THE INSCALE BASELINE SURVEY UGANDA

This report was completed for the inSCALE project by:

Seyi Soremekun and Frida Kasteng

October 2013

inSCALE – Innovations at Scale for Community Access and Lasting Effects

The inSCALE programme, a collaboration between Malaria Consortium, London School of Hygiene and Tropical Medicine (LSHTM) and University College of London (UCL), aims to increase coverage of integrated community case management (ICCM) of children with diarrhoea, pneumonia and malaria in Uganda and Mozambique. inSCALE is funded by Bill & Melinda Gates Foundation and sets out to better understand community based agent (CBA) motivation and attrition, and to find feasible and acceptable solutions to CBA retention and performance which are vital for successful implementation of ICCM at scale.

The key inSCALE team comprises:

Malaria Consortium:
Sylvia Meek, Program Director
James K. Tibenderana, Principal Investigator
Karin Källander, Programme Coordinator
Eleni Capsaskis, Regional Communication Specialist
Edmound Kertho, Project Coordinator Uganda
Maureen Nakirunda, Research Officer Social Sciences Uganda
Agnes Nanyonjo, Research Officer Public Health Uganda
Benson Bagorogoza, Research Officer Health Economics Uganda
Godfrey Ayebale, Field Supervisor, Uganda
Ana Cristina Castel-Branco, Project Coordinator Mozambique
Abel Muiambo, Research Officer Public Health Mozambique
Juliao Condoane, Research Officer Health Economics Mozambique
Fenias Benhane, Field Supervisor, Mozambique
Faruk Aboobakar, Research Officer Social Sciences Mozambique

London School of Hygiene and Tropical Medicine:
Betty Kirkwood, Professor of Epidemiology & International Health
Seyi Soremekun, Lecturer in Intervention Research, Project Evaluation Coordinator
Anna Vassall, Lecturer in Economics
Frida Kasteng, Health Economist

University College of London, Institute of Child Health:
Zelee Hill, Lecturer in International Child Health
Daniel Strachan, Senior Research Associate in International Child Health

ACKNOWLEDGEMENTS

CONTENTS

8 LIST OF GRAPHICS – EXECUTIVE SUMMARY

7 LIST OF TABLES - REPORT

6   LIST OF FIGURES - REPORT

5   GLOSSARY OF ABBREVIATED TERMS

CHW: Community-based Health Worker

CIDA: Canadian International Development Agency

DMEC: Data Management and Ethics Committee

EFA: Exploratory Factor Analysis

FDP: Child with any of fever, diarrhoea (watery), or pneumonia

ICC: Intra-Cluster Correlation Coefficient or between-cluster coefficient of variation

iCCM: Integrated Community Case Management of malaria pneumonia and diarrhoea

InSCALE: Innovations at Scale for Community Access and Lasting Effects

LC1: Local Council (Village Level)

LC3/LC5: Local Council (Subcounty/District Level)

RA: Fieldwork Research Assistant

RCT: Randomised Controlled Trial

RDT: Rapid Diagnostic Test for malaria

Stock-out: the VHT ran out of any items (drugs, RDTs, respiratory rate timers) used in the diagnosis or treatment of fever, diarrhoea or pneumonia within the past 3 months.

TAG: Trial Advisory Group

VHT: Village Health Team member

4 EXECUTIVE SUMMARY

The inSCALE project aims to show that by the use of best practices and innovative means, government-led integrated community case management programmes (iCCM) in Uganda and Mozambique can be rapidly driven to scale with high quality, leading to a sustained increase in the proportion of sick children receiving appropriate treatment for fever, diarrhoea and pneumonia.

 iCCM programmes utilize community health workers (CHWs) to promote healthy family practices in their local communities and to treat children under 5 years with diarrhoea, malaria and pneumonia. Programmes involving CHWs can play an important role in closing the gap in access to adequate health care in poor and/or rural communities. In 2010 the Ministry of Health of Uganda with the support of the Malaria Consortium and the Canadian International Development Agency included the iCCM strategy as part of its mission to reduce the gap in equitable access to health services. ICCM in Uganda is delivered through an existing cadre of health workers, the Village Health Team (VHT). The VHT consists of 5 community-level volunteer workers who are trained to provide health counselling, support and referral services within their communities. As part of the government iCCM strategy, 2 VHT members (VHTs) are trained to additionally manage non severe illness according to its guidelines.

Whilst CHW programmes can be successful in increasing access to essential health care services, there are often reports of high rates of CHW attrition during the lifetime of a programme, due to in part to lack of adequate CHW supervision and support (Nkonki et al 2011). Lack of supervision and support can also impact on the performance of CHWs and ultimately on the coverage of appropriately treated sick community members. In light of this, the inSCALE project in Uganda has developed two innovative approaches to improve VHT performance and motivation which we hope will lead to increased rates of appropriate treatment of children with diarrhea, malaria and pneumonia:

 i) **An mHealth platform** intended to strengthen VHT performance, supervision and peer support networks. CHWs are provided with mobile phones and accessories which allow frequent feedback to and support from their CHW supervisors (who are also supplied with phones), district health teams and other CHWs free of charge. This promotes their connectedness to the health system, an increase in the frequency and quality of contact between the CHW and their supervisor and peers, and enhances the status of the CHW in their community.

ii) **Community health clubs** which aim to improve child health through community-led forums with the CHW as the main focus point. Community health club meetings will provide a medium through which CHWs and community members can work together to identify child health and CHW challenges pertinent to them. The club members will work together to highlight and address local child health issues and solve problems, using village networks, personal experiences, collective knowledge, and other community assets.

The inSCALE project in Uganda will take place in 41 subcounties (clusters) within 8 contiguous districts (Buliisa, Hoima, Kibaale, Kiboga, Kiryandongo, Kyankwanzi, Kyegegwa, and Masindi), and will measure

the change in the appropriate treatment of fever, diarrhoea and pneumonia in children in households receiving the above community-based and technology-based interventions compared to those in areas with routine iCCM ('control' households).

In order to minimise the effect of any chance imbalance between control and intervention arms in the percentage of appropriately treated children and other important indicators at the beginning of the evaluation period, a baseline survey was conducted to collect illness, treatment and cost data from the included communities to inform the randomisation and endline analysis.
This document reports on the results of this baseline survey for the inSCALE project in Uganda.

Methods

The inSCALE Uganda baseline survey and data analyses were conducted over the period June 2011 - March 2012. A random sample of 32 households was selected for surveillance from each of 5 villages per subcounty. Where households included children under 5 years of age, data were collected on factors including household demographics, child illnesses in the past two weeks, care seeking, drug treatments, and awareness of the VHT/iCCM programme. Baseline data was also collected on all the iCCM-trained VHTs in the selected villages, and contained questions on drug stock levels, VHT motivation, and knowledge of the correct management of fever, diarrhoea and pneumonia. Additional data was collected from VHT supervisors at health facilities on facility-based treatment of sick children, and stocks of essential drugs/diagnostic equipment. All data were double entered and subject to consistency checks. Data were analysed and presented to the inSCALE trial advisory group (TAG) and the inSCALE data management and ethics committee (DMEC) in early 2012, who provided recommendations for the final analyses and this report.

BASELINE SURVEY · BASIC DATA

3900 households with children under the age of 5 years were sampled;
Of the 6501 children in these households, 47% were reported as having symptoms of fever, 11% with diarrhoea and 24% with pneumonia in the two weeks prior to the survey, and were thus eligible for the full household survey questionnaire on treatment, care seeking, and health practices. 360 iCCM VHTs and the 79 health facilities supporting these VHTS were also sampled as part of the baseline.

Household Survey

APPROPRIATE TREATMENT: Children were appropriately treated for diarrhoea in 30% of cases, in 47% of cases for fever, and in 54% of cases for pneumonia. The chances of appropriate treatment were dependant on where treatment was accessed. Appropriate treatment of sick children was most likely to have occurred via the local VHT or at a public health facility.
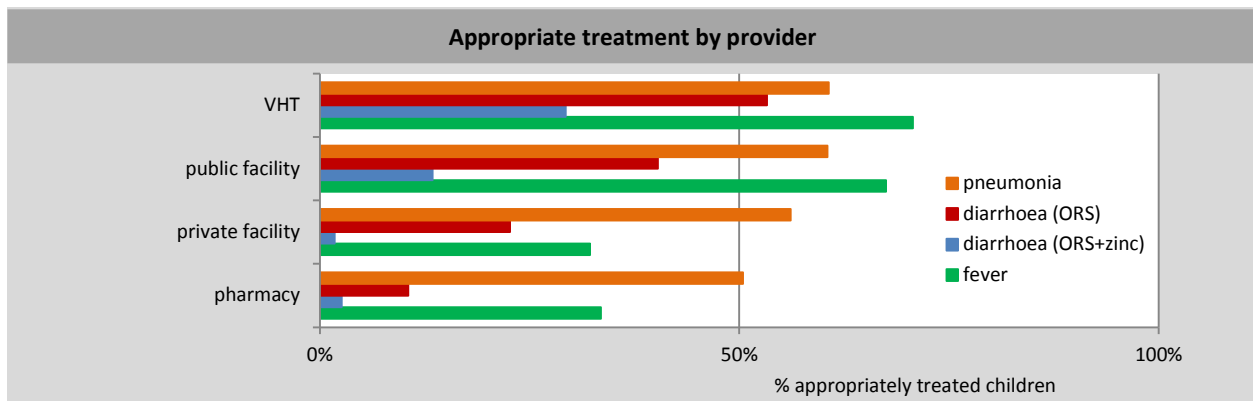
ES-FIGURE 1. APPROPRIATE TREATMENT OF CHILDREN BY CARE PROVIDER TYPE

CARE SEEKING: Even though the chances of appropriate treatment were highest at the VHT or in a public health facility, the majority of children were taken to a private facility (38%); only 22% of sick children were taken to a VHT.
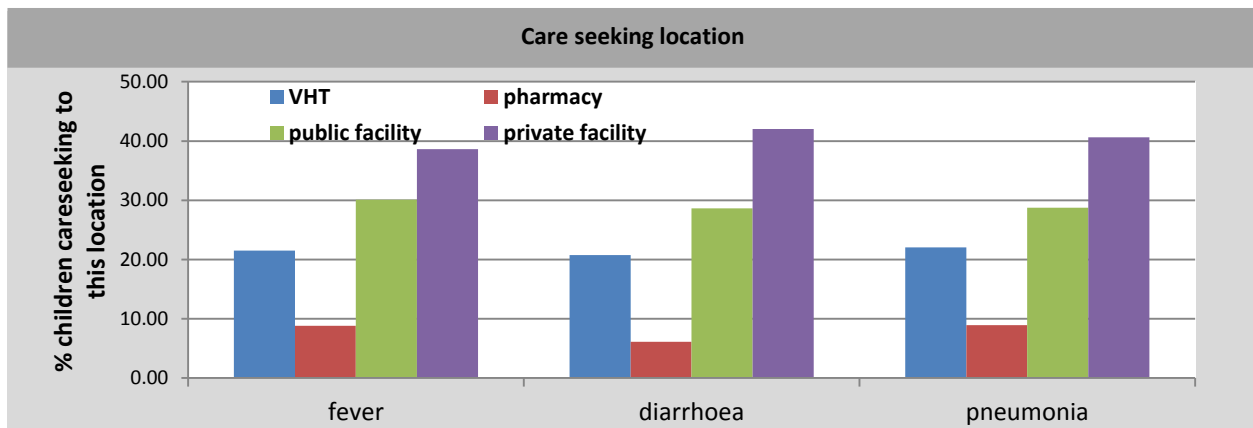
ES-FIGURE 2. CARE SEEKING LOCATION BY ILLNESS TYPE

COST OF CARE: Our findings suggest that in comparison to other providers, a consultation with a VHT is substantially cheaper from the patient perspective, particularly in terms of lower direct costs (the VHT service is free at point of use, families however did incur some costs for travel, food etc.)
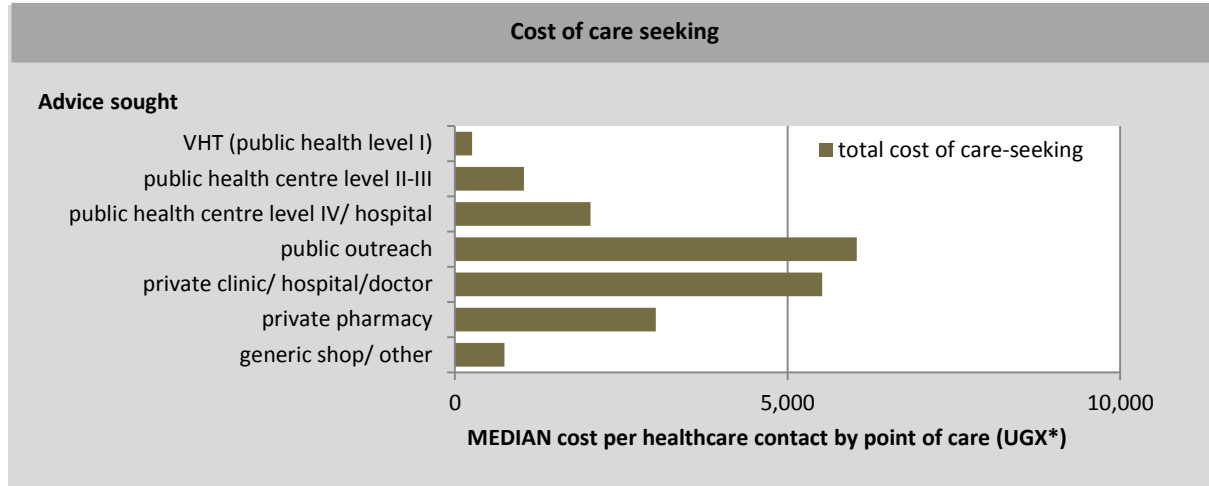
ES-FIGURE 3. COST OF CARE SEEKING BY CARE PROVIDER TYPE

This remains the case when taking into account the combined costs of the first two care seeking visits, for families which sought care to more than one provider (e.g. to a VHT and then to a private clinic). This suggests that some of those who consult a VHT in the first instance may still incur lower costs overall. Costs are highly skewed, with a few service users incurring very high costs**.**

VHT and Health Facility Survey

COVERAGE: All of the villages sampled had at least one iCCM-trained VHT; *76%* of villages had two iCCM-trained VHTs. The vast majority of caretakers were aware of the VHTs in their village (94%), but only 26% had had any contact with their VHT (for surveillance, treatment, counseling, or any other reason) in the month preceding the survey.

WORKLOAD: VHTs saw on average of 4 children and visited 4 households in the two weeks prior to the survey. Individual districts had varying levels of contact between VHTs and families ranging from an average of 3 to 6 households visited.
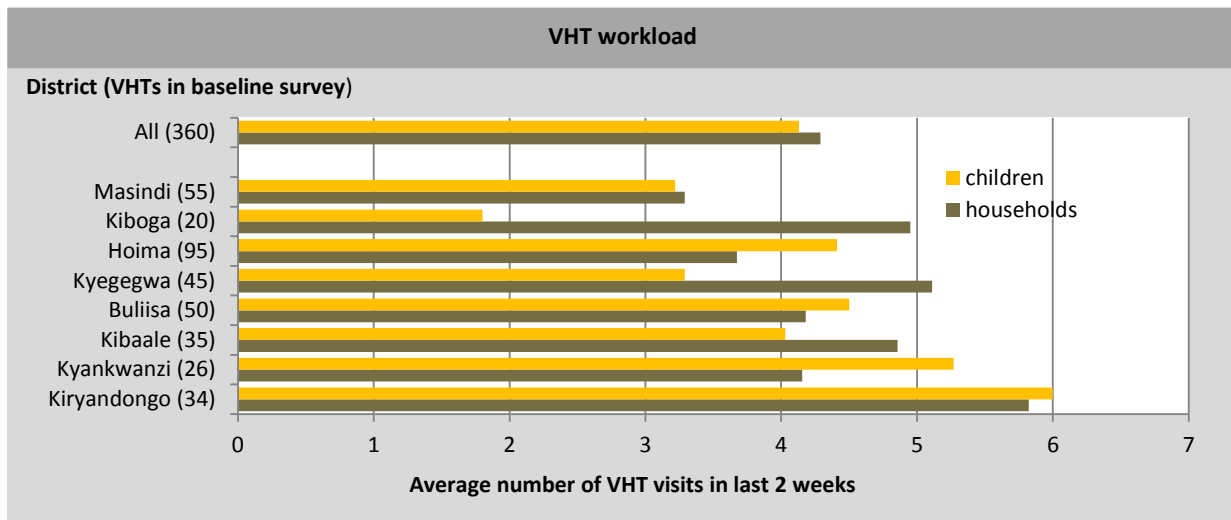
ES-FIGURE 4. AVERAGE NUMBER OF HOUSEHOLDS AND CHILDREN SEEN BY VHTS IN 8 DISTRICTS

VHT PERFORMANCE AND MOTIVATION: VHT performance was assessed in the survey by VHT responses to theoretical disease management scenarios (max score = 58) designed by the InSCALE study group (overseen by the study group physician) and validated within the study area. VHT motivation was assessed using a standardized tool developed and validated within the study site. VHT's were asked to respond to statements about their feelings of motivation and identity. Motivation scores were created and VHTs were ranked from least motivated (0%) to most motivated (100%).

Median motivation level and performances of VHTs differed by district; VHTs in Kiryandongo exhibited the least relative motivation (ranked in bottom 14%) and were one of the bottom 2 districts for performance (median score 30/58; lowest performing district was Kibaale with a median score of 29/58). Kiboga district contained the most motivated VHTs (ranked highest at 83%), and were in the top three districts for performance (median score 34/58; highest performing district was Hoima with a median score of 37/58).

SUPERVISION: In total, 93% of the VHTs interviewed reported receiving at least 1 visit from a supervisor in the past month, though this varied by district (range 80%-100%). It was reported that these visits were short, lasting for an average of 30 minutes, and were mainly for stock replenishment.

SUPERVISORS BY HEATH FACILITY LEVEL: The health facilities in which VHT supervisors were based were also surveyed; the majority of supervising facilities were level II facilities (37/79 level II facilities comprising 47% of all facilities supervising VHTs) and level III facilities (30/79 – 38% of all supervising facilities).

DRUG STOCK OUTS: Drug stock outs were identified as a major problem by both VHTs and health facility staff. Frequent stock outs of drugs will impact on the ability of staff to provide appropriate treatment for children in communities. VHTs reported the highest number of stock outs (within the previous 3 months), with over 60% experiencing stock outs of amoxicillin and 50% experiencing zinc stock outs.

Stock out by drug type	VHT (%)	HF II (%)	HF III (%)	HF IV (%)	Hospital (%)
ORS	32.47	30	10	50	10
Zinc	51.15	51.35	32.43	13.51	2.7
Amoxycillin capsules	60.34	50.82	37.7	11.48	0
Coartem yellow	35.34	60	26.67	13.33	0
Coartem blue	35.34	65	22.5	10	2.5

ES-TABLE 1. STOCK OUTS OF KEY DRUGS BY CARE PROVIDER TYPE

Summary

The InSCALE baseline survey indicates that iCCM delivered through the Village Health Team programme in Uganda has the potential to have a major impact on access to, and appropriate treatment with drugs for key childhood illnesses. Nonetheless there are still several supply and demand side barriers which hinder the progress of this programme, including care provider preferences of families, drug stock outs at every level, and lack of comprehensive supervision of VHT performance. Such issues will need to be addressed in order to realise a successful and sustainable programme at scale.

3   BASELINE REPORT

Introduction

This report presents data from the InSCALE Baseline Survey in Uganda in 2011. It contains a short background section followed by the results of the analysis of the baseline survey data, including the key indicators used to ensure balance for the randomisation of the study clusters into intervention and control arms. Details of field activities, data management and analysis methods used are provided in the appendices at the end of the report.

The inSCALE Project

The principal objective of the InSCALE programme is to demonstrate that government led Integrated Community Case Management (ICCM) programmes can be rapidly driven to scale with quality, leading to a sustained increase in the proportion of sick children receiving appropriate treatment. Objective two of the project is to evaluate the effectiveness and cost-effectiveness of the addition of innovative, complementary strategies to these iCCM programmes, compared to routine ICCM implementation. InSCALE will specifically test the effectiveness of both a community based and a technology based innovation, against routine ministry of health delivered ICCM using a three armed cluster randomised controlled trial. The effectiveness of the innovations will be evaluated based on the number of children who receive appropriate treatment for fever, pneumonia and diarrhoea; factors that affect motivation, retention and coverage of community based workers will also be considered.

