INTEGRATED APPROACH TO COMMUNITY MANAGEMENT OF ACUTE MALNUTRITION

LOIMA SUBCOUNTY, TURKANA, KENYA

ENDLINE COVERAGE SURVEY

August 2019

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Implemented by Save the Children Kenya and the Ministry of Health Kenya

EXECUTIVE SUMMARY

In collaboration with the Kenyan Ministry of Health, Save the Children International has been implementing a research study in Loima sub-county, Turkana, northern Kenya to integrate the treatment of severe and moderate acute malnutrition (SAM and MAM) into the existing integrated Community Case Management (iCCM) responsibilities of Community Health Volunteers. The research study took place between November 2018 and August 2019. A coverage survey was completed in Loima sub-county in August 2019 with the aim of assessing the evolution of treatment coverage of SAM and MAM in the intervention and control arms of the study. The baseline SAM and MAM treatment coverage estimate for Loima sub-county was estimated to be 54.4% and 48.2% respectively during a SQUEAC survey in May 2018.

The coverage survey was completed in the intervention and control arms of the study using an adapted "wide area survey" methodology. In addition to measuring the treatment coverage of SAM and MAM in children aged 6-59 months, the wide area survey set out to measure the treatment coverage of Malaria, Pneumonia and Diarrhoea in children aged 2-59 months.

Owing to the low prevalence of SAM at the time of the survey, the survey team did not attempt to estimate the coverage of SAM treatment. The sample sizes for MAM, GAM and Malaria were achieved in both study arms. The diarrhoea sample size was not achieved in the intervention arm and the pneumonia sample sizes were not met in either of the study arms.

The coverage estimates are as follows:

		Coverage estimate	Lower confidence interval	Upper confidence interval
MAM	Control	59.7%	47.5%	71.9%
	Intervention	62.3%	50.1%	74.5%
GAM	Control	62.5%	51.3%	73.7%
	Intervention	61.2%	49.5%	72.9%
Malaria	Control	68.1%	57.1%	79.1%
	Intervention	67.1%	56.5%	77.7%
Diarrhoea	Control	60.6%	49.2%	71.9%
	Intervention	Not possible to estimate coverage due to low sample size (30 total cases found / 17 covered)		
Pneumonia	Control	Not possible to estimate coverage due to low sample size (23 total cases found / 17 covered)		
	Intervention	Not possible to estimate coverage due to low sample size (19 total cases found / 12 covered)		

In both study arms, coverage of all interventions exceeded 50% (the Sphere standard for CMAM treatment coverage in rural contexts). Compared to the MAM treatment baseline coverage estimate (48.2%), coverage has increased by 10-12% in both intervention and control.

The survey findings indicate that coverage of MAM treatment is similar in the intervention and control arms of the study (approximately 60%) and that coverage has not increased significantly in the intervention arm of the study in comparison with the control arm (as expected).

Malaria treatment had the highest coverage of all interventions in both study arms (approximately 67.5%). It was not possible to estimate coverage of diarrhoea and pneumonia treatment in both study arms due to low sample sizes. However based on cases found, it is possible to say that coverage of these interventions was between 50% and 70%.

The qualitative findings of the survey did not provide any compelling evidence to explain why coverage of MAM treatment was not higher in the intervention arm in comparison with the control arm. However the findings indicate that in certain areas of both study arms, CHV outreach activities are limited, stock breaks hamper the delivery of iCCM services and there remains a preference for carers to seek treatment from health clinics rather than from CHVs.

Furthermore, at the time of the endline survey, the study had only be operational for 6 months (instead of the 12 months that was intended when the study was designed).

In relation to the reasons for non-attendance to treatment (of all interventions), there were no major differences between the control and intervention arms. In both study arms, the most common reason cited by carers of non-covered cases was a lack of awareness that the child was sick. The second most common reason was that the carer was aware that the child was sick but they had not yet had a chance to seek treatment.

In both study arms, a number of carers did not seek treatment because they were ashamed. Furthermore stock shortages at clinic and community level also resulted in some non-covered cases being rejected in the clinic or not provided with the relevant care by CHVs.

Survey results also indicated that in certain communities, carers have a preference for traditional medicine. Also there was strong evidence that if they are willing to seek treatment from the MoH, carers prefer to visit health clinics rather than accepting treatment from CHVs (including those in remote villages).

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ABBREVIATIONS

CI	Confidence interval
Cin	Cases in treatment
CHU	Community Health Unit
CHV	Community Health Volunteer
CMAM	Community based management of acute malnutrition
Cout	Cases not in treatment
GAM	Global Acute Malnutrition
iCCM	Integrated Community Case Management
INGO	International non-governmental organisation
KDHS	Kenya Demographic and Health Survey
MAM	Moderate Acute Malnutrition
MIYCN	Maternal Infant and Young Child Nutrition
MUAC	Middle upper arm circumference
ODK	Open Data Kit
OFDA	Office for US Foreign Disaster Assistance
OTP	Outpatient Therapeutic Programme
R	Recovered case (i.e. a case that has been treated successfully for malaria, pneumonia and diarrhoea during the previous 14 days)
Rin	Recovering case in the programme (i.e. a case that was SAM/MAM but who is still in the OTP/SFP programme as they have not yet reached discharge criteria)
Rout	Recovering case not in the programme (i.e. a case that has recovered from SAM / MAM without being admitted to an OTP/SFP)
SAM	Severe Acute Malnutrition
SCI	Save the Children International
SFP	Supplementary Feeding Programme
SMART	Standardised Monitoring and Assessment of Relief and Transitions
SQUEAC	Semi Quantitative Evaluation of Access and Coverage
U5	Aged Under five
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme

1. INTRODUCTION

1.1. OVERVIEW OF ICCM + SAM AND MAM STUDIES

Recent programmatic experience suggests that Integrated Community Case Management (iCCM) can be effective in achieving high treatment coverage for common childhood illnesses in the community as well as delivering high quality care in the community.

Furthermore recent exploration of the linkages between iCCM and nutrition suggest that iCCM of childhood illnesses may be a logical platform for increasing the reach of treatment for acutely malnourished children. However, although operational linkages between iCCM and community-based nutrition interventions are feasible, evidence is lacking in Kenya on the success of such a strategy when both iCCM and treatment of acute malnutrition are implemented in an integrated manner.

Therefore since November2018, Save the Children, the Ministry of Health, Action Against Hunger, UNICEF and WFP have been implementing a research study aiming to generate evidence that can inform the development of policy and practice regarding the possible integration of management of acute malnutrition into iCCM. The study is being conducted in the sub counties of Loima in Turkana County and Isiolo in Isiolo County and aims to:

1. Examine the feasibility and effectiveness of integrating management of acute malnutrition (both Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM) into iCCM including treatment outcomes, the performance of Community Health Volunteers (CHVs) and treatment coverage of the interventions.
2. Determine the enabling factors and identify challenges for effective integration of management of acute malnutrition into iCCM
3. Investigate the cost and cost-effectiveness of integrating management of acute malnutrition into iCCM
4. Document lessons and best practices in integrating management of acute malnutrition into iCCM and provide policy and programmatic recommendations in Kenya and beyond.

The studies are being implemented as randomised control studies and have taken place between November 2018 and August 2019 in Loima and Isiolo. In both sub-counties, five community units were selected as intervention arms and five community units were selected as control arms. In the intervention arms, the CHVs were trained to screen, diagnose and treat MAM and SAM in children aged 6-59 months. This is in addition to screening, diagnosing and treating malaria and diarrhoea cases and to screening, diagnosing and referring pneumonia cases in children aged 2-59 months. Meanwhile in the control arm the CHVs followed existing national iCCM and CMAM protocols by screening, diagnosing and referring SAM and MAM cases and diagnosing and treating malaria and diarrhoea cases (and referring pneumonia cases).

