malaria consortium
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BASELINE SURVEY REPORT

ICCM Central Project

Evaluation of integrated community case management for malaria, pneumonia, diarrhoea and newborn health in eight districts of central Uganda

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Abbreviations

ARI	Acute Respiratory Infection
ANC	Ante-Natal-Care
ACT	Artemisinin based Combination Therapy
BCG	Bacillus Calmette-Guérin
CIDA	Canadian International Development Agency
DHS	Demographic and Health Survey
DPT	Diphtheria, Pertussis, Tetanus immunization
DHT	District Health Team
EA	Enumeration Area
GFATM	Global Fund to fight AIDS, Tuberculosis and Malaria
HAZ	Height for Age Z-score
HH	Household
ITN	Insecticide Treated Net
ICCM	Integrated Community Case Management
LiST	Lives Saved Tools
LLIN	Long-Lasting Insecticidal Net
MIS	Malaria Indicator Survey
MoH	Ministry of Health
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health
MICS	Multi Indicator Cluster Survey
NMCP	National Malaria Control Programme
OPV	Oral Polio Vaccine
ORS	Oral Rehydration Salts
PCA	Principal Component Analysis
PPS	Probability Proportionate to Size
RDT	Rapid Diagnostic Test
SP	Sulphadoxine-Pyrimethamine
UBOS	Uganda Bureau of Statistics
VHT	Village Health Team

Executive summary

The survey findings reflect the morbidity patterns and treatment seeking behaviour of caregivers in central Uganda for children with malaria, acute respiratory infections (ARI)/pneumonia or diarrhoea, diseases responsible for the majority of deaths in children under five in Africa. The findings were within the expected range, although indicators relating to malaria/fever and diarrhoea were better than previous national surveys had indicated. However, the epidemiological profile for all three diseases were still considered valid, reflecting a suspected improvement in malaria control and possibly hygiene and sanitation conditions in the central region in recent years. There is a clear lack of access to timely and effective treatment for all three diseases, with the primary source of treatment being the private sector. There is currently no active community treatment system in place in any of the districts surveyed.

A total of 1036 households were sampled and information relating to childhood illness and biomarkers collected from 1,413 children under five from these households. The socio-economic and demographic characteristics were broadly similar to other nationally representative surveys, although for certain indicators the survey sample was above the average, however this is not unexpected for this region of Uganda.

Key findings

- 16.0% of children under five were reported to have had a fever within the last two weeks prior to the survey
- 12.3% of children under five had an Acute Respiratory Infection (ARI) in the last two weeks
- 9.1% of children under five had diarrhoea in the last two weeks
- 4.7% of children with a fever were hospitalised in the last three months
- Of children with a fever, only 19.4% were treated the same or next day with an ACT
- Of children with an ARI, only 8.8% of children were treated the same or next day with an antibiotic
- 2.2% of children under five with diarrhoea were treated with both ORS and zinc
- There was no significant community treatment system for children with either a fever, ARI or diarrhoea
- 92.8% of households owned at least one mosquito net, 74.3% had at least one Insecticide Treated Net (ITN)
- Universal coverage (one net per two people) was achieved in 46.4% of households
- 66.5% of children under five slept under any net the previous night and 61.4% under an ITN
- 65.1% of children have received a vitamin A supplementation
- 18.7% of children were classified as stunted
- 22.4% of children had malaria parasites, with a geometric mean parasite density of 755 parasites per µl
- 28.2% of children under five had anaemia

Introduction

ICCM Central Project

The Ugandan Ministry of Health (MoH), in 2010, introduced a new approach to reduce under five mortality in Uganda, through the provision of treatment in the community for malaria, pneumonia and diarrhoea using Village Health Teams (VHTs). Malaria Consortium Uganda, with funding from UNICEF, is supporting this Integrated Community Case Management (ICCM) in eight districts of the central region, namely Wakiso, Mpigi, Gombe, Gomba, Masaka, Lwengo, Bukomansimbi and Kalungu. The project began in July 2010 and has initial funding until December 2012. The main aim of the project is to avert at least 4,500 deaths in children under five over the project period.

The major interventions are to support and strengthen community based case management programs for malaria, pneumonia and diarrhoea through selection and training of Village Health Teams (VHTs), firstly in the basic health care package followed by training in ICCM. The VHTs trained in ICCM will be provided with the necessary commodities, job aids and drugs in order to carry out their roles effectively. Close support supervision and monitoring and evaluation of the VHT activities will be a key component of this project. For malaria, treatment is with an Artemisinin Combination Therapy (ACT), Artemether/Lumefantrine, and Rapid Diagnostic Tests (RDT) for the confirmation of *Plasmodium falciparum* parasites will be introduced in the second year of the project. For Acute Respiratory Infections (ARI) the diagnostic procedure will be a fast respiratory rate measured with aide of a respiratory timer, treatment will be the antibiotic Amoxicillin. Finally, the treatment for diarrhoea will be with zinc supplements and low osmolarity Oral Rehydration Salts (ORS).

The impact of the project will be evaluated, through a baseline and endline survey (household and child health surveys) and monitored through routine reporting systems including the VHT/ICCM registers and Health Management Information System (HMIS). The impact of the project on under five mortality rates will be measured at endline through the birth history methodology, as well as through mortality modelling (Lives Saved Tools).

Objectives of baseline survey

Study objectives

1. To evaluate the impact of integrated community case management interventions on all cause child mortality (the baseline data will be determined retrospectively at end line)
2. To assess anaemia, malaria parasite, and malnutrition prevalence among children under five
3. To measure two weeks prevalence rates of fever, diarrhoea, and cough/pneumonia among children under five
4. To measure health seeking behaviour around fever, diarrhoea, and cough/pneumonia episodes among mothers/caretakers of children under five

The above objectives were achieved at baseline through two methods:

- Household survey
- Malariometric indicator survey

Household survey indicators

Indicators that were used based on the survey results included the following:

1. Wealth index (calculated using a principle component analysis) and wealth quintiles
2. Proportion of households with at least one mosquito net/ITN
3. Proportion of households achieving universal coverage (1 ITN per 2 persons)
4. Proportion of children under 5 sleeping under a net/ITN on the night prior to the study
5. Proportion of children with a fever/ARI/ diarrhoea episode in the last two weeks prior to the study
6. Proportion of children with measured fever during the survey
7. Proportion of children hospitalized for fever/ARI/ diarrhoea episode in the last three months prior to the study
8. Proportion of children treated same or next day (fever, ARI, diarrhoea)
9. Proportion of children treated with an adequate medicine and dose (fever, ARI, diarrhoea)
10. Proportion of children treated by various sources of care (public/private; CHW/facility)
11. Proportion of children with full immunization coverage
12. Proportion of children who received Vitamin A supplementation
13. Proportion of children stunted (Height for weight z-score <-2)
14. Proportion of children with malaria parasites (trophozoites, gametocytes, geometric mean parasite density)
15. Proportion of children with anaemia

Methods

Study site

The study was carried out in the eight central districts of Wakiso, Mpigi, Butambala, Gomba, Masaka, Bukomansimbi, Kalungu and Lwengo, comprising of the intervention districts under the ICCM central project. Their combined estimated population is 2.5million (2010), based on the Uganda Bureau of Statistics (UBOS) projected figures from the 2002 National Census.

