caregivers were interviewed. Data analysis is ongoing. The final two teaming assessments have been conducted with a total of 47 CHW-TBA teams created and trained. After two years, 14 teams no longer exist due to loss of a team member, usually from employment or relocation. The loss of a CHW was responsible for 10 of the teams not continuing. We categorized 21 teams as "high" performing (scored ≥ 7 out of 14 on task work scale, and ≥ 90% on teamwork scale) and 12 teams as "low" performing (scored < 7 on task work and/or < 90% on teamwork). We conducted eight focus group discussions with caregivers and CHW-TBA teams and 29 in-depth interviews with community leaders, DHMT members and provincial health team members to assess community acceptability of the concept of teaming CHWs and TBAS. The CHW-TBA teaming idea was generally accepted by the community with perceived benefits including (1) a reduction of child deaths, (2) community members better informed and educated on health issues, (3) enhanced referral support, and (4) improved facility delivery and postnatal care. The DHMT has been engaged in the innovation and is committed to supporting the concept.

Table 3: OR Study Progress and Achievements in Year 2012-2013

Related Specific Objective/s of the Task/s (as outlined in OR Protocol)	OR Study Key Activities/Tasks Addressed during this Reporting Period	Any important Findings, Data, and/or Discussion of Progress (positive/negative)	Use and/or Dissemination of Results to Stakeholders
To assess the effectiveness of CHW-TBA teams to deliver high impact child survival interventions.	Endline data collected.	713 caregivers of children 0-59 months were interviewed. Data entry and cleaning is completed.	Data analysis has started but yet to be completed.
To assess the level of CHW-TBA teaming achieved.	Teaming assessment completed.	42 and 33 teams were assessed during the 3rd and 4th assessments respectively. Total of 47 teams were created of which 14 were "not sustained". In 10 cases, it was the CHW who left. The most common causes of team "not sustained" were finding new job (5) and relocation (4). 21 teams were categorized as "high" and 12 teams as "low".	Used to categorize the teams. We will use the findings to determine if higher levels of teaming is associated with higher use of interventions.
To decide the determinants of teaming.	Determinants of teaming data collected.	No indication that socio-demographic, community and service related factors influenced the level of teaming.	Yet to disseminate. Waiting for the completion of final analysis.
To measure whether higher degree of teaming is associated	Endline data collected	Yet to perform analysis.	We will use the findings to determine any

Related Specific Objective/s of the Task/s (as outlined in OR Protocol)	OR Study Key Activities/Tasks Addressed during this Reporting Period	Any important Findings, Data, and/or Discussion of Progress (positive/negative)	Use and/or Dissemination of Results to Stakeholders
with higher levels of use of intervention.	Teaming data collected		association between the level of teaming and use of interventions.
To assess community acceptability of CHW-TBA teaming.	Focus group discussions (FGDs) and in-depth interviews (IDIs) of key informants completed.	8 FGDs and 29 IDIs were conducted. CHW-TBA teaming idea was generally accepted by the community. Perceived benefits included reduction of child deaths, well informed and educated on health issues, referral support and improved facility delivery and PNC.	Yet to disseminate. Waiting for the completion of final analysis.

Research Products /Publications Two articles were published in peer reviewed journals (Annex 6).

1. *Kojo Yeboah-Antwi, Gail Snetro-Plewman, Karen Z Waltensperger, Davidson H Hamer, Chilobe Kambikambi, William MacLeod, Stephen Filumba, Bias Sichamba, David Marsh. Measuring teamwork and taskwork of community-based "teams" delivering life-saving health interventions in rural Zambia: a qualitative study. BMC Med Res Methodol. 2013; 13: 84. Published online 2013 June 27. doi: 10.1186/1471-2288-13-84.*

2. *Tanya Guenther, Salim Sadruddin, Tiyese Chimuna, Bias Sichamba, Kojo Yeboah-Antwi, Bamody Diakite, Bamadio Modibo, Eric Swedberg, and David Marsh. Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa. Am. J. Trop. Med. Hyg., 87(Suppl 5), 2012, pp. 77–84 doi:10.4269/ajtmh.2012.11-0747.*

Problems/Challenges Endline data collection was delayed due to unavailability of many of the baseline data collectors.

Changes Made to Original OR Plans No changes were made to the original research plans described in the OR protocol.

Major OR Plans for Coming Year The key activity for the next three months is to complete data analysis and report writing.

Annex 1: FY 2014 Work plan (Oct 2013-Sep 2014)

Timeline of planned activities					
		Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep
Cluster	**Activities**				
Project Management	Monthly meetings with DHMT	X	X	X	X
	Stakeholder meetings	X			
	Monthly skill building meetings with CMs	X	X	X	X
Monitoring & Evaluation	Policy and strategy review		X		
	Planning for end line survey	X			
	Submit Year 4 annual report	X			
	Final evaluation report to USAID				X
	Process documentation	X	X	X	X
	End line population-based survey			X	
	Final Evaluation				X
	Routine field monitoring/data collection	X	X	X	X
Operations Research	Data collection study #1 (Teaming)	X			
	Data cleaning and analysis	X	X		
	Documentation and dissemination	X	X	X	X
Access	TBAs providing ENC monitored	X	X	X	X
	CHW providing CCM-referrals monitored	X	X	X	X
	Medication and supply system monitored	X	X	X	X
	Supportive supervision facilitated/documented	X	X	X	X
Demand	LINCHPIN national dissemination meeting			X	
	Participation in national technical, policy, strategy groups/meetings		X	X	
	District/provincial planning cycles engaged		X		

Annex 2: Updated Performance Monitoring Indicator Table

Indicator Table: LINCHPIN Maternal, Newborn and Child Health Program

Result	Activity area	Indicator	2010	2011 Jul-Dec	2012 Jan-Dec	2013 Jan-Jun	Target	Comments
		Population coverage						
SO: **Increased use of key newborn and child health services and practices**	Service delivery	Proportion of mothers and newborns who received a PNC contact within 2 days of birth.	28%				60%	HH survey not conducted at mid-term – scheduled for project endline in Q2 of FY2014. Output data from community registers tracks progress in some treatment practices
		Proportion of children with suspected pneumonia who received amoxicillin.	50%				70%	
		Proportion of children with suspected pneumonia who received amoxicillin within 24 hours of onset of symptoms.	13%				50%	
		Proportion of children with diarrhea who received ORT.	74%				90%	
		Proportion of children with diarrhea who received zinc.	0%				50%	
		Proportion of children with suspected malaria who received ACT within 24 hours of the onset of fever and took an appropriate 3 day course.	11%				50%	
	Essential newborn care	Proportion of newborns wrapped and dried immediately after birth.	80% - D 88% - W				95% - D 95% - W	
		Program outputs						
IR1: **Increased access to and availability of services**	Deployment of human resources	CHW density/500	0.5/500	0.4/500	0.4/500	0.4/500	1/500	
		TBA density/1000	1.3/1000	1.2/1000	1.2/1000	1.2/1000	1/1000	
	Training	Proportion of CHWs trained in iCCM.	0	100% (85/85)	100% (85/85)	100% (85/85)	100%	
		Proportion of TBAs trained in MNCH.	0	90% (111/120)	90% (111/120)	90% (111/120)	100%	
	US Services	Proportion of TBA registered newborns who receive a PNC contact within 24hr of birth.	-	75% (855/1141)	74% (1275/1734)	74% (469/629)	100%	
		Proportion of TBA registered newborns who were delivered at a facility.	-	32% (369/1141)	47% (818/1734)	55% (347/629)	70%	

Indicator Table: LINCHPIN Maternal, Newborn and Child Health Program

Result	Indicator	2010	2011 Jul-Dec	2012 Jan-Dec	2013 Jan-Jun	Target	Comments
	Project outputs						
IR2: **Improved service quality**	Proportion of deliveries attended by a TBA where the baby was dried and wrapped.	-	100% (646/646)	100% (732/732)	100% (210/210)	100%	
	Proportion of deliveries attended by a TBA where the baby received assisted breathing.	-	7% (42/646)	11% (77/732)	8% (18/210)	6%	Expected % based on LUNESP study data
	Proportion of TBA registered newborns who are referred for danger signs.	-	6% (63/1141)	8% (137/1734)	6% (40/629)	1-11%	
	Proportion of CHW registered cases of suspected pneumonia treated with amoxicillin.	-	81% (357/440)	95% (1346/1411)	98% (737/753)	100%	
	Proportion of CHW registered cases of RDT positive malaria treated by CHWs.	-	73% (1283/ 1736)	95% (7711/ 8092)	100% (4663/ 4663)	100%	
	Proportion of CHW registered cases of diarrhea treated by CHWs with ORS.	-	78% (741/944)	90% (1343/1497)	91% (523/575)	100%	
	Proportion of CHW registered diarrhea cases treated by CHWs with zinc	-	55% (517/ 944)	18% (274/1497)	23% (133/575)	70%	
	Proportion of children with danger signs who are recommended for referral by CHWs.	-	27% (73/274)	20% (213/1083)	9% (46/491)	100%	

	Proportion of CHWs who received at least 1 supervisory visit in the previous 3 months which included clinical supervision.	-	100% (74/74)	100% (74/74)	84% (52/62)	100%	
	Proportion of TBAs who received at least 1 supervisory visit in the previous 3 months which included clinical supervision.	-	93% (97/104)	93% (97/104)	59% (61/104)	100%	
	Proportion of CHWs that have had no stock-outs of essential medicines in the previous month: list by amoxicillin, ACT, ORS, zinc, RDTs	-	AM- 23% ACT –45% ORS – 28% zinc – 11% RDT – 47%	AM -61% ACT –68% ORS – 43% zinc – 20% RDT – 52%	AM -38% ACT – 53% ORS – 34% zinc – 19% RDT –40%	50%	
IR3: **Increased demand for services and healthy practices**	Proportion of caretakers of children with suspected pneumonia who sought care from an appropriate provider.	67%				90%	
	Proportion of caretakers who know at last 4 danger signs for seeking care for their sick newborn.	11%				60%	
	Proportion of caretakers who know at least 4 danger signs for seeking care for their sick child.	22%				70%	
		Project outputs					
	Proportion of CHW/TBA teams trained	0	98% 46/47	98% 46/47	98% 46/47	100%	

IR4: Enabled environment	in teaming.						
	Proportion of NHCs trained in community mobilization and teaming.	0	68% 80/118	68% 80/118	68% 80/118	75%	
	Proportion of planned SMAGS established and implementing action plans.	0	88% (23/26)	88% (23/26)	88% (23/26)	100%	
	Annual district plan includes budgeted CCM activities.	0	Y	Y	Y	Y	

Annex 3: Project Data Form

Child Survival and Health Grants Program Project Summary

Oct-11-2013

Save the Children (Zambia)

General Project Information

Cooperative Agreement Number:	GHS-A-00-09-00013
SC Headquarters Technical Backstop:	Karen Waltensperger
SC Headquarters Technical Backstop Backup:	David Marsh
Field Program Manager:	John Kabongo
Midterm Evaluator:	John Murray
Final Evaluator:	
Headquarter Financial Contact:	Carmen Weder
Project Dates:	9/30/2009 - 9/29/2014 (FY2009)
Project Type:	Innovation
USAID Mission Contact:	William Kanweka
Project Web Site:	www.savethechildren.org

Field Program Manager

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Grant Funding Information

USAID Funding: $1,750,000 **PVO Match:** $583,275

General Project Description

Save the Children, a 2009 Innovation category grantee, is implementing the *Lufwanyama Integrated Neonatal and Child Health Project in Zambia* (LINCHPIN**)** in Lufwanyama District, Copperbelt Province, Zambia. Principal LINCHPIN partners are the Lufwanyama District Health Management Team (DHMT), and the Ministries of Health (MOH) and Community Development, Mother and Child Health (MCDMCH). The project goal is to decrease under-five mortality by increasing use of life-saving interventions through delivery channels that are accessible, available, high-quality, demanded and supported.