1.2. SAVE THE CHILDREN'S ACTIVITIES

Save the Children International (SCI) has been in Turkana since February 2014, when it completed a transition which saw SCI join forces with the British INGO, Merlin, and merge their health and nutrition programmes. Save the Children has since grown its operations in Turkana implementing both development and emergency programs with a progressive focus on health system strengthening approaches, particularly since the devolved government system was put in place. These include interventions to improve food security and livelihoods in order to improve access to diverse and quality food; access to clean water and improved hygiene and sanitation practices; access to health and nutrition including Maternal Infant and Young Child Nutrition (MIYCN); childcare and feeding practices; and access to education services, capacity building of government and local partners among others.

More recently, in response to the 2017 drought, Save the Children implemented an integrated lifesaving response programme funded by USAID's OFDA, the Disasters Emergency Committee and UNICEF in Turkana that focused on Health, Nutrition, Water Sanitation and Hygiene (WASH), and livelihoods interventions.

The SCI team in Turkana has been implementing the iCCM study in Loima from its base in Lodwar since November 2018.

1.3. ESTIMATING COVERAGE

The primary research question that the study seeks to answer is as follows:

Does integrating management of acute malnutrition (including MAM and SAM) into iCCM improve coverage, quality of care, and treatment outcomes for children 6-59 months of age with acute malnutrition?

Assessing the *treatment* coverage of SAM and MAM treatment in both the intervention and control arms of the study is therefore a key indicator of success of the implementation modality being tested.

A baseline coverage assessment was completed in Loima sub-county (in all community unit catchment areas) using the SQUEAC[1] methodology in May 2018. The coverage survey found that for Loima sub-county, the treatment coverage of SAM in the Outpatient Treatment Programme (OTP) was 54.4% and the treatment coverage of MAM in the Supplementary Feeding Programme (SFP) was 48.2%.

The study protocol did not set a specific target for an increase of treatment coverage of SAM and MAM treatment in the intervention arm. It simply requires that there is an *increase* in coverage.

[1] Semi-quantitative evaluation of access and coverage

1.4. OBJECTIVES OF COVERAGE SURVEY

The coverage survey detailed in this report was conducted as an endline coverage survey for the research study with the primary aim being to assess the evolution of SAM and MAM treatment coverage in the intervention and control arms of the study.

However in addition to assessing the coverage of SAM and MAM treatment in children aged 6-59 months, the survey methodology also set out to assess the coverage of malaria, diarrhoea and pneumonia in children aged 2-59 months.

Therefore the objectives of the survey in the intervention and control arms of the study in Loima sub-county were, to estimate coverage of:

- SAM and MAM treatment (in children aged 6-59 months)
- Malaria treatment (in children aged 2-59 months)
- Diarrhoea treatment (in children aged 2-59 months)
- Pneumonia treatment (in children aged 2-59 months)

2. METHODOLOGY

2.1. INTRODUCTION

Coverage can be estimated using survey data alone if a sufficiently large sample size of cases is identified in a given area[2]. Therefore, in both the intervention and control arms of the study, the survey team conducted multi-indicator wide area surveys to identify target sample sizes of children fulfilling the defined case definitions.

The results were then analysed to estimate the coverage of GAM treatment, malaria treatment, diarrhoea treatment and pneumonia treatment with a 95% confidence interval.

When cases were identified during the survey, additional qualitative data was collected by survey teams to determine the primary reasons for non-attendance in a treatment programme (for non-covered cases) and, for covered cases, information about where treatment had taken place.

The methodology includes the following steps. These steps were completed in both the intervention and control arms of the study:

1. Calculation of sample sizes required to estimate coverage
2. Calculation of number of villages to visit to reach required sample sizes
3. Selection of villages to visit for case finding
4. Community case finding in line with case definitions in selected villages and interviews with carers
5. Analysis of cases found in order to calculate coverage estimates with 95% confidence intervals.

[2] More information is available on page 127 of the SQUEAC and SLEAC technical manual. The technical manual can be accessed at this link.

6. Analysis of questionnaires to determine leading barriers to treatment for different child illnesses

2.2. KEY STEPS OF METHODOLOGY

1. Calculation of the sample sizes required to estimate coverage

The *Sampsize calculator*[3] was used to calculate the required sample size of each of the diseases in the community.

The following data needs to be added to the calculator to do this:

- *Precision*: The desired precision of the final estimate. 10-15% is an acceptable precision for coverage estimates – for the Loima wide area survey a precision of 12% was used.
- *Prevalence:* The estimated treatment coverage of the intervention (if this is unknown then 50% should be used – for Loima, 50% was used based on the baseline coverage estimates)
- *Population:* The estimated population suffering from the illness in the survey area (this can be calculated using population and prevalence data – details below)
- *Level*: The desired level of the confidence interval (95% is used for coverage surveys)

The expected populations of each disease were calculated based on the most recent and accurate prevalence estimates and the populations of children aged 6-59 months for each of SAM, MAM, malaria, diarrhoea and pneumonia in the survey area.

The following formula is used (N = estimated population of cases in each service delivery unit):

$$N = \left\lfloor population\ of\ survey\ area_{all\ ages} \times \frac{percentage\ of\ population_{6-59\ months}}{100} \times \frac{prevalence\ of\ disease}{100} \right\rfloor$$

The prevalence estimates were based on the following data sources:

- MAM and GAM prevalence: MAM and GAM prevalence by MUAC and / or presence of oedema were estimated to be 6.4% and 7.4% respectively during a SMART survey in June 2019
- Malaria, Diarrhoea and Pneumonia prevalence: At the time of the survey, the most recent prevalence estimates for malaria, diarrhoea and pneumonia were from the 2014 Kenya Demographic and Health Survey (KDHS). The KDHS found that the prevalence of Diarrhoea for all ages was 14.3% and for Pneumonia was 2.5% for all ages. The prevalence for malaria was reported as 13.3% - however this related to the percentage of respondents who reported fever and who then had a rapid diagnostic test to check for malaria. It was found that approximately 51% of those measured were confirmed as having malaria. Therefore the estimate of malaria in Loima was estimated to be 6.8%. This was further reduced to 4% based on the

[3] http://sampsize.sourceforge.net/iface/index.html#prev

belief by the Save the Children team that malaria prevalence would be lower than 6.8% at the time of the survey.

At the time of the survey, the Save the Children team estimated that the prevalence of SAM would be extremely low (less than 1%). Identifying a large enough sample size of SAM cases to be able to estimate coverage would have been very resource intensive owing to the fact that teams would have had to visit every village in each of the study arms to reach a sufficient sample. Therefore based on the advice of the consultant, the Save the Children team set out to estimate the coverage of MAM treatment and GAM treatment (by combining the SAM and MAM cases identified during the survey).

Table 1 shows the calculated sample size of each child illness in the control and intervention arms of Loima sub-county and the data used to calculate the sample sizes.

Table 1: Sample size calculations for wide area coverage survey, Loima, August 2019

		Intervention	Control
	No. of villages	61	73
	Estimated total population	30,500	36,500
	Estimated U5 population	5,949	7,119
	% children U5	20%	20%
MAM	Prevalence[4]	6.4%	6.4%
	Population	456	381
	Sample size	57	58
GAM	Prevalence[5]	7.4%	7.4%
	Population	440	440
	Sample size	57	57
Malaria	Prevalence	4%	4%
	Population	238	285
	Sample size	53	55
Diarrhoea	Prevalence	14.3%	14.3%
	Population	851	1,018
	Sample size	60	61
Pneumonia	Prevalence	2.5%	2.5%
	Population	149	178
	Sample size	53	55

2. Calculation of number of villages to visit

Based on the required sample sizes, the next step was to calculate the required number of villages (*n*) to visit to reach the required samples sizes. Considering that teams would visit each village and conduct case finding for all four child illnesses at the same time, the sample size of the rarest disease was used to calculate the number of villages to visit.