The Village Health Team and the iCCM Programme

The Ugandan Village Health Team system is made up of a cadre of volunteer health workers with responsibility for health promotion, monitoring, and surveillance activities in their communities. Village health teams typically consist of 5 members, are selected from within their communities by local residents, and are supervised by and receive support from their nearest referral health facility. Whilst village health team members (VHTs) receive no formal financial remuneration for their services, they are provided with materials (storage bags, t-shirts, badges) to aid them in their work, and transport expenses for travel to and from supervision meetings. The Ministry of Health has identified this VHT system as one of the means through which its Child Survival Strategy is to be operationalised (MoH 2010). As part of this strategy, VHTs are also trained to manage (diagnose, treat, refer) common childhood conditions according to protocols laid out in the guidelines for iCCM (these guidelines build on the WHO facility-based Integrated Management of Childhood Illness strategy (WHO/UNICEF 2011)). In the study area, the Canadian International Development Agency and the Malaria Consortium are supporting the MoH to scale-up iCCM activities by the training of two VHTs per community in the treatment of malaria, pneumonia, and diarrhoea. Through this partnership, trained VHTs are provided with iCCM kits containing rapid diagnostic tests (RDTs) for malaria, respiratory timers, supplies of artemether/lumefantrine (20mg/120mg tablets), amoxicillin (125mg dispersible tablets), low osmolarity ORS, zinc (20mg tablets) and rectal artesunate (50mg). The VHTs also receive a job aid containing the

iCCM diagnosis and treatment algorithms, and a register for recording the nature and frequency of all VHT-related activities they undertake.

The Baseline Survey

The baseline survey was carried out primarily to provide the study with robust estimates of the proportion of children between the ages of 2 months and 5 years currently receiving appropriate treatment for fever, pneumonia and diarrhoea, irrespective of care provider though within the context of this recently implemented iCCM programme. Baseline levels of appropriate treatment were determined to ensure comparability of the trial arms in terms of key factors during the restricted randomisation process and to allow for the adjustment of the trial sample size if necessary.

Study area

The baseline survey was performed in eight districts situated in the west of Uganda: Buliisa, Hoima, Kibaale, Kiboga, Kiryandongo, Kyankwanzi, Kyegegwa, and Masindi. The districts cover a total population of 2.2 million with an estimated population of 440,000 children aged less than 5 years. Within this area there are approximately 6000 active VHTs.

Baseline indicators

Data were collected from three source groups, households, VHTs, and health facilities, using a tailored questionnaire tool for each group. Full details of the survey tools are provided in Appendix 0. The key statistics on which the InSCALE intervention would be evaluated were collected as part of the baseline survey (plus additional indicators requested by the Ministry of Health of Uganda (MoH) as part of ongoing monitoring of iCCM activities). Key indicators, data sources and sample size for each point are presented in Table 1.

TABLE I. INSCALE AND UGANDA MOH ICCM INDICATORS COLLECTED AS PART OF THE UGANDA BASELINE SURVEY (MAIN INDICATORS IN BOLD)

Indicator areas	Data Source	Sample
INDICATOR AREAS FOR HOUSEHOLDS, CARETAKERS AND CHILDREN LESS THAN 5 YEARS OF AGE		
1. Prevalence of fever, diarrhoea, and pneumonia in previous 2 weeks (FDP)	Household form+child form	6501 children between 2 months -5 years, 6262 children between 4 months - 5 years (fever)
2. Socio-economic indicators (households)	Household form	4002 households (wealth index) 3888 households (demographic indicators)
3. Appropriate treatment for FDP	**Household form+child form**	**6501 children between 2 months -5 years, 6262 children between 4 months - 5 years (fever)**
4. Care seeking location (to VHTs and other health providers) for children under five with FDP	Household form+child form	3384 caretakers who sought care for FDP (any) in children
5. Average cost of care seeking per child with FDP	Household form+child form	3468 children with data on care seeking costs
6. ANC visits by pregnant mothers	Household form	167 mothers with children <2 months of age
7. Delivery locations of pregnant mothers	Household form	167 mothers with children <2 months of age
8. VHT visits to newborns in first week of life	Household form	161 mothers of children<2 months of age who knew their community had a VHT
9. Post-delivery care of newborns: feeding, drying and breastfeeding	Household form	168 children <2 months of age
10. Communities with 2+ iCCM-trained VHTs	VHT form	205 communities with at least 1 iCCM-trained VHT (all)
11. Socio-economic indicators (VHTs)	VHT form	360 VHTs (all)
12. Stock-outs of key drugs in past quarter	VHT form	348 VHTs who provided data on stock-outs
13. VHT motivation scores	**VHT form**	**332 VHTs who provided data on motivation**

Indicator	Source	Sample
14. VHT capacity to manage simple cases of FDP (VHT performance)	**VHT form**	**350 VHTs who provided data on performance**
15. Mean VHT-related expenditure in previous quarter	VHT form	360 VHTs (all)

*ICCM indicator table continued*Indicator	Source	Sample
16. Number of VHT visits to households in previous 2 weeks	VHT form	360 VHTs (all)
17. Number of VHT supervision visits by health facility staff in previous quarter	VHT form, Health Facility form	360 VHTs (all)
18. Number of children seen by the VHT in previous 2 weeks	VHT form	360 VHTs (all)
PUBLIC HEALTH FACILITY INDICATOR AREAS		
19. Capacity for public/not-for-profit facilities to correctly treat FDP	Health Facility form	79 facilities had a recent case of fever, 77 had a recent case of diarrhoea, and 67 had a recent case of pneumonia
20. Numbers of health staff trained to supervise VHTs	Health Facility form	79 facilities (all)
21. Number of VHTs supervised by health facility staff in previous quarter	Health Facility form	77 facilities with data on supervision
22. Stock-outs of key drugs and equipment for FDP	Health Facility form	79 facilities provided information on diarrhoea and pneumonia drugs, and 71 facilities provided information on fever drugs

Uganda Baseline Survey: Study outcomes

An overview of the study design and fieldwork activities can be found in the Appendix sections 0-0 and a glossary of terms used in this report in 0.

Data collection took place within the period 29th May – 15th August 2011. Within the 8 study districts (41 sub counties), a total of 4002 households with children under 5 years of age were sampled across 205 randomly selected villages. Data were also collected from 360 iCCM-trained VHTs within the selected study villages (approximately 1.8 VHTs/village; out of a total of approximately 6000 trained VHTs in the study area) and the 79 health facilities. The overall sampling profile is outlined in the flow chart in (FIGURE 1).

FIGURE 1. FLOW CHART SHOWING THE BREAKDOWN OF THE SAMPLING FRAME FOR THE INSCALE BASELINE SURVEY

```
                    ↓
┌──────────────────────┐ ┌──────────────────────┐ ┌──────────────────────┐
│  3900 households with│ │ 360 VHTs trained in  │ │ 79 Health facilities │
│    children between 2│ │        iCCM          │ │       with VHT       │
│    months and 5      │ │                      │ │     supervisors      │
│    years**           │ │                      │ │                      │
└──────────────────────┘ └──────────────────────┘ └──────────────────────┘
```
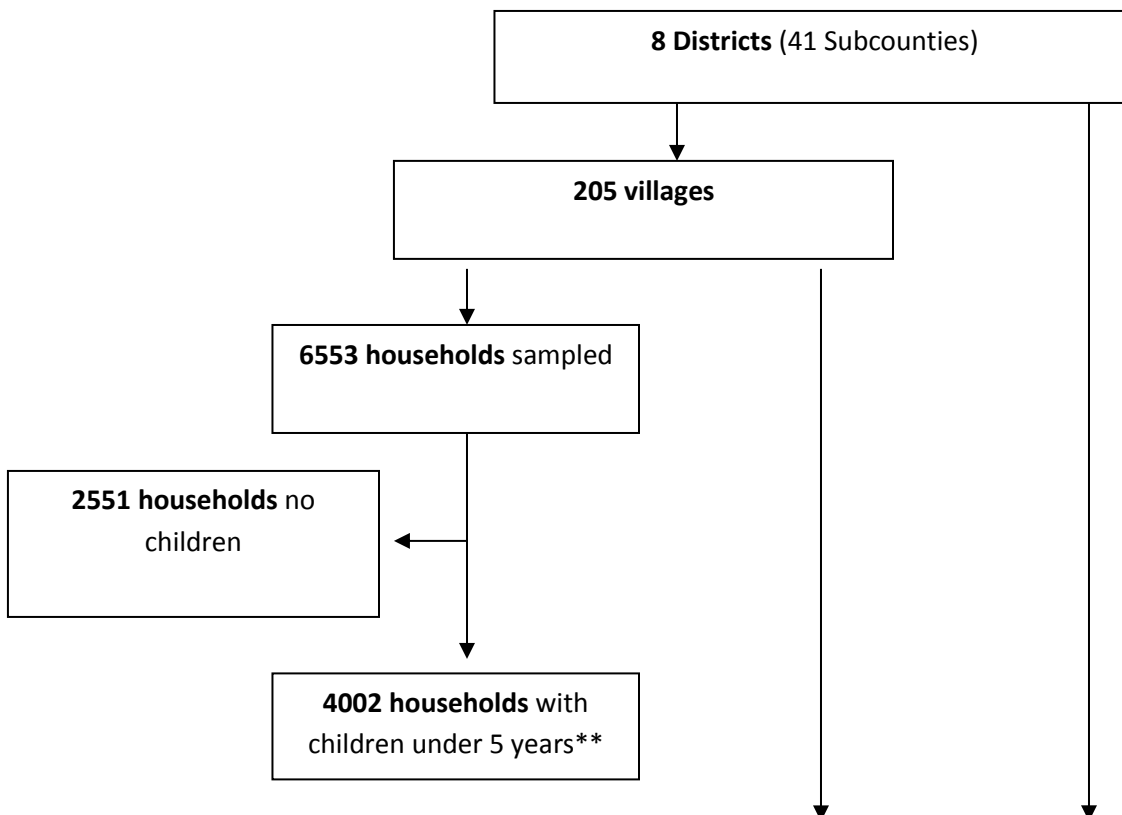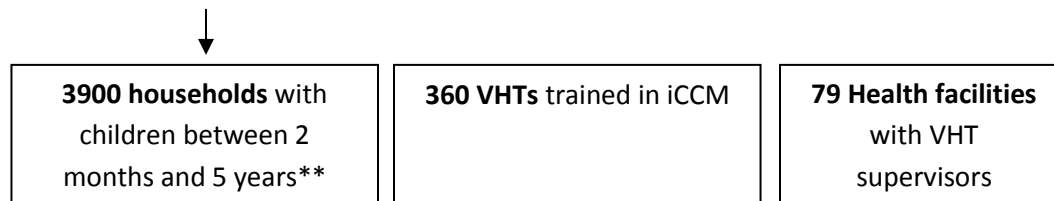
** 4002 households with children under 5 yrs interviewed - used for analysis of socio-economic status. Households with children between 2m and 59months used for all other analyses.

Household Survey

Full household data was collected from the 3900 households with children between 2 and 59 months of age (totaling 6501 children). The total number of children by district, and those for which any of fever, diarrhoea, or pneumonia (FDP) in the previous two weeks had been reported, is shown in TABLE 1 (52% of children had symptoms of any of FDP).

TABLE 1. NUMBER OF CHILDREN BETWEEN THE AGES OF 2 MONTHS AND 5 YEARS BY DISTRICT AND OVERALL

District	total no. children		no. children FDP	
	freq	% by total children	freq	% by district
BULIISA	1,068	16.43	728	68.16
HOIMA	1,575	24.23	821	52.13
KIBAALE	697	10.72	303	43.47
KIBOGA	286	4.40	113	39.51
KIRYANDONGO	707	10.88	454	64.21
KYANKWANZI	429	6.60	218	50.82
KYEGEGWA	889	13.67	347	39.03
MASINDI	850	13.07	400	47.06
TOTAL CHILDREN (N)	6,501		3,384	

Household Demographics

Full demographic data was collected from 3888 caretakers (99.7% of households with eligible children) and 3854 of the heads of the household (98.8% of households). TABLE 2 provides information for caretakers and house heads on their age distribution, education level completed, occupation types, ethnicity, religion, and for the most typical relationships between caretaker and the head of the

household, and with the children in the household (for 6426 children where relationship information was provided).

TABLE 2 DEMOGRAPHIC INDICATORS: CARETAKER/HOUSEHOLD HEAD BACKGROUND

Parameter	caretaker		household head	
age group (yrs)	freq	%	freq	%
<20	182	4.68	16	0.42
20-29	1478	38.01	824	21.38
30-39	1040	26.75	1,013	26.28
40-49	565	14.53	626	16.24
50+	436	11.21	680	17.64
not known	187	4.81	695	18.03
education (level completed)	freq	%	freq	%
no education	908	23.35	791	20.52
some primary (<7 years)	1873	48.17	1,716	44.53
7/8 years of primary	877	22.56	960	24.91
standard secondary/above	230	5.92	387	10.04
occupation	freq	%	freq	%
professional/clerical	74	1.90	1886	48.94
farmer/manual/domestic	3,398	87.40	1703	44.19
self-employed business	286	7.36	126	3.27
unemployed	81	2.08	42	1.09
student/sick/other	49	1.26	97	2.52
ethnicity	freq	%	freq	%
ethnicity (broad categories)				
Luo	822	21.14	785	20.37
Bantu	2650	68.16	2,668	69.23
Lugbara/other	416	10.7	401	10.4

Table 2 cont.

religion	freq	%	freq	%
catholic	1634	42.03	1,613	41.85
protestant	1349	34.70	1,389	36.04
muslim	246	6.33	269	6.98
charismatic	613	15.77	531	13.78
trad/other	46	1.18	52	1.35
Relationship of respondent to children in household (n=6426 children)	freq	%	freq	%
mother	3,961	61.64	n/a	n/a
father	1,126	17.52		
sibling	30	0.47		
aunt/uncle	228	3.55		
grandparent	995	15.48		
Other	86	1.34		
Relationship of respondent to household head	freq	%	freq	%
respondent was HoH	1,297	33.36	n/a	n/a
spouse	2,234	57.46		
(grand)child/child in-law	233	5.99		
parent/parent in law	68	1.75		
sibling	28	0.72		
other/not related	22	0.57		
relationship unclear	6	0.15		

Household assets and income

Household wealth was estimated by means of an asset index, which contained details about the types of assets households possessed, and included information on house construction materials, ownership of household items, land, animals, vehicles and other transport means, as well as plumbing and sanitation infrastructure. Typically households in the study area included at least one bicycle (52%), a metal roof (54%), a borehole or well as the main water supply (67%), and a store of firewood as the main source of cooking (94%). A wealth index was developed using the full range of asset data collected, and asset scores assigned to each household where the higher the score the greater the perceived wealth of the household (FIGURE 3-FIGURE 4). Households were then ranked into quintile groups based on their scores relative to other households. Details of the development of the full asset index is presented in and Appendix section 0).

Household asset data were available from 4002 households, whilst full household cash income data were availablefor 3258 households, as a relatively large proportion of caretakers did not know the details of their household cash income, or this information was missing (19% of households).

Cash income gives only partial information about income bringing activities in a setting dominated by substance activities, however it is nevertheless an useful indicator as it is likely to relate to the readily availability of cash in case of an illness episode that might require some out-of-pocket expenditure. Of responding households, over 60% reported a monthly cash income of UGX 50,000 (USD 20) or less; 10% of all households reported no cash income at all (FIGURE 2).

Besides Kiryandongo and Kiboga – the districts with the largest and smallest proportions respectively of households with a monthly cash income of UGX 50,000 or less – the proportion of household with a monthly cash income of UGX 50,000 or less was similar across districts. Kyegegwa and Kyankwanzi had the highest share of households reporting that they did not have any cash income at all.

FIGURE 2. HOUSEHOLD MONTHLY CASH INCOME BY DISTRICT
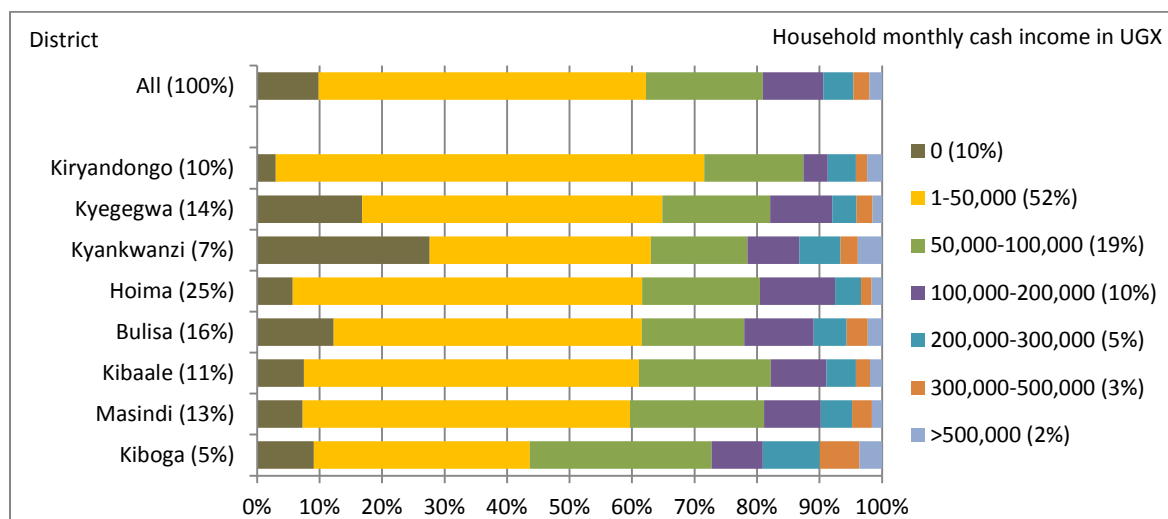
FIGURE 3 presents the derived asset and utilities (wealth) index in relation to household monthly cash income. The 19% of households with missing information was evenly distributed across wealth quintiles and thus did not affect interpretation of responses. Households in the higher wealth quintile groups had a substantially higher cash incomes that those in the lower quintiles.

FIGURE 3. HOUSEHOLD WEALTH BY MONTHLY HOUSEHOLD CASH INCOME
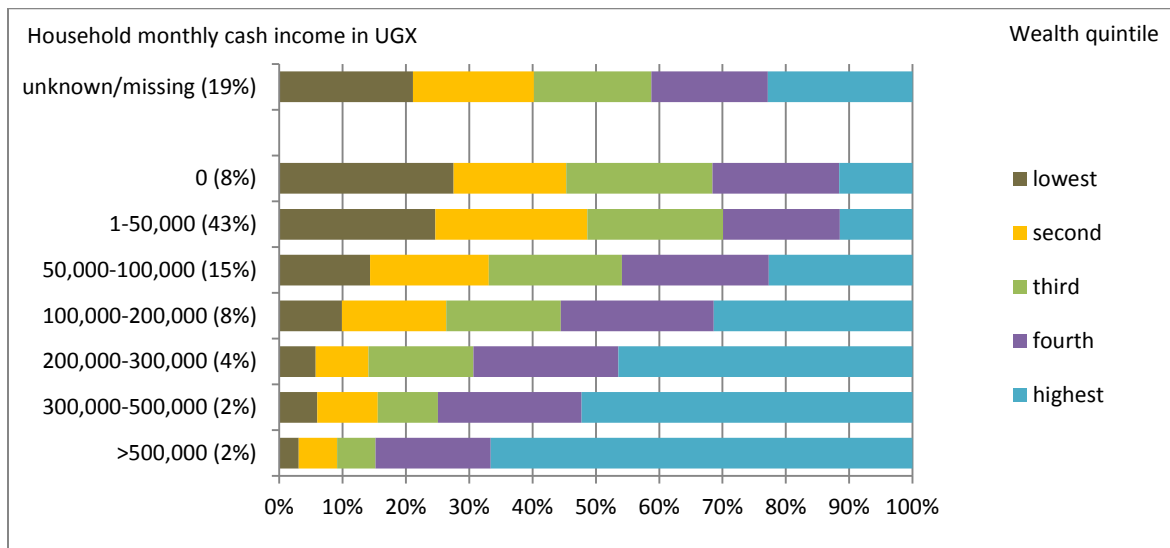
*1 USD=2,500 UGX

Household wealth differed across study districts (FIGURE 4). In Kiboga, Kyegegwa and Kibale less than 30% of the households surveyed belonged to the two lowest wealth quintiles compared to around 60% in Buliisa and Kiryandongo. The wealthiest districts are situated in the southeastern part of the study area and the poorest in the in the northern part of the study area.