The project area crosses the equator and follows the shoreline of Lake Victoria from Kampala to the south of Uganda. The districts are in the Buganda kingdom and the main language is Luganda. The primary income generating activities are related to agriculture and animal farming, fishery and small scale industry including coffee processing. The population is primarily rural however, in certain districts there are significant peri-urban areas, especially in Wakiso district that surrounds Kampala city and also includes Entebbe, and Masaka district that contains Masaka town.

Comparator areas

In addition to this baseline survey conducted in the intervention districts, the project also aims to undertake a similar baseline (household survey only) in three comparator districts of Luwero, Nakaseke and Rakai. The comparator areas are employed to help strengthen the probability argument of the evaluation, allowing for the comparison of differences in intervention and comparator area outcomes/impacts after control for potential confounders. The comparator area districts were chosen, in collaboration with the Ministry of Health, by the following criteria:

- No current or planned ICCM programme in the near future.
- Similar socio-economic and demographic profile to the intervention area.

The data collection for the baseline survey in the comparator areas was completed in February 2011, as soon as the funds became available from UNICEF. The results will be added to this report, as soon as analysis has been completed.

Survey design and sampling

For the child health surveys, the target sample size was 40 clusters of 26 households each, equating to a total of 1040 households, each with at least one child under five. Assuming a conservative design effect of 2.0 and a non-response rate of 10% this sample was to provide estimates with a precision of +/- 5 %-points if the estimate is around 50%. This is sufficient to capture changes in the effect mediators and confounders.

The survey comprised of two sections, a cross-sectional household interview survey and a malariometric indicator survey of all children under five residing in the households randomly selected for the household interview. A classical two-stage cluster sampling approach was used with a single sampling domain, i.e. no oversampling in urban areas or specific districts was applied.

The sampling frame was based on the population estimates from UBOS based on the last national census carried out in 2002. Clusters (villages) were selected using "probability proportionate to size" sampling (PPS). At the village level all households with at least one child under five were listed and the required number systematically sampled. For villages of more than 200 households an equal size section approach was used, i.e. the village was divided into 2-4 sections of approximately equal number of households and one section selected using simple random sampling. All households in that section were then mapped and the sample drawn as described above.

Data collection

Child Health Survey questionnaires

For data collection a pre-tested questionnaire was used. The household interviews took place between 12 and 30 September 2010. The primary respondent was the female head of household, all women of child-bearing age in the household were also interviewed (women and child questionnaires only). The questionnaires used for this study have been adapted from two similar malariometric studies implemented in Uganda (4, 5) and some questions and their design use malaria indicator survey (MIS) tools and the DHS+ modules.

The household survey interview comprised of the following sections:

- Interview with the head of household covering the socio-demographic and economic characteristics of the household including a complete list of permanent inhabitants, educational status of the head of household and availability and use of preventive measures for malaria control (mosquito nets, IRS etc.)
- Questionnaire for each child in the household regarding immunization and Vitamin A supplementation status, hospitalization due to febrile and/or respiratory disease during last 3 months and fever, diarrheal and respiratory illness during past two weeks. For those with a disease episode a detailed questionnaire on health seeking behaviour (timing and source of treatment, drugs taken and their dosage) was also administered.

In order to identify specific net brands and categorize them as Long Lasting Insecticidal Nets (LLINs) the interviewers were provided visual aids showing all currently available LLIN brand labels and packages. In case access to the net was not granted to the interviewer the respondent was shown the visual aid and asked whether they could identify the brand of the net. A visual aid to help determine different drugs was also provided.

Malariometric Indicator Survey

Each child under five from the households sampled were invited to participate in the malariometric/child health survey. The malariometric/child health survey was carried out concurrently with the household survey, but staggered by one day. A central place was selected for each village where the children were examined. Each participant went through the following stations:

1. ***Registration*** based on household member lists compiled during household surveys, information about the survey process, signing of consent form (by legal guardian of children) and short interview concerning history of fever in the last three days and history of intake of anti-malarials. Each participant received a record form and unique ID number.

2. ***Measurement of weight, height and temperature.*** An electronic scale was used for children above 18 months and the weight was recorded to the nearest 0.2 kg. Infants and children less than 18 months will be weighed together with the accompanying adult followed by the adult alone. The infant's weight was obtained by subtracting the two measurements and the weight registered to the nearest 0.1 kg. Length was measured in a standing position using a Stanley MaboSomatometer No. 191 (France) and recorded to the nearest 0.1 cm. Children under eighteen months were measured in a lying position using an infantometer. Axillary temperatures were measured simultaneously under both arms using electronic thermometers. If the readings differed by more than one degree the measurement was repeated. Otherwise both measurements were registered and the highest reading was considered the "true" temperature.

3. ***Physical examination and blood taking***. A physical examination was carried out by an experienced nurse or clinical officer and any acute or chronic condition was registered. Blood was taken by finger prick for thick and thin blood film and haemoglobin measurement (using a HemoCue system) and "standards of practice" have been developed along Malaria Indicator Survey guidelines. RDTs were also administered but restricted to those children that are sick with fever to provide an immediate diagnosis and treatment if required.

- ***Thick blood films:*** All slides were marked with the participants ID-number, the date and the survey number. An amount of 10µl was collected by pipette and evenly distributed on a pre-marked area of 10 x 10 mm of the slide. The slides were stained with 5% Giemsa solution for 20 minutes. Evaluations of thick films were done by experienced and trained microscopists at selected laboratories, with quality control readings done at Makerere University Molecular Biology Laboratory, Kampala. A total of 200 oil immersion fields were read before a slide is considered negative. If trophozoites of P*lasmodium falciparum* are present, the slide is considered positive. The parasite density per µl of blood is calculated as the number of trophozoites in 100 fields multiplied by 4, assuming an average thickness of the film of 0.09 mm and a volume in 100 fields of approximately 0.25 µl. No thick and thin blood films taken from participants were stored.

Teams and training

Interviewers and supervisors were carefully selected to be culturally acceptable, to have good knowledge of the local language, and to have experience in household surveys. Each team for the household survey had one supervisor and three interviewers, whilst the malariometric survey team comprised of six people, a supervisor, two nurses, two lab technicians and one medical officer. The week before the fieldwork, the field team was trained for four days. The training covered the

purpose and exact procedures of the interviews and malariometric survey and involved practice runs to ensure quality control.

Community sensitization

Community sensitization took place in August 2010. This included sensitization at all levels of the political leadership and local authorities gave approval to conduct the survey.

Quality control

At the end of each day, the team supervisor reviewed all questionnaires for completeness and possible inconsistencies and ensured that missing information was corrected while still in the field. In addition, spot-checks were performed on interviews conducted by each fieldworker.