[4] Prevalence was based on MUAC and/or presence of oedema
[5] Idem

This is done using the following formula. The average village population is calculated by dividing the total population of the survey area by the total number of villages in the survey area:

$$n = \left\lceil \frac{Required\ sample\ size}{Average\ village\ population \times Percentage\ of\ children\ aged\ 6\ to\ 59\ months \times prevalence} + 2 \right\rceil$$

With a prevalence of 2.5%, pneumonia was initially used to calculate the number of villages to visit. However using the pneumonia prevalence would have required teams to visit 48 villages throughout the intervention and control arms of the study (around one third of all villages in both areas). With the resources available for the survey, it would not have been possible to complete case finding in 48 villages.

Therefore the sampling plan was calculated based on the prevalence of malaria (4%). Based on this data it was estimated that 16 villages in each arm of the study would need to be visited to meet the required sample sizes (for malaria, diarrhoea and GAM). The data is summarised in Table 2.

Table 2: Data used to calculate the number of villages to visit in each study arm, Loima wide area coverage survey, August 2019

	Intervention	Control
Required sample size (Malaria cases)	53	55
Average village population	500	500
Percentage of children U5	20%	20%
Prevalence of malaria	4%	4%
Number of villages to visit	14	14
Additional villages[6]	2	2
Total villages to visit	16	16

During data collection in the control arm, an additional village in the Community Unit of Lorengippi was visited for case finding which was not on the original list of villages. This is because data collection teams completed data collection in the selected villages quickly (by 1pm). The nearest neighbouring village (Loya) was therefore visited for case finding.

3. Selection of villages to visit

The villages to visit were then selected using a random sampling method.

Considering that no detailed map of Loima sub-county existed (marked with each village), the villages were selected from an exhaustive list of all villages, disaggregated by ward and health facility catchment area using the Stratified Systematic Sampling Method. This is described on page 93 of the SQUEAC / SLEAC Technical reference[7].

In brief, this method included the following steps:

1. Calculation of a sampling interval by dividing the total number of villages in the relevant study arm with the number of villages to visit.

[6] During coverage surveys it is advisable to add on two additional villages to provide the survey teams with a better chance of reaching the required target sample sizes

[7] The SQUEAC / SLEAC technical reference can be accessed at this link.

2. Selection of a random number between 1 and the sampling interval (this was done using the "RANDBETWEEN" function in Microsoft Excel)
3. List of villages arranged by ward, then by community unit, then alphabetically
4. Numbering of villages from 1 to last village in list
5. Using the random number, select the first village. Then apply the sampling interval from the first number until the required number of villages is selected.

The complete list of sampled villages is available in Annexes 1 and 2.

4. In community case finding in selected villages and interviews with carers

Data collection teams visited each of the selected villages to conduct case finding to identify all children adhering to the defined case definitions of the survey. Case finding took place with the CHV from the local area.

The case definitions are as follows:

- All children aged 6-59 months who are suffering from GAM (based on MUAC and/or presence of oedema) and / or who are receiving treatment for acute malnutrition
- All children aged 2-59 months who are confirmed to have malaria (based on a rapid diagnostic test) and / or who are receiving treatment for malaria or who received treatment in the previous 14 days
- All children aged 2-59 months who are confirmed to have diarrhoea (based on information provided by carer) and / or who are receiving treatment for diarrhoea or who received treatment in the previous 14 days
- All children aged 2-59 months who are confirmed to have pneumonia (based on observation of breathing by survey team) and / or who are receiving treatment for pneumonia or who received treatment in the previous 14 days

The teams identified children suffering from one or more of the conditions using the procedure set out in the "Sick child recording form". If they found children who were sick, they then established if the child was receiving treatment or not for the relevant illness. Children who were not receiving treatment were referred to treatment appropriately using a referral slip (either to the CHV for treatment in the community or to the nearest health facility).

If they found children who fell within any of the case definitions, they recorded the information on a data collection sheet and administered a questionnaire if the child was a non-covered case.

For each case identified, there were a number of potential case "classifications":

- Covered case (Cin): This refers to a child that is suffering from acute malnutrition, malaria, diarrhoea or pneumonia at the time of the survey but who is receiving treatment.
- Non-covered case (Cout): This refers to a child that is suffering from acute malnutrition, malaria, diarrhoea or pneumonia at the time of the survey and who is NOT receiving treatment.
- Recovering case (Rin): For acute malnutrition, this refers to a child that is not sick at the time of the survey, but who is still receiving treatment as they have not reached discharge criteria.

- Recovered case (R): For Malaria, Diarrhoea and Pneumonia cases, a recovered case includes any child that has received treatment and has recovered in the last 14 days (confirmed by the mother or by checking the child's health card).

If relevant, cases were classified on the data collection summary sheet using the classifications of cases in Table 3.

Table 3: Classifications of cases identified during coverage survey of acute malnutrition, malaria, diarrhoea and pneumonia

	GAM cases	Malaria cases	Diarrhoea cases	Pneumonia cases
Covered cases	GAM Cin	M Cin	D Cin	P Cin
Non-covered cases	GAM Cout	M Cout	D Cout	P Cout
Recovering / Recovered cases	GAM Rin	M R	D R	P R

If the child fell within multiple case definitions (e.g. they were suffering from malaria and acute malnutrition and were not covered by treatment for either illness), only one questionnaire was administered.

5. Calculation of coverage estimates with 95% confidence intervals

When the survey was completed in the selected villages, the survey teams shared the totals for each of the case classifications with the survey coordination team.

Where the sample sizes were reached or exceeded it was then possible to estimate the coverage. For the coverage of MAM and GAM the Single coverage estimator[8] is the recommended estimator to use. For the coverage of malaria, diarrhoea and pneumonia treatment, the period coverage estimator is the most suitable estimator to use.

For SAM and MAM cases, *Rout* refers to SAM or MAM cases that never received treatment and have recovered naturally. It is calculated using a correction factor which is based on scientific studies (described in the footnote 8). Similar studies have not been conducted for malaria, pneumonia or diarrhoea cases. Therefore it is not appropriate to calculate *Rout* for these cases and therefore to estimate coverage using the Single coverage estimator.

Estimating coverage using the Single coverage estimator

The most reliable, and widely suited, coverage estimator for CMAM coverage surveys is the single coverage estimator. The estimator estimates coverage using active MAM / GAM cases as well as recovering cases in the programme and recovering cases NOT in the programme (Rout). The following formula is used to calculate single coverage:

$$Single\ Coverage = \frac{Cin + Rin}{Cin + Cout + Rin + Rout}$$

[8] For more information see Myatt, M et al, (2015) *A single coverage estimator for use in SQUEAC, SLEAC, and other CMAM coverage assessments*, p.81 Field Exchange 49.

Cin, *Cout* and *Rin* are all collected during the wide-area survey however *Rout* must be estimated using the following formula:

$$Rout \cong \frac{1}{3} \times (Rin \times \frac{Cin + Cout + 1}{Cin + 1} - Rin)$$

Estimating coverage using the Period coverage estimator

The period coverage estimator is a more suitable estimator to use to calculate the coverage of malaria, diarrhoea and pneumonia treatment. The following formula is used:

$$Period\ Coverage = \frac{Cin + R}{Cin + Cout + R}$$

Calculating the confidence intervals

The 95% Confidence interval for each of the coverage estimates can be calculated using the following formula:

$$95\%\ CI = Coverage\ \pm 1.96\ \times \sqrt{\sum \frac{\frac{c}{n} \times (1 - \frac{c}{n})}{n}}$$

Key:

- CI = Confidence interval
- c = numerator
- n = denominator

6. Analysis of questionnaires

Finally, the qualitative data collected from carers of non-covered cases identified was analysed to identify and rank reasons for non-attendance to treatment (barriers).

This was done by analysing the results in the “ODK Collect” database from the survey.

3. RESULTS

3.1. INTRODUCTION

The results of the wide area coverage surveys in the intervention and control arms of the study are detailed in this section.

Across both study arms teams assessed nearly 1,600 children for malaria, diarrhoea, pneumonia and acute malnutrition in 33 villages using the steps outlined in the sick child recording form during eight days of data collection. This accounts for approximately 12% of the total population of children under five (13,068) in the 10 community catchment areas of the study in Loima sub-county. A summary of data collection is shown in Table 4. Village by village results are available in Annexes 1 and 2.