FIGURE 4. HOUSEHOLD WEALTH BY DISTRICT

District   Wealth quintile

District					
Kiryandongo (10%)					
Bulisa (16%)					
Hoima (25%)					
Masindi (13%)					
Kyankwanzi (7%)					
Kibaale (11%)					
Kyegegwa (14%)					
Kiboga (5%)					

- ■ lowest
- ■ second
- ■ third
- ■ fourth
- ■ highest

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
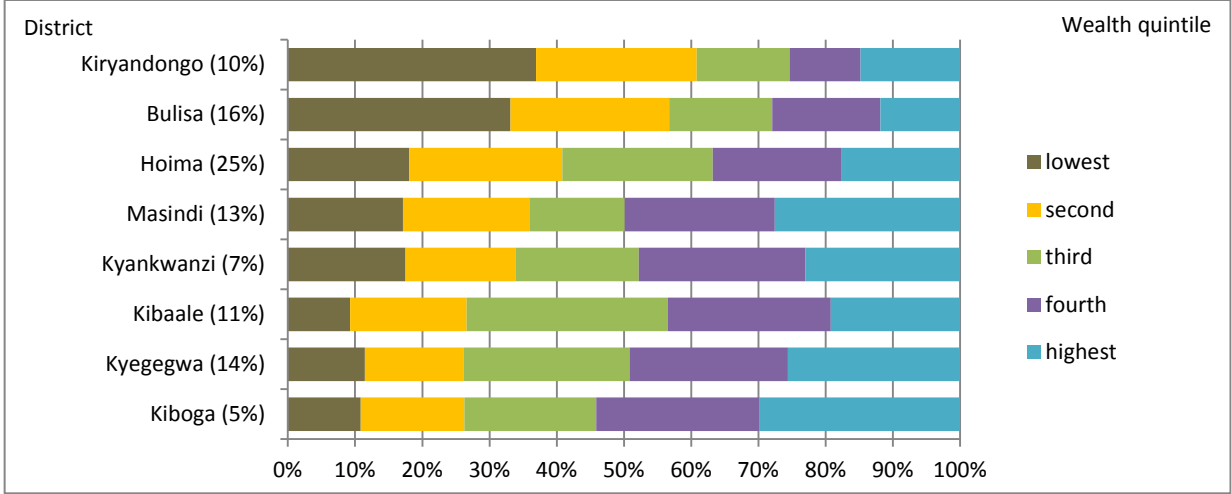
Childhood Illness, Care seeking, and Treatment

Overall 3384 (52.1%) of the eligible children in the study area were reported by the caretaker as having had symptoms of fever, diarrhoea, or pneumonia in the two weeks prior to the date of the questionnaire. TABLE 3 shows the breakdown of children by illness type (children could have symptoms of more than one illness), indicating that reports of fever were the most common.

TABLE 3. PREVALENCE OF ILLNESS.

parameter	freq	%	total
Total children with FDP	3,384	**52.05**	6,501
Fever*	2,921	**46.65**	6,262
Confirmed as malaria in 86% (635/776) of cases where a blood test (RDT or blood slide) was performed			
watery diarrhoea†	685	**10.54**	6,501
pneumonia	1,544	**23.75**	6,501

*fever – in children aged 4 months and above †all future references to 'watery diarrhoea' in this document be given as "diarrhoea"

Caretakers of sick children were asked whether care for the illness was sought outside the home, and the nature of the care sought. Caretakers were able to provide details of up to two care providers used. Analysis of care seeking patterns for children with FDP indicated the majority of sick children were taken to a health facility, which, in most cases would be a privately run clinic or hospital (Table 4). In just under 11% of children with symptoms of FDP, no care was sought; the principal reported reasons for this was that the *illness was not severe*, it could be managed at home or the family did not have money to seek care.

TABLE 4. CARE SEEKING LOCATION FOR THOSE WITH FDP (MORE THAN ONE LOCATION POSSIBLE)

Location	freq	%	total
to a health facility	2,126	**62.83**	3,384
to a private facility	1,287	**38.03**	3,384
to a public facility	971	**28.69**	3,384
HCII	405	11.97	3,384
HCIII	371	10.96	3,384
HCIV	98	2.90	3,384
Hospital	111	3.28	3,384
outreach services (mobile/temporary)	66	**1.95**	3,384
to a VHT	729	**21.54**	3,384
to a pharmacy	303	**8.95**	3,384
no care sought	363	**10.73**	3,384

As shown in FIGURE 5 there did not appear to be a relationship between symptom type and choice of care provider.

FIGURE 5. CARE SOUGHT AT KEY LOCATION BY SYMPTOM TYPE (CARE-SEEKING TO MORE THAN ONE LOCATION IS POSSIBLE)
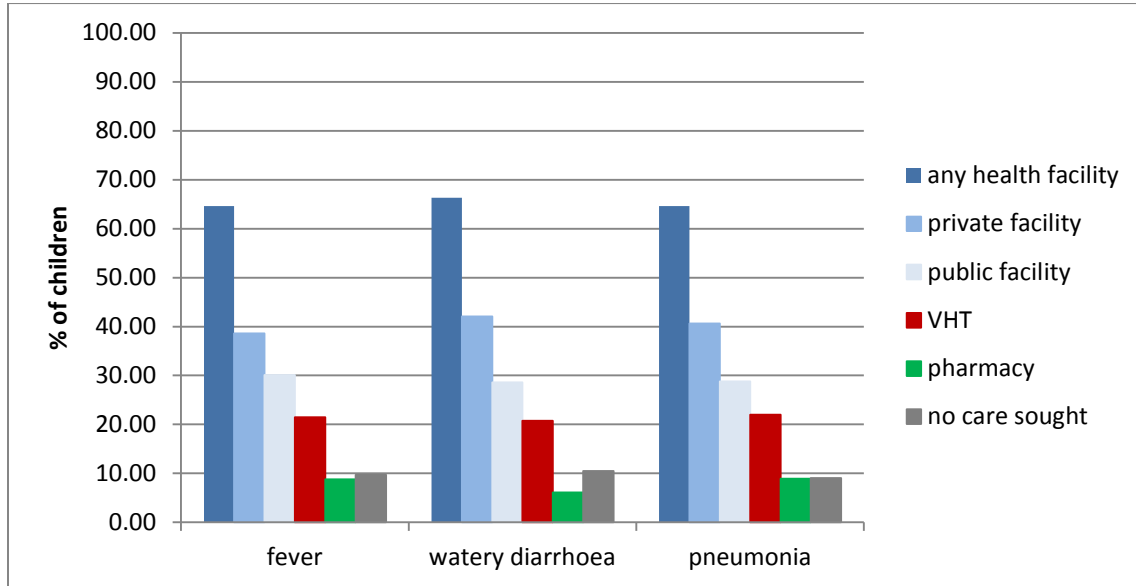
Appropriate treatment for FDP was defined as the use of appropriate drugs for each set of symptoms (see Appendix section 0 for details). For the majority of drugs in the household questionnaire, no details were provided for the duration of treatment or for dose given, so these additional criteria were not included in our overall definition or appropriate treatment.

Appropriate treatment by illness and district is shown in TABLE 5, indicating that correct drug use was highest for pneumonia and lowest for diarrhoea. Official Uganda MoH guidelines recommend treatment of diarrhoea with both ORS and zinc; however this policy is not fully implemented in all parts of the country. Disaggregation of appropriate treatment by care provider indicates that those who sought care from their VHT were however most likely to have received zinc treatment, although figures were still low (FIGURE 6 – 29%)

TABLE 5. PERCENTAGE OF CHILDREN RECEIVING APPROPRIATE TREATMENT FOR FDP (OVERALL DENOMINATORS ARE THE PREVALENCES FOR FDP IN TABLE 3). "MALARIA" – CONFIRMED MALARIA IN THOSE WITH FEVER. "DIARRHOEA+ZN" TREATMENT FOR DIARRHOEA WITH BOTH ORS AND ZINC SUPPLEMENTS

District	fever		malaria		diarrhoea		diarrhoea+Zn		pneumonia	
	freq	%	freq	%	freq	%	freq	%	freq	%
BULIISA	262	**39.58**	102	**76.12**	67	**31.75**	15	**7.11**	214	**54.73**
HOIMA	366	**51.48**	110	**77.46**	44	**31.65**	13	**9.35**	169	**47.34**
KIBAALE	107	**44.03**	45	**75.00**	12	**25.00**	3	**6.25**	89	**57.79**
KIBOGA	41	**42.71**	16	**57.14**	9	**29.03**	2	**6.45**	16	**41.03**
KIRYANDONGO	180	**43.17**	48	**56.47**	22	**24.72**	7	**7.87**	78	**48.15**
KYANKWANZI	111	**59.04**	50	**87.72**	17	**37.78**	6	**13.33**	56	**71.79**
KYEGEGWA	126	**48.09**	43	**69.35**	17	**28.81**	8	**13.56**	104	**54.17**
MASINDI	170	**49.71**	48	**70.59**	18	**28.57**	6	**9.52**	109	**63.74**
Total	1,363	**46.66**	462	**72.64**	206	**30.07**	60	**8.76**	835	**54.08**

FIGURE 6. % OF CHILDREN RECEIVING APPROPRIATE TREATMENT FOR THE BELOW ILLNESSES BY CARE SEEKING
LOCATION (PRIVATE FACILITY, PUBLIC FACILITY, PHARMACY, ICCM VHT OR ANY FACILITY).

Fever
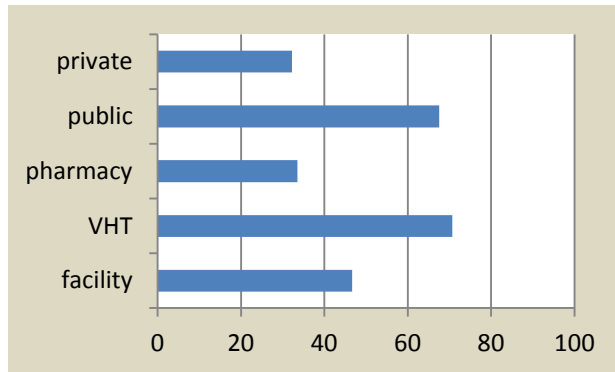
Malaria
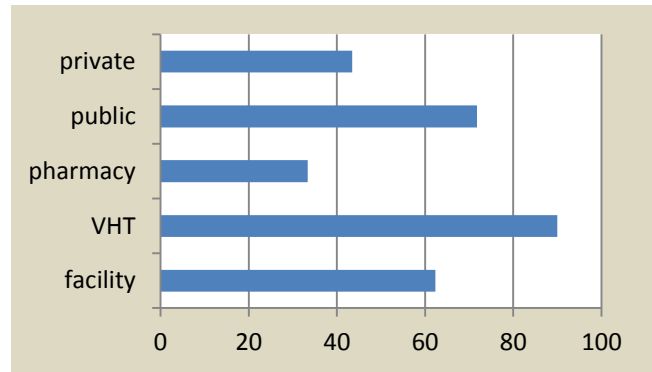
Diarrhoea
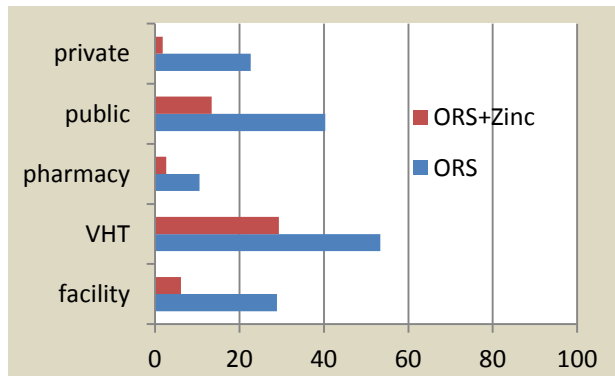
Pneumonia
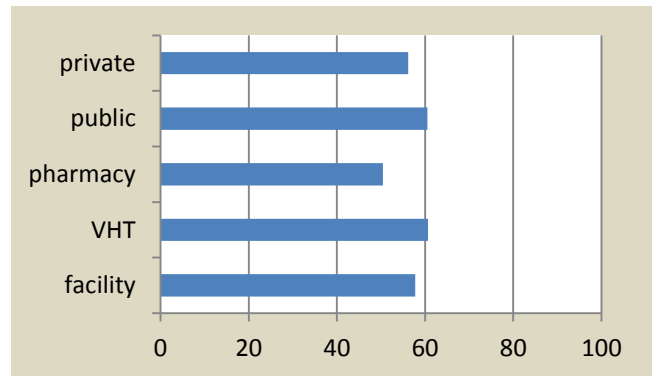
Costs of treatment of sick children

FIGURE 7 presents the mean and median cost of care-seeking by point of care for those that sought any
kind of advice/treatment. Costs are divided into three categories:

- **Direct medical costs** including fees, medicines, cost of diagnostics, inpatient stay etc.
- **Direct non-medical costs**, which included transportation costs and subsistence cost for child
  and caretaker during time spent away from home
- **Indirect costs of care-seeking** i.e. opportunity cost of the time of travelling to the health facility
  (note the opportunity cost estimate is not comprehensive, as data information was not
  collected about any time spent waiting and time of consultation at the point of care).

As is often the case with health care expenditure, the cost data were skewed (having a small number of
cases of very high costs which distorts otherwise normally distributed cost data). Four caretakers
reported particularly high costs of care-seeking (UGX 1,000,000 - 6,000,000 (USD 400-2,400); these
observations were dropped due to uncertainty as to whether they were correctly recorded.

The highest average direct medical costs were associated with seeking care at a private health facility, with a mean direct medical cost of UGX 9,000 (USD 3.6). However when looking at total costs, including also cost of transport and subsistence and the opportunity cost of travel time, the highest costs were seen among those seeking care at a public level IV health facility or hospital, UGX 14,400 (USD 5.8). The average cost of consulting a VHT was UGX 140 (USD 0.05) in direct medical costs, UGX 660 (USD 0.25) in direct non-medical costs, and indirect costs of UGX 480 (USD 0.19).

The highest median costs were among those seeking care at a public outreach unit or at a private facility (with median direct medical costs of UGX 5,000 (USD 2) and median opportunity costs of transport time of UGX 1,040 (USD 0.42) and 520 (USD (0.21) respectively). The median direct medical cost of seeking care at any public facility apart from outreach services was zero.

FIGURE 7. MEAN AND MEDIAN COST OF CARE-SEEKING BY POINT OF CARE (N=4030 HEALTH CARE CONTACTS FOR CHILDREN AGED 2 MONTHS TO 5 YEARS)
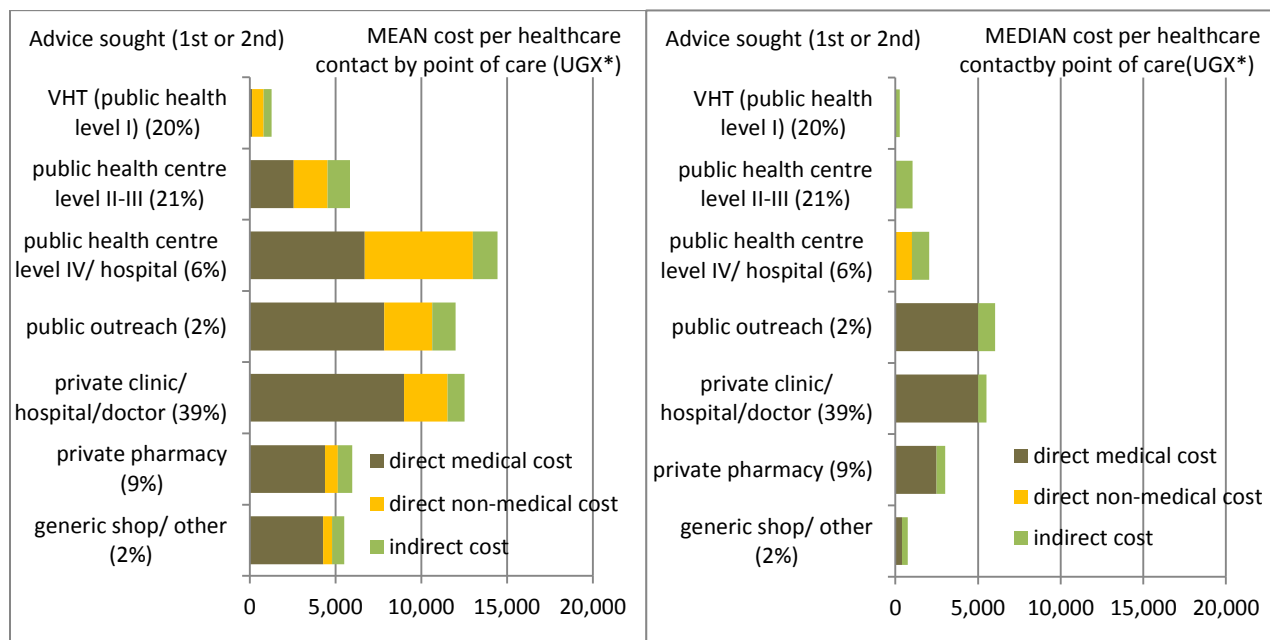
*1 USD=2,500 UGX

As part of the understanding of how household costs are allocated across the care seeking process, care seeking behaviour was disaggregated by first and second care provider seen. In total, 20% of caretakers with an ill child aged between 2 months and 5 years first consulted a VHT. A private clinic, hospital or doctor was the most common place to first seek advice (33% of first advices sought). 19% of first consultations were in public facilities of level II and III and 4% in public level IV facilities or public hospitals (FIGURE 8).

40% of caretakers that first consulted a VHT went to seek advice or were referred to a 2nd provider, half of these went to a private clinic hospital or doctor, and 19% of those that w to a public health centre level II-III sought 2nd advice, in most cases also at a private clinic hospital or doctor. The baseline survey

did not capture information about the reason for seeking 2nd advice, thus to what extent this was because of referral, drug stock-outs or unsatisfactory outcome of the 1st advice sought is unknown.
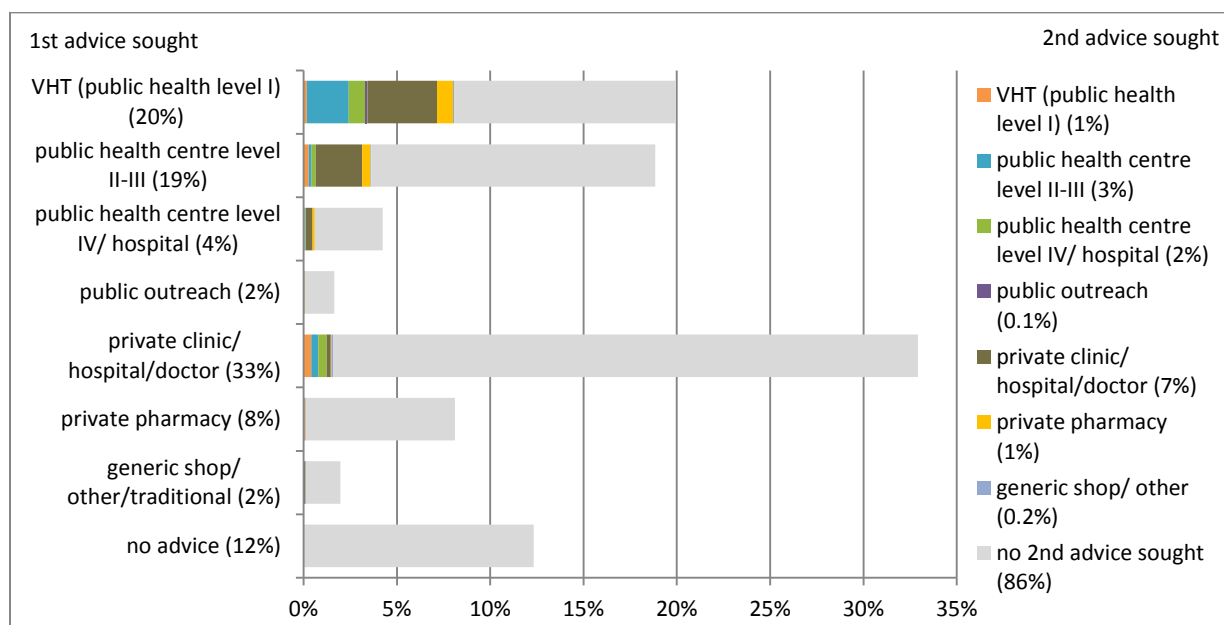
The fact that a relatively large proportion of caretakers that first consulted a VHT or a public health centre level II-III also sought care somewhere else resulted in additional careseeking care for a sick child for these groups (FIGURE 9). When calculating the overall costs of seeking 1st and, on occasions, 2nd advice for an ill child by the source of 1st advice the mean cost for those that first consulted a VHT was thus UGX 5,500 (USD 2.2) per child and for those that first consulted a health centre level II/III UGX 8,200 (USD 3.3). The percentages are slightly different from figure 7, since figure 7 considers all reported consultations to a specific point of care while figure 8 groups the first and second consultation under the first point of care.