LINCHPIN's strategy is to support an integrated, community-based newborn care and community case management (CCM) package delivered through innovative TEAMS comprised of traditional birth attendants (TBAs) and community health workers (CHWs), supported by Neighborhood Health Committees (NHCs), linked to health facilities, and consistent with national plans and policies.

Project Location

Latitude: -12.91	**Longitude:** 27.36
Project Location Types:	Rural
Levels of Intervention:	Health Center Health Post Level Community
Province(s):	Copperbelt Province
District(s):	Lufwanyama District
Sub-District(s):	--

Operations Research Information

OR Project Title:	Feasibility and Effectiveness of an Integrated TBA-CHW Team on the Delivery and Use of Treatments for Infections among Children 0-59 Months of Age in Lufwanyama District, Copperbelt Province, Zambia
Cost of OR Activities:	$199,424
Research Partner(s):	Boston University
OR Project Description:	"Teaming" is a common service strategy in high-income countries, especially in serious outcome settings, such as emergency wards and operating theaters. Health teaming, though not reported in low income countries, seems a sensible strategy to improve outcomes for vulnerable young infants. The LINCHPIN Project aims to train and deploy TBA-CHW teams to provide essential newborn and continuous curative care for infants 0-59 months of age in Lufwanyama District, Zambia, thus closing the gap for infants 0-2 months in the continuum of care. **T**he level of teaming achieved – both structurally and functionally – will be evaluated and the factors that influence it will be assessed. We will also use service statistics to measure (a) delivery of interventions by TBAs and CHWs before and after teaming training and (b) the association between teaming achieved and the delivery of interventions. The findings will contribute to the scant teaming literature from low-income countries and, more importantly, may inform strategies to reduce newborn and young infant mortality in settings where TBAs and CHWs are policy-sanctioned.

Partners

Save the Children Sweden (Subgrantee)	$844,320
Boston University (Subgrantee)	$199,424
Lufwanyama District Health Management Team (Collaborating Partner)	$0
Copperbelt Provincial Medical Office (Collaborating Partner)	$0
Ministry of Health (Collaborating Partner)	$0
Ministry of Community Development, Mother and Child Health (Collaborating Partner)	$0

Strategies

Social and Behavioral Change Strategies:	Community Mobilization Group Interventions Interpersonal Communication

Health Services Access Strategies:	Emergency Transport Planning/Financing Addressing social barriers (i.e. gender, socio-cultural, etc.) Implementation in a geographic area that the government has identified as poor and underserved
Health Systems Strengthening:	Supportive Supervision Task Shifting Developing/Helping to develop clinical protocols, procedures, case management guidelines Developing/Helping to develop job aids Providing feedback on health worker performance Monitoring CHW adherence with evidence-based guidelines Referral-counter referral system development for CHWs Community role in supervision of CHWs Community role in recruitment of CHWs Review of clinical records (for quality assessment/feedback) Coordinating existing HMIS with community level data
Strategies for Enabling Environment:	Create/Update national guidelines/protocols Advocacy for revisions to national guidelines/protocols Stakeholder engagement and policy dialogue (local/state or national) Advocacy for policy change or resource mobilization Building capacity of communities/CBOs to advocate to leaders for health
Tools/Methodologies:	Rapid Health Facility Assessment

Capacity Building

Local Partners:	National Ministry of Health (MOH) Dist. Health System Health Facility Staff Health CBOs Government sanctioned CHWs TBAs

Interventions & Components

Control of Diarrheal Diseases (20%) - Hand Washing - Feeding/Breastfeeding - Care Seeking - Case Management/Counseling - Zinc - Community Case Management with Zinc (Implementation) - Community Case Management with ORS (Implementation)	IMCI Integration	CHW Training
Malaria (20%) - Training in Malaria CM - Access to providers and drugs - Care Seeking, Recog., Compliance - ACT - Community Case Management of Malaria (Implementation)	IMCI Integration	CHW Training
Maternal & Newborn Care (40%) - Recognition of Danger signs - Newborn Care	IMCI Integration	CHW Training HF Training
Pneumonia Case Management (20%) - Case Management Counseling - Access to Providers Antibiotics - Recognition of Pneumonia Danger Signs - Community Case Management with Antibiotics (Implementation) - Policy Advocacy for CCM of Antibiotics	IMCI Integration	CHW Training HF Training

Operational Plan Indicators

Number of People Trained in Maternal/Newborn Health			
Gender	**Year**	**Target**	**Actual**
Female	2010	63	
Female	2010		125
Male	2010		1
Male	2010	0	
Female	2011	75	
Female	2011		485
Male	2011		326
Male	2011	95	
Female	2012	400	
Female	2012		184
Male	2012		43
Male	2012	254	
Female	2013	26	
Female	2013		26
Male	2013		60
Male	2013	60	
Female	2014	26	
Male	2014	60	
Number of People Trained in Child Health & Nutrition			
Gender	**Year**	**Target**	**Actual**
Female	2010	35	
Female	2010		13
Male	2010		36
Male	2010	150	
Female	2011	65	
Female	2011		424
Male	2011		388
Male	2011	45	
Female	2012	400	
Female	2012		30
Male	2012		85
Male	2012	254	
Female	2013	91	
Female	2013		91
Male	2013		60
Male	2013	60	
Female	2014	91	
Male	2014	60	
Number of People Trained in Malaria Treatment or Prevention			
Gender	**Year**	**Target**	**Actual**
Female	2010		13
Female	2010	25	
Male	2010		36

Male	2010	50	
Female	2011		514
Female	2011	64	
Male	2011		393
Male	2011	45	
Female	2012		18
Female	2012	400	
Male	2012		54
Male	2012	254	
Female	2013		26
Female	2013	26	
Male	2013		60
Male	2013	60	
Female	2014	26	
Male	2014	60	

Locations & Sub-Areas

Total Population: 85,033

Target Beneficiaries

Zambia - SC - FY2009

Children 0-59 months	15,136
Women 15-49 years	18,537
Beneficiaries Total	33,673

Rapid Catch Indicators: DIP Submission

Sample Type: 30 Cluster				
Indicator	**Numerator**	**Denominator**	**Percentage**	**Confidence Interval**
Percentage of mothers with children age 0-23 months who received at least two Tetanus toxoid vaccinations before the birth of their youngest child	**439**	**465**	**94.4%**	**3.0**
Percentage of children age 0-23 months whose births were attended by skilled personnel	**168**	**465**	**36.1%**	**6.2**
Percentage of children age 0-5 months who were exclusively breastfed during the last 24 hours	**110**	**134**	**82.1%**	**9.2**
Percentage of children age 6-23 months who received a dose of Vitamin	**293**	**329**	**89.1%**	**4.8**
Percentage of children age 12-23 months who received a measles vaccination	**163**	**191**	**85.3%**	**7.1**
Percentage of children age 12-23 months who received DTP1 according to the vaccination card or mother's recall by the time of the	**176**	**191**	**92.1%**	**5.4**
Percentage of children age 12-23 months who received DTP3 according to the vaccination card or mother's recall by the time of the	**164**	**191**	**85.9%**	**7.0**
Percentage of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after the fever began	**20**	**178**	**11.2%**	**6.6**
Percentage of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution (ORS) and/or recommended home fluids	**93**	**126**	**73.8%**	**10.9**
Percentage of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider	**48**	**72**	**66.7%**	**15.4**
Percentage of households of children age 0-23 months that treat water effectively	**196**	**465**	**42.2%**	**6.3**
Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	**279**	**465**	**60.0%**	**6.3**
Percentage of children age 0-23 months who slept under an insecticide-treated bednet (in malaria risk areas, where bednet use is effective) the previous night	**237**	**465**	**51.0%**	**6.4**
Percentage of children 0-23 months who are underweight (-2 SD for the median weight for age, according to the WHO/NCHS reference population)	**93**	**408**	**22.8%**	**5.8**
Percentage of infants and young children age 6-23 months fed according to a minimum of appropriate feeding	**171**	**329**	**52.0%**	**7.6**
Percentage of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest	**255**	**463**	**55.1%**	**6.4**
Percentage of mothers of children age 0-23 months who are using a modern contraceptive method	**217**	**465**	**46.7%**	**6.4**
Percentage of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within two days after birth	**21**	**77**	**27.3%**	**14.1**

Rapid Catch Indicators: Mid-term

Rapid Catch Indicators: Final Evaluation

Rapid Catch Indicator Comments

Sample Size and Sampling

The sample size calculation was based on the least prevalent condition among the key outcomes (indicators) which is treatment for pneumonia. It was assumed that 10% of children aged 0 – 23 months will have a history of cough and fast and/ or difficult breathing (pneumonia) during the last two weeks. The proportion of these children who received antibiotic treatment was 38.8% from the Zambia DHS 2007. The target for this project is to increase the proportion of children receiving antibiotic treatment to 70%. With 80% power at 95% confidence intervals (CI), we will need to enroll 45 children with fast/difficult breathing. Since the prevalence of fast/difficult breathing in children aged 0-23 months was estimated at 10%, we needed to recruit 450 women with children aged 0-23 months in the baseline survey. This sample size calculated from the formula below (Figure 1) would give a high level of precision for the other outcomes since the prevalence of these conditions is higher.

Figure 1

The sample size was recruited from all of the 19 HF catchment areas proportional to their population. In each HF catchment area one or more villages were randomly selected to ensure that no more than 15 households were enrolled from each village.

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

A total of 465 care givers of children 0-23 months were interviewed in all the 19 HF areas ranging from 15 (one village) to 60 (four villages).