Table 4: Summary of data collection

	Control	Intervention	TOTAL
Villages visited	17	16	33
Children assessed	787	807	1,594
Total cases found	233	191	424
Percentage of children classified as at least one "case"[9]	29.6%	23.7%	26.6%

In the sampled villages in the control arm, a total of 233 cases of at least one of the diseases (based on the case definitions of the survey) were found, representing approximately 30% of all children assessed. This is higher than the intervention arm where only 23.7% of all children assessed were found to be cases.

3.2. SAMPLE SIZES

As explained in Section 2, in order to be able to estimate coverage of the different illnesses, it was necessary for survey teams to identify target sample sizes of each. The sample sizes were calculated based on the expected population of children in the relevant age range in each of the study arms. The calculations are shown in Table 1.

Table 5 shows the actual cases found at the end of case finding in the 33 selected villages (16 in the intervention arm and 17 in the control arm).

[9] Based on the case definitions of the survey

Table 5: Sample sizes and cases found during wide area surveys, Loima sub-county, August 2019

	CONTROL				INTERVENTION		
Disease	Sample size	Cases found	%[10]		Sample size	Cases found	%[11]
SAM		10				5	
MAM	57	60	105%		55	57	104%
GAM	58	70	121%		57	62	109%
Malaria	55	69	125%		53	76	143%
Diarrhoea	61	71	116%		60	30	50%
Pneumonia	55	23	42%		53	19	36%

As explained in the methodology, owing to the low prevalence of SAM at the time of the survey, it was not possible to estimate the coverage of SAM treatment in each of the study arms. However it was possible to estimate the coverage of MAM treatment and GAM treatment (by combining the SAM and MAM cases found during the survey in each of the study arms).

As shown in Table 5, the sample sizes were achieved or exceeded for MAM, GAM and Malaria in both arms of the study and for Diarrhoea in the Control arm. However the sample sizes were not reached for pneumonia in the control and intervention arms, and for diarrhoea in the intervention arm.

It was suspected before the survey started that it would be difficult to reach the required sample size for pneumonia in both arms of the study. While no recent pneumonia prevalence information was available, the Save the Children team suspected that the prevalence was very low at the time. The low number of pneumonia cases found in both study arms confirmed the low prevalence.

The low sample size of diarrhoea cases in the intervention arm was surprising, especially considering the large sample size found in the control arm. This indicates that diarrhoea is patchy in different wards and villages of the sub-county.

Ideally, case finding would have continued until the sample sizes of all diseases were met or exceeded. However, this was not possible in Loima due to resource constraints.

3.3. COVERAGE ESTIMATES

Where the sample sizes were met or exceeded, it was possible to estimate coverage of treatment of the diseases in the intervention arms. Where the sample sizes were not reached, while it is not possible to estimate coverage, the results indicate the whether treatment coverage of that particular disease was high or low.

[10] This figure indicates the percentage of cases found in comparison to the target sample size. So, for example, in the control arm, 70 GAM cases were found in comparison to a sample size of 58. Therefore the percentage = 70 / 58 *100 = 121%
[11] Idem

MAM and GAM case finding results and coverage estimates

The MAM and GAM treatment case finding results and coverage estimates are shown in Table 6 for the control arm and in Table 7 for the intervention arm. For a reminder of the different case definitions (Cin, Cout and Rin), see pages 12 and 13.

"Rout" refers to "Recovering cases not in the programme" and is an estimated figure based on Cin, Cout and Rin. The calculation for Rout is as follows:

$$Rout \cong \frac{1}{3} \times (Rin \times \frac{Cin + Cout + 1}{Cin + 1} - Rin)$$

Therefore, for example, to calculate Rout for MAM cases in the control arm, the following calculation is made:

$$Rout \cong \frac{1}{3} \times \left(8 \times \frac{29 + 23 + 1}{29 + 1} - 8\right) = 2$$

Table 6: Coverage estimate calculation for MAM and GAM treatment in control arm

	Cases found				Denominator	Numerator	Coverage estimate	Confidence interval (CI)	
					n	C	c/n		
	Cin	Cout	Rin	Rout	Cin + Cout + Rin + Rout	Cin + Rin	Numerator/ Denominator	Lower CI	Upper CI
SAM	4	2	4	0					
MAM	29	23	8	2	62	37	59.7%	47.5%	71.9%
GAM	33	25	12	2	72	45	62.5%	51.3%	73.7%

Table 7: Coverage estimate calculation for MAM and GAM treatment in intervention arm

	Cases found				Denominator	Numerator	Coverage estimate	Confidence interval (CI)	
					n	c	c/n		
	Cin	Cout	Rin	Rout	Cin + Cout + Rin + Rout	Cin+Rin	Numerator/ Denominator	Lower CI	Upper CI
SAM	2	2	1	0					
MAM	21	19	17	4	61	38	62.3%	50.1%	74.5%
GAM	23	21	18	5	67	41	61.2%	49.5%	72.9%

The survey findings indicate that the coverage of MAM treatment has not increased significantly in the intervention arm of the study in comparison with the control arm (as expected). The coverage of GAM treatment is very similar in the intervention and control arms of the study. In both arms, since the baseline coverage assessment, coverage has increased by 10-12%.

The possible reasons for this are explored in Section 3.5.

Malaria, Diarrhoea and Pneumonia case finding results and coverage estimates

Tables 8 and 9 summarise the case finding results for malaria, pneumonia and diarrhoea and, where the sample size was reached, indicate the coverage estimates in the study arms.

Table 8: Coverage estimate calculations for malaria, diarrhoea and pneumonia treatment in control arm

	Cases found			Denominator	Numerator	Coverage estimate	Confidence interval (CI)	
				n	c	c/n		
	Cin	Cout	R	Cin+Cout+R	Cin+R	Numerator/ Denominator	Lower CI	Upper CI
Malaria	21	22	26	69	47	68.1%	57.1%	79.1%
Diarrhoea	28	28	15	71	43	60.6%	49.2%	71.9%
Pneumonia	7	6	10	23	17	n/a	n/a	n/a

Table 9: Coverage estimate calculations for malaria, diarrhoea and pneumonia treatment in intervention arm

	Cases found			Denominator	Numerator	Coverage estimate	Confidence interval (CI)	
				n	c	c/n		
	Cin	Cout	R	Cin+Cout+R	Cin+R	Numerator/ Denominator	Lower CI	Upper CI
Malaria	19	25	32	76	51	67.1%	56.5%	77.7%
Diarrhoea	11	13	6	30	17	n/a	n/a	n/a
Pneumonia	5	7	7	19	12	n/a	n/a	n/a

Tables 8 and 9 indicate that the treatment coverage of malaria was very similar across both arms of the study with approximately 68% of children suffering from malaria covered by treatment.

While it was not possible to estimate coverage of pneumonia treatment, the case finding results indicate that coverage of treatment was similar across the intervention and control arms (ranging from 55-75%).

However diarrhoea treatment coverage was slightly lower compared to the other illnesses: 60.6% in the control arm and from 45-65% in the intervention arm.

3.4. COVERAGE BY COMMUNITY UNIT

The village by village results (Annexes 1 and 2) indicate villages with particularly high or low coverage. The results are also summarised by community unit catchment area in Table 10. In the table “c” relates to covered cases and “n” relates to all cases found. The

coverage estimates in this table serve to indicate the *approximate* coverage estimate in each community unit and should not be used as individual coverage estimates.