FIGURE 9. MEAN AND MEDIAN COST OF CARE-SEEKING FOR SICK CHILDREN (1ST AND 2ND ADVICE SOUGHT, IN 2 WEEK PERIOD) BY 1ST SOURCE OF ADVICE
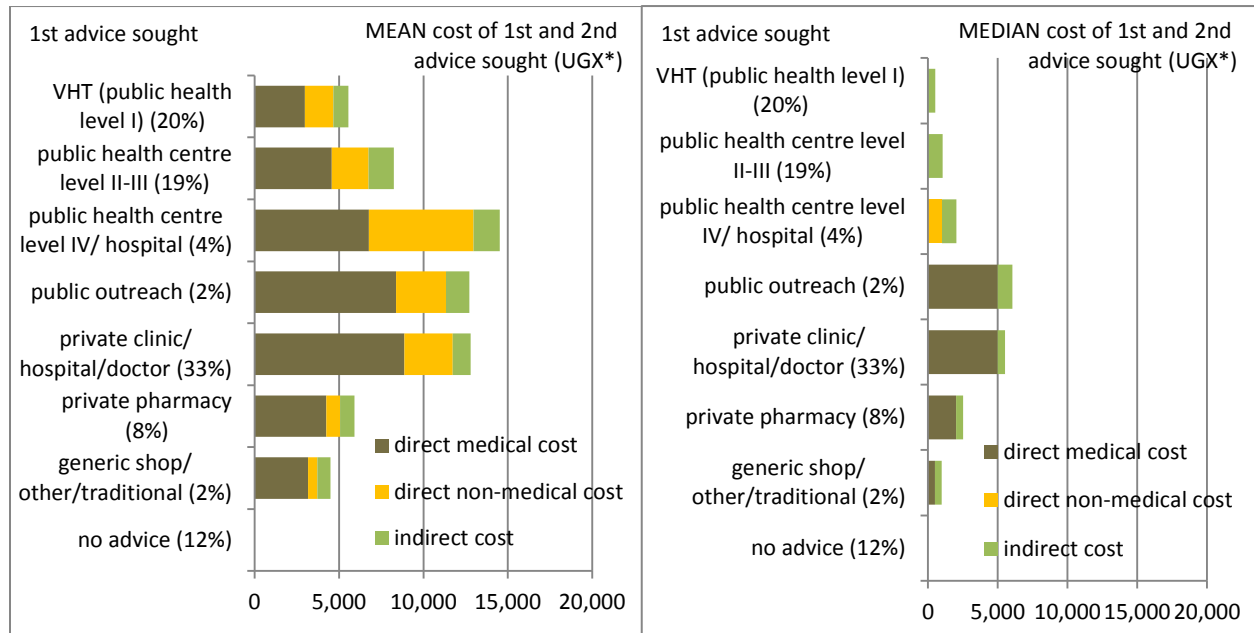
*1 USD=2,500 UGX

FIGURE 10 presents 1st advice sought in relation to household wealth. Caretakers that first consulted a VHT were evenly spread across wealth quintiles. Caretakers in the lowest two wealth quintiles were the most likely to not seek advice or to first consult a generic shop, traditional healer or other, whereas households in the higher wealth quintiles were the most likely to approach a private pharmacy, consult public outreach services or a public health centre of level IV or a public hospital.

FIGURE 10. 1ST ADVICE SOUGHT BY HOUSEHOLD WEALTH
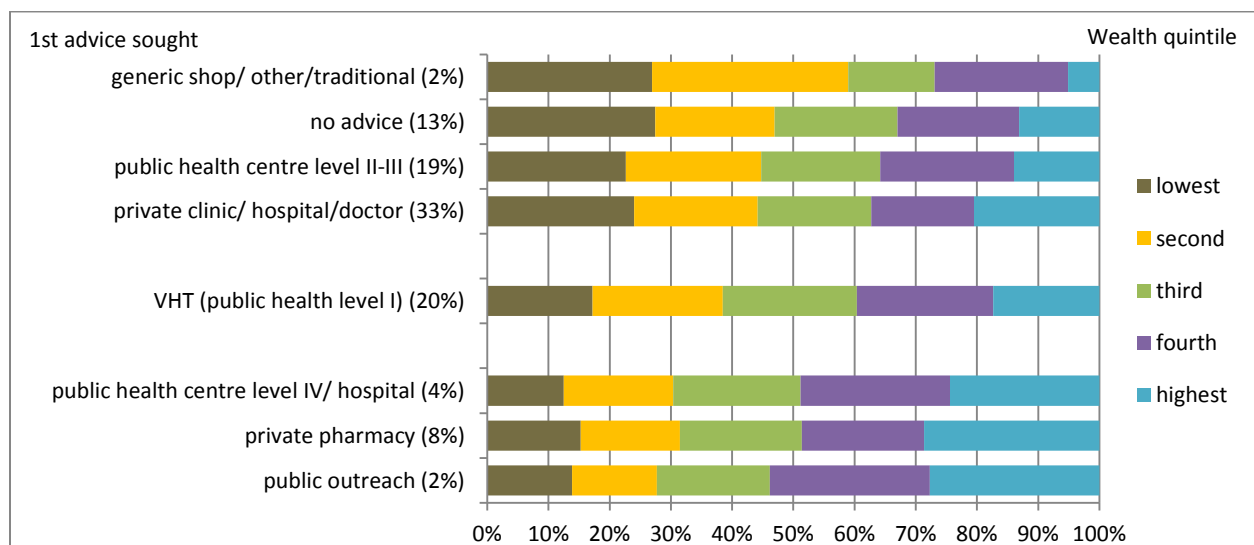
FIGURE 11 depicts cost of care seeking in relation to household wealth quintile. Households in the highest and lowest health quintiles reported higher mean as well as median costs of careseeking.

FIGURE 11. MEAN AND MEDIAN COST OF CARE SEEKING (1ST AND 2ND ADVICE SOUGHT, IN 2 WEEK PERIOD) BY HOUSEHOLD WEALTH (N=3468 ILL CHILDREN AGED 2 MONTHS TO 5 YEARS)
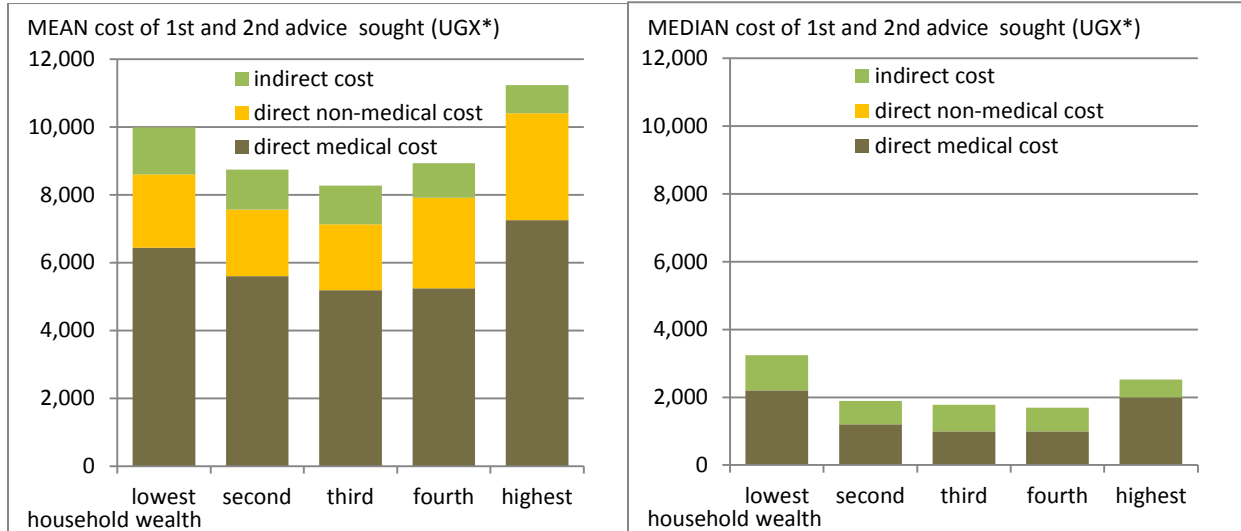
1 USD=2,500 UGX

The cost of care seeking differed more between districts that between wealth quintiles. Buliisa and Kyegegwa had the higher mean and median costs of careseeking; Hoima and Masindi the lowest mean and median costs (FIGURE 12).

FIGURE 12. MEAN AND MEDIAN COST OF CARE-SEEKING (1ST AND 2ND ADVICE SOUGHT, IN 2 WEEK PERIOD) BY DISTRICT (N=3468 ILL CHILDREN AGED 2 MONTHS TO 5 YEARS)

1 USD=2,500 UGX

34
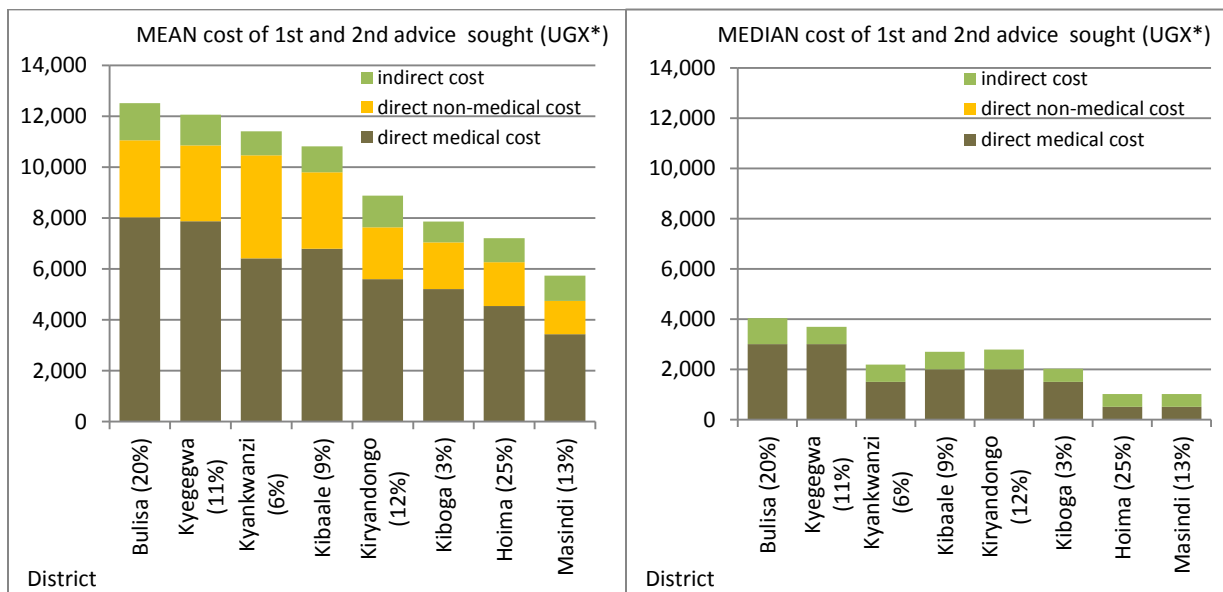
Both mean and median care-seeking costs in relation to illness symptoms were higher for children where the caretakers reported symptoms that indicated more than one concomitant illness. Since survey questions were limited to careseeking in a 2 week period and information about point of care and expenditure collected for a maximum of 2 consultations sought for a sick child, the costs presented in FIGURE 13 are truncated and should not be interpreted as total careseeking cost for the illness symptoms listed in the figure.

FIGURE 13. MEAN AND MEDIAN COST OF CARE-SEEKING (1ST AND 2ND ADVICE SOUGHT, IN 2 WEEK PERIOD) BY ILLNESS SYMPTOMS (N=3466 ILL CHILDREN AGE 2 MONTHS TO 5 YEARS – 3 MISSING OBSERVATIONS)
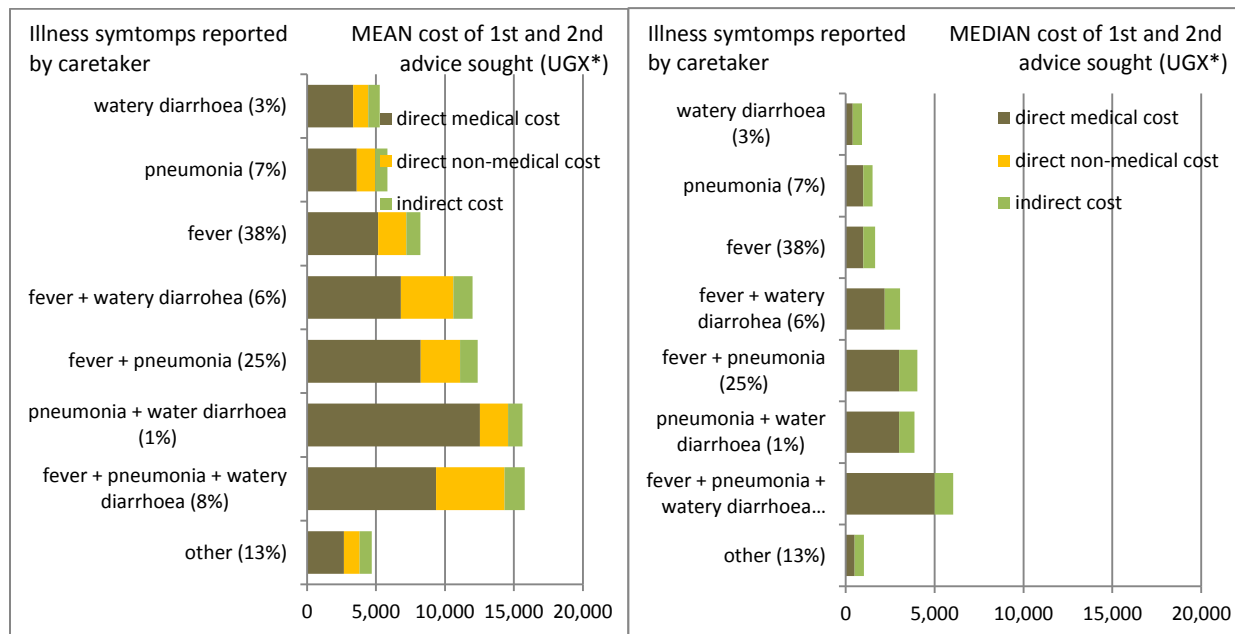
1 USD=2,500 UGX

In total, 80% of caretakers that consulted a VHT, and 53% of caretakers overall, reported that it took them less than 30 minutes to reach the point of care (FIGURE 14). Public facilities of level II or higher were associated with the longest transport times, 12% households that consulted such facilities reported a transport time to reach the facility of 2 hours or more.

The most common way of reaching the 1ˢᵗ point of care was walking (75% of caretakers), followed by
cycling and motorcycle taxi (11% and 10% of caretakers respectively). Of those caretakers that sought a
2ⁿᵈ opinion for their ill child, 65% walked, 17% took a motorcycle taxi and 13% cycled. Overall, 96% of
caretakers that consulted a VHT walked. Caretakers that consulted a public health centre level IV or a
hospital were the most likely to use a means of transport to reach the facility, 56% of these caretakers
got to the facility by other means by walking

Caretakers in Buliisa and Kiryandongo reported the longest transport time to reach a point of care. 12%
of caretakers in Buliisa and 10% in Kiryandongo reported transport times exceeding 2 hours (FIGURE 15).

FIGURE 15. TRANSPORT TIME TO CARE-SEEKING BY DISTRICT (N=3960 HEALTH CARE CONTACTS FOR CHILDREN
AGED 2 MONTHS TO 5 YEARS – 74 OBSERVATIONS UNKNOWN/MISSING)

36
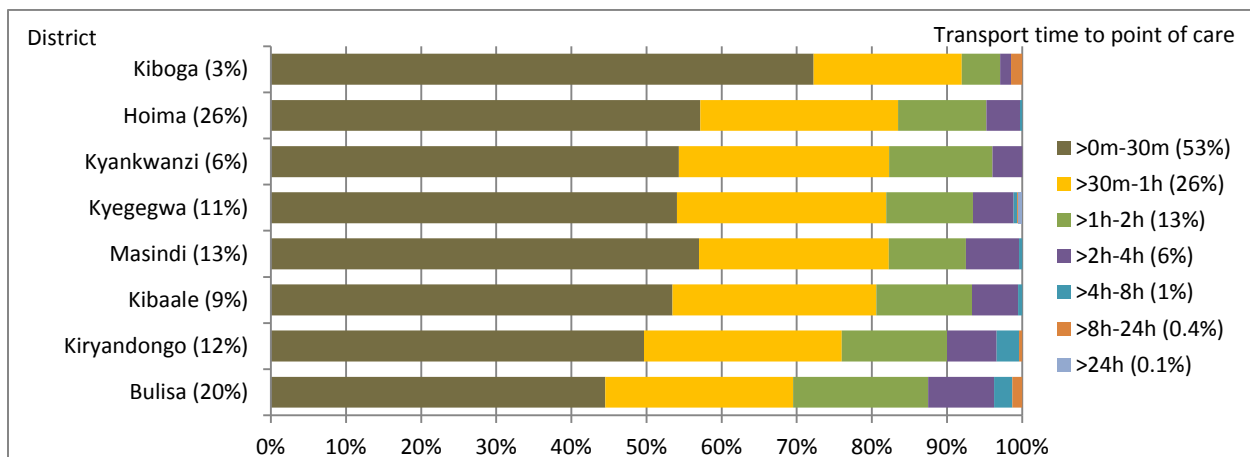
Focus Box I

Focus on: Drugs provided to iCCM VHTs

Uganda MoH/WHO guidelines recommend Coartem, Zinc+ORS, and Amoxycillin as first line drugs for fever, diarrhoea and pneumonia in children under five years (and over 2/4months) respectively. VHTs are trained to treat sick children with these drugs only. Other health providers include a wider range of (not necessarily appropriate) treatment options. Figure B1 shows the range of sources from which caretakers obtained drugs used to treat sick children.

B1. Source of drugs for children who took Amoxycillin, ORS, Zinc, and Coartem:
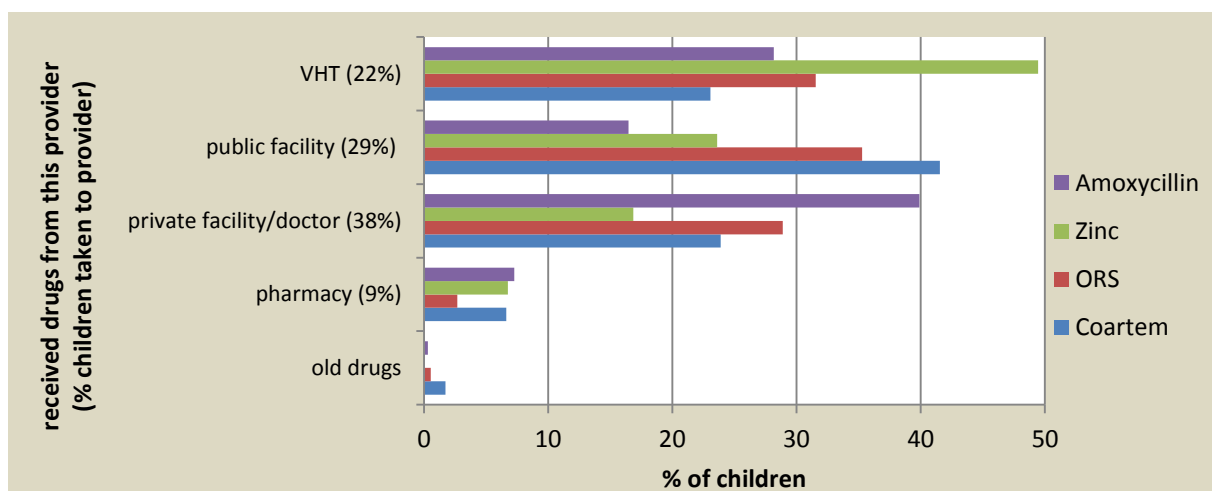
Prompt treatment (within 24 hours of onset of symptoms) with the above drugs was also part of the VHT duty of care/counseling package. Overall, caretakers reported that their children were treated promptly more than half of the time (this did not vary greatly by drug type).

B2. Promptness of treatment (%) for children with FDP treated with Amoxycillin, ORS, Zinc, or Coartem
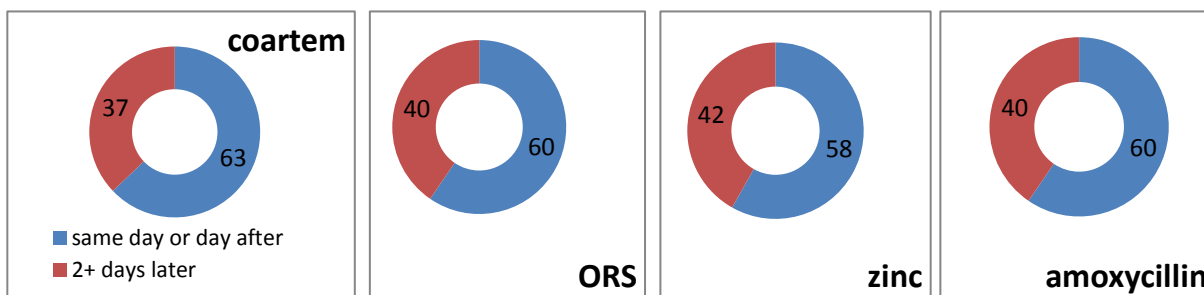
Pregnancy and delivery sub-survey

We had complete data for a sub-sample of the 167 mothers of 168 children (including one set of twins) less than 2 months of age at the time of the survey. 96% (161) of women were reported to have had some Antenatal Care (ANC) whilst only 38% had made 4 or more ANC visits. TABLE 6 provides information about the ANC visits for those 161 mothers who had made at least one visit in pregnancy. Just over half of the women (52%) delivered in a facility or maternity home (TABLE 7).