Ethical Consideration

Ethical clearance for the study was approved by the Uganda National Council for Science and Technology (UNCST).

Individual informed consent was sought from all respondents before interviews were conducted, captured either by the signature of the respondent or if they were illiterate, by their right hand thumb print. Before each interviewee was asked to give consent, the interviewer gave a brief description of the study objectives, the data collection procedure, the potential harm to participants, the expected benefits, and the voluntary nature of participation at all stages of the interview. All participants were ensured that data would be kept confidential and would not be shared with non-project staff.

Data processing and analysis

Data entry was done using EpiData 3.1 software with double entry of all records. Both data sets were then compared, and any discrepant records were verified using the original questionnaires. After the first stage of cleaning, the data set was transferred to the STATA 11 statistical software package for further consistency checks and preparation of data files. Final analysis was based on the outcome indicators, estimates were obtained for overall and by background characteristics, including place of residence (urban and rural) and socioeconomic status (wealth quintiles). The data was self-weighted. However, to adjust for possible distortion of results by the difference of village sizes, sampling weights were calculated based on the probability of household selection.

The wealth index was computed at the household level using principal component analysis (PCA) [3]. The variables for household amenities, assets, livestock, and other characteristics that are related to a household's socioeconomic status were used for the computation[1]. All variables were dichotomized except those of animal ownership where the total number owned was used. The first

[1] Land ownership was not used in the PCA analysis, as it did not reflect the expected wealth profile of the households

component of the PCA was used as the wealth index. Households were then classified according to their index value into quintiles.

Sample characteristics

Response rates

Household interviews were conducted between 12 and 30 September 2010. The interviews were conducted in Luganda, the most commonly spoken language in the central region. The household, individual (women) and child (malariometric) response rates are given below, table 1. The discrepancy between the women interviewed and the eligible women is because not all women in the household were available at the time of the interview. Therefore child health information was available for only those eligible children that had their caregivers present.

Table 1: Sample size per questionnaire survey

Questionnaires	
Household interviews	
Households selected	1,040
Households interviewed	1,036
Household response rate	99.6%
Interviews with women (age 15-49)	
Eligible women	1243
Women interviewed	1021
Eligible women response rate	82.1%
Children (age <5 years or 0-59 months)	
Eligible children	1791
Eligible children captured for child health	1479
Eligible children captured for malariometric	1413
Eligible children response rate	82.6%

Demographics

A total of 1036 households were included in the final analysis of the baseline survey, from a total of three districts[2]. Information was missing from a total of four households, a 0.4% loss, either due to missing data or issues with the matching of unique identifiers between the data sets.

Geographic distribution

The data collected was from across the three project districts, with a total of 1,036 households analysed, after data cleaning and removal of duplicates. The majority of the households were defined as in a rural area, 67.5% (95% CI: 51.0-80.6).The average household size was 5.66 (95%CI: 5.42-5.91), with a difference seen amongst household size in rural (5.86; 95%CI: 5.56-6.16) and peri-urban/urban areas (5.26; 95%CI: 4.96-5.55). Amongst all the households sampled only 17.5% (95% CI: 14.6-20.7) had a female head. The table below provides a breakdown of the sample of households

[2]Although the districts have since split to become eight districts, for the analysis and data presentation the information will be provided for the three former districts of Wakiso, Mpigi and Masaka.

from each district. Peri-urban/urban areas were defined in collaboration with the District Health Teams (DHTs).

Table 2 outlines the split of the sample of households per district; percentages are based on sampling weights

Table 2: Sample size per district

District	Number of households	Proportion of overall sample	Proportion of households in sample classified as rural
Masaka	363	35.0%	92.8%
Mpigi	208	20.1%	75.0%
Wakiso	465	44.9%	44.3%
TOTAL	1036	100%	

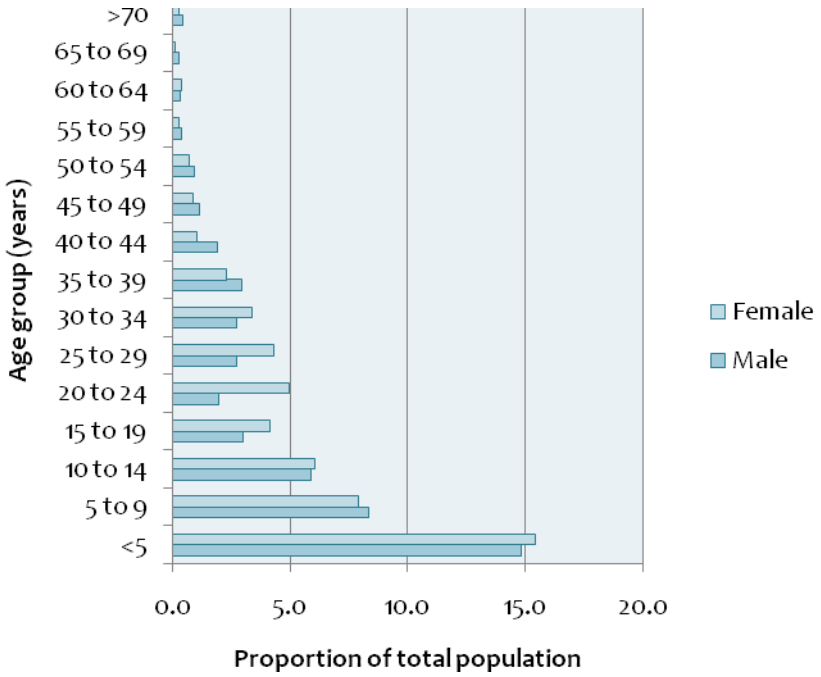
The highest number of households were from Wakiso district, which has the highest population. The majority of the households selected in this district, were classified as peri-urban/urban.

Age distribution

The total number of persons listed in all households sampled was 5,926, of which 98.8% were actually living in the household. The household population is young, with 30.2% (95%: 29.0-31.6, n=1791) under five years of age[3].

Each household had an average of 1.73 (95% CI: 1.67-1.80) children under five residing within. Figure 1 shows the reported age distribution of the population in the households, in five year age groups by sex. There has been no smoothing of data for any suspected age heaping.

Figure 1: Age structure by sex



[3] It should be noted that the sampling frame included all households with at least one child under five, therefore the proportion of children under five in the sample population is higher than the actual population.

Household ownership of nets

The questionnaire collected data on the availability and use of mosquito nets. The interviewers requested to physically observe the net, in order to collect detailed information on every net present in the household including the source and brand of the net and if the net was used by anyone last night. These indicators will be monitored over time, as it can affect the mortality outcome of children under five in the intervention area.