Table 10: Summary of cases found by community unit

CONTROL	GAM[12]			Malaria			Diarrhoea			Pneumonia		
	c	n	%	c	n	%	c	n	%	c	N	%
Lobei	7	8	88%	8	9	89%	8	13	62%	0	0	n/a
Naipa	2	3	67%	6	17	35%	8	11	73%	6	7	86%
Lorengippi	12	17	71%	7	9	78%	6	14	43%	3	5	60%
Napeikar	14	15	93%	6	13	46%	6	11	55%	7	8	88%
Turkwel	10	27	37%	20	21	95%	15	22	68%	1	3	33%
Total	45	70		47	69		43	71		17	23	

INTERVENTION	GAM			Malaria			Diarrhoea			Pneumonia		
	c	n	%	c	n	%	c	n	%	c	N	%
Namoruputh	10	14	71%	13	23	57%	5	11	45%	3	5	60%
Lokiriama	10	11	91%	11	12	92%	4	4	100%	1	1	100%
Lorugum	9	21	43%	12	22	55%	4	8	50%	6	10	60%
Nadapal	9	13	69%	13	16	81%	4	6	67%	2	3	67%
Nasigier	3	3	100%	2	3	67%	0	1	0%	0	0	n/a
Total	41	62		51	76		17	30		12	19	

The results indicate that treatment coverage of all diseases is relatively high (greater than 60%) in all community unit catchment areas in the control arm, with a few exceptions (low GAM coverage in Turkwel, low malaria coverage in Naipa and Napeikar and low diarrhoea coverage in Lorengippi).

Meanwhile in the intervention arm, coverage of all diseases is high in Lokiriama, Nadapal and Nasigier, however coverage was particularly low for all diseases in Lorugum.

3.5. REASONS FOR NON-ATTENDANCE

When a child was found to not be receiving treatment for an illness when they were eligible to be treated, the data collection team administered a structured questionnaire to their carer to understand the primary reason for non-attendance to the relevant treatment programme. If a single child was found to not be receiving treatment for multiple illnesses, their carer was only administered one questionnaire. A total of 137 children were found to be non-covered cases for one or more illnesses; 77 in the control arm and 60 in the intervention arm. Based on the responses provided, it is possible to determine the primary reason for non-attendance for each non-covered case.

Figures 1 and 2 rank the primary reasons for non-attendance identified in the intervention and control arms.

[12] When estimating GAM treatment coverage by catchment area, it is not appropriate to calculate *Rout* and to estimate coverage using the "Single coverage estimator". Therefore the Period coverage estimator is used (c=Cin+Rin; n=Cin+Cout+Rin).

Figure 1: Primary reasons for non-attendance in control arm (n=77)

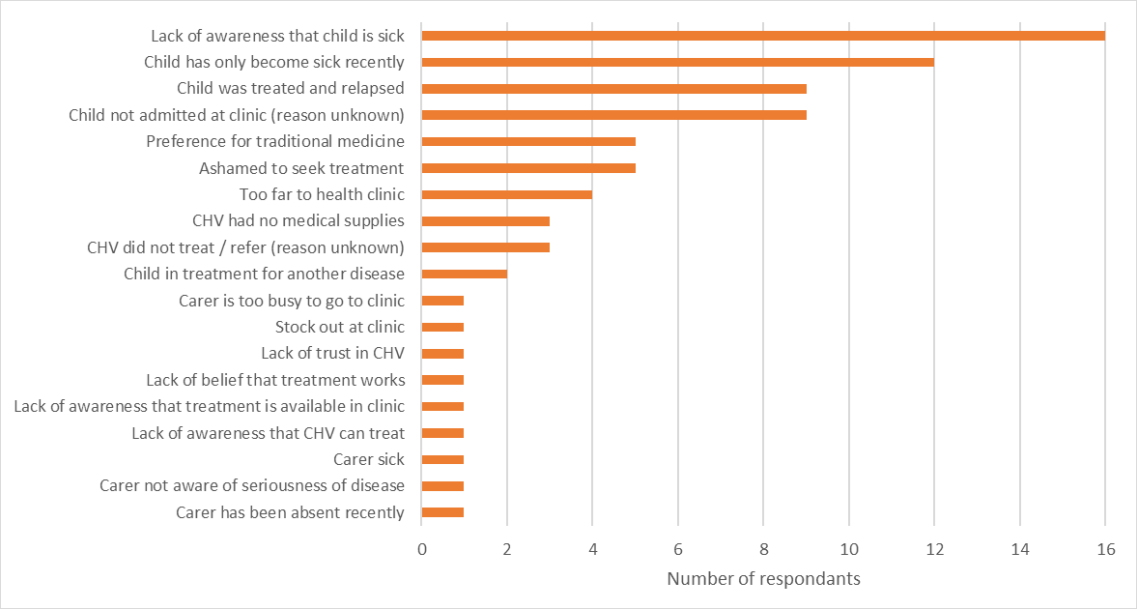
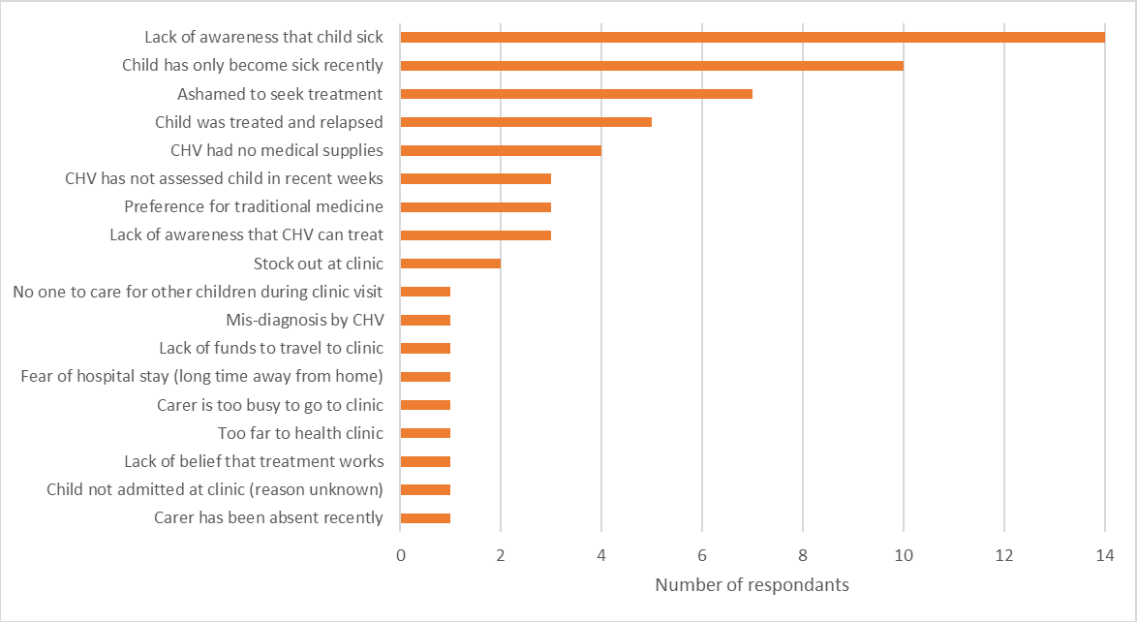


Figure 2: Primary reasons for non-attendance in intervention arm (n=60)



The most common reason for non-attendance on both arms of the study was that the carer was not aware that the child was sick. The majority of carers who cited this reason were carers of non-covered MAM cases (13 out of 16 in control and 11 out of 14 in intervention). This indicates the difficulty associated with identifying that a child is MAM based on their physical appearance or behaviour.

The second most common reason in both arms of the study was that the child had only recently become sick and so the carer had not yet had the opportunity to seek treatment for them (cited by 12 carers in control and 10 carers in intervention). The majority of carers who cited this reason were carers of non-covered malaria, diarrhoea and pneumonia cases. In the control and intervention arms out of the 22 carers who cited this reason, only two were a non-covered GAM cases.

Relapse was also a common reason for non-attendance in both arms of the study, especially in the control arm where 9 carers said that their child had been treated but had become sick again. In the control arm, 6 of these 9 cases had been previously discharged from the SFP. When relapse occurs in SFPs and OTPs, this can indicate of poor sensitisation of carers at the point of discharge.

Some carers also stated that they were ashamed to seek treatment for their child (7 in the intervention arm and 5 in the control arm) and that they preferred to treat their child using traditional medicine (3 in intervention and 5 in control). This is an additional indication of poor sensitisation about available treatment at community level.