TABLE 6. TIMING AND NUMBER OF ANC VISITS SHOWN AS A PERCENTAGE OF THE 161 MOTHERS WHO HAD MADE AT LEAST ONE ANC VISIT DURING PREGNANCY

timing of first ANC visit (161 women)	freq	%
1st trimester	32	19.88
2nd trimester	89	55.27
3rd trimester	39	24.22
don't know	1	0.62
number of ANC visits (161 women)	freq	%
1 visit	14	8.70
2 visits	27	16.77
3 visits	54	33.54
4 visits	44	27.33
5 visits	9	5.59
6 visits	7	4.35
7 visits	1	0.62
8 visits	2	1.24
don't know	3	1.86

TABLE 7. DELIVERY LOCATIONS FOR PREGNANT WOMEN IN SURVEY

location	freq	%
home	64	38.32
traditional birth attendant	15	8.98
health centre	44	26.35
midwife/maternity home	2	1.20
private clinic	20	11.98
hospital	21	12.57
other	1	0.60
combined		
facility/maternity home	87	52.10
home/TBA	79	47.30

161/167 mothers knew their village had a VHT (96%), and these were asked about VHT visits to their households after their delivery. Of these, only 28 (17%) had received a VHT visit in the week following their delivery, the majority of which occurred within the first 3 days of the life of the newborn (75%). Only 7 mothers (4%) received 3 or more visits in the first week. TABLE 8 shows the VHT visit breakdown for the 28 women receiving visits.

TABLE 8. NUMBER AND TIMING OF VHT VISITS TO RECENTLY DELIVERED WOMEN, SHOWN AS A PERCENTAGE OF THOSE VISITED (28) AND OF ALL WOMEN WHO KNEW THEIR VILLAGE HAD A VHT (161)

number of visits	freq	% visited	% overall
1	12	42.86	7.45
2	9	32.14	5.59
3	5	17.86	3.11
4 or more	2	7.14	1.24
timing of 1st visit	freq	% visited	% overall
day of birth	7	25.00	4.35
day after birth	9	32.14	5.59
day 3	5	17.86	3.11
day 4	1	3.57	0.62
day 5	3	10.71	1.86
day 7	3	10.71	1.86

Mothers were also questioned about the post-delivery care of their newborns (TABLE 9); specifically, information was compiled on cord care, drying, and breastfeeding behaviour for the 168 babies in the sub survey.

TABLE 9. POST-DELIVERY CARE OF NEWBORNS: A) CORD CARE, B) DRYING AFTER BIRTH, C) INITIATION OF BREASTFEEDING

a)	overall		facility birth		community birth	
	freq	%	freq	%	freq	%
applied something to cord	114	67.86	58	66.67	56	68.14
substances applied to cord						
medicine	8	7.02	6	10.34	2	3.57
baby powder	37	32.46	19	32.76	18	32.14
ash	8	7.02	2	3.45	6	10.71
saline	19	16.67	13	22.41	6	10.71
herbs	29	25.44	12	20.69	17	30.36
not known	13	11.40	6	10.34	7	12.50

b)

	overall		facility birth		community birth	
	freq	%	freq	%	freq	%
baby dried after birth	140	**83.33**	68	**78.16**	72	**88.89**
timing of drying						
<15mins	106	**75.71**	52	**76.47**	54	**75.00**
15-30mins	8	**5.71**	4	**5.88**	4	**5.56**
30-60mins	6	**4.29**	3	**4.41**	3	**4.17**
1-3hrs	9	**6.43**	4	**5.88**	5	**6.94**
>3hrs	9	**6.43**	4	**5.88**	5	**6.94**

c)

	overall		facility birth		community birth	
	freq	%	freq	%	freq	%
baby breastfed	168	**100%**	87	**100%**	81	**100%**
timing of breastfeeding						
1hr (of birth)	80	**47.62**	45	**51.72**	35	**43.21**
>1-3hrs	43	**25.60**	21	**24.14**	22	**27.16**
>3-12hrs	16	**9.52**	7	**8.05**	9	**11.11**
>12-24	13	**7.74**	4	**4.60**	9	**11.11**
>24hr	16	**9.52**	10	**11.49**	6	**7.41**

VHT Survey

A sample of 360 iCCM-trained VHTs were interviewed for the baseline survey (i.e. all iCCM-trained VHTs in the villages we sampled; from a total of an estimated 6000 VHTs across the study area); approximately 76% of the villages had 2 iCCM-trained VHTs (all villages had at least one trained VHT). TABLE 10 shows the distribution of our sub-sample of VHTs by district, and the following table (TABLE 11) provides a breakdown of VHT demographics.

TABLE 10. ICCM VHT STATISTICS BY DISTRICT

district	number of subcounties	number of VHTs	villages with 2 iCCM VHTS	
			freq	%*
BULIISA	6	50	20	66.67
HOIMA	11	95	40	72.73
KIBAALE	4	35	15	75.00
KIBOGA	2	20	10	100.00
KIRYANDONGO	4	34	14	70.00
KYANKWANZI	6	26	11	73.33
KYEGEGWA	3	45	20	80.00
MASINDI	5	55	25	83.33
totals	**41**	**360**	**155**	**75.61**

*denominator=total villages

VHT Demographics

TABLE 11. DEMOGRAPHIC INDICATORS FOR 360 ICCM VHTS SAMPLED AT BASELINE

Parameter		
age group (yrs)	freq	%
<30	81	**22.50**
30-39	127	**35.28**
40-49	99	**27.50**
50+	53	**14.72**
education (level completed)	freq	%
no education	0	**0.00**
some primary (<7 years)	47	**13.06**
7/8 years of primary	217	**60.28**
standard secondary/above	96	**26.67**
occupation	freq	%
professional/clerical	11	**3.06**
farmer/manual/domestic	295	**81.94**
self-employed business	42	**11.67**
unemployed	1	**0.28**
student/other	11	**3.06**
ethnicity (broad categories)		
Luo	53	**14.72**
Bantu	281	**78.06**
Lugbara/other	26	**7.22**
religion	freq	%
no religion	234	**65.00**
protestant	114	**31.67**
catholic	10	**2.78**
tradit/musl/charis/oth[*]	2	**0.56**

*traditional/Muslim/charismatic Christian/other

VHT assets and expenditure

VHTs' household wealth was estimated by means of an asset index, which included a number of questions on house construction, ownership of household items, land, animals and transport means, as well as status of water and sanitation infrastructure. Typically VHTs were more likely to own at least one bicycle (66%), have a metal roof (70%), a borehole or well as the main water supply (72%), and a store of firewood as the main source of cooking (96%), in comparison to families in the households survey. As with asset data from the household survey, a wealth index was created to rank the VHTs according to their relative wealth.

FIGURE 16 presents VHT household wealth in relation to the wealth of the entire survey population (households and VHTs). 63% of the VHTs surveyed belong to the two highest wealth quintiles.

FIGURE 16. VHT HOUSEHOLD WEALTH
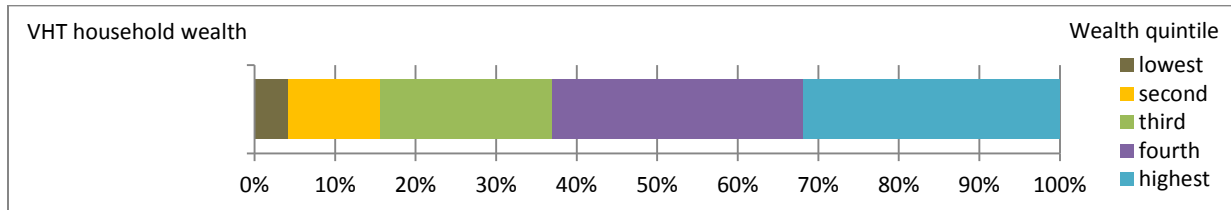
93% of the VHT sample reported that their principal occupation was self employed farmer/fishermen/cattle-keeper or self-employed businessperson. None of the VHTs that worked in the private sector or were civil servants belonged to the lowest two wealth quintiles. One VHT reported that they were unemployed, they all belonged to the lowest wealth quintile (FIGURE 17).

FIGURE 17. VHT HOUSEHOLD WEALTH BY VHT OCCUPATION
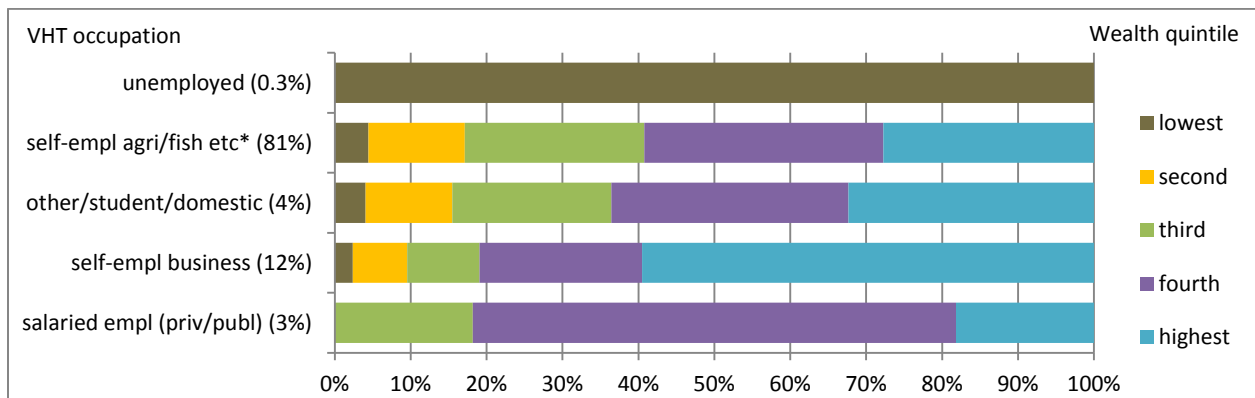
farmer/fisher/cattlekeeper(+casual workers (1%))

65% OF VHTS REPORTED THAT THEY HAD OCCURRED EXPENSES IN RELATION TO TRAVELLING TO THE HEALTH FACILITY IN THE LAST 3 MONTHS, 31% OF THOSE VHT THAT OCCURRED EXPENSES REPORTED THAT THESE WERE REIMBURSED PARTLY OR FULLY BY THE SUPERVISOR. 67% OF VHTS REPORTED MOBILE PHONE EXPENSES IN THE LAST 3 MONTHS, NONE OF THE VHTS REPORTED THAT THESE WERE REIMBURSED. 28% OF VHTS REPORTED OTHER VHT-RELATED EXPENSES IN THE LAST 3 MONTHS, SUCH AS PARAFFIN, SOAP, PHOTOCOPYING OF REFERRAL FORMS (TOTAL COST OF SUCH EXPENDITURES WERE NOT REPORTED). MEAN NON-REIMBURSED TRAVEL EXPENDITURE AND MOBILE PHONE EXPENDITURE IN THE LAST 3 MONTHS FOR THE VHT SAMPLE WERE UGX 6,000 (USD 2.4) AND UGX 3,700 (USD 1.5) RESPECTIVELY (

FIGURE 18

FIGURE 18. MEAN VHT-RELATED EXPENDITURE IN LAST 3 MONTHS BY DISTRICT
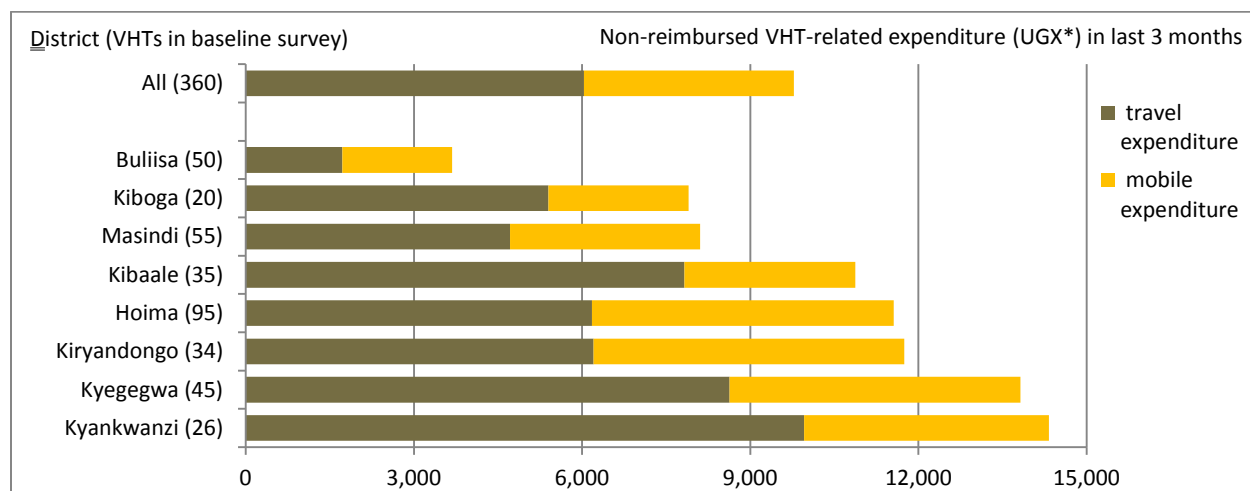
*1 USD=2,500 UGX

5% of the VHTs reported that they had received gifts from community members in the last 2 months (such as maize, soda, sugar, chicken, matoke, beans). None of the VHTs reported receiving any money for their VHT work from community members.

VHT Supervision, workload and stock-outs

VHTs are supervised by staff at local health facilities, the first point of call for replenishment of their stocks of drugs and RDTs. In all districts the vast majority of VHTs (80%-100%) reported having had at least 1 supervision visit in the previous quarter (TABLE 12).

TABLE 12. VHT SUPERVISION (MET WITH SUPERVISOR)

Number of visits	none		1		2		3		4+	
district	freq	%	freq	%	freq	%	freq	%	freq	%
BULIISA	7	14.00	15	30.00	13	26.00	11	22.00	4	8.00
HOIMA	2	2.11	15	15.79	34	35.79	29	30.53	15	15.79
KIBAALE	0	0.00	17	48.57	11	31.43	5	14.29	2	5.71
KIBOGA	4	20.00	5	25.00	4	20.00	2	10.00	5	25.00
KIRYANDONGO	0	0.00	16	47.06	11	32.35	5	14.71	2	5.88
KYANKWANZI	3	11.54	6	23.08	11	42.31	2	7.69	4	15.38
KYEGEGWA	5	11.11	11	24.44	15	33.33	9	20.00	5	11.11
MASINDI	5	9.09	22	40.00	13	23.64	11	20.00	4	7.27
total	26	7.22	107	29.72	112	31.11	74	20.56	41	11.39

During the 2 weeks prior to being interviewed, the VHTs saw on average 4.1 children and visited 4.3 households. VHTs in Kiryandongo had the highest average number of contacts: 6 children and 5.8 households per VHT (FIGURE 19).

FIGURE 19. AVERAGE NUMBER OF CHILDREN SEEN AND HOUSEHOLDS VISITED PER VHT BY DISTRICT
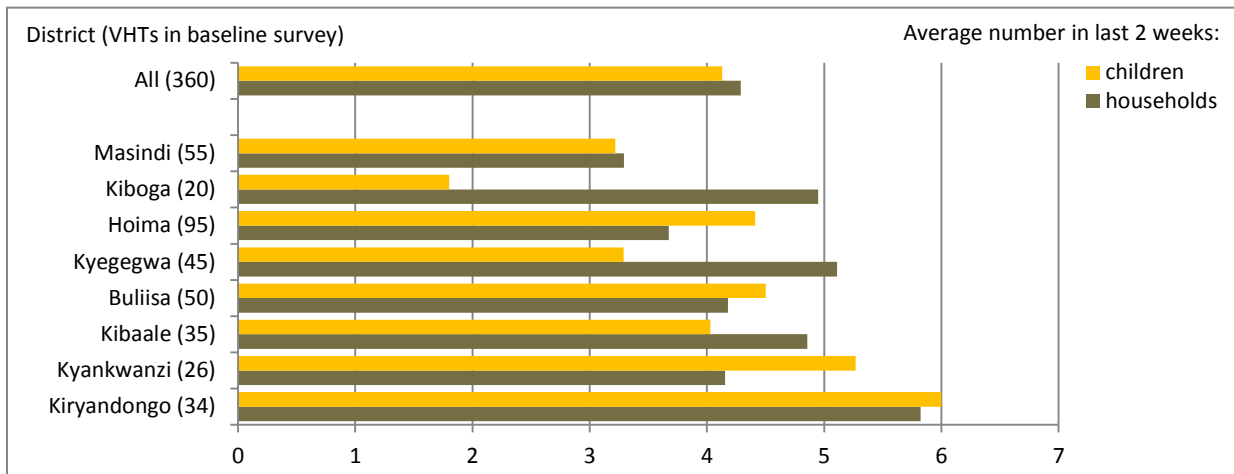
Overall, 70% of the VHTs surveyed saw between 1 and 10 children in the 2-week period. 22% of VHTs did not see any children at all. Less than 2% of VHTs saw more than 20 children in the 2-week period. As can be seen in FIGURE 20, Kiryandongo also had the lowest proportion of VHTs that did not see any children at all in the 2-week period as well as the highest proportion of VHTs that saw more than 5 children.

FIGURE 20. CHILDREN UNDER 5 SEEN IN LAST 2 WEEKS (TIME INTERVAL JUN-AUG 2011) BY DISTRICT
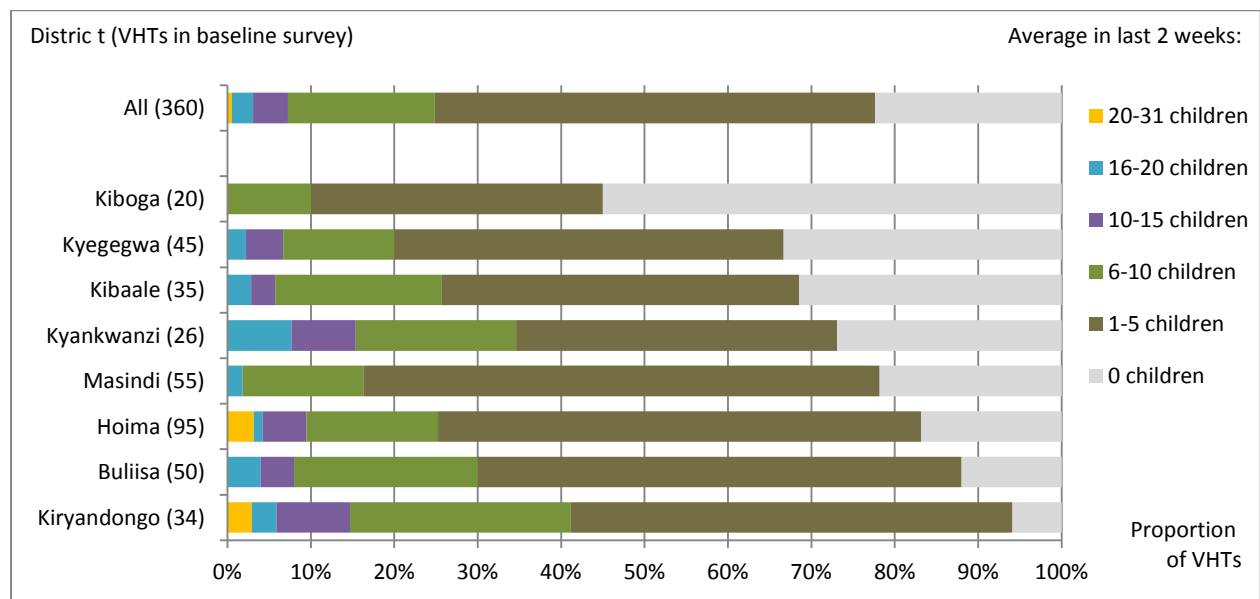
Of the VHTs surveyed that had seen at least 1 child in the last 2-week period, 57% reported that they had spent on average 16-30 minutes per child. 5% of the VHTs spent more than 1 hour on average per child (FIGURE 21). Of the VHTs that had conducted household visits in the 2-week period prior to being interviewed, 66% spent from 15 minutes up to an hour in each household (Figure 22).