Net ownership was very high, with 92.8% of households stating that they had at least one net of any type and 74.3% of households had at least one insecticide-treated net (ITN), table 3. The average nets (any nets) per household is 2.5 (95%CI: 2.4-2.6), with an average of 2.3 (95%CI: 2.2-2.4) ITNs in households with at least one. Universal coverage, defined as one net for every two people, was achieved in 46.4% (95%CI: 41.7-51.2) of households. There is strong evidence ($p<0.01$) to suggest that those from higher socio-economic status or in peri-urban/urban ($p<0.01$) compared to rural areas are more likely to have achieved the above definition of universal coverage.

Table 3: Mosquito net ownership: any net and long lasting insecticide-treated net

	n (households)	% (percentage)	95%CI
Any net			
% households that have any nets	961	92.8	86.6-96.2
Do not have nets	75	7.2	3.8-13.4
Number of nets per hhld			
1	192	20.0	16.8-23.6
2	353	36.7	32.8-40.9
3	255	26.5	22.8-30.7
4	82	8.5	6.9-10.5
5	39	4.1	3.1-5.3
6	40	4.2	3.0-5.7
District profile			
Masaka	310	85.4	69.5-93.8
Mpigi	208	95.2	90.5-97.6
Wakiso	465	97.4	94.7-98.8
Any ITN			
% households with any LLIN	714	74.3	69.9-78.3

Households were asked if the nets were used last night and if they were, who used them, table 4. In particular, the usage of nets amongst one of the most vulnerable groups was recorded, with 61.4% of children under five using an ITN the previous night.

Table 4: Nets used the previous night

Net usage previous night	n	%	95%CI
Persons that used any net	3166	53.5	49.0-57.9
Persons that used an ITN	2879	48.6	44.0-53.3
Children under five that used any net	1191	66.5	61.4-71.2
Children under five that used an ITN	1100	61.4	55.9-66.7

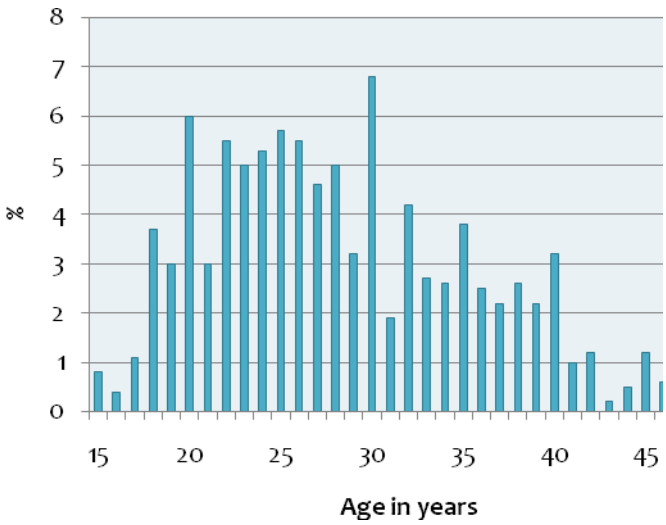
Characteristics of the women in the sample

Information on the characteristics of women in the households was gathered and analysed. A total of 1,021 women of child-bearing age were interviewed and for which data was available after data cleaning and removal of duplicates that did not match the household lists. From the household list, there were 1,243 women of child-bearing age, therefore a 82.1% response rate.

Age profile

The mean age of the women in the sample was 28.8 (95%CI: 28.3-29.3) years of age.

Figure 2: Age distribution of women in the sample



Education and literacy

A large majority of women consider themselves literate (85.6%) and attended school (86.9%), however only 8.5% of women studied beyond 'O' level standard, table 5.

Table 5: Educational status and literacy levels of women in the sample

Education	n	%	95%CI
Literate			
Yes	872	85.6	81.4-88.9
No	147	14.4	81.4-88.9
Attended school			
Yes	879	86.9	82.6-90.2
No	133	13.1	9.8-17.4
Highest level of schooling attended			
Primary	481	54.9	48.2-61.4
"O" level	321	36.6	31.9-41.8
"A" level	33	3.8	2.5-5.8
University/Tertiary	41	4.7	3.1-7.0

Characteristics of the children in the sample

This section presents some key characteristics of children under five in the sample. The information presented in this section was collected from the Child Health section of the Women's questionnaire and therefore only refers to the children of the interviewed women.

Age distribution

Information was collected for a total of 1,479 children under five.

A breakdown of the age groups of these children by age revealed that the age distribution was quite evenly spread, table 6.

Table 6: Age distribution of children under five, in completed years

Age (completed years)	n	%
<1	283	19.1
1	275	18.6
2	268	18.1
3	323	21.8
4	330	22.3
TOTAL	**1479**	

Vaccination status

The vaccination status was assessed for every child under five. The caregivers were asked if the child had a vaccination card and this was observed where possible. The vaccination card was then used to determine the child's vaccination status or if that was not available the mother was asked if the child had the various vaccines[4], table 7. It should be noted, that the table is not cumulative, therefore if a child has had all three vaccinations against oral polio vaccine, they are only recorded in the OPV3 column and they are not represented in the OPV1 or OPV2 column.

Table 7: Vaccination status

	BCG	OPV1	OPV2	OPV3	PENTA1	PENTA2	PENTA3	MEASLES	Seen vaccination card
Received	78.0%	26.2%	30.4%	52.1%	25.5%	32.3%	43.8%	61.1%	22.2%
95% CI	73.9-81.6	22.3-30.6	26.0-35.1	46.0-58.0	21.3-30.2	27.1-37.9	38.1-49.7	57.3-64.9	

Vitamin A and de-worming

Caregivers were also asked to recall (drug samples were also shown) if their child had received a vitamin A supplementation in the last six months, with 65.1% (95%CI: 59.2-70.5) reporting their child had received the vitamin.

[4]The interviewers would verify which vaccination had been given by describing the injection site for the various vaccines.

Caregivers were also asked to recall when their child had last received a de-worming treatment, with the majority stating they had ever received the treatment (74.7%) and the largest proportion were within the last 3 months (44.2%), table 8.

Table 8: Children that received de-worming treatment

	n	%	95%CI
Ever received			
Yes	1080	74.7	70.3-78.6
No	366	25.3	21.4-29.7
Time of last de-worming treatment			
This month	272	25.2	21.6-29.2
3 months ago	477	44.2	39.5-48.9
6 months ago	131	12.1	10.1-14.6
>6 months ago	121	11.2	8.5-14.7
Don't know	79	7.3	4.9-10.7

Breastfeeding

The vast majority (93.3%) of children under five had been breastfed, with most having been breastfed for at least one year, table 9.

Table 9: Breastfeeding

	n	%	95%CI
Ever breastfed	1353	93.3	90.3-95.5
Breastfed for at least 1 year	751	81.8	77.7-85.3

Disease specific information

Fever morbidity

Fever prevalence and treatment given

A total of 16.0% (95%CI: 12.8-19.9) of children under five had a reported fever in the last two weeks, as reported by the caregiver. Of these, only 32.5% (95%CI: 26.2-39.5) of children under five with a fever received an ACT, with an even smaller proportion 19.4% (95%CI: 14.1-26.2) received an ACT within twenty-four hours and 24.5% (95%CI: 18.8-31.3) within forty-eight hours of symptom onset, table 10.