Annex 4: Learning Brief

CHW tests child for malaria

Photo by KZ Waltensperger

Key Findings:

- **Nearly half (46% [12/26]) of CHWs dropped out because they found employment.**
- **Three-quarters (75% [9/12]) of those who found employment were hired as Classified Daily Employees in health facilities.**
- **A fifth (19% [5/26]) of CHWs who left were discharged for disciplinary reasons: "unprofessionalism," lax attitude towards work, conflicts with communities or supervisors.**
- **Another fifth (19% [5/26]) of CHWs withdrew citing personal reasons: relocation; need to search for employment; need to concentrate on farming; and "personal reasons."**
- **Death accounted for 4% (1/26); ill health 8% (2/26); (4% [1/26]) old age.**

USAID FROM THE AMERICAN PEOPLE

Save the Children

PROGRAM LEARNING BRIEF

Community Health Worker Attrition:
A Case Study in Lufwanyama District, Zambia

Zambia, like many sub-Saharan African countries, is challenged by a critical shortage of trained health professionals. The shortfall is mitigated by a cadre of volunteer Community Health Workers (CHWs) - trained for 6 weeks, certified by the health authorities, and linked to health facilities – who provide a primary health care package to the population. This includes integrated community case management (iCCM) of pneumonia, diarrhea, and malaria, which has rolled out in all 10 of Zambia's provinces and approximately half of the 83 districts.

Save the Children trained 87 certified CHWs (10 men, 7 women) in iCCM in 2010, consistent with Zambia's national Integrated Management of Childhood Illness (IMCI) strategy and in support of the district's program to reduce under-5 mortality. These 87 CHWs represented the district's full complement of certified CHWs serving a total population of more than 85,000. Over the ensuing 3-year period, the district experienced a 30% attrition rate as 26 (23 men, 3 women) of the 87 CHWs dropped out for various reasons. This drastic fall in the number of CHWs compromised availability and accessibility of high-impact interventions for newborns and children. CHW density in Lufwanyama decreased from 0.51/500 in 2010 to 0.35/500 in July 2013. (National standard=1 CHW/500 population.)

The high CHW attrition rate is echoed throughout Zambia and threatens the country's progress in attaining Millennium Development Goal (MDG) 5. Save the Children investigated CHW attrition in Lufwanyama District to identify the factors driving CHWs to drop out.

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

October 2013

Background

To reduce under-5 mortality and advance Zambia's efforts to meet MDG 4, Save the Children, in partnership with the Lufwanyama District Health Management Team (DHMT) and Boston University Center for Global Health and Development, is implementing the Lufwanyama Integrated Neonatal and Child Health Project in Zambia (LINCHPIN), a catalytic 5-year initiative in rural, remote, and underserved Lufwanyama District (12˚46'S 27˚32"E) in Zambia's Copperbelt Province. Lufwanyama District has a current (2010) total population of 85,033 with 15,136 (17.8 percent) children under five and 18,537 (21.8 percent) women of reproductive age. The project runs for five years (from October 2009 to September 2014) with matching support to the district from ELMA Philanthropies, the Crown Foundation, and other private donors such as the Swedish Postcode Lottery and the Swedish International Development Agency (SIDA).

Project Design

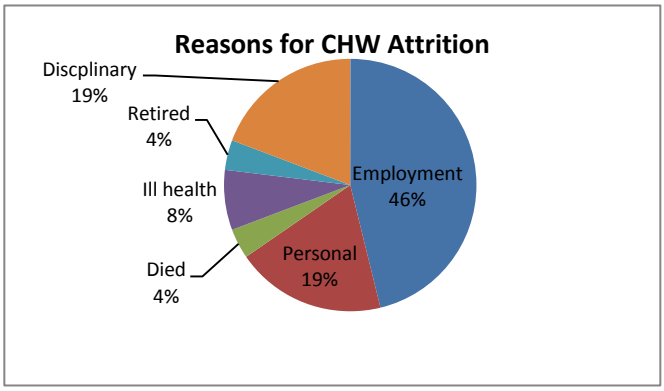
LINCHPIN's integrated, community-based, newborn care and iCCM package is delivered through an enhanced district-wide community health program linked to health facilities and Neighborhood Health Committees (NHCs) and is consistent with Ministry of Health (MOH) and new Ministry of Community Development, Mother and Child Health (MCDMCH) plans and policies. LINCHPIN's strategic objective is to increase the use of curative interventions through improved access/availability, quality, demand, and enabled environment supported by an empowered and mobilized community.

Methodology

To investigate the factors underlying the high rate of CHW attrition, the LINCHPIN team collected both qualitative and quantitative data using in-depth interviews with facility-based health workers (CHW supervisors), NHCs, and CHWs. Our case study was conducted in the 17 health facilities where CHWs are deployed. We interviewed both CHWs and supervisors to explore both sides of the story, particularly where CHWs and supervisors had had conflicts. Where certain CHWs were unavailable, we interviewed members of the CHW's household. We also interviewed the DHMT Clinical Care Officer to understand the DHMT's view of CHW attrition and the reasons behind it.

Findings

The major reason for CHW attrition was need for income from employment or farming, with disciplinary action being a secondary reason. Of the 26 CHWs that dropped out, nearly half (46% [12/26])) cited finding a job as the reason. Of these 12 who were employed, three-quarters (75% [9/12]) were hired by the government as Classified Daily Employees (CDEs), who are essentially health facility cleaners and helpers. However, with the shortage of frontline health workers, it is not uncommon to find CDEs delivering clinical interventions or providing other services. The remaining three CHWs who found other employment were hired by other businesses or organizations in the local area.



Close to a fifth (19% [5/26]) of CHWs were discharged for disciplinary reasons that included "unprofessionalism," lax attitude towards work, and conflicts with communities or supervisors. Decisions to discharge CHWs for disciplinary reasons were reached during consultative meetings between the DHMT and community representatives.

Another fifth (19% [5/26]) of CHWs withdrew their services citing personal reasons including: relocation; need to search for employment; need to concentrate on farming; and "personal reasons."

Death accounted for another 4% (1/26); and ill health 8% (2/26). One CHW (4% [1/26] retired due to advanced age.

PROGRAM LEARNING BRIEF

Of the three female CHWs who left the ranks, one did so for disciplinary reasons, one due to relocation, and one to take up employment as a CDE.

Conclusions and Lessons Learned

Motivating and sustaining volunteers is a well-known and constant challenge. Volunteer health cadres in sub-Saharan Africa have become even more difficult to retain as countries develop, wage labor opportunities increase, and women gain more access to markets.

We learned through our interviews that some Lufwanyama communities expressed their appreciation to well-liked CHWs by assisting them in their fields. This practice, however, was not widespread. CHWs also told us that refresher trainings and supportive supervision were motivators that made them feel recognized and valued. Throughout the LINCHPIN project cycle, Save the Children has worked closely with the DHMT and NHCs to offer incentives to volunteer CHWs (i.e. bags, bicycles, t-shirts, and other job aids). In addition, the project experimented with livestock (goats and poultry) as an adjunct to support NHCs and CHWs. Notwithstanding; it is evident that the need for income from paid employment or farming was the most powerful factor contributing to attrition. Even the 19% of CHWs who cited personal reasons expressed livelihood needs among them.

It is noted that some of the CHWs who left after their iCCM training had been on the CDE employment roll for a long time. It is possible they are still using their case management skills and experience at the health facilities where they now work.

Finally, as Save the Children generally had no input into the decisions made by DHMT and communities about CHW discharge, it is difficult to know whether these situations could have been avoided.

Recommendations and Use of Findings

To fill the gap of the 26 CHWs who left, Save the Children collaborated with the DHMT, health facilities, and NHCs to identify and train 15 candidates from the neediest areas in the district. The CHW basic training curriculum now includes iCCM. These 15 new CHWs have been certified and are providing services, bringing the full LINCHPIN complement to 76.

Save the Children suggests that an "early warning" approach to CHW disciplinary problems might be developed for the district, to include both NHCs and Save the Children, to intervene and possibly head off avoidable discharge.

In response to the need to increase the workforce of frontline health workers and strengthen community-based primary health care, Zambia recently launched a new community-based cadre, the Community Health Assistant (CHA). CHAs are trained for 12 months, compensated by the Ministry of Health (MOH), and will be deployed at scale over the next decade. However, it is worth noting that the monthly compensation package for a CHA is less than that of a CDE.

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

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PROGRAM LEARNING BRIEF

Operations Research Brief

OPERATIONS RESEARCH BRIEF

CHW-TBA Teams

Photo by LINCHPIN

Key Findings:

- **LINCHPIN created 47 teams but lost 14 due to individual team members taking paid employments or relocating.**
- **We categorized 21 teams as high level teams and 12 teams as low performing teams.**
- **The teaming concept is well-accepted by the community.**
- **Perceived benefits of teaming included reduction of child deaths and improved referral support, facility delivery and post-natal care.**

The impact of CHW-TBA teaming on use of integrated newborn and child survival interventions in Zambia

To reduce under-5 mortality and advance Zambia's efforts to meet Millennium Development Goal 4, Save the Children - in partnership with the Lufwanyama District Health Team (DHMT) and Boston University - is supporting implementation of a USAID/CSHGP Child Survival Project in the Copperbelt Province. The Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN) is an integrated, community-based, newborn care and community case management package delivered through an enhanced district-wide community health program linked to health facilities and Neighborhood Health Committees (NHCs). It is consistent with Ministry of Health (MOH) and the new Ministry of Community Development, Mother and Child Health (MCDMCH) plans and policies. LINCHPIN's four intermediate results (IRs) are: IR-1: Increased access to and availability of services; IR-2: Improved quality of services; IR-3: Increased demand for services and health practices; and IR-4: Enabled environment.

LINCHPIN's innovation is formation of volunteer teams of Community Health Workers (CHWs) and Traditional Birth Attendants (TBAs), supported by Neighborhood Health Committees (NHCs). The project's is conducting operations research is measuring feasibility and effect of the CHW-TBA team on delivery and use of integrated newborn and child interventions among children 0-59 months of age in Lufwanyama, Zambia.

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

October 2013

OPERATIONS RESEARCH BRIEF

Background

Delivery of high-impact, life-saving interventions to children under-5, and especially to young infants 0-2 months, is difficult in low-income countries, especially in rural settings. Challenges include lack of access to care, policy constraints, unclear roles among existing cadres and gaps in the continuum of care. "Teaming" is a common service strategy in high- income countries, especially in serious outcome settings such as emergency wards and operating theaters. Health teaming, though little reported in low-income countries, seems a sensible strategy to ensure coverage of vulnerable young infants. LINCHPIN aims to train and deploy TBA-CHW teams, supported by NHCs, to provide essential newborn, postnatal, and continuous curative care for children 0-59 months of age in Lufwanyama District, where a majority of the population lacks access to public health services.

Intervention Design and Implementation

We conducted preformative research to identify community and culturally-relevant processes, functions and factors for assessing teamwork. We used the findings to (1) build and reinforce the ability of CHWs and TBAs to work effectively as teams and (2) develop a tool to measure teamwork and task work. We applied a pre- and post-intervention design to assess the use of key high-impact services and practices after two years. We assessed community acceptability of the teaming concept with post-intervention qualitative design.

Methodology

We carried out four, six-month long assessments to measure the level of teaming, household surveys with caregivers to measure baseline and endline outcomes of the use of interventions. We also conducted focus group discussions with caregivers and CHW-TBA teams, and in-depth interviews with community leaders, DHMT members and Provincial Health Team members, to assess community acceptability.

