Semi-Quantitative Evaluation of Access & Coverage (SQUEAC)

Aweil East County
Northern Bhar-El-Ghazal State

Republic of South Sudan

October 2012
ACRONYMS

ACF --------- Action Against Hunger
CMAM -------- Community Management of Acute Malnutrition
CNV --------- Community Nutrition Volunteer
CNW -------- Community Nutrition Worker
CSB -------- Corn Soy Blend
MUAC ------ Mid Upper Arm Circumference
OTP -------- Outpatient Therapeutic Program
PHCC ------ Primary Health Care Centre
SAM -------- Severe Acute Malnutrition
SQUEAC ---- Semi QUantitative Evaluation of Access and Coverage
SSRRRC----- South Sudan Relief and Rehabilitation Commission
SPLA-------- Sudan People’s Liberation Army
SAF -------- Sudanese Armed Forces
RTI--------- Respiratory Tract Infection
RUTF-------- Ready to Use Therapeutic Food
TFP--------- Therapeutic Feeding program
TSFC-------- Targeted Supplementary Feeding Care
WFP--------- World Food Program
ACKNOWLEDGEMENTS

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A special thanks to the South Sudan Relief and Rehabilitation Commission and County Health Manager of Aweil East County for providing vital information on the population and geographical information, participation and support during the investigation.

The team would like to thank the ACF nutrition team in Malualkon for participation and provision of community nutrition workers in data review toward building the prior as well as the surveillance team and particularly the ACF support team for the logistical facilitation.

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EXECUTIVE SUMMARY

The Aweil East County ACF follow-up nutrition program coverage investigation using Semi QUantitive Evaluation of Access and Coverage (SQUEAC) methodology was conducted from Sept 24th – Oct 5th 2012. The objectives of the investigation were:

1. To estimate the overall coverage of ACF Therapeutic Feeding program (TFP) in Aweil East.
2. To identify boosters and barriers to access and uptake of the Community Management Acute Malnutrition (CMAM) services provided by the ACF nutrition treatment program in Aweil East
3. To provide key-recommendations for strengthening ACF nutrition treatment services in improving quality and coverage of the CMAM program

The evaluation used a simplified version of the standard, 3-stage; Bayesian beta-to-binomial conjugate analysis. CMAM coverage in Aweil East County was estimated to be:

Point Coverage¹: 33.25% (24.0% - 43.8%)
Period Coverage²: 60.9% (52.8% - 68.4%)

In November 2011 ACF implemented a SQUEAC investigation in Aweil East. Following the first report recommendations, ACF scaled up nutrition treatment program to an additional four (4) mobile Outpatient Therapeutic Program (OTP) sites, and increment of community health and nutrition promotion to improve access in areas with high under-nutrition rates. ACF also recruited four (4) additional team leaders, increased on the job coaching for community nutrition volunteers (CNV’s) and developed an OTP monitoring checklist to improve the quality of the services provided. Despite implementing the above mentioned activities the point coverage found during this SQUEAC investigation is noticeably lower than the point coverage (45.5% (35.0%-56.2%) found during the SQUEAC investigation in November 2011.

Point coverage was found to be 33.25% (24.0% - 43.8%). The point coverage was found to be below the recommended SPHERE standards and lower than the point coverage from the previous year due to a number of reasons explored in the report. The SQUEAC investigation confirmed that in areas within 3 hours walk from TFP services showing high coverage (> 50%) and areas further than 3 hours walk low coverage. This implies that coverage across the program area is patchy and not homogenous, and that far away areas are likely to have really low coverage. Main barriers found included poor awareness on malnutrition and treatment, supply shortages, OTP service provision (including rejection of children as they don’t fit in the admission criteria), distance and physical barriers to the OTP, not optimal community mobilization in far away villages, Ready to Use Therapeutic Food (RUTF) perceptions and acceptance and lastly stigma.

The SQUEAC investigation recommends to increase awareness on malnutrition and CMAM services provided, involve traditional healers and community leaders in the sensitization on malnutrition and CMAM services, improve supply chain management in collaboration with UNICEF and WFP, develop uniform nutrition education messages, increase on-job training for community nutrition workers (CNWs), ensure close collaboration and support to the CNVs to improve motivation.

¹ Point coverage: this estimator uses data for current cases only. It provides a snapshot of service performance and places a strong emphasis on the timeliness of case finding and recruitment.
² Period Coverage: this estimator uses data for both current and recovering cases. Recovering cases are children that should be receiving treatment because they have not yet met discharge criteria.
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1. BACKGROUND

Aweil East County is one of the five (5) counties that make up the state of Northern Bahr el Ghazal in Southern Sudan. The county consists of seven administrative Payams of Malualbaai, Baac, Madhol, Mangartong, Mangok, Yargot and Wunlang running from north to south.