Table 10: Children under five with a fever and treatment received

Age in months	Number children with fever	% with fever in last 2 weeks	95% CI	% who took an ACT	% who took an ACT the same/next day	% who took an ACT within 48 hours	% who sought treatment from provider same/next day
<12	45	15.9	11.8-21.0	28.9	11.1	20.0	37.8
12-23	53	19.3	14.7-24.9	32.1	20.8	24.5	41.5
24-35	48	17.9	12.7-24.7	35.4	25.0	27.1	33.3
36-47	47	14.6	9.8-21.0	38.3	25.5	34.0	36.2
48-59	44	13.3	9.4-18.6	27.3	13.6	15.9	25.0
Total	**237**	**16.0**	**12.8-19.9**	**32.5**	**19.4**	**24.5**	**35.0**
District profile – children under five with fever							
	n		%		95% CI		
Masaka	116		18.0		12.9 - 24.5		
Mpigi	47		16.1		12.0 - 21.2		
Wakiso	74		13.7		8.8 – 20.6		
Urban_rural profile – children under five with fever							
Rural	167		14.4		10.3 – 19.7		
Peri-urban/urban	40		3.4		1.9 – 6.2		

Children under five residing in a rural area (19.6%; 95%CI: 14.9-25.2) were more likely to have had a fever in the last two weeks compared to peri-urban/urban areas (12.9%; 95%CI: 9.5-17.2), p=0.04. There was no evidence (p=0.34) that there was any difference between socio-economic status and two week period prevalence in children under five.

Overall, 32.5% of fevers were treated with an ACT, 3.0% sulphadoxine-pyrimethamine (sp), 4.5% chloroquine and 3.0% an artemisinin-derived monotherapy.

Treatment seeking behaviour for fever

The treatment seeking behaviour of the caregivers for a child under five were recorded, table 11. Approximately three quarters (75.9%; 95%CI: 69.6-81.3) of all caregivers of all children under five who had a fever in the past two weeks sought treatment or advice. Thirty five percent (95%CI: 27.9-42.9) sought treatment within twenty-four hours (same or next day).

Table 11: Source and timeliness of treatment for a child under five with a fever

Source of treatment	n	%	95% CI	Rural	95%CI	Peri-urban	95% CI
None	58	24.5	19.1-30.7	21.0	16.0 – 26.9	37.5	22.2 – 55.8
Public	52	21.9	15.0-30.9	21.0	12.4 – 33.1	22.5	14.0 – 34.1
Private	125	52.7	43.1-62.2	56.9	46.1 – 67.1	40.0	20.9 – 62.7
Both	2	0.8	0.2-3.3	1.2	0.3 – 4.7	0	0
Timeliness of treatment							
TOTAL sought treatment	180	75.9	69.6-81.3	79.0	73.1-84.0	65.0	44.4-81.2
TOTAL sought treatment 24 hrs	83	35.0	27.9 - 42.9	38.3	28.9 - 48.7	27.5	14.1 - 46.8
TOTAL sought treatment 48 hrs	124	52.3	43.8 – 60.7	56.9	47.1 – 66.2	42.5	26.8 – 59.9

Of those who sought treatment, the majority, 69.5% (95%CI:58.1-78.8) of all caregivers sought treatment for their child from the private sector only compared to 28.9% (95%CI: 19.4-40.7) in public sector only. Table 12, breaks down the source of all treatment sought. Five percent (4.74%; 95%CI: 2.25 – 9.71) of children were hospitalised due to the fever.

Table 12: Source of treatment for a child with a fever

Source for fever treatment	n	% (all children with a fever)	95%CI
Public sector			
Hospital	14	5.9	3.2-10.7
Health Centre	27	11.4	6.2-20.0
Clinic/outreach services	11	4.6	1.9-10.9
VHT or CMD	1	0.4	0.1-3.1
Other public	1	0.4	0.1-3.1
Private medical sector			
Pvt hospital/clinic	72	30.4	23.1-38.8
Pharmacy/drug shop	27	11.4	5.8-21.3
Other private	27	11.4	5.8-21.3

Diagnostics for fever

The presence of a fever can be used as a presumptive indication that the child has an infection with malaria. However, with a changing malaria epidemiological profile in Uganda, the National Malaria Control Programme (NMCP) advocates that all fever cases should be tested for malaria. Only 19.0% of children with a fever were tested for malaria, table 13, with an increased likelihood that a diagnostic test was administered in a peri-urban/urban area compared to a rural area (p=0.03).

There was no evidence for a difference between peri-urban/ urban areas and rural areas in the malaria test positivity rate (p=0.31).

Table 13: Diagnostics for malaria

Malaria test for a child with fever	n	%	95%CI
Yes	44	19.1	11.6 – 29.6
No or don't know	187	81.0	70.4 – 88.4
Rural			
Yes	23	13.9	6.9 – 26.2
No	142	86.1	73.8 – 93.1
Peri-urban			
Yes	14	37.8	19.7 – 60.2
No	23	62.2	39.8 – 80.3
Malaria test positivity rate			
Positive	38	90.5	73.9 – 97.0
Negative	4	9.5	3.0 – 26.1

Acute Respiratory Infection (ARI)/Pneumonia morbidity

Prevalence of ARI/Pneumonia and treatment received

The two week period prevalence of pneumonia or an acute respiratory infection, was estimated by asking the caregivers if their child under five had been ill in the past two weeks preceding the survey with a cough accompanied by short, rapid breathing which the mother considered to be chest-related. These symptoms are compatible with an ARI[5]. When considering the findings, it should be noted that the morbidity data collected are subjective, as they rely on the mother's perception of illness, without any independent verification by medical personnel. A total of 56.1% of children under five were reported to have had a cough in the last two weeks with 12.3% of children under five reported to have had an ARI (cough and fast breathing) in the last two weeks. The prevalence of an ARI was highest in those less than two years old. There was no evidence to suggest there was any difference between rural and peri-urban areas (p=0.88) or between socio-economic status (p=0.37).

Caregivers were asked what drugs, if any, they gave their child with an ARI/pneumonia. Forty-four percent (95% CI: 33.3-54.3) of children with an ARI received an antibiotic, however only 8.8% (95%CI: 4.9-15.4) of children received an antibiotic within twenty-four hours of symptom onset, table 14.The largest proportion of children with an ARI, were given Septrin (26.5%) or Amoxicillin (17.4%).