Findings

We created and trained a total of 47 teams. After two years, 14 teams were "not sustained" due to individual team members finding a new job or relocating to a new geographical area. The absence of the CHW member accounted for the reduction in ten of the 14 teams. Of the remaining teams, 21 were categorized as "high" teams (scored ≥ 7 out of 14 on task work scale, and $\geq 90\%$ on teamwork scale) and 12 teams as "low" (scored < 7 on taskwork and/or $< 90\%$ on teamwork). Eight focus group discussions and 29 in-depth interviews were conducted to assess community acceptability of the teaming concept itself. The CHW-TBA teaming idea was generally well-accepted by the community. Perceived benefits included a reduction in child deaths, community members who were well-informed and educated on health issues, and improved referral support, facility delivery and post-natal care.

Conclusions and Lessons Learned

The concept of teaming CHWs and TBAs to provide integrated newborn and child interventions in rural areas where access to public health care services is limited is feasible and accepted. The Lufwanyama DHMT is committed to supporting the concept and national interest has been stimulated. However, there is the need to explore ways of maintaining and retaining team members to ensure that the full benefit of the concept is achieved at the community level.

Recommendations and Use of Findings

We have published some early findings about teaming in a peer-reviewed journal and anticipate more publications to follow. *1. Kojo Yeboah-Antwi, Gail Snetro-Plewman, Karen Z Waltensperger, Davidson H Hamer, Chilobe Kambikambi, William MacLeod, Stephen Filumba, Bias Sichamba, David Marsh. Measuring teamwork and taskwork of community-based "teams" delivering life-saving health interventions in rural Zambia: a qualitative study. BMC Med Res Methodol. 2013; 13: 84. Published online 2013 June 27. doi: 10.1186/1471-2288-13-84.*

Analysis of the quantitative (household survey) data is needed to ascertain and confirm the benefits of the teaming concept on the use of newborn and child interventions. Results will be forthcoming and reported as part of the project's final evaluation at the end of 2014.

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

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

OPERATIONS RESEARCH BRIEF

Annex 5: Reports and Information Products Requested During the SW Consultation

Not applicable.

Annex 6: Papers, Presentations, News Coverage About Project, and Products

1. Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa
2. Measuring teamwork and taskwork of community-based "teams" delivering life-saving health interventions in rural Zambia: a qualitative study

Am. J. Trop. Med. Hyg., 87(Suppl 5), 2012, pp. 77–84
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Beyond Distance: An Approach to Measure Effective Access to Case Management for Sick Children in Africa

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Abstract. Health planners commonly use geographic proximity to define access to health services. However, effective access to case management requires reliable access to a trained, supplied provider. We defined effective access as the proportion of the study population with geographic access, corrected for other barriers, staffing patterns, and medicine availability. We measured effective access through a cross-sectional survey of 32 health facilities in Malawi, Mali, and Zambia and modeled the potential contribution of community case management (CCM). The population living within Ministry of Health (MOH)–defined geographic access was 43% overall (range = 18–52%), but effective access was only 14% overall (range = 9–17%). Implementing CCM as per MOH plans increased geographic access to 63–90% and effective access to 30–57%. Access to case management is much worse than typically estimated by distance. The CCM increases access dramatically, again if providers are available and supplied, and should be considered even for those within MOH-defined access areas.

INTRODUCTION

Malaria, pneumonia, and diarrhea remain the leading causes of death in children less than five years of age globally, despite the availability of effective and affordable treatments.[1–5] Children need reliable access to case management for these illnesses because they can become ill at any time and die quickly. Access is often defined and measured by Ministries of Health (MOHs) and program planners in geographic terms, namely distance to a health facility.[6,7] However, even families with geographic access can face other barriers such as those that are physical (mountains, rivers), temporary (flooding, rains), security, cultural, social and economic.[8,9] The normative definition of access better suits preventive than curative interventions because under-staffed and under-supplied facilities can serve as staging points for outreach teams that bring their own personnel to deliver interventions. However, to provide case management, a health facility must be open daily and for sufficient duration; staffed with persons trained to treat sick children; and supplied with essential frontline treatments.

There is no single agreed framework or even definition for access to health care.[8–11] Terms such as access, accessibility, and availability are used commonly but inconsistently.[11] Many theories and frameworks have been developed to better define and standardize what is meant by access to care, but none have been fully adopted.[9,11] A point of consistency across these various theories and framework is the notion that access to health care is multi-dimensional and requires interplay of demand and supply side factors.[8–11] In this study, we focused on the supply side, exploring factors that influence travel to a health facility and receiving treatment services once there.

We coined the term effective access to case management of child illness to mean access to a trained provider and to appropriate medicines. The primary purpose of our study was to measure levels of effective access to case management of child illness at health facilities in Malawi, Zambia, and Mali and to describe the influence of selected factors on effective access. A secondary purpose was to explore the potential contribution of community case management (CCM), in which community-based health workers (CBHWs) are trained and equipped to provide case management for common child illnesses closer to the home.

MATERIALS AND METHODS

Study site and context. The study was conducted in three districts, one each in Malawi, Mali, and Zambia, where Save the Children (SC) supports the MOH to improve integrated case management services at the community level (Table 1). All study areas are rural and under-served and have limited roads, public transportation, and electricity. Our study focused on public health facilities that provided case management services for children less than five years of age. The MOH definition of access to health care varied: ≤ 5 km (Zambia) versus ≤ 8 km (Malawi) versus ≤ 10 km (Mali). In Zambia and Malawi, facility-based health services were managed at the district level and provided free. In Mali, health facilities were managed by local health committees who charged user fees to deliver and maintain services. All three districts lacked private sources of standard case management. Data collection for the study was completed as part of routine programmatic activities and did not involve the collection of any individual identifiable data.

The design and implementation stage of CCM programs varied by country. In Malawi, the MOH was scaling up CCM through a cadre of paid, centrally recruited health surveillance assistants (HSAs) and targeting hard-to-reach areas (> 8 km from a health facility). In Zambia, CCM was delivered through unpaid community health workers selected by their communities, although the policy was under review. In Mali, the MOH recently created a new cadre of paid, CBHWs, Agents de Santé Communautaire, to deliver CCM supported through local health committees.

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TABLE 1
Characteristics of the study districts*

Parameter	Malawi	Mali	Zambia
District	Mulanje, Southern Region	Bougouni, Sikasso Region	Lufwanyama, Copperbelt Province
Population (source year)	525,429 (2008 census)	459,509 (2009 census)	87,592 (2010 census)
Size (population density/km^2)	2,056 km^2 (256)	20,028 km^2 (23)	8,774 km^2 (10)
Ministry of Health definition of access	≤ 8 km	≤ 10 km	≤ 5 km
Health facility infrastructure	23 facilities (1 district hospital, 1 mission hospital, 18 health centers, 2 dispensaries, and 1 maternity center)	140 facilities (1 district hospital, 34 health centers, and 105 maternity centers)	15 facilities (11 health centers and 4 health posts)
CBHW cadre for CCM	Health surveillance assistants (HSAs) centrally recruited and assigned to hard-to- reach areas (> 8 km from HF); Each HSA serves approximately 1,000–1,500 population	Newly introduced cadre Agent de Santé Communautaire recruited by local government/health committees to serve areas > 5 km from health facility and with a population of at least 1,500	CHWs and/or TBAs, both which are identified by communities, trained centrally for 6 weeks to serve hard to reach communities in clinic catchment areas. A CHW is expected to cater for a population of 1,000, and a TBA serves 500
Age group and conditions covered by CCM	Treat children 2–59 months of age for malaria (ACTs), pneumonia (cotrimoxazole) and diarrhea (ORS and zinc)	Treat children 2–59 months of age for malaria (ACTs), pneumonia (amoxicillin) and diarrhea (ORS and zinc)	Treat children 2–59 months of age for malaria (ACTs), pneumonia (amoxicillin) and diarrhea (ORS and zinc)
No. CBHWs trained in CCM at time of study	81	35	59

*CBHW = community-based health worker; CCM = community case management; HF = health facility; CHW = community health worker; TBAs, traditional birth attendants; ACT = artemisinin-based combination therapy; ORS = oral rehydration salts.

Study design and sampling. We conducted a cross-sectional assessment of health services in study areas, including all 15 health facilities in Lufwanyama, Zambia; all 10 health centers in the SC intervention areas of Mulanje, Malawi (representing approximately half the district population and health facilities); and all seven health centers in the health zones of Bougouni, Mali, where SC was implementing CCM (representing nearly one-third of the district's population).

Study tools and data collection. Save the Children staff collected data through structured interviews with the health facility in-charge and other staff during July–October of 2010 as part of baseline assessments and program planning. Relevant district authorities granted permission, and all respondents provided consent upon being informed of the study purpose.

We designed survey tools to collect the following information at each facility: number of staff trained in case management of childhood illness; number of hours during the previous week the trained staff was available (either on-site or on-call) to provide case management; and availability of first-line antimalarial drugs (artemesinin-based combination therapy), antibiotics (amoxicillin or cotrimoxazole) and oral rehydration salts. In Malawi and Mali, we determined the number of stockout days for each medicine in the last month. In Zambia, we observed availability on the day of the survey. Respondents also listed all villages in their catchment area, specifying for each total population, distance to health facility in kilometers, and presence of CBHWs providing CCM either then or in the near future. For villages with MOH-defined geographic access, we assessed other barriers that would affect reaching a health facility: permanent physical (mountains, rivers), temporary physical (flooding), and security (check-points, insecure areas). Permanent physical barriers referred to features such as mountains or rivers that increased travel time by foot (carrying a sick child) beyond the times implied by the MOH distance definitions (e.g. > 1 hour for 5 km, > 1.5 hours for 8 km, or > 2 hours for 10 km). For temporary physical or security barriers, respondents estimated the number of months per year that travel to the facility was affected.

Data analysis. Data were entered in Microsoft (Redmond, WA) Excel (Malawi/Zambia) and Microsoft Access (Mali) and analyzed by using Microsoft Excel. We defined geographic access as the proportion of the total study population living within the MOH-defined distance to a health facility. We then calculated an annualized adjustment factor to account for other barriers to reaching a health facility for this population. This factor was the proportion of annual person-months the population with official access actually had access to the facility after accounting for permanent and temporary physical barriers or security barriers. The denominator of annual person-months was the study population living within MOH-defined access areas multiplied by 12 months.

The numerator was the denominator minus the number of person-months over a 12 month period during which access was affected by any of the barriers. We then multiplied geographic access by the annualized adjustment factor to obtain adjusted geographic access.