Northern Bahr el Ghazal is traditionally an agro-pastoralist region, and cattle ownership remains the primary determinant of wealth and status. Livestock are sold for cash, traded for other products, form marriage dowries and serve as a source of milk and meat.

During the fifth population census, the population of the county was estimated at 309,921, considering an annual population growth of 2.5% and 9% estimated returnees/IDPs, the population in 2012 can be estimated to be 368,806. The SMART survey conducted by ACF – USA surveillance team in May 2012 showed that the Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM) rates were 28.7% (24.8% - 33.0%, 95% C.I) and 6.0% (4.5% - 8.0%, 95% C.I) respectively and reported as per the WHO, 2006 standards.

ACF has been working in Northern Bhar el Gazal State since 2007 implementing integrated nutrition, food security & livelihoods and WASH activities in Aweil East County. The Therapeutic Feeding program (TFP) admits and treats severely malnourished children under-5 years in seven (7) Outpatient Therapeutic program (OTP) sites and those with medical complications and/or no appetite at Stabilization Center (SC) level. The TFP sites are located in Malualkon, Baac payam.

![Figure 1: Map of ACF operational sites in Aweil East County](image)

ACF conducted a coverage investigation in November 2011 and estimated the point coverage to be 45.5% (35.0% - 56.2%) and recommended actions to be implemented. The table below shows the recommendations made in 2011 coverage investigation and the activities put in place:

<table>
<thead>
<tr>
<th>Recommendations November 2011 SQUEAC investigation</th>
<th>Activities implemented based on the recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating mobile OTPs for some identified pocket areas with high acute malnutrition</td>
<td>The nutrition service scaled-up with additional 4 mobile OTPs</td>
</tr>
<tr>
<td>Increase the number of Community Nutrition Workers (CNWs) especially in those sites with high admissions</td>
<td>The number of CNWs working in OTPs with high admissions (Malualbai and Gabat). In addition, four team-leaders were recruited for Malualkon, Warawar,</td>
</tr>
</tbody>
</table>
In 2012, ACF planned for another SQUEAC investigation in follow up of last year’s investigation. The Aweil East coverage investigation using SQUEAC methodology was conducted from Sept 24th – Oct 5th 2012. The objectives of the investigation were:

1. To estimate the overall coverage of ACF Therapeutic Feeding program in Aweil East.
2. To identify boosters and barriers to access and uptake of the CMAM services provided by the ACF nutrition treatment program in Aweil East
3. To provide key-recommendations for strengthening ACF nutrition treatment services in improving quality and coverage of the CMAM program

The SQUEAC tool was developed to provide an efficient and accurate method for identifying existing barriers to service access and evaluating coverage in a non-emergency context.

This investigation was based on the principle of triangulation of data. This means that data was collected and validated by different sources and different methods. The exercise ended when there was redundancy; i.e. no new information was being gained from further investigation using different sources or methods.

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The investigation achieved its efficiency by using a three stage approach: the development of the Prior, the development of the Likelihood and the generation of the Posterior. The first two stages aimed at identifying potential barriers and providing two individual estimations of coverage. During the Prior building process, existing routine data which had previously been collected and compiled was combined with qualitative data to produce a coverage “picture”; the “picture” was drawn in form of a mind map and with use of the xMind software. Building the Prior provided a projection of coverage levels for both the entire target area and also on specific areas suspected of relatively high or low coverage within the programme’s target zone.

The Likelihood was built with data collected during a wide area field survey in randomly selected villages. The Active and adaptive Case Finding (AACF) method was used to identify severely malnourished children as well as children enrolled in the program who were still malnourished or recovering. During the wide area survey, additional qualitative data was collected in order to explain why some severely malnourished children were not enrolled in the OTP.

The last stage, the generation of the Posterior, combined the two initial exercises and provided the overall coverage estimation, including Credibility Intervals (C.I), by taking into account the “strength” of each component of the equation. The Posterior was calculated using the Bayesian calculator.

2. STAGE ONE

The first stage of SQUEAC investigations begun with an analysis of routine program monitoring data which included admissions, exits and data that is already collected on beneficiary record cards such as admission by mid-upper arm circumference (MUAC), beneficiary address (home villages), etc.

The objective of Stage One was to identify areas of low and high coverage and the reasons for coverage failure using routine program data or easy-to-collect quantitative and qualitative data.