[5] Symptoms of an ARI are considered a proxy for pneumonia

Table 14: Children under five with an ARI/pneumonia and treatment received

Categorisation	n	%	95% CI	% took antibiotic	% took antibiotic same/next day	% took antibiotic in 48 hrs	% sought treatment same/next day
Age (months)							
0-11	50	17.7	13.4–22.9	46.4	4.0	12	10.0
12-23	45	16.4	12.4-21.2	28.9	4.4	6.7	8.9
24-35	31	11.6	7.3-17.8	44.4	12.9	12.9	16.1
36-47	30	9.3	5.9-14.3	54.3	16.7	26.7	16.7
48-59	26	7.9	5.1-12.0	46.4	11.5	23.1	19.2
TOTAL	**182**	**12.3**	**9.5-15.8**	**43.5**	**8.8**	**14.8**	**13.2**
District profile – children under five with cough and fast breathing							
	n			**%**	**95%CI**		
Masaka	104			16.1	12.0 – 21.2		
Mpigi	23			7.9	5.4 – 11.3		
Wakiso	55			10.2	5.9 – 17.0		
Urban_rural profile – children under five with cough and fast breathing							
Rural	109			12.8	9.0 - 17.9		
Peri-urban/urban	45			14.5	10.1 - 20.3		

Seven percent (7.0%; 95%CI: 3.1-14.8) of children with an ARI were hospitalised in the last three months.

Treatment seeking behaviour for a child with an ARI

Treatment seeking behaviour for children under five with an ARI was assessed, table 15. Treatment was sought for approximately half (51.3%; 95%CI: 40.3-62.2) of all children under five who had an ARI. There was no evidence (p=0.71) to suggest that those residing in rural areas were more likely to seek treatment for fever than in the peri-urban/urban areas. Many caregivers delayed seeking treatment for a child with an ARI with just over one in ten (13.2%; 95%CI: 8.4-20.0) seeking treatment for an ARI within twenty-four hours of symptom onset.

Table 15: Source and timeliness of treatment for a child with an ARI/pneumonia

Source of treatment	n	%	95% CI	Rural	95%CI	Peri-urban	95%CI
None	82	45.1	35.1-55.4	45.9	34.5-57.7	46.7	28.0-66.3
Public	34	18.7	12.6-26.8	21.1	13.8-30.8	13.3	4.5-33.3
Both	4	2.2	0.7-7.0	1.8	0.4-7.3	2.2	0.3-14.1
Private	62	34.1	24.9-44.6	31.2	20.6-44.2	37.8	20.0-59.7
Timeliness of treatment							
TOTAL sought treatment	101	55.5	45.0-65.6	55.0	42.8-66.7	53.3	33.7-72.0
TOTAL sought treatment within 48 hrs	50	27.5	21.2-34.8	22.0	15.1-31.0	31.1	18.8-46.9
TOTAL sought treatment within 24 hrs	24	13.2	8.4-20.0	11.0	6.1-19.0	13.3	5.4-29.4

The main source of treatment was from the private sector, with 61.4% (95%CI: 48.8-72.6) of caregivers that sought treatment, seeking it from the private sector only and 33.7% (95%CI: 23.3-45.9) from public sector only. Of all children with an ARI, most caregivers sought treatment from a private hospital or clinic, table 16.

Table 16: Source of treatment for a child with an ARI

Source for ARI treatment	n	%	95%CI
Public sector			
Hospital	18	9.9	6.1-15.7
Health Centre	14	7.7	4.2-13.7
Clinic/outreach services	5	2.7	0.9-7.9
VHT or CMD	0	0	
Other public	1	1.0	
Private medical sector			
Pvt hospital/clinic	45	24.7	17.0-34.5
Pharmacy/drug shop	5	2.7	1.2-6.2
Other	16	15.4	

Diarrhoea morbidity

Prevalence of diarrhoea and treatment given

A total of 9.1% (95%CI: 6.9-11.8) of children under five had diarrhoea in the last two weeks, with little evidence to suggest there is a difference between peri-urban and rural areas (p=0.06) and socio-economic status (p=0.06). The highest prevalence of diarrhoea was in children aged 12 to 23 months (19.3%).

The proportion that received Oral Rehydration Salts (ORS) for an episode of diarrhoea was 40.3% (95%CI: 25.1-57.7), however only 2.2% (95%CI: 0.8-6.3) received both ORS and zinc, table 17.

Table 17: Children under five with diarrhoea and treatment received

Categorisation	n	%	95% CI	% received ORS	% took ORS and zinc	% sought treatment
Age (months)						
0-11	27	9.5	6.3-14.2	20.8	0	38.5
12-23	53	19.3	14.3-25.4	46.2	0	40.0
24-35	22	8.2	5.3-12.5	28.6	0	60.0
36-47	16	5.0	2.7-9.0	50.0	6.3	60.0
48-59	16	4.8	2.9-7.9	61.5	12.5	50.0
TOTAL	**134**	**9.1**	**6.9-11.8**	**40.3**	**2.2**	**46.4**
District profile – children under five with diarrhoea						
	n		%	95%CI		
Masaka	79		12.2	8.5-17.3		
Mpigi	17		5.8	2.8-11.8		
Wakiso	38		7.0	5.1-9.6		
Urban_rural profile – children under five with diarrhoea						
Rural	69		8.1	6.0-10.9		
Peri-urban/urban	43		13.8	8.6-21.4		

Treatment seeking behaviour for a child with diarrhoea

The caregivers of just under a half (46.4%; 95%CI:34.2-59.1) of all children under five with diarrhoea sought any kind of treatment, table 18, with equal proportions seeking treatment from the private (50.0%; 95%CI: 34.0-66.0) as the public sector (50.0%). There was no evidence to suggest there was a difference in where treatment for diarrhoea was sought between the peri-urban/urban and rural areas (p=0.39).

Table 18: Source of treatment for a child under five with diarrhoea

Source of treatment	n	%	95% CI	Rural	95%CI	Peri-urban	95%CI
None	75	56.0	43.4-67.8	60.9	47.1-73.1	44.2	22.2-68.7
Public	29	21.6	13.0-33.9	17.4	9.9-28.7	25.6	7.5-59.4
Private	30	22.4	14.8-32.5	21.7	13.0-34.0	30.2	14.4-52.8

Of all children with diarrhoea, 24.7% sought treatment from the private hospital or clinic, table 19.

Table 19: First source of treatment for a child with diarrhoea

First source for diarrhoea treatment	n	%	95%CI
Public sector			
Hospital	11	8.2	4.0-16.2
Health Centre III	13	9.7	5.0-18.0
Clinic/outreach services	5	3.7	1.0-13.5
VHT or CMD	3	2.2	0.3-14.8
Private medical sector			
Pvt hospital/clinic	23	17.2	9.9-28.0
Pharmacy/drug shop	2	1.5	0.4-5.8
Other private	5	3.7	

Malariometric and anthropometric measurements

Methodology

Malariometric and anthropometric measurements were taken from every child under five that was registered in a household. After the administration of the household and women's questionnaire, every child under five was given a notification card and asked to come, the next day, to a central place within the village, so their child could be assessed for malariometric and anthropometric measurements. When they arrived, the children proceeded through a series of stages, whereby the child was registered, assessed to determine if they were currently sick with fever (on the day of the survey) or had been sick in the last 72 hours (3 days) and their auxillary temperature was taken to determine if the child had a fever. A thick and thin film was also taken to assess for parasitaemia through microscopy. In addition a RDT was administered for those with a fever, for diagnostic purposes. If the child had a positive RDT, the child was treated with an ACT. Height and weight measurements were also taken to assess for the presence of stunting and wasting.