We defined effective access as adjusted geographic access to a facility plus available trained staff, with available essential frontline medicines. Thus, effective access was the product of (adjusted geographic access) × (staff availability) × (medicine availability). Staff availability was the proportion of time one or more staff trained in case management was available. The numerator was the total number of hours a trained provider was available, within the denominator of the 84 hours defined by 8:00 AM to 8:00 PM seven days per week. The definition of medicine availability varied by setting. In Malawi and Mali, medicine availability was calculated as100% less the sum of reported stockout days in the past month for three essential case management medicines (artemisinin-based combination therapy, antibiotic, and oral rehydration salts) divided by a total of 90 potential stock-out days (three medicines × 30 potential stock-out days/medicine) expressed in percentage. In Zambia,

TABLE 2
Geographic and adjusted geographic access by study area

Parameter	Mulanje, Malawi	Bougouni, Mali	Lufwanyama, Zambia
Health facilities sampled	10	7	15
Study population*	269,305	147,095	119,799†
Population within Ministry of Health–defined access limits (access limit)	133,657 (≤ 8 km)	76,573 (≤ 10 km)	22,148 (≤ 5 km)
Geographic access	50%	52%	18%
Population affected by permanent physical barriers (no. months affected)	2,735 (12 months)	0	2,756 (12 months)
Additional population affected by temporary physical barriers (no. months affected)	802 (5 months)	1,498 (3 months) 1,363 (2 months)	0
Population affected by security barriers	0	0	0
Total no. person-months affected over one year	36,830	7,220	33,072
Annualized adjustment factor‡	98%	99%	88%
Adjusted geographic access	48%	52%	16%

*Based on facility estimates of their catchment population.
†Lufwanyama facilities use headcount figures for population estimates that tend to be higher than official census figures.
‡Calculated among the proportion of the population with geographic access. Denominator = population within Ministry of Health–defined access limits × 12 months; numerator = denominator – number of person-months affected by physical, cultural, or security barriers.

medicine availability was 100% less the sum of the number of health facilities with stockouts for each type of medicine divided by the total number of health facilities times the number of medicines (15 health facilities × same three medicines) expressed as a percentage. All access variables were calculated for each health facility and then for each study area by weighting each health facility's value according to its population size.

To explore the potential contribution of CCM, we calculated the proportion of the study population with potential geographic access and with potential effective access to case management once CBHWs trained in case management were deployed. In each study area, we used MOH data on the number and location of CBHWs already trained or scheduled for training in CCM. We ran two scenarios. The first assumed that deployed CBHWs would be available continuously and fully stocked with necessary medicines (ideal), and the second applied levels of likely availability of CBHWs (75%) and medicines (60%) based on data from separate monitoring studies conducted around the same time (U.S. Agency for International Development/Malawi Community Case Management Evaluation).

RESULTS

The catchment areas of the 32 surveyed health facilities included 541 villages with a population of 536,199. Our sample represents approximately half of the combined population of the three study districts. The impact of geographic and other factors that influence reaching a health facility is shown in Table 2. More than half (57%) of the total study population lived beyond MOH-defined access limits, which varied from ≤ 5 km in Zambia to ≤ 10 km in Mali. Among those with geographic access, other barriers such as mountains or rivers and temporary factors like flooding had little additional effect on access. Only 4% (range = 3–12% by district) of those living within MOH-defined access areas across study districts were affected by year-round or temporary physical barriers. Security barriers were not reported for any village in the study.

Although nearly all health facilities were mandated to provide case management, availability of trained staff was uneven (Table 3). In Mulanje, trained staff was available an average of 30 hours per week across facilities, and only 36% were available the desired 84 hours/week. In Bougouni, staff availability varied highly across facilities (range = 6–99%). In Lufwanyama, four facilities had no staff trained in case management, and one facility reported a single trained staff member who was absent the entire week before data collection; staff availability in the remaining 10 facilities ranged from 36% to 88%.

Frontline medicines for case management of malaria, pneumonia, and diarrhea were available in most facilities in Mulanje and Lufwanyama. In Mulanje, five health centers had stockouts in the previous 30 days, mostly for oral rehydration

TABLE 3
Staff availability and medicine availability at health facilities by study area*

Parameter	Mulanje, Malawi	Bougouni, Mali	Lufwanyama, Zambia
Health facilities sampled	10	7	15
No. HFs with ≥ 1 staff trained in case management	9	7	12
Total no. staff trained in case management available across HFs	18	8	16
Average hours per week CM services available	30	36	45
Staff availability†	36%	42%	47%
No. HFs with stockouts (total no. stockout days)			
ACTs	1 (3)	7 (185)	0 (NA)
Antibiotics	1 (5)	0	2 (NA)
ORS	4 (62)	1 (30)	0 (NA)
Medicine availability‡	91%	66%	93%

*HF = health facility; CM = case management; ACT = artemisinin-based combination therapy; ORS = oral rehydration salts.
†Denominator = 7 days × 12 hours = 84 hours/week.
‡Malawi and Mali calculation: (Total no. stockout days for all medicines/total no. potential stockout days, where total no. stockout days = 30 days × 3 medicines); Zambia calculation: (Total no. health facilities with stockout × no. medicines with stockouts/no. health facilities × no. medicines).

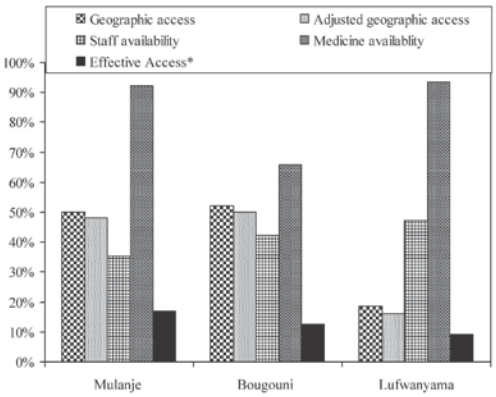

FIGURE 1. Effective access to case management for childhood illness at facility level by study area.

salts and ranging from 14 to 21 days. In Lufwanyama, two facilities lacked amoxicillin on the day of the survey. Stockouts for antimalarial drugs were pervasive in health facilities in Bougouni, where all seven facilities reported stockouts of antimalarial drugs in the past 30 days (average = 26 days).

Effective access. Effective access was low (< 20%) in all settings (Figure 1). Full details by facility are shown in Table 4. In Mulanje, half of the study population had geographic access, but case management was only available at the facilities 34% of the time, mainly because of shortages of trained staff; medicines for case management were generally available. As a result, effective access was only 17%, just one-third of geographic access.

Similar patterns were observed in Bougouni. Effective access was only 13%, just 25% of geographic access. Among the population within 10 km of a health facility with no additional barriers, access to a trained provider equipped with all necessary medicines to treat malaria, pneumonia, and diarrhea was available only 24% of the desired time. In Lufwanyama, the overall pattern of access was also similar, but a greater proportion of the population did not have geographic access, partly because of the stricter MOH definition of access. Among those living within 5 km of a health facility, access to trained staff averaged approximately 47%, which was higher

TABLE 4
Access indicators and effective access by study district and health facility

District and health facility	Total population	Geographic access	Annualized adjustment factor	Adjusted geographic access	Staff availability	Medicine availability	Effective access
Mulanje, Malawi							
Mulomba	51,067	23%	100%	23%	33%	100%	8%
Thuchira	34,072	65%	93%	60%	36%	97%	21%
Bondo	21,670	28%	82%	23%	42%	79%	8%
Mimosa	22,655	71%	100%	71%	37%	78%	21%
Mpala	25,494	82%	98%	80%	50%	100%	40%
Chambe	45,968	40%	100%	40%	42%	77%	13%
Dzenje	8,583	86%	100%	86%	0%	0%	0%
Kambenje	21,854	46%	100%	46%	42%	92%	18%
Milonde	14,833	28%	100%	28%	33%	100%	9%
Chinyama	23,109	72%	100%	72%	41%	100%	30%
Total	269,305	50%	98%	48%	36%	92%	17%
Bougouni, Mali							
Keleya	25,515	56%	98%	55%	99%	67%	36%
Domba	11,773	34%	100%	34%	19%	67%	4%
Koumantou	28,542	44%	100%	44%	6%	67%	2%
Faragouaran	15,086	54%	97%	52%	40%	83%	18%
Bougouni-ouest	28,367	61%	100%	61%	32%	67%	13%
Garalo	18,457	42%	100%	42%	93%	33%	13%
Kologo	19,355	66%	99%	65%	7%	78%	4%
Total	147,095	52%	99%	52%	42%	66%	13%
Lufwanyama, Zambia							
Bulaya	4,503	14%	100%	14%	88%	100%	13%
Chikabuke	3,416	30%	100%	28%	36%	100%	11%
Chinemu	11,585	21%	100%	18%	76%	100%	16%
Fungulwe	5,345	23%	81%	23%	88%	100%	17%
Kapilamikwa	5,800	14%	0%	14%	0%	100%	0%
Lumpuma	6,107	26%	100%	26%	88%	100%	23%
Mibenge	4,142	34%	100%	34%	0%	100%	0%
Mibila	10,500	7%	100%	7%	0%	100%	0%
Mukumbo	10,859	20%	89%	20%	88%	100%	16%
Mukutuma	5,752	7%	100%	7%	0%	67%	0%
Mushingashi	13,382	11%	34%	11%	52%	100%	2%
Nkana	4,917	65%	100%	0%	48%	100%	31%
Shimukunami	9,272	33%	84%	32%	67%	100%	18%
St. Joseph's	10,353	11%	100%	11%	76%	100%	8%
St. Mary's	13,866	5%	100%	5%	0%	67%	0%
Total	119,799	18%	88%	16%	47%	93%	9%

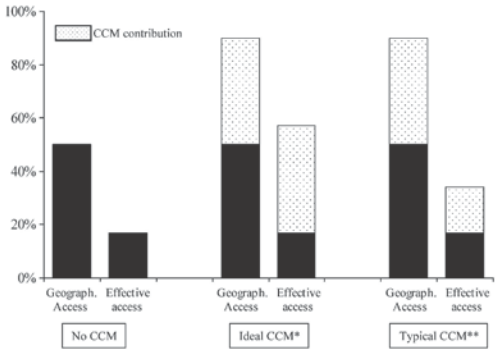

FIGURE 2. Model of geographic (geograph.) and effective access to integrated case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Mulanje study area. CBWWs = community-based health workers.

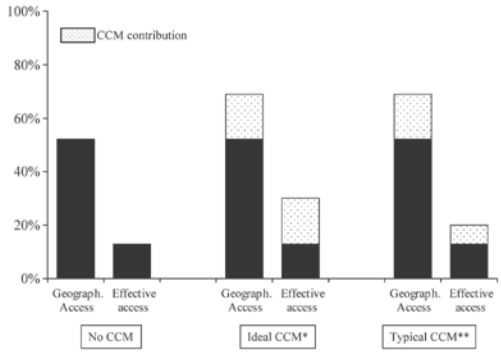

FIGURE 3. Model of geographic (geograph.) and effective access to integrated case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Bougouni study area. CBWWs = community-based health workers.

than the other study areas. In total, effective access was only 50% of MOH-defined access.