FIGURE 21. A) AVERAGE TIME SPEND ON A CHILD CONSULTATION B) AVERAGE TIME SPENT IN EACH HOUSEHOLD

a)

% of VHTs

Time per child seen
in the last 2 weeks:

1%
4%
16%
21%
57%

- <15 min
- 16-30 min
- 31-60 min
- 1-2 h
- 2-4 h

b)

% of VHTs

Time per household visited in the
last 2 weeks:

2% 1%
9%
23%
30%
36%

- <15 min
- 16-30 min
- 31-60 min
- 1-2 h
- 2-4 h
- 4-6 h
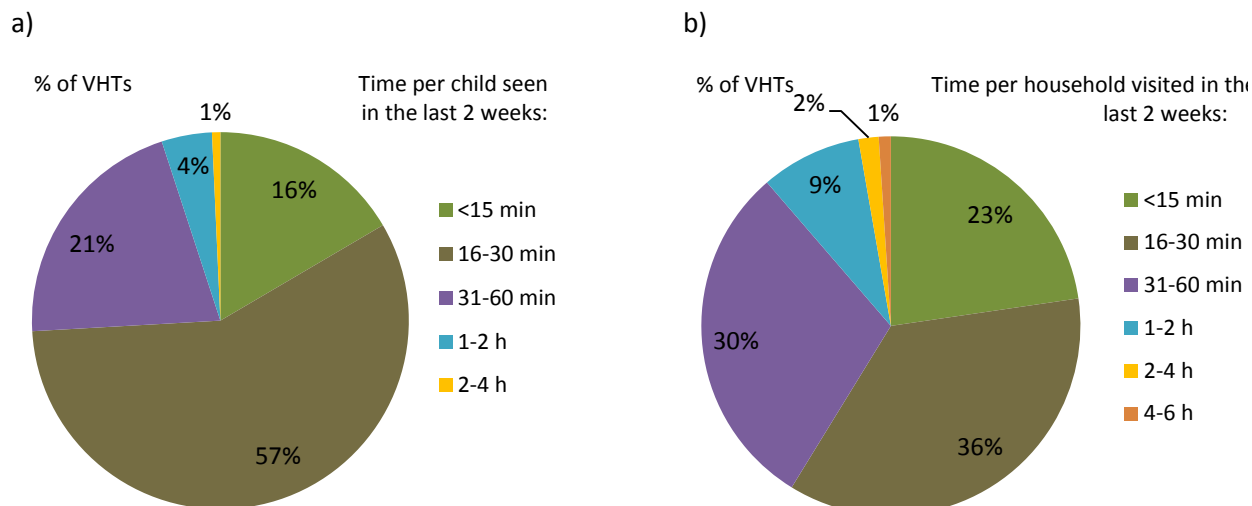
32% of the VHTs reported that they had had other activities as VHTs in the last 2 weeks, including sensitisation in the community (in relation to for example nutrition, hygiene and sanitation), visiting newborns and pregnant women, taking children to a health facility, administrative work, and collection of drugs. The VHTs that had dedicated time to such activities spent on average 3 hours during the 2-week period (median time: 1.5 hours, range: 5 minutes to 24 hours).

Questions were not asked in a way that allowed for a comprehensive estimate of time dedicated to VHT work in the 2-week period, but an approximate calculation (multiplying the number of children seen/households visited with the average time per child/household plus time spend on other activities as reported) gave that the VHTs spent on average 6 hours on VHT work in the 2-week period, ranging across districts from an average of 4 hours in Hoima to 10 hours in Kiryandongo (overall median time dedicate to VHT work was 3.5 hours, range: 0 to 86.5 hours).

We had full data on availability of iCCM stock for 348 VHTs. 96% (333) of VHTs reported a stock-out of one or more drugs within the previous quarter. Reports of stock-outs of key pneumonia drugs were highest (TABLE 13).

TABLE 13. PERCENTAGE OF VHTS WITH STOCK-OUTS OF BELOW DRUGS/TOOLS IN PAST 3 MONTHS (348 VHTS ANSWERED ALL QUESTIONS). 'OUT OF STOCK OF ALL DRUGS' ROWS:- STOCK-OUTS MAY NOT NECESSARILY HAVE BEEN AT THE SAME TIME WITHIN PAST QUARTER

Drug or tool type	freq	%
any diarrhoea drug	192	55.17
zinc	178	51.15
ORS	113	32.47
out of stock both diarrhoea drugs	**99**	**28.45**
any pneumonia drug	283	81.32
amoxycillin (pink)	249	71.55
amoxycillin (green)	244	70.11
out of stock both amoxycillin drugs	**210**	**60.34**
any fever drug	156	44.83
coartem (blue)	123	35.34
coartem (yellow)	123	35.34
rectal artesunate	34	9.77
out of stock all fever drugs	**18**	**5.17**
out of stock all drugs	**8**	**2.30**
RDT	239	68.68
Respiratory rate timer (non-functioning)	24	6.90

VHT performance and motivation

VHT KNOWLEDGE OF THE CORRECT MANAGEMENT OF FDP WAS TESTED USING A SERIES OF VIGNETTES (HYPOTHETICAL SCENARIOS INVOLVING SICK CHILDREN), WHICH WERE LATER SCORED BY THE PROJECT CLINICIAN. A MAXIMUM SCORE OF 58 WAS POSSIBLE IF THE VHT CORRECTLY MENTIONED ALL THE KEY POINTS NECESSARY FOR CORRECT DIAGNOSIS, TREATMENT AND REFERRAL ACCORDING TO THEIR TRAINING ALGORITHM. THE BASELINE SURVEY DID NOT ATTEMPT TO BREAK DOWN PERFORMANCE BY ILLNESS TYPE, NOR WAS A MINIMUM 'ACCEPTABLE' PERFORMANCE LEVEL SPECIFIED AT THIS STAGE. THE AVERAGE PERFORMANCE SCORE ACROSS THE SAMPLE WAS 33 (IQR 30-36).

FIGURE 22 shows the distribution of performance scores, indicating that VHTs in Hoima had on average the highest-scoring VHTs in contrast with Kibale which had the lowest scoring VHTs.

FIGURE 22. BOXPLOT SHOWING VHT MEDIAN PERFORMANCE BY DISTRICT (25TH AND 75TH PERCENTILES FORM THE TOP AND BOTTOM OF THE BOX, WITH 5TH AND 95TH PERCENTILES AS WHISKERS)
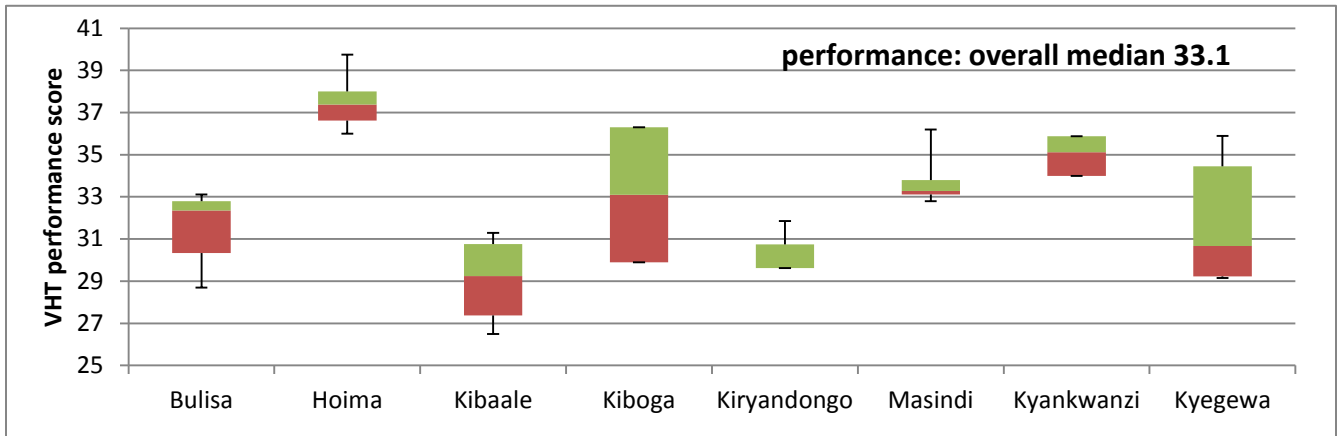
VHTs were read a set of 29 statements relating to feelings of motivation and identity, to which they indicated their level of agreement with each statement on a likert scale of 1 (strongly agree) to 5 (strongly disagree). Factor analysis was conducted to streamline the tool (several statements were dropped after the survey as not representative - see appendix section 0 for details of this analysis). This produced a percentage motivation score which ranked VHTs from the most motivated (100%) to least motivated (1%).

FIGURE 23 shows the mean percentage motivation for the VHTs in each district using the motivation measure.

FIGURE 23. BOXPLOT SHOWING VHT MEDIAN % MOTIVATION BY DISTRICT (25TH AND 75TH PERCENTILES FORM THE TOP AND BOTTOM OF THE BOX, WITH 5TH AND 95TH PERCENTILES AS WHISKERS)
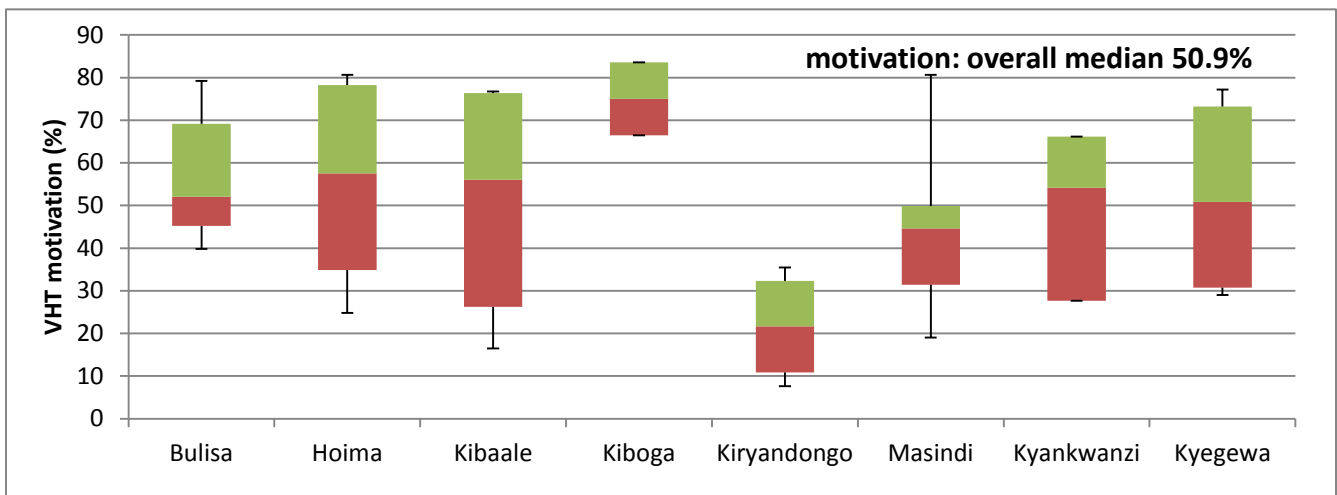
The graphs in FIGURE 24 map the mean motivation and performance scores against VHT workload (household visits and children seen) and supervision by health facility staff. There is a trend of increasing VHT motivation and performance with increasing health facility supervision visits to VHTs, and a suggestion of a negative relationship between motivation and workload (particularly motivation against number of children seen in past 2 weeks).

FIGURE 24. SHOWING MEAN % MOTIVATION (LEFT HAND AXIS) AND MEAN PERFORMANCE SCORE (RIGHT HAND AXIS) AGAINST NUMBER OF A) VHT SUPERVISION MEETINGS B) VHT VISITS TO HOUSEHOLDS AND C) CHILDREN SEEN BY VHTS

a)
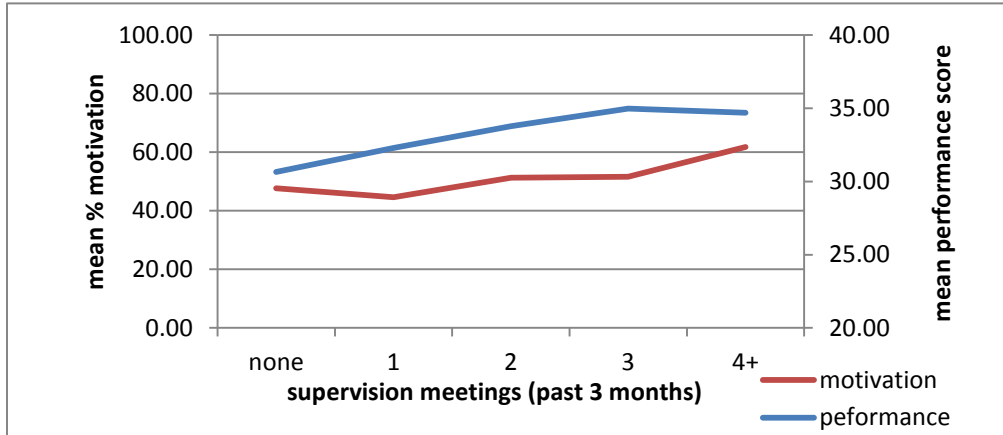
b)
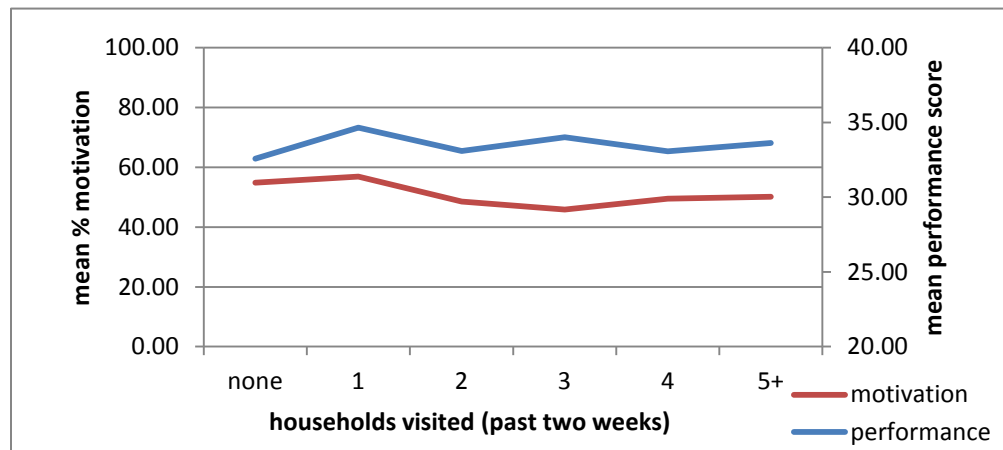
c)
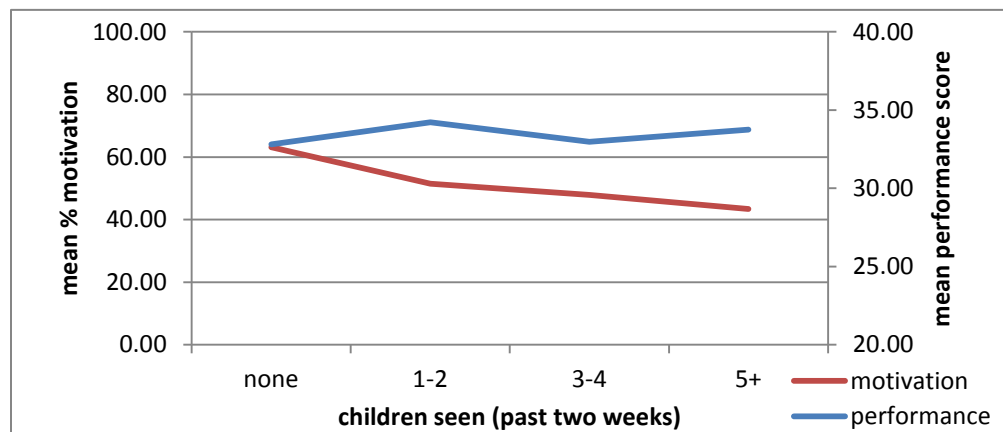
Community awareness of VHTs

Data was collected on knowledge of, and contact with VHTs from 3717 caretakers of children under five years. Whilst the majority (94%) knew that their community had a VHT, only a quarter had been visited by a VHT within the past month (25%). TABLE 14 (lower section) shows the range of activities conducted by the VHT during household visits (according to the caretaker interviewed).

TABLE 14. CARETAKER PERCEPTIONS OF VHTS: PERCENTAGES WITH KNOWLEDGE OF THE PRESENCE OF THE VHT IN THE COMMUNITY, VISITED BY A VHT AND DETAILS OF VISIT CONTENT

	freq	%	total
community has VHT	3,506	94.32	3,717
visited by VHT in past month	934	26.64	3,506
VHT activities during visit (62 did not answer all qns):			
asked about vaccinations	476	54.59	872
kept a health record for family	483	55.39	872
gave advice about health	257	29.47	872
asked/observed health practices	659	75.57	872

Health Facility Survey

TABLE 15 shows a breakdown of the 79 VHT-linked health facilities across the 8 districts, which serve a total of approximately 2305 villages in the catchment area. Across all districts nearly half (47%) of all facilities were at level II (VHTs are at level I).

TABLE 15. DISTRIBUTION OF HEALTH FACILITIES WITHIN STUDY DISTRICTS

	HF II		HF III		HF IV		Hospital		total		total
district	freq	%	freq	%	freq	%	freq	%	freq	% of all facilities	villages served*
BULIISA	4	**66.67**	1	**16.67**	1	**16.67**	0	**0.00**	6	**7.59**	121
HOIMA	14	**50.00**	10	**35.71**	4	**14.29**	0	**0.00**	28	**35.44**	433
KIBAALE	1	**16.67**	4	**66.67**	0	**0.00**	1	**16.67**	6	**7.59**	308
KIBOGA	1	**25.00**	1	**25.00**	1	**25.00**	1	**25.00**	4	**5.06**	94
KIRYANDONGO	3	**42.86**	3	**42.86**	0	**0.00**	1	**14.29**	7	**8.86**	119
KYANKWANZI	1	**25.00**	2	**50.00**	1	**25.00**	0	**0.00**	4	**5.06**	79
KYEGEGWA	3	**33.33**	5	**55.56**	1	**11.11**	0	**0.00**	9	**11.39**	910
MASINDI	10	**66.67**	4	**26.67**	1	**6.67**	0	**0.00**	15	**18.99**	241
Overall	**37**	**46.84**	**30**	**37.97**	**9**	**11.39**	**3**	**3.80**	**79**	**100%**	**2305**

*Estimated from health facility records

Standard treatment for childhood illnesses

Overall, 100% of the health facilities had had a recent case of childhood malaria on record, compared with 97% (77) for diarrhoea and 85% (67) for pneumonia. We collected data from these records on the types of drugs prescribed for the illness (FIGURE 25 – with a breakdown by health facility level in TABLE 16). As data on child age/weight/severity of disease was not recorded on file, we were not able to confirm whether the doses and durations advised for the treatments were correct according to the particular aspects of each case.

FIGURE 25. % OF FACILITIES PRESCRIBING APPROVED DRUGS FOR LAST CASE OF FDP ON RECORD
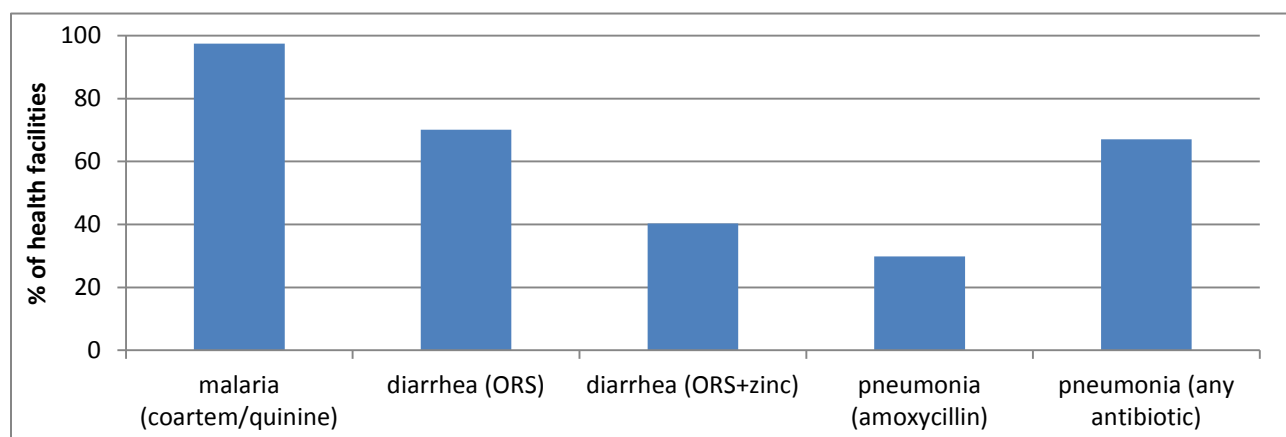
TABLE 16. BREAKDOWN OF APPROPRIATE TREATMENT FOR FDP BY HEALTH FACILITY (HF) LEVEL

HF level	coartem/quinine for **malaria**		ORS for **diarrhoea**		ORS+zinc **for diarrhoea**		Amoxy for **pneumonia**		any reasonable antibiotic for **pneumonia**	
	freq	%	freq	%	freq	%	freq	%	freq	%
HF II	37	**100**	24	**66.67**	13	**36.11**	5	**17.24**	21	**72.41**
HF III	28	**93.33**	22	**75.86**	15	**51.72**	10	**35.71**	23	**82.14**
HF IV	9	**100.00**	5	**55.56**	2	**22.22**	4	**50.00**	8	**100.00**
Hospital	3	**100**	3	**100.00**	1	**33.33**	1	**50.00**	1	**50.00**

Shown in TABLE 17 are details of stock outs of key drugs by facility level, in the three months prior to the survey. Whilst the length of a stock out was unknown, the high rates of amoxycillin stock-outs across facilities (77%) nonetheless correspond with the low rates of pneumonia treatment using this drug (FIGURE 25).