A total of 1,413 children under five participated in the malariometric indicator survey. There were an eligible 1,791 children under five, according to the household listing that could have attended, therefore there was a 21.1% loss.

Fever

A child with a temperature of 37.5°C and above has been taken as the gold standard for a fever in previous similar malariometric surveys. Of the children measured, 3.0% had a measured fever (temperature >=37.5°C) on the day of the survey compared to 13.2% of caregivers reporting that the child had a fever that day. Thirty two percent of children under five were reported by the caregivers too have had a fever in the last three days, table 20.

Table 20: Prevalence of fever

Prevalence of fever	n	%	95%CI
Children with measured fever			
Measured temp >=37.5C	42	3.0	2.0-4.4
Temp below 37.5C	1370	97.0	95.6-98.0
TOTAL	1412	100.0	
Children reported with fever on day of survey			
Have fever	186	13.2	10.3-16.7
No fever	1201	85.0	81.6-87.8
Don't know	26	1.8	1.2-2.9
Children reported with fever in last 72 hours			
Had fever	446	31.5	27.2-36.3
No fever	958	67.8	63.1-72.1
Don't know	10	0.7	0.4-1.4

Biomarkers

Malaria parasite prevalence

Approximately one in five of all sampled children, (22.4%) had malaria parasites, with evidence (p=0.002) the proportion is higher in rural (29.2%; 95%CI:23.9-35.2) compared to peri-urban/urban areas (11.0%; 95%CI:5.9-19.8), table 21. Asymptomatic parasitaemia was high at 57.6%, conversely only 34.8% of fevers had malaria parasites present. However, the latter did not take into account if the child had received any anti-malarials.

Table 21: Parasitaemia

Parasite prevalence	n	%	95%CI
Parasite prevalence (parasites present)			
Parasites present (all ages)	316	22.4	17.9-27.6
<6 months	7	4.5	2.2-8.7
6-59 months	309	24.6	19.7-30.3
No parasites present	1097	77.6	72.4-82.1
District profile			
Masaka	152	27.9	21.2-35.7
Mpigi	63	23.5	17.2-31.2
Wakiso	101	16.8	10.2-26.5
Asymptomatic parasitaemia (parasites present)			
All ages	182	57.6	50.7-64.2
Gametocytes present			
All ages	316	22.4	17.9-27.6
< 6 months	7	0.5	0.2-1.0
6-59 months	309	21.9	17.5-27.0

Figure 3: Parasite prevalence by age in months

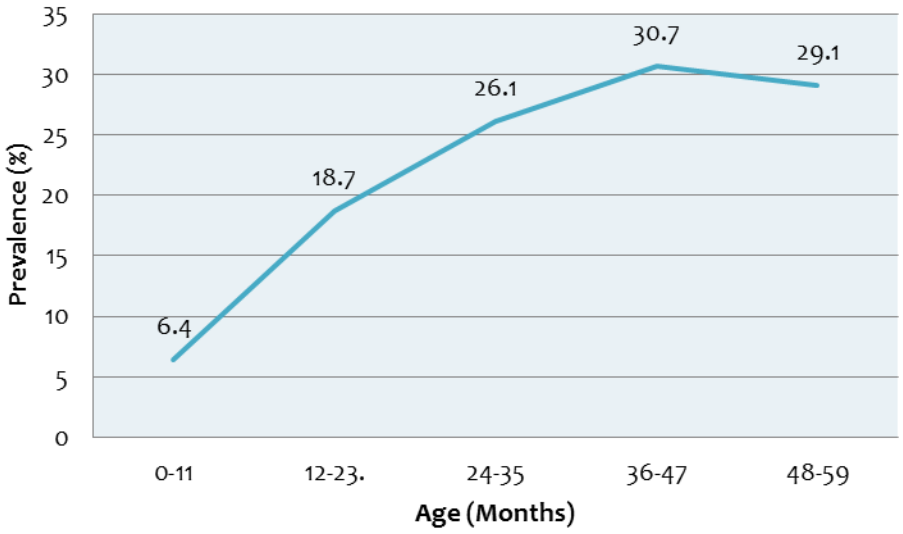


Figure 3 shows the breakdown of parasite prevalence by age group. Parasitaemia peaks in children aged 36-47 months old.

Most children with malaria (79.3%) were infected with *P. falciparum* alone. Infection with more than one species of malaria was found in 3.9% of all children examined (17.3% of all malaria infections). The most common mixed infection was of a mixed infection *P. falciparum* and *P. malariae* (15.2% of all malaria infections), table 22.

Table 22: Multiple malaria infections (trophozoites or gametocytes)

Parasite species	n	%	95%CI
All children			
Multiple infections	55	3.9	2.4-6.3
All malaria infections			
P. falciparum	261	79.3	72.2-85.0
P. malariae	11	3.3	1.8-6.2
P. vivax	2	0.6	0.2-2.2
P.falciparum + P. malariae	50	15.2	10.1-22.2
P. falciparum + p.vivax/p.ovale	5	1.5	0.5-4.2

Parasite density levels give an indication of children that have an infection that are more likely to result in severe malaria, see table 23. The proportion of children (with any parasitaemia) with a high parasite density was 21.4%, with children above six months having a higher prevalence than children under six months.

Table 23: Parasite density

Geometric Mean Parasite density (parasites/µl)			
	n	Mean	95%CI
All ages	304	755	592-963
<6 months	6	332	29-3913
6-59 months	298	768	601-981
Proportion with high parasite density (>5,000/µl)			
All ages	239	21.6	16.3-28.1
< 6 months	1	6.7	2.1-65.5
6-59 months	64	21.5	16.0-28.3

Anaemia

Amongst all children under five, 28.2% (95%CI: 24.0-32.7) had any anaemia (haemoglobin levels below 11g/dL), with no evidence to suggest that there is any difference between rural and peri-urban/urban areas (p=0.21), table 24. Less than one percent of children under five had severe anaemia (0.4%) and 12.5% had moderate anaemia, as defined by WHO. The proportion of children with moderate/severe anaemia based on the MERG recommended cut-off of 8g/dL hb was 1.3%.