Other important reasons included rejection at the clinic (due to unknown reasons) and stock shortages for the clinic or CHV (10 cases). Stock shortages were cited as a reason for non-attendance in 6 out of the 10 community units in the survey areas, but most frequently in Lorugum (4 cases).

Access related reasons (i.e. distance, lack of time to go to clinic, lack of funds to travel to clinic) were cited relatively rarely; 5 cases in the control arm and 3 cases in the intervention arm. However considering the long distances from some health clinics to villages and the scattered nature of Turkana family settlements, CHVs may also struggle to reach the most distant villages which would explain the relatively high numbers of carers who were unaware of the fact their child was sick.

3.6. PREVIOUS ASSESSMENT OF CHILDREN AT HOME

Carers of non-covered cases were also asked if their child had previously been assessed at their home and if yes, when this last happened. Figure 3 shows the results by community unit catchment area of the question: *Has your child been assessed for these diseases at your house previously?*

Figure 3: Responses to question: Has you child been assessed for these diseases at your house previously?

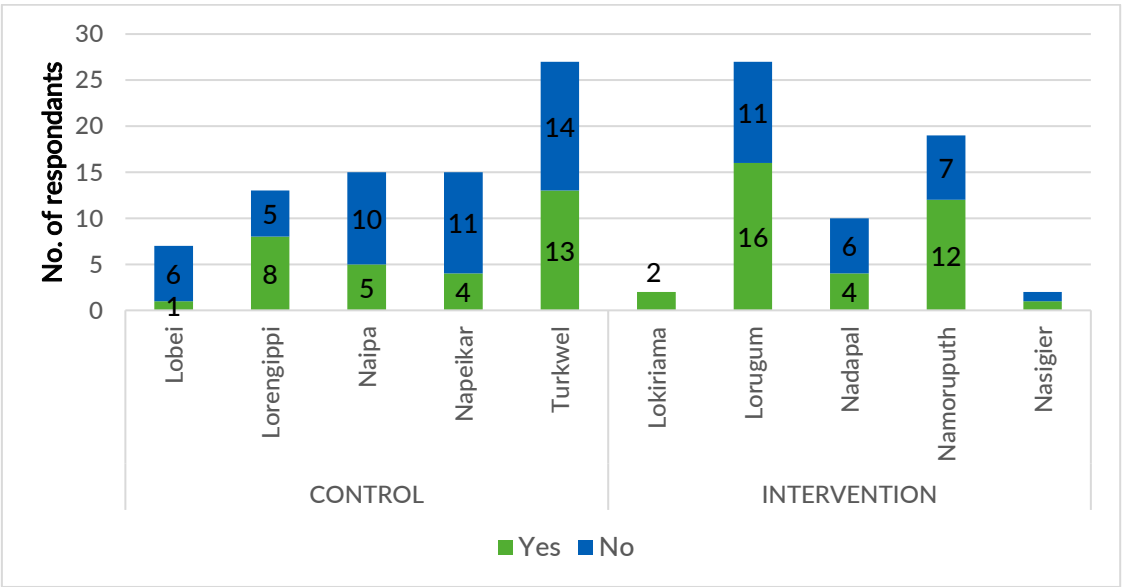


Figure 3 indicates that CHVs are conducting house-to-house screening in the intervention arm more regularly. Overall, 58% of carers said that their child had been

assessed in the community units in the intervention arm, compared to 40% in the community units of the control arm.

However the findings also indicate that screening is less frequent in the intervention arm. Overall, only 32% of carers said that their child had been assessed within the last month. This is compared to 27% in the control arm.

3.7. PREVIOUS TREATMENT

The questionnaire also asked carers if their child had been treated previously for acute malnutrition or for the other diseases (as relevant).

Out of the 57 non-covered GAM cases identified, 35 of them (61%) had been treated previously for acute malnutrition, 17 in the control arm and 18 in the intervention arm.

21 of the 35 children that had been treated previously, had been discharged as cured and had become SAM or MAM again. From of the remainder, 8 had defaulted, 3 had been discharged as non-responders and 3 had left the programme for other reasons

Out of the 89 children suffering from malaria, pneumonia and diarrhoea, 54 of them (also 61%) had been treated previously; the majority of these had been treated 3-5 times previously (although it is not known which diseases they were treated for). There was no major difference in results between the intervention and control arms.

3.8. LOCATIONS OF TREATMENT

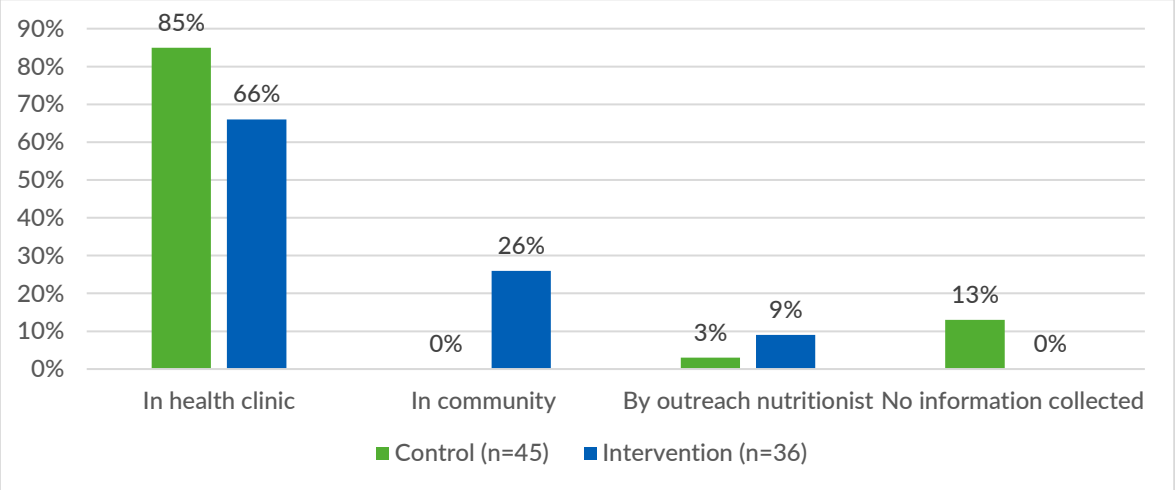
When a covered case was identified (including active cases covered by treatment and recovering[13] and recovered[14] cases), data collection teams asked carers where their child had been treated. This was done to investigate whether treatment had taken place in the community (delivered by a CHV), in a health clinic or elsewhere.

The results are summarised in Figure 4.

[13] A “recovering” case was any child who was receiving treatment for acute malnutrition at the time of the survey but who was not SAM / MAM at the time

[14] A “recovered” case was any child who had been treated for malaria, pneumonia or diarrhoea in the previous two weeks

Figure 4: Locations of treatment of covered GAM cases



In the control arm of the study, treatment for acute malnutrition was taking place in health clinic – therefore it is expected that a high percentage of GAM cases were treated in health clinics in Control. However the data from Intervention villages indicates that only a quarter of cases identified during the survey were being treated by CHVs in the community.

In theory, all covered GAM cases identified in the intervention arms should have been treated by CHVs in the community (if they did not have complications at the time of admissions). It was not possible to collect data during the survey to understand why this figure was particularly low. It may be that some carers prefer to go the clinic to have their child admitted to the OTP or SFP rather than accepting treatment from a CHV. This is explored more in Section 4.