Potential contribution of CCM. Results for Mulanje are shown in Figure 2. The addition of the 81 CBHWs trained in CCM increased the proportion of the population with potential geographic access to case management in Mulanje from 50% to 90%. The ideal CCM scenario where CBHWs are always available and fully stocked showed that potential effective access overall tripled from 17% to 57%. However, the addition of CCM in the hard-to-reach areas alone did not address the limited availability of trained staff and supplies at the health facility. As a consequence, there was a facility service gap for the 50% of the population who had MOH-defined access, constraining potential effective access for the total population. Potential effective access under typical CCM conditions in Mulanje (75% availability of CBHWs and 60% availability of medicines) reached 35%, barely half of the ideal CCM scenario, but twice the level without CCM. The addition of CCM as per MOH plans in Bougouni and Lufwanyama increased potential geographic access to 69% and 63% and potential effective access under ideal CCM conditions to 30% and 58%, respectively; full details are shown in Figures 3 and 4 and Table 5.

DISCUSSION

This study showed that official measures of access based on distance overestimate the proportion of the population with access to integrated case management by between two- and three-fold. The distinction between access to a service site and access to life-saving case management cannot be overstated. Access to a trained provider supplied to treat malaria, pneumonia, and diarrhea was less than one-third among those who lived within MOH-defined access areas.

Effective access is the product of several factors, low levels of most will yield a low overall value. In our study, limited availability of trained staff at health facilities in particular translated into low effective access. Even if all necessary medicines were available at the health facilities studied, effective access would remain less than 20% for the total population and range between 28% and 48% for those living within the MOH-defined access across the study areas. A simultaneous household survey in Lufwanyama District showed that the proportion of children receiving antibiotics for likely pneumonia (13%) and fever/malaria (12%) was nearly equal the level of effective access (9%) and was much lower than the proportion who reported seeking care for these illnesses, highlighting the gaps at facility level (Yeboah-Antwi K and others, unpublished data). Families may consider what care may or may not be available at a health facility before committing their time and resources to care-seeking. The poor human resource availability at health facilities in developing countries is well documented.[7,12–14] A recent study in Malawi reported that only 49% of the expected clinical staff was available in

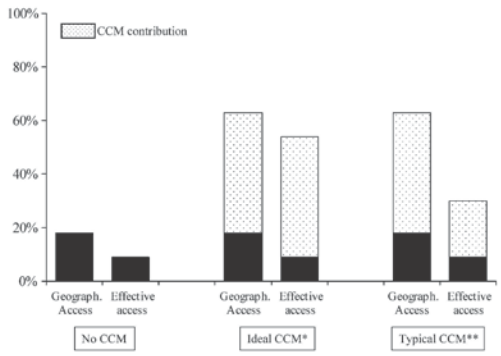

FIGURE 4. Model of geographic (geograph.) and effective access to case management for childhood illness with community case management (CCM) implemented according to Ministry of Health (MOH) plans in Lufwanyama study area. CBWWs = community-based health workers.

TABLE 5
Geographic access and effective access with addition of CBHWs trained in CCM by study district and health facility*

District and health facility	Total population	Geographic access, no CCM	Effective access, no CCM	CBHWs trained in CCM	Potential geographic access	Potential effective access, ideal†	Potential effective access, typical‡
Mulanje, Malawi							
Mulomba	51,067	23%	8%	16	80%	65%	33%
Thuchira	34,072	65%	21%	11	99%	54%	36%
Bondo	21,670	28%	8%	9	100%	79%	40%
Mimosa	22,655	71%	21%	2	80%	29%	24%
Mpala	25,494	82%	40%	4	100%	58%	48%
Chambe	45,968	40%	13%	18	88%	61%	34%
Dzenje	8,583	86%	0%	1	100%	14%	6%
Kambenje	21,854	46%	18%	10	99%	70%	41%
Milonde	14,833	28%	9%	5	81%	62%	33%
Chinyama	23,109	72%	30%	5	87%	45%	36%
Total	269,305	50%	17%	81	90%	57%	35%
Bougouni, Mali							
Keleya	25,515	56%	36%	6	73%	53%	44%
Domba	11,773	34%	4%	4	47%	17%	10%
Koumantou	28,542	44%	2%	5	61%	19%	9%
Faragouaran	15,086	54%	18%	3	60%	24%	20%
Bougouni-ouest	28,367	61%	13%	5	75%	27%	20%
Garalo	18,457	42%	13%	6	63%	34%	22%
Kologo	19,355	66%	4%	6	94%	31%	16%
Total	147,095	52%	13%	35	69%	30%	21%
Lufwanyama, Zambia							
Bulaya	4,503	14%	13%	4	59%	58%	33%
Chikabuke	3,416	30%	11%	1	48%	29%	19%
Chinemu	11,585	21%	16%	2	79%	74%	42%
Fungulwe	5,345	23%	17%	2	70%	63%	38%
Kapilamikwa	5,800	14%	0%	2	74%	60%	27%
Lumpuma	6,107	26%	23%	6	70%	67%	43%
Mibenge	4,142	34%	0%	4	100%	66%	30%
Mibila	10,500	7%	0%	4	100%	93%	42%
Mukumbo	10,859	20%	16%	2	39%	35%	25%
Mukutuma	5,752	7%	0%	1	11%	4%	2%
Mushingashi	13,382	11%	2%	6	19%	10%	6%
Nkana	4,917	65%	31%	0	65%	31%	31%
Shimukunami	9,272	33%	18%	5	52%	38%	27%
St. Joseph's	10,353	11%	8%	10	70%	67%	35%
St. Mary's	13,866	5%	0%	10	91%	86%	39%
Total	119,799	18%	9%	59	63%	54%	30%

*CBHW = community-based health worker; CCM = community case management.
†CBHWs are always available and have all three drugs in stock 100% of the time.
‡CBHWs are available 75% of the time and have all three drugs in stock 60% of the time.

health centers because of unfilled positions and to staff absences related to trainings and leave time.[14]

At the time of the study, medicine availability on the whole was quite good at the health facilities we assessed. However, medicine stocks fluctuated and lengthy stockouts were common, as shown by antimalarial drug stockouts in Bougouni and other studies in Malawi and Zambia.[14,15] In Lufwanyama, we measured availability of medicines on the day of the survey and did not capture reports of stockouts; and in Mulanje and Bougouni, a stockout of one of the three medicines only contributed one-third of a stockout day. Thus, we may have overestimated the availability of medicines.

We did not commonly identify permanent or temporary physical barriers or security barriers to reaching the facilities in these study districts. In other settings, such as South Sudan where rainy seasons are lengthy and disruptive or Somalia where insecurity is rife, these barriers would be more important. In the few study areas that did report additional year-round or temporary physical barriers, they often affected most of a given facility's catchment area, highlighting the importance of identifying such areas so that solutions can be tailored.

This study showed that even those living near health facilities often lacked access to trained staff and medicines. These observations can help explain the often contradictory findings regarding influence of distance on access to health care and shed light on why those living nearby facilities still face poor health outcomes.[8,16–18] These findings reinforce the need to consider options to mitigate access barriers for those living within MOH-defined access areas. In instances where staffing problems are caused by lack of training in case management (as opposed to staffing shortages and operational hours), training of existing staff in IMCI is sensible. However, addressing staff shortages at health facilities will take more time and resources. The CBHWs can be trained to treat common childhood illness in as little as six days, but CCM involves similar if not greater inputs for supply chain management and supervision. Typically, CCM programs target communities beyond the MOH-defined access areas, but MOHs could consider redefining the catchment areas so that more CBHWs could be deployed, even in areas traditionally considered to have access as a complementary strategy to help ensure reliable access to case management. Families living at the margins of these MOH-defined access areas often have

limited alternatives for care and venturing on foot even 4 or 5 km to seek care is a significant time and resource gamble.

Our exploration of the potential contribution of CCM showed that training CBHWs to provide case management nearer to the home can reduce the geographic barriers for those living beyond the traditional access areas. However, the modeled results depended on the MOH implementation plan, underscoring the need to ensure that CCM policy makers, planners, and managers consider how to optimize distribution and availability of CBHWs within defined target areas. Furthermore, our study showed that under typical conditions of CCM programming at scale CBHWs are not always available because of other responsibilities or turnover and stockouts can be common. Thus, the potential increase in effective access from CCM is not fully realized. In Malawi for example, CBHWs (HSAs) are encouraged by the MOH to operate their village health clinics for at least two days per week, in recognition of the other tasks HSAs are expected to perform. In addition, although HSA basic training guidelines request HSAs to reside in their catchment areas, this requirement is not consistently enforced, and hard-to-reach areas targeted for integrated CCM (iCCM) tend to be the most difficult to staff. The competing demands on HSAs' time, combined with the reality that many do not reside in their catchment areas, limit the availability of case management at the community level in Malawi. Policies that support availability of CBHWs to deliver CCM on a routine basis, including for emergencies after hours and on weekends, are needed to help protect against erosion of services.

Another challenge concerns medicine availability. At present, iCCM programs in most settings are supported by partners who provide additional inputs, such as medicines and support to the government supply chain to improve medicine availability at the community level. As a result, availability of medicines for iCCM in areas wholly dependent on government supply chain would in some settings likely be even lower than the 60% we modeled. Strategies for supply chain management and effective human resources management for CCM programs operating at scale are essential to optimize the returns on investments in CCM.

We designed a simple, rapid method to measure effective access to iCCM that can be conducted by program planners with limited time and financial resources. Although more sophisticated methods exist to precisely measure distance to a health facility and to quantify other access barriers, they require additional human and financial resources and may be more difficult to communicate to decision-makers.[19,20] Our experience in Malawi demonstrated that the process of systematically considering access barriers for each village within a facility catchment area was valued by district health officials and led to areas not previously considered hard-to-reach being so identified and targeted for CCM (Chimuna T, unpublished data).

The study has limitations. The study settings were underserviced, rural districts of three countries in Africa where availability of facilities, trained staff, and supplies were probably lower than typical. Governments often ask implementing partners to program in under-served areas. The study was cross-sectional and captured effective access at a single point in time and from a supply perspective only. Collection of data at multiple time points would strengthen the reliability of an annualized estimate. Estimates of distance and whether villages faced physical or security barriers were based on reports by facility staff, which may have underestimated the communities' perspective. Furthermore, the quality of case management and availability of essential supplies, such as timers, to provide case management were not assessed. Other documented barriers to effective access from the demand side, such as cultural, economic, and social constraints, were not captured. Likewise, we did not measure clients' expectations. Experiencing an understaffed facility or a stockout of even one essential medicine could discourage future care seeking for sick children, not only by the family in question, but also by neighbors. In light of the off-setting biases (relatively under-served districts versus overestimations of access), the findings probably do represent much of rural Africa.