Table 24: Anaemia in children under five

Anaemia levels	All ages			6-59 month		
	n	%	95%CI	n	%	95%CI
Severe (*hb <7.0g/dL*)	5	0.4	0.1-0.8	5	0.4	0.2-0.9
Moderate (*hb 7.0-9.9 g/dL*)	176	12.5	10.2-15.3	155	12.4	10.1-15.1
Mild (*hb 10.0-10.9 g/dL*)	214	15.3	12.7-18.2	190	15.2	12.5-18.4
Any anaemia (*hb<11.0g/dL*)	395	28.2	24.0-32.7	350	28.0	23.7-32.7
No anemia (*hb≥11.0g/dL*)	1008	71.8	67.3-76.0	899	72.0	67.3-76.3

Stunting and wasting

The anthropometric measurements of the child were measured in order to determine the prevalence of stunting and wasting in the sample. Weight data was available for 1,221 children and height data for 1,209. Z-scores were calculated based on the WHO Child Growth Standards. Extreme (i.e biologically implausible) z-scores for each indicator are flagged according to the following system: Weight for age z-score <-6 or >5; length/height-for-age z-score <-6 or >6; Weight-for-length/height z-score <-5 or >5; and BMI-for-age z-score <-5 or >5. Extreme scores were removed, before conducting the analysis for children with stunting or wasting.

As shown in table 25, the overall stunting in children under five was 18.7% with 131 scores flagged as likely erroneous measurements. A total of 7.7% of children were classified as wasted with 118 scores flagged as likely erroneous.

Table 25: Prevalence of stunting and wasting in children under five

	N	%	95%CI
Stunting (z-score<%<-2SD)	187	18.7	15.4-22.4
Wasting (z-score<%<-2SD)	78	7.7	4.2-13.9

Discussion

The report outlines the current situation in the intervention areas in regards to child health, in particularly for fever, ARI and diarrhoea. This baseline will provide a comparison, to which the same indicators will be compared to at the end of the project. The methodology and tools used were consistent with the Uganda Demographic Health Survey (DHS) [1] and Malariometric Indicator Surveys (MIS) [2], allowing for a comparison to be made between these baseline findings and trends in the past.

The population demographics broadly resemble those reported in the national surveys above, with a household size of 5.6 in the survey compared to 5.0 in the DHS 2006 and 4.7 in MIS 2009. However, in the survey samples there is a bias in the sampling frame, selecting households with at least one child under five.

As is highlighted in table 26 below, the two week fever prevalence in children under five was significantly lower than either the MIS or DHS survey. However, one explanation could be that since either of the latter surveys, there has been a large distribution of Long-Lasting Insecticide Nets under the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) in the intervention area. The impact of which is highlighted by the increased coverage in ITNs amongst households in the survey area. There may also be some seasonal variations, between the timings of this survey and the MIS and DHS[6].

Table 26: Comparison of survey results for fever prevalence and ITN coverage with DHS and MIS

Indicator	ICCM central baseline	MIS 2009	DHS 2006
Two week fever prevalence	16.0 (12.8-19.9)	33.9	40.9
% HH with at least 1 ITN	74.3 (69.9-78.3)	35.3	8.4

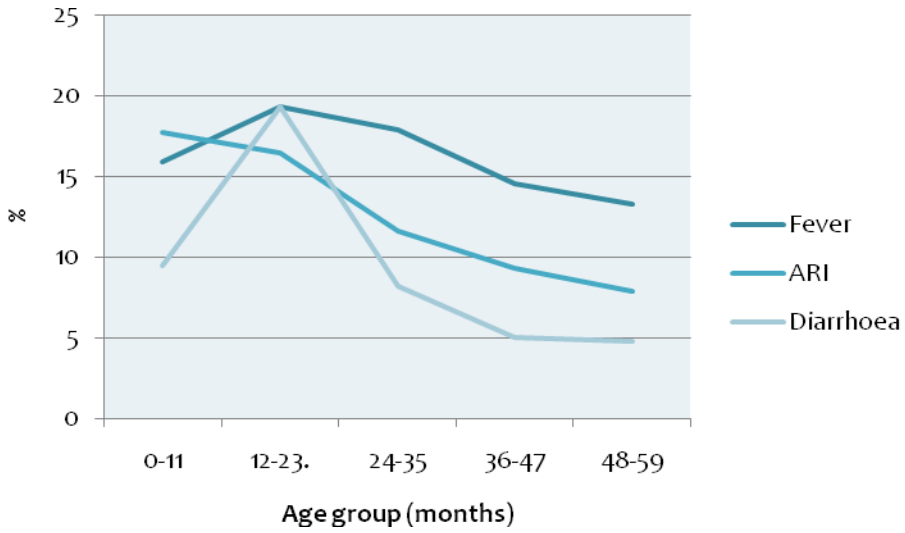
However, the two week period prevalence of diarrhoea in children under five, is also lower in the survey area (9.1%) compared to the DHS 2006 findings (23.6%). This again could be due to seasonal or local variations, or a more general trend of improved hygiene and sanitation within households.

The findings for pneumonia (12.3%) were more similar to the DHS 2006 findings (9.8%).

Importantly, the age pattern of disease, figure 4, was consistent with similar findings in the DHS 2006 results and is what would be expected epidemiologically.

[6] DHS 2006 was conducted in May to October 2006; MIS 2009 was conducted in November and December 2009

Figure 4: Prevalence of disease by age



It is clear that access to timely and appropriate treatment for these diseases in currently insufficient. Treatment seeking behaviour for the three diseases, varied slightly with caregivers of a child with a fever more likely to seek treatment (75.9%) compared to a child with an ARI (55.5%) or diarrhoea (46.4%). Where treatment was sought, the caregivers were likely to seek treatment in the private sector only (fever, 69.4%; ARI, 61.4%) however, for a child with diarrhoea the caregiver was as likely to go to the public (50.0%) as to the private sector (50.0%). It should be noted that case management in the private sector varies, with many facilities, especially drug shops, providing ineffective treatment and sometimes sub-doses. There was no significant treatment available through village health teams or community health workers. Crucially, these findings confirm that there is quite a significant treatment gap, with under a third of children receiving an ACT for a fever (32.5%), with only 19.4% receiving an ACT within twenty-four hours of fever onset. A child with an ARI was more likely to receive an antibiotic (43.5%), mainly amoxicillin or septrin, however very few, 8.8%, received the antibiotics the same or next day of symptom onset. For diarrhoea, very few children, 2.2% were appropriately managed with both ORS and zinc, although 40.3% of children did receive ORS.

The above findings for treatment received for a child with an ARI or diarrhoea, is similar to the DHS 2006 results. However, timely access to appropriate treatment for a child with a fever/malaria, appears to have improved since the DHS 2006 survey (2.8%) and MIS 2009 (9.5%). This would be consistent with the policy shift in Uganda to ACTs and the trend in the increased awareness and availability of the drugs in both the public and private sector over the years.

The biomarkers, also show a slight improvement against MIS 2009 results, which has been consistent across all malaria indicators, with 22.4% of children with malaria parasites and 28.2% with any anaemia compared to 38.9% and 63.0% respectively.

It can not be excluded that the difference in this survey findings compared to DHS and MIS surveys, is not a result of measurement error. However, the results for malaria indicators are consistently better but remain within what is epidemiologically expected. In addition, there have been known improvements in malaria control efforts in the area and there is a general better socio-economic status of the population then compared to certain regions of Uganda, thus making these findings very plausible.

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