TABLE 17. % OF HEALTH FACILITIES REPORTING A DRUG STOCK-OUT IN THE PREVIOUS QUARTER, FOR KEY DRUGS. OVERALL PERCENTAGES: OUT OF ALL FACILITIES. PERCENTAGES AT EACH FACILITY LEVEL: OUT OF ALL FACILITIES WITH STOCK-OUTS. 74/79 AND 71/79 FACILITIES PROVIDED DATA FOR COARTEM YELLOW AND BLUE RESPECTIVELY, ALL 79 FACILITIES PROVIDED DATA FOR OTHER DRUGS.

	Overall		HF II		HF III		HF IV		Hospital	
Drug type	freq	%	freq	%	freq	%	freq	%	freq	%
ORS	10	**12.66**	3	**30.00**	1	**10.00**	5	**50.00**	1	**10.00**
Zinc	37	**46.84**	19	**51.35**	12	**32.43**	5	**13.51**	1	**2.70**
Amoxycillin capsules	61	**77.22**	31	**50.82**	23	**37.70**	7	**11.48**	0	**0.00**
Coartem yellow	30	**40.54**	18	**60.00**	8	**26.67**	4	**13.33**	0	**0.00**
Coartem blue	40	**56.34**	26	**65.00**	9	**22.50**	4	**10.00**	1	**2.50**

VHT Supervision – Health facility

244 health staff across all districts were identified at time of the survey as having had training in the supervision of iCCM VHTs. The majority of supervisors were based at level II-III facilities (TABLE 18).

TABLE 18. SUPERVISORY STAFF NUMBERS AT HEALTH FACILITIES PER DISTRICT, BY HEALTH FACILITY LEVEL (TOTALS)

District	HF II	HF III	HF IV	Hospital	total	% level II+III
Buliisa	12	4	8	0	24	66.7
Hoima	28	27	15	0	70	78.6
Kibaale	1	20	0	3	24	87.5
Kiboga	2	3	9	16	30	16.7
Kiryandongo	6	9	0	3	18	83.3
Kyankwanzi	1	4	4	0	9	55.6
Kyegegwa	4	14	6	0	24	75.0
Masindi	24	18	3	0	45	93.3

24% of the health facilities included in the survey reported that facility staff had not spent any time on supervision of the VHTs allocated to their facility in the last 3 months prior to the survey. FIGURE 26 presents the average time spent on supervision per VHT (including also those facilities that reported no time dedicated to VHT supervison), by district. Health facilities in Buliisa and Kyankwanzi reported almost no time dedicated to VHT supervision. The reported average time dedicated to VHT supervision in the 3 months across district was just over 30 minutes per VHT.

FIGURE 26. AVERAGE TIME SPEND ON SUPERVISION (VHT HOME VISITS AND IN FACILITY) PER VHT ALLOCATED TO FACILITY, OVERALL AND BY DISTRICT (N=75 – 4 OBSERVATIONS MISSING)
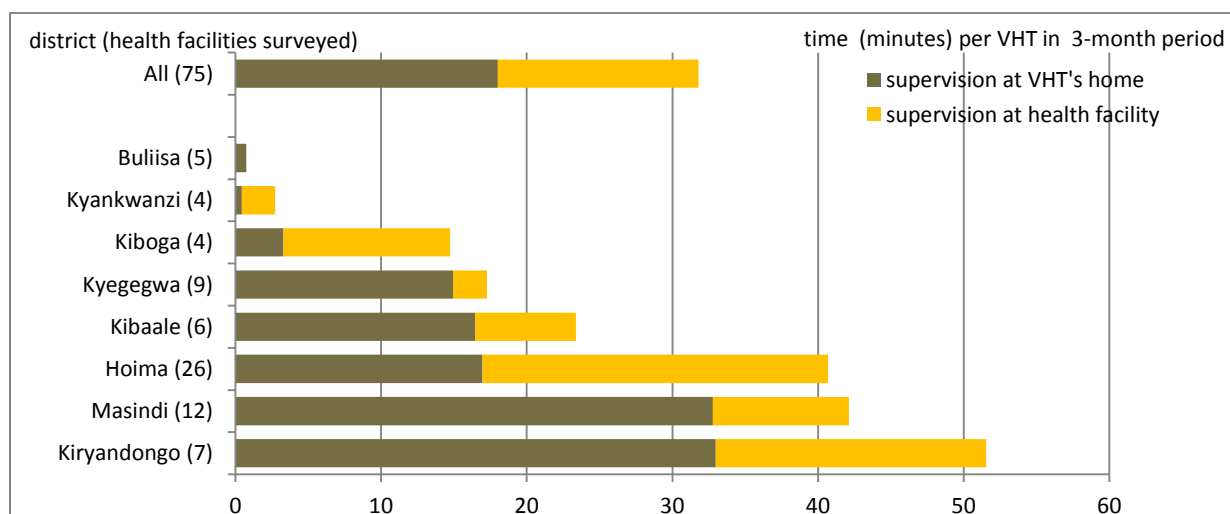
Focus Box 2

Focus on: Staff and Equipment in health facilities

The potential to correctly manage childhood cases of fever pneumonia and diarrhoea will be influenced by the presence of skilled clinical staff and working equipment within facilities.

B3. Mean number of clinical staff by public health facility level
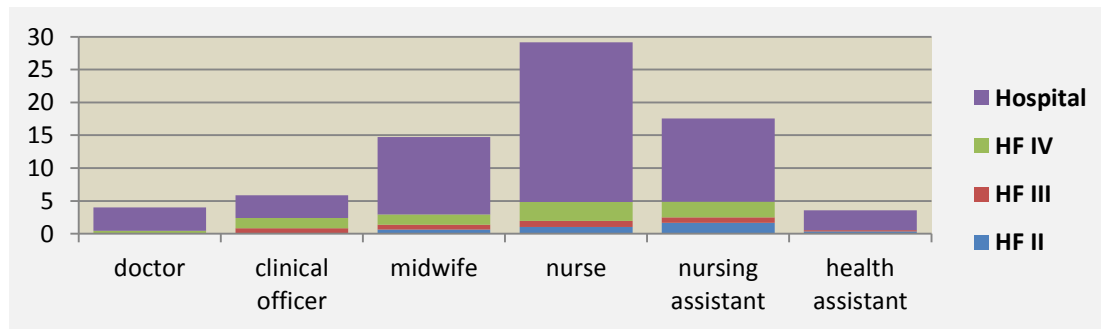
B4. Availability of equipment by public health facility level

respiratory timers

weighing scales
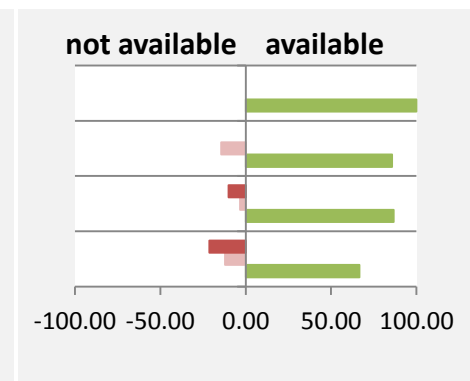
microscopes

thermometers

RDTs
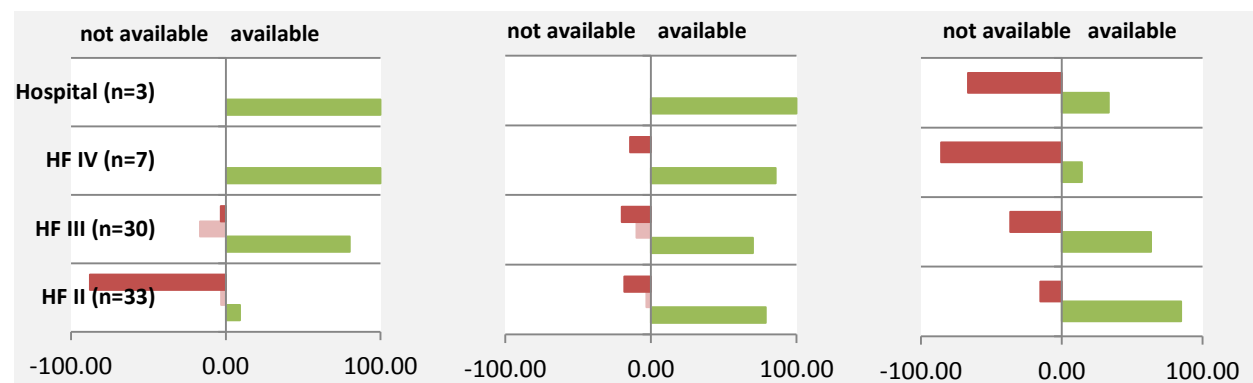
inSCALE Endline Survey: Sample size and restricted randomisation

Sample size

TABLE 19 compares the parameters used in the calculation of sample size for the baseline survey, with the updated parameters (obtained from the baseline data) which were used to re-calculate sample sizes for the endline survey (see Appendix section 0 for methods).

Significant differences between estimates were found, particularly between pre-baseline and post-baseline values for prevalence of households with children under five years, numbers of children per household, and the coefficients of variation (CVs).

TABLE 19. VALUES FOR THE KEY PARAMETERS USED IN THE ESTIMATION OF SAMPLE SIZE AND POWER CALCULATIONS FOR THE BASELINE SURVEY (PRE-BASELINE) AND THOSE WHICH WILL BE USED FOR THE ENDLINE SURVEY (POST-BASELINE)

	Pre-baseline estimate	Post-baseline
Sample		
% Households with children >2months & <5yrs	63.2	**59.51**
Average num. of children/HH	2	**1.7**
Prevalence of		
fever	40.00	**46.65**
diarrhoea (watery)	25.00	**10.54**
pneumonia	15.00	**23.75**
Appropriate treatment of		
fever	≤30%/<60%*	**47%**
diarrhoea (watery)	≤50%	**30%**
pneumonia	20%-70%	**54%**
CV for appropriate treatment of		
fever		**0.16**
diarrhoea (watery)	0.15	**0.15**
pneumonia		**0.18**

Based on these updated figures, we estimate that we will have 90% power to detect a difference of ≥10% between control and intervention clusters for appropriate treatment of fever and pneumonia, and ≥15% for appropriate treatment of diarrhoea by sampling 220 children per cluster in the endline survey.

Restricted randomisation

The inSCALE intervention in Uganda will be evaluated using a three armed cluster randomized controlled trial, comparing a technology based intervention, a community-based interventions and a control arm.

A restricted randomization was performed to minimize the differences between the three arms on key indicators – average proportion of children appropriately treated for FDP (3 indicators), average VHT motivation, and the average (log10) cost of treatment for children with FDP. In an iterative process, clusters were repeatedly randomly allocated to each of the three arms of the trial, producing a series of different cluster combinations, or schemes. Only schemes with small between-arm differences in values for these key parameters were kept. The maximum allowed size of the difference between arms for each parameter is shown in TABLE 20 (displayed as ratios). These ratios were chosen not only to minimize the between-arm differences, but also as they were not overly restrictive, which could otherwise lead to too few randomization schemes fitting all the criteria (and resulting in selection bias).

TABLE 20. BETWEEN-ARM RATIO (UPPER AND LOWER LIMITS) OF THE MEAN VALUES FOR THE 5 PARAMETERS USED IN THE RESTRICTED RANDOMISATION

parameter	mean motivation*	appropriate fever	appropriate diarrhoea	appropriate pneumonia	cost of treatment
upper ratio	1.2	1.1	1.1	1.1	1.1
lower ratio	1/1.2	1/1.1	1/1.1	1/1.1	1/1.1

*using the motivation factor score from the factor analysis (i.e. the values used to create a % score, as this had less variation between clusters). Cost of treatment =log10 cost

Out of 500,000 random allocations of 39/41 clusters to three arms, 13,683 of the allocations fit all the criteria in TABLE 20. After applying a further filter to ensure that all districts had at least one subcounty in the technology intervention arm, and that at least the larger districts had a control arm, a final scheme was picked from the resulting sub-sample of 1791 allocation schemes. In this scheme fortunately all districts had both at least one subcounty in the control arm and one in the technology arm, and 5/8 districts also had at least one subcounty in the community arm.

Table 21 shows the averages per arm for a set of the 15 main parameters, and the between-arm ratio for these parameters, for the final chosen randomisation scheme.

TABLE 21. AVERAGED VALUES PER INTERVENTION ARM FOR 15 PARAMETERS OF INTEREST AFTER SELECTION OF THE FINAL CHOSEN RANDOMISATION SCHEME. VALUES IN BOLD REFER TO THOSE PARAMETERS ON WHICH THE RANDOMISATION WAS RESTRICTED.

stats	cluster size HH/VHT ratio	care to VHT	household/caretaker costcare(L)	costcare(aL)	education	vht quality motivation	performance	prevalence illness fever	diarrhoea	pneum	appropriate treatment fever	diarrhoea	pneum
1.control													
mean	406.50	0.22	**3.14**	1473.89	75.30	**2.29**	33.52	47.55	10.07	22.00	**48.17**	**30.61**	**54.14**
sd	128.07	0.08	**0.18**	525.77	11.32	**0.40**	2.95	11.19	4.56	7.94	**12.49**	**16.92**	**13.07**
2.technology													
mean	376.86	0.18	**3.13**	1459.03	77.29	**2.47**	32.45	43.61	8.89	22.46	**47.65**	**29.62**	**58.22**
sd	172.99	0.07	**0.19**	620.72	7.95	**0.49**	3.76	14.45	4.09	5.56	**8.09**	**13.25**	**8.20**
3.community													
mean	424.94	0.19	**3.15**	1747.03	75.49	**2.34**	34.17	49.83	12.42	26.58	**45.87**	**29.49**	**53.45**
sd	153.95	0.10	**0.27**	1379.35	9.02	**0.40**	3.13	17.03	7.40	10.52	**12.16**	**15.14**	**12.15**
comparison of arms (ratio)													
1 v 2	1.08	1.22	**1.00**	1.01	0.97	**0.93**	1.03	1.09	1.13	0.98	**1.01**	**1.03**	**0.93**
1 v 3	0.96	1.14	**0.99**	0.84	1.00	**0.98**	0.98	0.95	0.81	0.83	**1.05**	**1.04**	**1.01**
2 v 3	0.89	0.93	**0.99**	0.84	1.02	**1.06**	0.95	0.88	0.72	0.84	**1.04**	**1.00**	**1.09**

'Care to VHT' = proportion of sick children care seeking to a VHT; 'costcare(L)'= log10 cost of careseeking; 'costcare(aL)'= anti-log10 cost of care seeking. 'motivation' = factor coefficient score (from EFA).

Baseline Survey – Summary Remarks

The central purpose of this baseline survey was to characterise pre-intervention levels of the main InSCALE parameters in the study area, and to use this data to ensure an acceptable degree of balance between clusters on these key parameters after randomization of the clusters to intervention arms. This survey allowed the successful randomization of the 39 clusters into the 2 intervention and one control arm (with two spare clusters) as part of the evaluation of the InSCALE cluster randomized controlled trial. There was minimal difference between clusters in the proportion of children appropriately treated for FDP, the average level of VHT motivation, and the average (log10) cost of treatment for children with FDP.

In addition to this primary task, further analysis of the survey data showed that the likelihood of receiving appropriate treatment with ACT/ORS/amoxicillin or equivalent for childhood fever, diarrhoea or pneumonia respectively was highest if the child was taken to a VHT, and lowest in the private sector, which was conversely the most expensive option (the VHT being the cheapest). These results are encouraging from both iCCM feasibility and iCCM sustainability viewpoints, indicating that adequate treatment can be made available to households across the socio-economic spectrum at low cost.

2 APPENDIX

Baseline Survey – Sample Size and Study Design

The sample size calculation for the baseline survey was based on the main evaluation outcome:

% children receiving appropriate treatment during illness episodes for each of pneumonia, diarrhoea and fever.

This is also the outcome that requires the largest samples, as not all children surveyed will have had a recent illness episode. The sample size calculation was intended for use in both the study end-line evaluation, and the baseline survey.

Data on village populations were collated from census records of Uganda Bureau of Statistics (UBOS) and Community Information Systems (CIS). Data on VHT training were collated from health facility deployment forms and from data collected in our formative research on demographic characteristics of VHTs. There were 95 clusters (sub-counties) in the 8 study districts. In order to be eligible for randomisation, a cluster had to have VHTs trained on ICCM by 31st January 2011. We excluded clusters which had less than 10 villages in a cluster and clusters where other Malaria Consortium projects are known to collect data from households in order to avoid household fatigue from data collection. This yielded an overall total of 41 eligible sub-counties, giving 3 groups of 13 (plus 2 spare).

The sample size calculation was therefore based on a cluster RCT with 13 sub-counties per arm, and assumed a coefficient of variation (CV) of 0.15 (between-cluster coefficient of variation – conservative estimate as we had no study site-specific data to inform us at the time), and 5% significance level. The number of sick children required/cluster was determined by varying this number in the formula for the number of clusters (as given in Hayes & Moulton (Cluster Randomised Controlled Trials Taylor & Francis USA Chapman and Hall (Pub) 2008)) until the number of clusters/arm equaled 13.

The calculation was based on the formula for comparison of proportions, adjusted for cluster effects stated in equation 7.7 from Hayes & Moulton (see above reference), i.e. where k is the between cluster coefficient of variation:

$$C = 1 + (z_{\alpha/2} + z_\beta)^2 \left((\pi_0(1-\pi_0)/m + \pi_1(1-\pi_1)/m + k^2(\pi_0^2 + \pi_1^2)) / (\pi_0 - \pi_1)^2 \right)$$

Table A1 below shows the number of children with a recent illness episode needed per cluster for each of pneumonia, diarrhoea and fever in order to detect absolute differences between each intervention arm and the control arm, or between the two intervention arms. Where possible calculations were for 90% power; however, it was not possible to achieve 90% power to detect a 10% absolute difference with 13 clusters per arm, and so 80% power was used. The table also shows

the total number of children that needed to be surveyed in order to yield the required number with a recent episode. Prevalence estimates were based on estimates from recent DHS, Malaria Indicator

Power	absolute difference in correctly treated subjects	no. of children with pneumonia, diarrhoea and fever (each) required per cluster	No. of children required to be sampled per cluster to yield this for:		
			Pneumonia (assuming 15% prevalence)	Diarrhoea (assuming 25% prevalence)	Fever (assuming 40% prevalence)
90%	20%	20	**133**	80	50
90%	15%	50 (assuming % of control correctly treated is ≤50%)	333	**200**	125
80%	10%	80(assuming % of control correctly treated is ≤30% for fever)	533	320	**200**

Surveys and Mozambique's Integrated Health Systems and Child Friendly District Survey by UNICEF.
Table A1. Sample sizes necessary to have 80-90% power to detect 10-20% differences in appropriate treatment of FDP. Cells in grey/bold show the per-cluster number of children we proposed to sample in the Uganda baseline survey.

Based on these calculations, we proposed to sample **200 children under 5 years of age per cluster**. Assuming an average of 2 children per household, this would be achieved by sampling from **100 households per cluster**. To achieve geographic spread, we picked 5 villages at random from within each cluster and selected 100 households from these. Data from a 2009 survey in the area suggests that 62.3% of houses have children under 5 years of age, therefore 32 households were selected from each village. **We also surveyed all the iCCM VHTs in the selected villages, and the health facilities with VHT supervisors in the selected subcounties.**

Timeline of key Baseline Survey field activities

(Detail on key activities is provided in later appendix sections specified in the brackets below)

Feb 2011

STUDY SITE SENSITISATION: District- and Subcounty-Level meetings were held to inform representatives from proposed study areas about the planned baseline survey. District level meetings were convened by Malaria Consortium. Meetings were attended variously by District and Subcounty Health Team Officers, Subcounty Chiefs, LC5, and LC3 chairs. Sensitisation information was disseminated from these meetings to LC1 Chairs, VHTs, and other community leaders.

SAMPLING FRAME DEVELOPMENT (0): District and Subcounty Council offices provided subcounty population characteristics and listings of villages. Subcounties were excluded from the proposed InSCALE study area if they had already been enumerated for other projects (including the CIDA-funded mobile phone pilot), contained less than 10 villages, or did not have sufficient iCCM VHTs trained by the 31st Jan 2011. From the remaining 41 eligible subcounties (8 Districts), 5 villages were chosen at random from each subcounty (plus 5 back-up villages) by the epidemiology team for inclusion in the baseline survey. Lists of all the households in the villages were then compiled by the resident VHTs.

QUESTIONNAIRE AND FIELD TOOL DEVLOPMENT I (0): 3 questionnaire tools were compiled by the technical teams, and focussed on data collection from i) households and children under five years of age, ii) VHTs, and iii) health facilities. 'Drug cards', created to assist caretaker identification of treatments provided for their children, were also compiled. Drug cards contained pictures of packaging for all known drug types available for malaria, diarrhoea and pneumonia.