Figure 5: Locations of treatment of covered malaria and diarrhoea cases

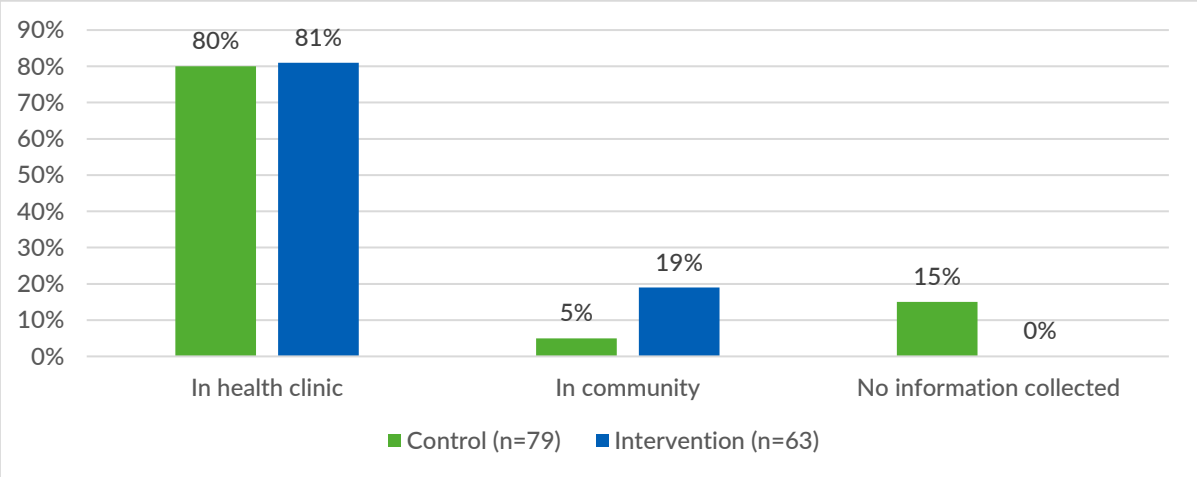


Figure 5 indicates the results for malaria and diarrhoea. This also indicates that treatment for these two diseases is largely delivered in health clinics, rather than in the community, in both arms of the study.

3.9 INFORMATION COLLECTED FROM VILLAGES

As they conducted data collection, teams noted additional pertinent information about villages and health services which the visited. Table 11 summarises the information noted by teams.

Table 11: Village and health facility information collected during data collection

Study arm	CHU	Village name	Comments
Control	Lobei	Kambi mpya	Anti-malarial stock out in facility and currently outbreak of malaria
Control	Lobei	Lomilo	Many mothers absent
Control	Lobei	Napatio	Anti-malarial (A/L) and Oral Rehydration Salts (ORS) stock out in health facility. Most mothers seeking treatment in health facility rather than CHVs
Control	Turkwel	Napetet 0 A	Rapid diagnostic test (RDT) and A/L stock out in both facility and community level
Control	Turkwel	Napetetii B	
Control	Turkwel	Nawoyatira	
Intervention	Namoruputh	Hewan	No stock of ORS at health facility. Requesting stock from neighbouring health facilities
Intervention	Namoruputh	Lobole /Nalemu	CHV serving a very large area - 20km from one village to another
Intervention	Lorugum	Kongit	Herbal medicine found to be used extensively in village
Intervention	Lorugum	Nakatiyan	Very scattered small settlements
Intervention	Nadapal	Akatorongot	Immunisation, deworming and vitamin A supplementation for most children screened not up to date.
Intervention	Nadapal	Naparipari	
Intervention	Nasigier	Kalopiria	Small but scattered settlements. Immunisation, deworming and vitamin A supplementation for most screened children were not up to date.
Intervention	Nasigier	Nasigier Centre	

Village level information was not collected and recorded consistently in all villages visited. However the information that was collected indicates that stock breaks of key commodities needed for the delivery of iCCM were missing at the time of the survey in a number of villages visited. There is a chance therefore that they may have been missing during the previous months which would have impacted the implementation of the research study.

4. DISCUSSION

The endline wide area coverage surveys in the intervention and control arms of the ICCM + acute malnutrition study in Loima sub-county in Turkana set out to measure the coverage of SAM and MAM treatment and the treatment of malaria, pneumonia and diarrhoea.

This is the first time such a multi-indicator coverage survey has been completed using this methodology. A baseline coverage survey was completed in May 2018 using the SQUEAC methodology – however this survey only measured the coverage of SAM and MAM treatment and set out to estimate the treatment coverage of the whole of Loima sub-county (rather than the coverage in the catchment areas of the intervention and control arms of the study). The endline survey needed to assess the coverage of multiple nutrition and health interventions across the control and intervention arms of the study. Therefore an adapted "wide area survey" methodology was completed comprising multi-indicator coverage surveys taking place in both arms of the study. The methodology is described in more detail in Section 2.

The survey succeeded in estimating the treatment coverage of MAM, GAM and malaria in both arms of the study and of diarrhoea in the control arm. Owing to low sample sizes (and inadequate resources to be able to sample more villages to reach the required sample sizes) it was not possible to estimate the coverage of diarrhoea treatment in the intervention arm or of pneumonia treatment in both arms. It was also not possible to estimate the coverage of SAM treatment owing to the low SAM prevalence at the time of the survey. The coverage estimates results are summarised in Table 12.

Table 12: Summary of coverage estimates from wide area coverage surveys in Loima sub-county, August 2019

		Coverage estimate	Lower confidence interval	Upper confidence interval
MAM	Control	59.7%	47.5%	71.9%
	Intervention	62.3%	50.1%	74.5%
GAM	Control	62.5%	51.3%	73.7%
	Intervention	61.2%	49.5%	72.9%
Malaria	Control	68.1%	57.1%	79.1%
	Intervention	67.1%	56.5%	77.7%
Diarrhoea	Control	60.6%	49.2%	71.9%
	Intervention	Not possible to estimate coverage due to low sample size (30 total cases found / 17 covered)		
Pneumonia	Control	Not possible to estimate coverage due to low sample size (23 total cases found / 17 covered)		
	Intervention	Not possible to estimate coverage due to low sample size (19 total cases found / 12 covered)		

The study in Loima sub-county has set out to integrate SAM and MAM treatment into the responsibilities of the Community Health Volunteers operating in the community units which are part of the intervention arm of the study. In addition to other objectives (summarised in Section 1.1), it was hoped that by doing this, the treatment coverage of SAM and MAM would increase in the community units in the intervention arm of the study. Given that Loima sub-county is a rural district which is populated by Turkana pastoral communities, the distances from communities to health clinics is generally far.

Therefore, by rolling out treatment from clinic to community level (to be delivered by CHVs), it was hoped that treatment coverage of SAM and MAM children would increase in the intervention arm. The survey findings indicate that the coverage of MAM treatment has not increased significantly in the intervention arm of the study in comparison with the control arm (as expected).

The coverage of MAM treatment is very similar in the intervention arm (62.3%) and control arm (59.7%) of the study. A single MAM treatment coverage estimate was found for the entire sub-county during the baseline assessment it is not possible to disaggregate the result. However, assuming that coverage was homogenous across the sub-county, coverage has increased by approximately 10%.

As no baseline treatment coverage estimates exist for malaria, pneumonia or diarrhoea, it is not possible to assess the impact that the study has had on the treatment coverage of these illnesses. However it is possible to compare coverage in the two zones of the study.

Malaria treatment coverage was very similar between the two zones with treatment coverage estimated to be 68.1% and 67.1% in the control and intervention arms respectively. Diarrhoea coverage was a little lower; 60.6% in the control arm and, based on the cases that were identified, it seems that coverage would have been similar in the intervention zone. While it was not possible to estimate pneumonia coverage, based on the number of covered cases compared with all cases found, treatment coverage appears to fall between 60% and 75% in both arms of the study.

With the data collected during the survey, it is not possible to gain a detailed understanding of the reasons why MAM treatment coverage has not increased by a greater percentage in the intervention arm. The decision was made to not conduct a detailed investigation during the coverage survey as the study team of the research partner (African Population and Health Research Centre) have been and are in the process of collecting additional quantitative and qualitative data to enable them to address the other research questions.

However the qualitative data gathered during the survey from carers of non-covered and covered cases helped to understand some of the possible reasons.

The most common reasons for non-attendance in both arms of the study were “Lack of awareness that child is sick” and “Child has only become sick recently”. Together these account for 36% and 40% of reasons for non-attendance in control and intervention respectively. The first reason was cited predominantly by carers of non-covered MAM cases and the second reason by carers of non-covered malaria and diarrhoea cases.