This study demonstrates that access to case management is much worse than officially estimated once the contribution of physical barriers, staff availability and stockouts are accounted. We also proposed a method to account for intermittent barriers. In study areas, less than 50% of the population had geographic access (i.e., lived within 5, 8, or 10 km of a facility), and less than 20% had effective access. Our findings highlight the important distinction between access to a health facility and access to case management. Poorly staffed and supplied facilities cannot save the lives of sick children, and planning for curative services should look at how to improve effective access for the total population, including those who live within MOH-defined access areas. Although CCM typically targets areas that do not have geographic access, CCM can also be considered even in those areas near to facilities to overcome other access barriers such as physical barriers and limited staff availability. However, CCM will only improve effective access if CBHWs are adequately distributed and supported.

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Measuring teamwork and taskwork of community-based "teams" delivering life-saving health interventions in rural Zambia: a qualitative study

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Abstract

Background: The use of teams is a well-known approach in a variety of settings, including health care, in both developed and developing countries. Team performance is comprised of teamwork and task work, and ascertaining whether a team is performing as expected to achieve the desired outcome has rarely been done in health care settings in resource-limited countries. Measuring teamwork requires identifying dimensions of teamwork or processes that comprise the teamwork construct, while taskwork requires identifying specific team functions. Since 2008 a community-based project in rural Zambia has teamed community health workers (CHWs) and traditional birth attendants (TBAs), supported by Neighborhood Health Committees (NHCs), to provide essential newborn and continuous curative care for children 0–59 months. This paper describes the process of developing a measure of teamwork and taskwork for community-based health teams in rural Zambia.

Methods: Six group discussions and pile-sorting sessions were conducted with three NHCs and three groups of CHW-TBA teams. Each session comprised six individuals.

Results: We selected 17 factors identified by participants as relevant for measuring teamwork in this rural setting. Participants endorsed seven functions as important to measure taskwork. To explain team performance, we assigned 20 factors into three sub-groups: personal, community-related and service-related.

Conclusion: Community and culturally relevant processes, functions and factors were used to develop a tool for measuring teamwork and taskwork in this rural community and the tool was quite unique from tools used in developed countries.

Keywords: Teams, Teamwork, Taskwork, Community health workers, Traditional birth attendants, Newborn and child health care, Zambia

Background

Zambia has high under-five mortality and is not on track to achieve Millennium Development Goal 4, which calls for a two-thirds reduction in under-five mortality from 1990 levels by 2015 [1]. Zambia's strained health care system with few health facilities and insufficient human resources is inadequate to confront its unacceptably high newborn and under-five mortality [2]. As a consequence of insufficient human resources, many basic health services, especially in rural areas, are provided through several categories of minimally trained community-based providers including community health workers (CHW) and traditional birth attendants (TBA). CHW responsibilities include providing preventive interventions, treatment of common childhood illnesses (fever, diarrhea, and pneumonia), health education and community mobilization and sensitization, as well as supporting

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outreach services by the rural health staff. TBAs provide maternal and newborn interventions including antenatal care, postnatal care, recognition of and referral for danger signs of pregnant women and newborns. Neighborhood Health Committees (NHCs) selected by the communities support these cadres of health workers as per the Ministry of Health (MOH) community-based delivery strategy [3].

The Center for Global Health and Development (CGHD) of Boston University in partnership with local partners, including the District Health Management Teams (DHMTs) conducted two community-based research projects in Zambia that showed the feasibility and effectiveness of using CHWs and TBAs to provide integrated community case management (CCM) and newborn care [4,5]. Currently TBAs and CHWs may reside in the same community, but work independently of each other, leading to inefficiency and missed opportunities for continuity of care. Experts suggest that health interventions for newborns should be integrated into child health programs [6]. The continuum of care approach is expected to promote care for mothers and children from pregnancy to delivery, the immediate postnatal period and childhood [7].

Save the Children in collaboration with CGHD, the MOH, and the Lufwanyama DHMT is implementing the Lufwanyama Integrated Newborn and Child Health Project in Zambia (LINCHPIN), which teams CHWs and TBAs, supported by NHCs, to provide essential newborn and continuous curative care for children 0–59 months of age in rural Zambia. LINCHPIN is an integrated, community-based newborn care and CCM package delivered through an enhanced district-wide community health program linked to health facilities and NHCs in a manner that is consistent with MOH plans and policies. The rationale for the integration and the teamwork is to close the gap in the continuum of care and increase the likelihood that the effect of the team will exceed the effects of the individuals working alone.

Teams occur in many settings, including health care, in both developed and developing countries. There is a general agreement that a team consists of two or more individuals who have specialized knowledge, have specific roles, make decisions, perform interdependent tasks, are adaptable, and share a common goal [8-10]. Benefits of a team may include distributing workload among team members, reinforcing individual capabilities, creating the feeling of participation and involvement, better decision-making and generating a diversity of ideas for a common purpose [11]. Two general categories of behaviors are often used to distinguish a team: teamwork and taskwork. Teamwork consists of behaviors that are related to team member interactions and are necessary to establish coordination among individual team members in order to achieve team goals whereas taskwork consists of behaviors that are performed by individual team members and are critical to the execution of individual team member functions [12,13].

Assessments of the impact of teamwork have occurred in medical settings such as operating rooms [14] and emergency departments [15]; furthermore, teamwork has been linked to patient safety [16] in well-resourced settings. Measuring teamwork to ascertain whether the team is performing as expected to achieve the desired output is rare in health care settings in developing countries. Our review of the literature revealed one report in which the MOH and *Médecins sans Frontières* formed community health teams comprised of community health agents, community health volunteers and TBAs in Mozambique's Angónia District to improve coverage of basic health services including tuberculosis and HIV care [17]. Team members received joint five-day initial training and were provided the necessary drugs, supplies and job aides. Although the report lacked measures of teamwork or evidence of effect at the beneficiary level, the authors asserted that the teams had advantages over a "vertical CHW" approach in the areas of mutual accountability, joint problem-solving, improved delivery of preventive and curative health services, and consistent health education messages. They concluded that the team approach improved accountability, acceptability, and access to care.

In cases where teamwork has been measured, dimensions of teamwork or processes that comprise the teamwork construct such as: goal comprehension, communication, conflict management, decision-making/planning, leadership, mutual performances monitoring, mutual trust, team cohesion and team motivation have been used, [10,16,18-20]. This paper describes the process of developing a measure of teamwork and also taskwork for community-based health teams in rural Zambia.

Methods

Study location

The study was conducted in Lufwanyama District in the Copperbelt Province of Zambia. Lufwanyama is a large, rural, undeveloped district with a population of 85,033 [21]. Despite its location in the comparatively urban, industrialized Copperbelt, the district lacks physical infrastructure, and most roads are frequently impassible during the rainy season. It has 11 health centers and four health posts, but no district hospital - indeed the district health office is currently outside the district pending completion of a new district seat. Many basic health services including treatment of minor illnesses, health education, antenatal care, family planning services, follow up of patients with chronic illnesses and referrals are provided through several categories of

minimally trained community workers –TBAs, CHWs, male motivators, safe motherhood agents, family planning agents, disease surveillance agents, malaria agents, tuberculosis agents, HIV/AIDS agents, as well as untrained TBAs.

Study design

This formative research employed a qualitative methodology using a combination of group discussion and pile-sorting to explore and identify processes and domains for measuring teamwork and functions for measuring taskwork. The pile sorting technique engages participants in sorting cards with words into piles that represent how they think about and categorize elements on interest [22]. Six sessions were conducted, three with NHC members and three with CHW-TBA pairs. Each NHC session was made up of the chairperson, the secretary and four other members including at least two women. The CHW –TBA sessions were made up of three CHWs and three TBAs. We purposively selected three NHCs considered as "highly effective" by the DHMT (held regular meetings and had strong, dynamic chairpersons). The CHWs and TBAs came from the selected NHC areas. A total of 36 individuals were involved. This number may be small but sample sizes of 30–40 have been shown to have adequate reliability and found acceptable for validity in card sorting tasks [23,24].

Group discussions and pile sorting

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

Each session had three parts.

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

During the discussions, participants were asked to identify processes that helped or hindered teamwork. The processes that participants indicated as important for teamwork were written on cards by the facilitator. We wrote cards ahead of time of processes (from the literature, our experience and pre-formative discussion with the community) that we consider as important for teamwork. The purpose was for the facilitator to ask the participants if these processes were not mentioned in the discussion to indicate whether they were important for teamwork.

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

During the third part, a list of seven functions prepared prior to the sessions by the investigators through consultation with health workers, community based workers and NHCs was introduced. The purpose was to ascertain whether the participants agree that TBAs and CWHs need to jointly perform these pre-determined functions so that they could be incorporated into the tool to measure taskwork. We asked participants to indicate and explain which of the functions they considered important for the CHW and TBA to perform jointly in order to assist them in providing life-saving integrated newborn care and CCM interventions.

Data analysis

We used a weighting system to select factors for measuring teamwork from those identified and sorted by the participants. Five points were given for "very important", three for "important" and one for "least important". A factor was selected if it scored 22 or more points out of a possible 30 points. We chose a score of at least 22 to ensure that a factor is selected if at least two FGDs indicated it as "very important" and the reaming four FGDS indicated it as "important". We further categorized the selected factors into dimensions of teamwork, or processes that comprise the teamwork construct. There were some factors which were identified and sorted by the participants but which we thought that they do not necessarily measure teamwork but rather may influence

the way the team performs. These were termed as determinants and may explain why teams engage in effective teamwork. We categorized these factors (determinants) into three groups: personal, community-related and service-related.

Ethical issues

Ethical approval was obtained from the Boston University Institutional Review Board (BU-IRB) and Zambia's ethical review committee (ERES CONVERGE). Informed consent was obtained from all study participants. A consent form developed in accordance with guidelines of the BU-IRB and the local ethical review committee was translated into Bemba, the local language.

Results

Participant characteristics

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

Processes and factors for teamwork

Seventeen factors identified by the participants that scored 22 or more were selected to measure teamwork. We categorized these factors into dimensions of teamwork or processes that comprise the teamwork construct (Table 1). All the six FGDs identified three of the 17 factors as "very important," and five FGDs identified six as "very important". One factor "motivating each other" was considered "very important" by only two of the six groups, one NHC and the other CHW-TBA. Two groups (one NHC and the other CHW-TBA) considered all the seventeen factors as "very important" for measuring teamwork. Factors which scored below 22 and therefore not selected included "leadership"; "similar vision", "mutual support" and "coordination among members". All six FGDs indicated that leadership was not important in a two person team. Reasons participants sorted some of the factors into the "very important" group are shown in Table 2.

Table 1 Processes and factors of teamwork

Process	Factors
1. Mutual performance monitoring	1) Consulting each other
	2) Seeking help from each other
	3) Checking each other's work and giving feedback
2. Mutual trust	4) Confidentiality
	5) Respect
	6) Trust
3. Decision making/planning	7) Making decisions together
	8) Making a plan together
	9) Dividing tasks so not to duplicate effort
4. Team cohesion	10) Interest and commitment
	11) Members available and accessible
5. Team motivation	12) Motivating each other
	13) Encouraging each other
6. Goals and objectives	14) Having a common goal
7. Communication	15) Good communication
	16) Sharing information
8. Conflict resolution/ management	17) Ability to manage conflict

Jointly performed functions for taskwork

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

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

We used these functions to measure taskwork.