TRAINING OF SUPERVISORS: Field Supervisors were recruited (across a cross-section of local language speakers) and trained at the Malaria Consortium Hoima Office with the survey tools.

March 2011

SAMPLING OF HOUSEHOLDS: Households from the selected villages (5 per subcounty) were verified on the ground by fieldwork supervisors. Up-to-date household lists were sent to the epidemiology team who then randomly selected 32 households for surveillance at random from each sampled village.

TRAINING OF RESEARCH ASSISTANTS (FIELD): Research assistants were recruited and trained mid-March 2011.

April-May 2011

QUESTIONNAIRE DEVLOPMENT II (0): Questionnaire forms went through several stages of development after valuable input from the recruited field teams. Questionnaires were printed ready for the field.

REFRESHER TRAINING AND FAMILIARISATION: Refresher training of both Supervisors and RAs was followed by deployment to field sites for familiarisation with data collection tools, communities, and troubleshooting.

ETHICAL APPROVAL: For the baseline survey. This was granted from LSHTM on the 16th of May.

June-August 2011

BASELINE SURVEY: Took place from 29th May until 15th August. Quality control checks (re-sampling of 10% of household data where there were children under 5 years of age) were implemented to monitor the quality of data.

DATA MANAGEMENT SYSTEM DEVELOPMENT: An IT consultancy was hired on the 4th of July to install a data management system capable of creating permissions, entering forms, checking data for inconsistencies and creating an audit trail.

DATA ENTRY: Data entry clerks (DECs) were trained and started entering form data (first entered data into a simple Epidata system due to time constraints; databases were then migrated to the SQL-Server based system developed by the IT consultancy).

September –December 2011

DATA CHECKING AND CLEANING: The data management system was finalised, data were uploaded and went though several stages of consistency, range, and inter-database checks. Database tables were sent to the LSHTM Epidemiology/Economics teams.

ANALYSIS OF BASELINE DATA (0): Baseline data analysis commenced in October 2011

TECHNICAL ADVISORY GROUP MEETING: Initial Baseline survey statistics were presented to the TAG on 14TH Dec.

January –March 2012

DATA CHECKING AND CLEANING: Outstanding minor issues with database tables were resolved

ANALYSIS OF BASELINE DATA: Key summary statistics tables were recalculated to incorporate recommendations from TAG.

RANDOMISATION and SAMPLE SIZE CALCULATIONS: Sample sizes necessary for the evaluation of the Uganda innovations were re-calculated based on the data obtained during the baseline survey. The baseline data were also used to inform a restricted randomisation programme.

Uganda Baseline Survey: Sampling, Field Tool development and Analytical Methods

Sampling frame and Survey tool development
Three questionnaires were developed with which to collect data on key health and cost of care indicators required for the assessment of the comparability of the intervention arms.

1. Household survey, using interviewer administered questionnaires

2. Survey among VHTs, using interviewer administered questionnaires

3. Survey among health facility staff (in-charges), using interviewer administered questionnaires

For each domain in each questionnaire, leading researchers were assigned. See Tables A.1-A.3 for an overview of the questionnaire domains.

Initial drafts for all sections of each of the tools were discussed in an iterative process: i) with the team of researchers in London and Kampala, ii) with potential field supervisors in Hoima, and lastly, iii) with trainees of the fieldworker training. Both the supervisors and fieldworkers visited local homes under supervision of a researcher to practice and test the questions and make revisions.

See the InScale website page: (http://www.malariaconsortium.org/inscale/pages/tools/uganda) for examples of the survey tools including questionnaires.

Household questionnaire (Table A.2)
The household questionnaire contained questions pertaining to household demographics, assets and activities, with a section for details of the children under 5 years of age, further questions for the first child if he/she had been ill in the previous two weeks, and questions on essential newborn care for caretakers of children under 2 months of age. An additional child form containing the ID section and section 4 of the household questionnaire asked identical questions on illness and care-seeking for any additional children which had been ill in the same period (See Household questionnaire).

Questionnaire supplement - Drug chart: Drug chars were provided to all field technicians containing pictures of the range of drugs (both appropriate and inappropriate) in their various forms of packaging that were available to households in the region either via prescription or over the counter for the diseases of interest to the study. Drugs were categorized and coded by disease type in order to match to entries in the household questionnaire. As it was not expected that caretakers would necessarily remember the names or types of drugs prescribed for their child's illness, this chart enabled the field staff to verify the types of drugs used in cases of illness; participants would point to the drug picture(s) they recognized as being used in the treatment of the child and field technicians would verify the name/type of drug through additional questions on the questionnaire.

HH questionnaire development and testing - notes from the field:

- It was difficult to assess the size of land owned due to the different units used to measure size; it was therefore decided that the interviewer write down the amount of land using whichever units were given. Using a conversion table in the "field notes" accompanying this tool the interviewer calculated the size of the land in acres and entered this on the form. The supervisors were tasked to check all calculations themselves before handing in the questionnaires.

- When testing the tool in the village it became obvious that the observation of the compound (for documentation of roof type, toilet facility, etc) should be done at the very end of the interview and not – as intended- as part of the first section of the HH form: getting up during an interview and looking around before continuing was disrupting.

- GPS coordinates were taken from all compounds. All supervisors were trained in the use of the GPS. Several group and individual exercises were developed to master the use of these machines.

VHT questionnaire (Table A.3)

The VHT questionnaire was aimed at understanding VHT ability to manage FDP, and VHT motivation. Data on socio-economic indicators including supervision, workload and demographic details identical to Section 2 of the household form was also collected.

VHT questionnaire development and testing - notes from the field:

- A 5-point Likert scale ranging from 'strong agreement' to 'strong disagreement' with a series of statements was used to assess VHT motivation (see section A.3.2 below), and was tested with and without supporting drawings of faces of a Ugandan woman (See VHT questionnaire). The drawings showed facial expressions matching different states of happiness/content, starting with a very sad face, brightening up to a very happy face. Supervisors preferred the version with the drawings on the top of the page, rather than no drawings at all or repeating the five drawings in each answer.

- The order of answer options for the motivation section of the form was decided as 1=very happy to 5=very sad, because " 1 is always the best, not the worst") In the testing we realized that the vocabulary used was hard to grasp – for example "goal" – thus we changed wording and dropped some of the questions that seemed to replicated other questions. With this feedback the tool was finalised, resulting in a 29-question tool. An important message from the tests was that in every question the answer options had to be read out again and explained because VHTs were likely answer on a 2-point scale (agree/disagree) rather than a 5-point.

- Questions on knowledge and intended practice were obtained from a post-training test from VHT training in another programme in Uganda. The questions were adapted were possible in order that they could be phrased in a simpler and less ambiguous way.

Health facility questionnaire (Table A.4)

In order to assess the quality of standard management of FDP in the health facilities at which VHTs were supervised, the health facility questionnaire contained a section allowing field staff to transcribe details of the management of the last case of FDP from facility records. Details of staff numbers and supervision of VHTs were also collected (see the baseline report additional materials folder for examples of the health facility questionnaire).

Health facility questionnaire development and testing - notes from the field:

- Within the research team the likelihood that health facility in-charges would answer honestly about drug stock-outs was discussed since this was a very political topic at the time (with newspaper headlines and senior people (at national level) being arrested for drug frauds). Nevertheless the decision was made to ask about stock outs in a very general way to avoid any pressure on the interviewee.

Table A.2. HH questionnaire (pre-labelled with compound & household code from sampling frame)

section	title	Nr q's	Topics:
1	Compound ID & interview	11	Location, date/time, consent, interviewer code
2	Demographics & SES	91	Interviewee: Gender, age, ethnicity, religion, education, employment, assets. Same for Head of Household
3	Children under 5	9 for the first child, 8 for every subsequent child (up to 10 children)	Identifying children under 5 in this household who had been sick in the previous 2 weeks
4	Illness in Children & care seeking	164	Identifying illness episodes and care seeking behaviour; expenditure; care providers. For each episode identifying which drugs were prescribed; purchased. In addition: drugs are shown on a poster which the interviewee may recognise as being prescribed. (Poster shows antimalarials, antibiotics, ORS). For ORS, Amoxycillin, Zinc and Coartem specific questions are asked about where this was purchased; dose, frequency and duration of treatment.
5	Awareness of drugs	17	For Zinc and Amoxycillin interviewee is asked to indicate whether he she agrees with statements about what these drugs are for.
6	VHT visits	20	Interaction with VHTs: Was the household visited by a VHT in the last month? Did VHT visit any newborns? What did VHT do during such visits? Specific newborn care practices are identified (drying &

			wiping, early initiation of BF; cord care).
7	Awareness of VHT	4	Did you hear about VHTs? How? (role of media?)
8	Observation of the compound	14	Characteristics of compound, relevant for wealth index. (walls and roofing, water and sanitation)

Table A.3. VHT questionnaire

section	title	Nr q's	Topics:
1	Compound ID & interview	11	Location, date/time, consent, interviewer code
2	Demographics & SES	91	Interviewee: Gender, age, ethnicity, religion, education, employment, assets. Same for Head of Household
3	Role as VHT	30	Workload (volume, time); Monetary expenses; Monetary or non-monetary contributions received)
4	Motivation	29	Statements about motivation, identity, worksatisfaction: 5 point agreement scale, with graphs of facial expressions.
5	Clinical knowledge & intende practice	12	4 case presentation followed by specific questions about diagnosis and management.
6	Mobile Phone Network & Drugs and Materials availability	16	Which network has coverage (5 networks: yes/no) Which drugs materials had run out of stock at any point in the past 3 months?
7	Observation of the compound	14	Characteristics of compound, relevant for wealth index. (walls and roofing, water and sanitation)

Table A.4. Health facility questionnaire

Section	title	Nr q's	Topics:
1	ID+Hospital demographics	17	Location, date/time, consent, interviewer code Hospital type, number of staff, population catchment area
2	Work	7	Volume of patients treated, specific treatment given for last patient with malaria; diarrhoea; pneumonia
3	Drug supplies	24	18 questions on stock out of drugs; 6 about observation of drugs/materials.
4	Supervision	16	Experiences with VHT supervision (type, volume, duration)

Sampling frame

A sampling frame containing the names of all districts, subcounties, parishes, and villages within the InSCALE study area was compiled. Where possible population figures were also added. This was a particularly complex task that took several months, as these data were not readily available for all districts, and what data was available came in a variety of formats and was often incomplete. Data also came from different sources: District offices, the Uganda Bureau of Statistics, and parish records. Each of these sources had collected the data in different years, resulting in duplicated data that was not always consistent between sources. There were challenges with duplicate names (due to spelling differences) and shifting district boundaries.

The final table had the following variables: district, subcounty, parish, village, number of households, and number of inhabitants. Later we added columns containing the number of VHT's trained and whether the subcounty was part of the CIDA-mobile phone pilot area (yes/no). These data were used as inclusion and exclusion criteria respectively. During fieldwork if we identified villages were there were no longer iCCM-trained VHTs despite information to the contrary in our sampling records, a back-up village was used.

For the villages for which no population data were available we estimated the population size based on the average village size of the villages in the same subcounty, or parish.

At this stage of the sampling process, the subcounty was chosen as the cluster variable on which to randomise households, being the most self-contained administrative level for VHTs below the level of the district, and containing enough households (within villages and communities) to sample enough children per cluster to meet our sample size requirements.

Sampling method for villages: Using http://www.jerrydallal.com/random/random_permutation.htm the lists of villages per sub-county were randomly ordered. The first 5 villages were sampled for the baseline, with the next 5 saved back up villages in case of potential issues in the field.

Sampling method for households: A list containing the details of the 5 villages in each cluster was sent out to the project coordinator based in Hoima, who together with the field office director went to visit all MOH district offices. From the district offices the order was given to the local community councils to draft a list of all the households in each of the five villages sampled in their specific sub-county. This exercise enabled the identification of discrepancies between villages in our records and those that existed on the ground, thus back-up villages were used where necessary.
The visits to the district offices were also used to sensitise district staff about the upcoming research activities, and to advocate the work of the Malaria Consortium in a broader context.

The lists of households compiled by district staff were photocopied, and entered into a spreadsheet. For each sub-county one table of households was constructed and excel was used to apply systematic random sampling resulting in select 32 households for each village on that list.
[In excel three steps were used: (1) the total number of households per village was counted, (2) divided by 32 to calculate the sampling fraction and (3) the "seed" number was randomly selected as a number between 0 and the sampling fraction. With this information the list of 32 households was constructed.]
From the excel files, user-friendly pdf prints were created to "freeze" the tables, which also prevented the recalculation of the random selection of households every time the file was opened.

Sampling method for VHTs: All iCCM-trained VHTs working in the selected villages were approached for interviewing. Lists containing the names of all the VHTs within the study area were provided through the LC1 or from health facilities.

Sampling method for health facilities: All the health facilities in the selected sub counties which provided supervision to the VHTs in the sampled villages were included in the survey. Information about the names and catchment areas of the health facilities was provided by the subcounty offices.

Data cleaning, preparation, and summarisation
All inconsistent or missing records (e.g. age/date discrepancies, etc) were rechecked in the field or via the original questionnaires, and corrected (or excluded on a per-analysis basis). Excluding the creation of an asset index for households/ VHTs and a VHT motivation score (see below), all remaining indicators presented in this report were summarised via simple cross-tabulations of percentages and averages. All analyses were carried out in Stata v10.2 (StataCorp, Texas USA), and graphs created in MS Office Excel for Windows 2007 (MSN, Washington USA).

Definitions
A list of criteria used to define the indicators reported in the results section of this report is recorded in section 0 below. All definitions of illness and appropriate drug types were based on IMCI guidelines (WHO/UNICEF 2012).

VHT motivation score - Factor analysis (EFA)
Data on VHT motivation was collected using a 29-question tool with topics ranging from, but not limited to, reported motivation, programme commitment, job security, identify, self-efficacy, and management and supervision (each question asked the VHT how strongly they agreed or disagreed with a statement using a 5-point Likert scale (1=strongly agreed, 5=strongly disagreed)). The tool was initially compiled using pre-tested material from several sources (Chandler et al 2009, Alex Haslam (pers. comm.)). The 29 question tool was administered to iCCM VHTs as part of a larger questionnaire on VHT performance, supervision and motivation.

In order to create a standardised motivation/identity score and to explore the relationships between the items in the questionnaire, standard item-reduction methods were used (we dropped highly

correlated questions and questions whose meanings were agreed to be ambiguous). Multiple factor analysis runs followed in which items which did not load on any factor to at least 0.4 after each analysis were dropped, and promax oblique rotations carried out after each run to further explore the data in instances where questions cross-loaded onto more than one factor (Basto and Pereira 2012, Hilari et al 2003). Internal consistency of the grouped items was measured using Cronbach's alpha (Bland and Altman 1997) following each FA run. FA of this type attempts to define how well groups of questions are correlated with each other, and scree checks of the resulting output indicates the optimum number of factors (groups) needed to explain the underlying relationships between the questions (Chandler et al 2009, Hilari et al 2003).

This analysis resulted in a single-factor tool of 18 questions that explained the majority of the variation in motivation and identity between VHTs. The items in this final tool showed good consistency with each other ($\alpha=0.85$). Standardised motivation scores were then calculated for each VHT by multiplying the regression coefficients generated from the final factor analysis by the original Likert value for each question (DiStefano et al 2009). VHTs were additionally grouped into centiles based on their scores to allow further interpretation of relative VHT motivation on a scale from 1 (low) to 100 (highest).

An additional motivation indicator was calculated based on the simple addition of the likert values for 28/29 questions (one question was permanently dropped as non-representative) for each VHT. In this case, a value of 28 was the lowest possible score and indicated the highest motivation, and 140 was the highest score and indicated lowest motivation. Both this simple score and the above factor score are cited in the body of this report, and show good agreement ($r^2 = 0.8$, Figure A1).

Figure A1. Scattergraph of VHT motivation score (simple addition of answers given for questions) against motivation score (factor analysis). Factor analysis score is bound at 1 and 100.
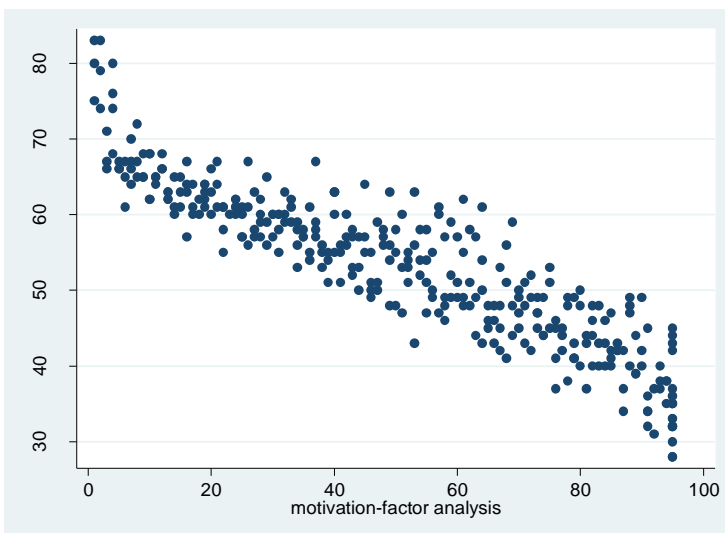
Household and VHT asset index - Principle Component Analysis (PCA)

Questions in the baseline household and VHT surveys on house construction, ownership of household items, land, animals and transport means, and water and sanitation infrastructure were used to create a single indicator representing household wealth. This is an often used method to estimate relative wealth/(socio)economic circumstances in settings where a substantial part of the population are self-sustaining farmers and/or work in the informal sector.

The wealth indicator was developed by running a principal components analysis, which assigns a coefficient to each variable included in the asset index by means of an iterative model based on its importance in relation to the other variables. The sum of the coefficients for each household/VHT is then used to calculate an overall wealth index (ref). Households and VHTs were then categorised by relative wealth (individual indices ranked from lowest to highest and grouped into quintiles).

The individual indicators that weighted heaviest in the analysis were house construction material (material of roof, walls and floor) and type of toilet facility used. Different ways of deriving the wealth index were explored (such as excluding some of the variables collected to see how this would affect the wealth indicator, or grouping similar answers to some of the questions to reduce the number of variables); however it was decided to use the complete set of asset variables and the full sets of responses given to each question collected, as this approach seemed to give the best representation of wealth after validation of the index against related factors such as average monthly household cash income and the education level and occupation of the head of household (Vyas and Kumaranayake 2006)

Definitions (based on WHO guidelines for integrated management of childhood illness)

- **Illness**

Diarrhoea: child had diarrhoea episode(s) AND 3+ loose stools were passed in a day in previous two weeks. For **Watery Diarrhoea**, additional criteria = AND diarrhoea type was watery.

Fever: child had fever episode(s) in previous two weeks

Malaria: child had fever episode AND a blood test positive for malaria in previous two weeks

Pneumonia: child had a cough AND fast breathing at least one time in previous two weeks. Alternatively child had chest indrawing AND another danger sign in previous two weeks.

- **Appropriate treatment of FDP**

Fever: Any ACT: Coartem, Duo-Cotecxin, Amodiaquin-Artesunate, or Artesunate-Fansidar taken. Others: Rectal Artesunate. Included in health facility criteria: Quinine (omitted from household criteria as only approved for treatment of children <4 months, who were excluded from the household survey sample).

Diarrhoea: ORS, or homemade ORS taken. ORS plus zinc supplementation was analysed as a secondary indicator.

Pneumonia: Amoxycillin, Cotrimoxazole, Chloramphenicol, Erythromycin, Ceftriaxone, Septrin, Azythromycin, Gentamycin, or Cephalexin taken

1   REFERENCES

Basto M and Pereira JM 2012 Journal of Statistical Software 2012 46:1 "An SSPS-R menu for ordinal factor analysis"

Bland JM, and Altman DG 1997 BMJ 314:572 "Cronbach's Apha"

Chandler C et al 2009 Social Science and Medicine 68:2078 "Motivation money and respect: A mixed-methods study of Tanzanian non-physician clinicians"

DiStefano C et al 2009 Practical Assessment Research and Evaluation 14:1 "Understanding and using factor scores, considerations for the applied researcher"

Hilari K et al 2003 Stroke 34:1944 "Stroke and aphasia quality of life scale-39: evaluation of acceptability, reliability and validity"

Ministry of Health, Uganda 2010 "Integrated Community Case Management of Childhood Malaria, Pneumonia and Diarrhoea: Implementation Guidelines" 54 pages Kampala, Uganda http://www.malariaconsortium.org/inscale/downloads/uganda/ICCM-implementation-guidelines.pdf accessed June.2013.

Nkonki L et al 2011 Bulletin WHO 89:919 "Lay health worker attrition: important but often ignored"

Vyas S, Kumaranayake L 2006 Health Policy and Planning 21:459 "Constructing socio-economic status indices: how to use principal components analysis"

World Health Organisation/UNICEF 2011 "Integrated Management of Childhood Illness: Caring For Newborns and Children in the Community" 133 pages WHO Press Geneva, Switzerland