Both reasons underline the importance of community outreach work and indicate that community outreach is not taking place as regularly as it should (especially in the intervention arm). This is confirmed by the fact that across both arms of the study only 48% of carers said that a CHV had measured their child at their home previously. The reasons “Ashamed to seek treatment” and “Preference for traditional medicine” were also cited multiple times in both study arms. These reasons are also indicators of a lack of understanding amongst community members about common child illnesses which adds to the evidence that there has been a lack of community outreach activities by CHVs in certain communities.

Stock outs of nutrition products and medicines also figured prominently in the reasons for non-attendance cited by carers of non-covered cases. In the control arm, 9 carers said that they had been rejected from the clinic. While the reason for the rejection is not clear, it is likely that a stock out of commodities was the reason for this. Furthermore, for 3 cases in control and 4 cases in intervention, the CHV had no stock to be able to treat the child. These reasons can be combined with the observations made by data collection teams during the survey which are summarised in Table 11. Stock outs of anti-malarial drugs seemed to be a problem in Lobei and Turkwel (in control) in addition to a stock out of ORS in certain villages in Namoruputh in intervention. It will be important for the research to clearly document stock-out at both facility and CHV level in intervention and control to understand if and how these stock-outs varied across arms. This information should be extractable from programme data.

Without the necessary commodities, it is impossible for health facilities or CHVs to deliver care. Therefore stock outs are likely to have affected the results of the study negatively.

A third observation relates to the preferred course of treatment for carers of children in Loima sub-county. Carers of sick children appear to prefer seeking treatment in health clinics rather than from CHVs. While "mistrust of CHVs" to treat their child was only cited once by a carer of a non-covered case (in control), the majority of carers of *covered* cases in both the intervention and control arms said that they had gone to the health clinic to seek treatment, in spite of the fact that the CHV was able to deliver care in the community. It was not possible to collect detailed information which could explain this during the survey; carers may have gone to the clinic due to the fact that the CHV had no stock available at the time of admission. But it indicates that even though distances from communities to their nearest clinics were large, some carers seem willing to make the journey to the clinic.

The three reasons for non-attendance explored above account for the majority of non-covered cases identified during the survey. They were equally common across the intervention and control arms of the study and so it is hard to explain why coverage of MAM was not higher in in intervention than in control.

Looking at the village by village results can indicate where there were "pockets" of high and low coverage; for example in one village in control (Naitangomo in Napeikar) 10 covered MAM cases were identified (7 active cases and 3 recovering cases) and no non-covered cases. The villages visited in Lobei also seemed to have particularly high coverage of MAM treatment. Meanwhile Turkwel's villages contained 10 covered GAM and 17 non-covered cases.

The intervention arm also had pockets of "high" and "low" GAM coverage (Lokiriama was particularly high and Lorugum particularly low).

In a rural sub-county like Loima, as shown by the many different reasons for non-attendance in Figures 1 and 2, the coverage of treatment is affected by many factors, some of which are within the control of the MoH and Save the Children (e.g. CHV activities, supply of commodities) and some of which are outside of their control (e.g. carer preference for traditional care and preference for care in facilities rather than with CHVs). In order for the research study in Loima to have had a notable impact on coverage, it is important that the factors which are within the control of the MoH and Save the

Children are addressed and are consistent across the two study arms. Based on the results of this survey, this does not appear to have been the case in Loima during the implementation of the study. Furthermore, at the time of the survey, the study had been underway since January 2019, a period of approximately 6 months. This is a relatively short period of time to see significant changes in coverage which are often driven by changes in the behaviour of the community. Therefore if the study continues in the intervention arm for another 6 months, it might be that treatment coverage of GAM increases in comparison to the control arm however only if the CHVs are able to deliver their responsibilities effectively in order to treat children successfully and gain the trust of community members.

ANNEX 1: VILLAGE BY VILLAGE RESULTS CONTROL ARM

CHU	VILLAGE NAME	Children screened	SAM			MAM			Malaria			Diarrhoea			Pneumonia		
			Cin	Cout	Rin	Cin	Cout	Rin	Cin	Cout	R	Cin	Cout	R	Cin	Cout	R
LOBEI	AKOROS	29	0	0	0	1	0	1	1	0	2	0	0	3	0	0	0
	KAMBI MPYA	31	0	0	0	3	1	1	2	0	0	3	1	0	0	0	0
	LOMILO	25	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0
	NAPATIO	28	0	0	0	0	0	0	1	1	0	2	3	0	0	0	0
NAIPA	ALABLAB	68	0	0	0	0	0	0	1	7	1	1	2	1	0	0	1
	OYAKOLE/ICHILEUR	64	0	0	1	1	1	0	3	4	1	4	1	2	3	1	2
LORENGIPPI	LINE1	45	1	0	2	4	3	1	0	1	4	2	2	1	1	1	1
	NATANGI	32	0	0	0	3	1	1	0	0	1	2	3	0	1	1	0
	LOYA (additional village)	25	0	0	0	0	1	0	2	1	0	1	3	0	0	0	0
NAPEIKAR	LOGURUME	40	0	0	0	1	1	0	1	0	3	2	2	2	1	0	6
	NAITANGOMO	55	0	0	0	7	0	3	0	2	1	1	2	0	0	0	0
	NAPEIKAR	44	0	0	0	2	0	1	0	5	1	0	1	1	0	1	0
TURKWEL	KOOPON	51	0	0	0	2	3	0	2	0	1	1	1	1	1	0	0
	NAIPA	55	0	0	0	1	2	0	3	0	0	3	1	2	0	1	0
	NAPETET 0 A	65	2	0	0	1	1	0	3	1	2	1	3	0	0	1	0
	NAPETETII B	78	1	0	1	1	9	0	1	0	4	3	0	1	0	0	0
	NAWOYATIRA	52	0	2	0	1	0	0	1	0	3	2	2	1	0	0	0
TOTAL		787	4	2	4	29	23	8	21	22	26	28	28	15	7	6	10

ANNEX 2: VILLAGE BY VILLAGE RESULTS IN INTERVENTION ARM

CHU	VILLAGE NAME	Children screened	SAM			MAM			Malaria			Diarrhoea			Pneumonia		
			Cin	Cout	Rin	Cin	Cout	Rin	Cin	Cout	R	Cin	Cout	R	Cin	Cout	R
NAMORUPUTH	HEWAN	65	0	0	0	1	0	2	4	1	1	3	5	1	0	1	0
	LOBOLE/NALEMU	47	0	0	0	4	2	0	1	6	3	0	0	0	0	1	0
	NAKORIMUNYEN	54	0	0	0	1	2	2	1	3	3	1	1	0	1	0	2
LOKIRIAMA	KANGAKIRESIA	17	0	0	0	3	0	0	0	1	5	0	0	0	0	0	0
	LOKITELAKAPIS	33	0	0	0	3	1	3	3	0	1	3	0	0	0	0	0
	NATAPAE	25	0	0	0	1	0	0	1	0	1	1	0	0	1	0	0
LORUGUM	KONGIT	66	0	0	0	1	0	0	3	1	3	1	1	0	0	0	0
	LOGOGO	62	0	1	0	0	5	0	0	1	2	0	1	0	0	0	0
	LORUGUM CENTRE	94	0	1	1	1	4	0	1	6	0	0	1	0	2	2	2
	NAKATIYAN	28	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0
	NANGORDENGO	57	0	0	0	2	1	2	2	0	1	0	1	3	1	2	1
NADAPAL	AKATORONGOT	60	0	1	0	2	2	1	2	2	4	0	0	0	0	1	1
	NAPARIPARI	53	1	0	0	1	1	3	0	1	0	1	1	1	0	0	1
	NGITORONGKES	51	0	0	0	0	1	0	1	0	6	1	1	1	0	0	0
NASIGIER	KALOPIRIA	47	0	0	0	0	0	2	0	0	1	0	1	0	0	0	0
	NASIGIER CENTRE	48	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0
TOTAL		807	1	3	1	21	19	17	19	25	32	11	13	6	5	7	7