Table 2 Importance and illustrative quotations of teamwork factors

Factors	# Groups indicating factor as "very important"	Illustrative Quotation
Confidentiality	6	• *Many NHCs have stopped functioning because there was lack of confidentiality among members.*
		• *Many mothers refused to go to CHWs because of lack of confidentiality.*
		• *If there is no confidentiality among us as team members, the community will be scared to access the needed services from us.*
		• *Lack of confidentiality in a team can lead to dismantling of the team.*
Having a common goal	6	• *A common goal gives direction to a team.*
		• *A team without a common goal has no direction.*
Making a plan together	6	•*Making a plan together is the ingredient for achieving the goal of a team*
Good communication	5	• *Anytime we do not communicate among ourselves, we feel our team is collapsing.*
Seeking help from each other	4	• *If we cannot help each other when the need arises, how can we work together? It's like going in different directions.*
Members available and accessible	4	• *How can you work as a team if members are not available when needed?*
Checking each other's work and giving feedback	4	• *It is important to learn from each other what happened, our mistakes and successes.*
		• *If we are not giving feedback, how can we learn from the past?*
		• *Not learning from the past will affect the performance of the team.*
Dividing tasks so not to duplicate effort	4	• *Duplicating efforts can cause conflict in the team.*

Determinants of teamwork

We selected 20 factors identified by the participants as determinants of teamwork. These factors may explain why teams engage in effective teamwork. We categorized these factors into three sub-groups: personal, community-related and service-related. Most of the factors belonged to the personal and service-related sub-groups (Table 3).

Discussion

This formative research employing group discussion and pile sorting enabled community-generated processes, functions and factors to be elicited to measure teamwork and taskwork, and determinants of teamwork in this setting. We used this methodology because of its ability to promote consensus among group members [22]. Pile sorting has been used in public health settings to capture local definitions of disease [25,26], to study relationships between symptoms and disease severity [27]; and to investigate the acceptability of interventions [28,29]. In our case the pile sorting was constrained, as participants organized the cards according to categories provided to them [30]. Relatively few studies have used pile sorting in focus groups similar to ours [31,32].

The 17 factors identified for measuring teamwork were categorized under eight of the processes that comprise teamwork construct: 1) mutual performance monitoring, 2) mutual trust, 3) decision making/planning, 4) team cohesion, 5) team motivation, 6) goals and objectives, 7) communication and 8) conflict resolution/management. Three of our processes were included in the Team Development Measure constructed by Mahoney and Turkovich to measure the level of development of a team in health care setting in the developed world [18]. Communication was also part of the TeamSTEPPS Teamwork Attitudes Questionnaire, a measure designed to assess attitudes towards the core components of teamwork in healthcare [10]. Factors that affect a team's processes identified by a WHO Working group on patient safety [16] were similar to what we found.

Most of the seventeen factors we identified for measuring teamwork belong to teamwork attitudes and behaviors and this underscores their importance in team performance in this rural setting. Leadership, commonly an important

Table 3 Factors for measuring the determinants of teamwork

Personal	Community-related	Service-related
• Age	• Presence of and links to NHCs	• Training
• Gender	• Distance between CHW and TBA families	• Experience
• Education	• Distances among , CHW and rural health center	• Supervision and support by relevant community and health system structures
• Socio-economic status		• Payment or in-kind compensation
• Language		• Motivation
• Tribal affiliation		• Availability of means of transport (e.g. bicycle)
• Religion		• Possession of a cell phone
• Employment		• Availability of various supplies and drugs that the CHW and TBA might need to provide the defined services
• Membership in an association		

construct for measuring teamwork, was considered unimportant in this setting. Indeed, participants indicated that the team would likely fail if one member imposes him/herself as a leader of the team, perhaps because of team composition and small size and/or the relatively egalitarian rural culture. The seven functions identified for measuring taskwork emphasize the importance of strong relationship between the community-based workers and the community leadership in charge of health on one hand, and the community-based workers and the beneficiaries of their services on the other.

The 20 factors identified as determinants of teamwork will assess the relationship between the level of team performance and personal, service-related and community-related factors. Community and social systems are often integrated and linked; therefore assessing the relationship between the level of teamwork and these determinants, especially the community related determinants such as the supportive role of the NHC to the CHW/TBA team is important. The personal factors include age and gender which research in developed world has not typically found to have any relationship with teamwork. We however think since we are dealing with a rural community where age and gender are very sensitive issues and our teams are composed of two persons, these factors may be important.

The developed tool (Additional file 1) has three parts. Part A is administered to both the CHW and TBA jointly and measures taskwork. It assesses whether the team jointly performs and documents the seven functions in the previous three months. The team scores "0" if a function is not performed, "1" if performed but there is no documentary evidence and "2" if there is documentary evidence. Part B is administered separately to the CHW and the TBA and measures teamwork through 27 characteristics/indicators derived from the17 factors selected for teamwork. This elicits the team's opinion whether the characteristic is present in their team over the previous six months. Each characteristic has three responses "No" or "never; ii) "sometimes" and iii) "Yes" or "all the time" and the scores 1, 2 and 3 respectively. The score for the team is the average score of the two members. Part C collects information on the determinants of teamwork and is administered separately to each individual team member to explain why teams engage in effective teamwork.

The tool is intended to be used by the supervisors (the rural health center staff and the DHMT) of the community-based workers to assess the level of teamwork and taskwork and their relationship to the utilization of the services being provided by the teams. The processes of teamwork and taskwork functions represent unique skills, and together form integral part of an effective community based team. These processes and functions can serve as competencies to be strengthened during refresher trainings to improve team performance.

This tool is unique that it measures community based healthcare volunteers' views of teamwork and taskwork. Most of the existing tools are not aligned with what the literature advocates as the core components of teamwork. For example, the Safety Climate Survey tool measures perceptions of organizational commitment to patient safety such as commitment to safety, leadership, interpersonal interactions, attitudes towards stress and knowledge of how to report adverse events [33]. The Safety Attitudes Questionnaire also measures attitudes about teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions and stress [34]. Another tool, the Team Climate Assessment Measurement Questionnaire was developed to enable teams in health and social care to review aspects of their team that are believed to affect patient safety and error management [35].

A limitation of this study was the purposive selection of well-functioning NHCs. We needed to be able to draw on "functional" NHC prior experience working with community members to solve health problems and identify existing "best practices". This was essential because there would be no point in studying a disorganized, dysfunctional setting where teamwork was unlikely to have been present. We also acknowledge the complexity of measuring some of the determinants such as socio-economic status, motivation and links with NHCs. Another limitation of the study is the small number of participants.

Conclusion

To our knowledge, this is the first tool developed to assess teamwork and taskwork in a community-based health care setting in a developing country, and the first tool to assess a two-person team. We used a qualitative participatory methodology involving the population (community health workers and committees) the tool is targeted for in the process of developing the tool. We believe that this approach may contribute to making the tool acceptable to the target population. The method was simple and proved highly valuable for identifying community and culturally relevant processes for measuring teamwork and functions for measuring taskwork. The simplicity of this method and its value in identifying community- and culturally-relevant processes and functions are strengths of this approach. We believe our tool can be adapted to measure teamwork and taskwork in other health settings and in situations where there are more than two members of a team.

Additional file

Additional file 1: Team Measurement Tool.

Abbreviations

BU-IRB: Boston University Institutional Review Board; CCM: Community Case Management; CGHD: Center for Global Health and Development; CHW: Community Health Worker; DHMT: District Health Management Team; LINCHPIN: Lufwanyama Integrated Newborn and Child Health Project; MOH: Ministry of Health; NHC: Neighborhood Health Committee; TBA: Traditional Birth Attendant.

Competing interests

All other authors declare that they have no competing interests.

Authors' contributions

KYA, DM, DHH, KYA, KZW, and WM contributed to the conception and design of the study. KYA, DHH, GSP, CK, SF, and BS all participated in study implementation and data collection. KYA, DHH and WM performed data analyses and with DM, GSP and KZW assisted with interpretation of the data. KYA, DHH and DM drafted the manuscript. All authors contributed to revisions of the manuscript and read and approved the final manuscript.

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Annex 7: Optional
LINCHPIN Training Record Year 3

Showing LINCHPIN and complementary match-funded initiatives in Lufwanyama District

S/No	Type of Training	Participants	Expected # Participants	Dates	# trained	Remarks
1	TOT HBB training	Lufwanyama Health Center staff	3	15-17/2/2012	3	Training took place in Lusaka with staff from other districts
2	Managing Ill Children and sick infants	Nurses and clinical Officers	22	27/6-02/07 12	22	
3	Refresher training in essential newborn	TBAs and CHWs	111	07/08-10/08 12/08-15/08 & 23/08-26/08 2012	114	Participants were trained in three groups
4	Training in leadership and planning	Members of Neighborhood health Committees	80	3-7 /07/12 19-22/06/12	80	Trained in two phases
5	Training in Essential Newborn and Helping Babies Breathe	Nurses, midwives and clinical officers	23	01/10-04/10 2012	23	
6	Training in BBC	NHC members	40	29/07/12 to 2/08/12	39	Drama clubs were included in training
7	Enhance Community Mobilization	NHC members	38	May 2013	38	Work plans developed
8	Training in HBB	Heath workers	12	16-18/05/2013	12	
9	CHWs training	Selected community members	15	02/05-28/06/2013	16	One was disqualified due to poor performance
MDG 4 & 5						
1	Financial Management	NHC leaders	40	2012	40	
2	SMAG training	Community members	40	2012	40	
3	Advocacy training	NHC members	40	13-15/11/12	40	
4	SMAG training	Community	21	25/2-1/3/13	21	
4	IYCF training	Community	40	25/2-2/3/13	40	
Local to Global						

S/No	Type of Training	Participants	Expected # Participants	Dates	# trained	Remarks
1	CRP training	Program staff	12	22/2-24/02/122	12	
2	CRP training	CHW/NHCs	15	22-23/03/12	15	
3	CRP training	Duty bearers and leaders	12	16-18/04/12	12	
4	CRP Training	Children	14	19-20/04/12	14	
5	Community Action Cycle training	Councilors	12	26-27/04/12	12	
6	CRP training	CHW/TBA/NHC	20	19-21/03/13	20	
7	CRP training	Caregivers and parents	22	22-24/03/13	22	
Nutrition						
1	Nutrition and HIV training	CHW/IYCF counselors/GMPs	30	22 - 24/05/13	33 (13f/20m)	Added some general members of NHCs.
2	Nutrition training	Nutrition support groups	44	17-19 /04/13	44 (28f/16m)	Due to limited funds, only executive members of the groups were trained.
3	Positive deviance hearth training	GMPs/Nutrition support group members, NHCs and IYCF counselors.	35	16-17/05/13	35 (17f/18m)	