2.1 Programme Admissions

Among the ACF nutrition program operational areas in South Sudan, Aweil East has the highest number of admissions throughout the year. For purposes of this investigation data analysed covers a period that stretches from October 2011 to September 2012. During this period, ACF admitted 9,788 children in the seven (7) operational OTPs.

The evolution of overall admissions is illustrated in Figure 1. The admission trend reveals a steady increase in admissions from January 2012 up until June 2012 with a slight reduction in admissions in May 2012. Admissions in January were low and were explained by scale down of screening and outreach activities as well as reduced casual worker arrangements at OTPs.

The reduction in admission in May 2012 doesn’t depict improvement of nutrition status of children under 5-years in the county. It was rather due to shortages of Ready To Use Therapeutic (RUTF) supplies. During RUTF shortages, priority is given to children under-5 years admitted in the TFP, while new admissions are limited (sometimes stopped) according to the available RUTF supplies. Additionally, in May 2012 there were a series of aerial bombardments along the contested areas of Aweil East County. Ground force engagements also happened within the county between Sudan’s People Liberation Army & Sudanese Armed Forces.

The pronounced peak in admissions in June 2012 was explained by the investigation as the period when the reserve stocks for the household are depleted and when there is migration to the big centres which increases the population in places like Wunyiik and Warawar. In addition, the county experienced a high number of returnees in Aweil East coupled by internally displaced persons from areas with conflicts. Locations like

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4 The Bayesian approach is about beliefs and updating beliefs with data, the estimation interval is called the credible interval.

5 The admission numbers exclude Aweil centre OTP which was not part of the survey
Malualbai are close to some of the areas served by Gogrial West program. Hence, beneficiaries from areas such as Akon prefer visiting Malualbai instead of centres in Gogrial West.

The July 2012 drop was partly attributed to general food distribution by World Vision as well as movements back to the cultivation areas and floods which hampered the access to OTP sites. This is also the time where a lot of milk from animals is available and consumed. This was a time when mobile OTPs stopped at Rum-Aker and Warlung due to improvement of the nutrition situation in these areas.

Graph 1: OTP program Admissions trend from October to September (2011 and 2012), Aweil East County

2.2 Admission by service delivery unit (OTP)

Overall admissions to the program were further analysed by service delivery unit in order to identify potential disparities in admissions across the different facilities.
The analysis identified a clear difference between the sites. Two (2) OTP sites (Wargeng and Lieth) had admissions close to 1000 severe acute malnutrition (SAM) cases. Three (3) sites (Yargot, Warawar and Omduruman) had admission between 1000 and 1500 while OTP sites in Malualbai and Malualkon had about 2000 admissions each. The investigation concluded this to be the result of the location of the OTP sites. The last two OTP sites are near the primary road connecting different centres and are large centres. Malualbai and Malualkon also experience in-migration during the hunger gap and primary health care is also available in both areas, thus these two (2) OTPs have many admissions. Additionally, Malualbai is in close proximity to Gogrial West, and receives beneficiaries from this area. The admission trends over time per health facility are illustrated in Graph 3 below.
The OTP admissions indicate similar trends over time as compared to the overall program admission. All health facilities show an increase between Dec 2011 and April 2012. Malualkon and Malualbai showed the highest admissions in June. Due to the alarming food security situation in these two (2) areas the nutrition program intensified community mobilization and beneficiary follow-up.

2.3 Admissions vs. Needs

Seasonal peaks are based on the local seasonal calendar and critical events, which highlights highest food insecurity (i.e. pre-harvest) and in-migration to bigger towns during peak periods between March- May. In linking admission trends and the seasonal calendar it’s been observed that the admission trends correspond to needs (Annex 1), though largely based on assumptions as the time frame is not long enough (over years) to illustrate this adequately.

The investigation has also ascertained that admissions drop with increasing agricultural responsibilities. This is two-fold; first there is out-migration to the cultivation fields and second the labour intensive nature of cultivation and foreseen benefit does give little chance to seeking OTP services. There is more priority placed on cultivation by the caretakers and thus will require an adapted approach; increased outreaches and mobile OTPs at this time to improve access.

2.4 Spatial coverage of Admissions

A geographical mapping exercise of admissions, defaulters and CNVs was used to assess the pattern of spatial coverage across the real catchment area of the program. However, due to limitations on availability of good quality maps\(^6\), the spatial coverage assessment was modified. A pivot table was generated from the database to identify villages with corresponding admissions, defaulters and volunteers.

The analysis showed that admissions were higher in communities along the network of roads within the County and from the more densely populated areas. It is also clear that coverage is high with populations within short radius from the OTP, this corroborated by the fact that most villages far from the OTP had a low number of admissions purely because of distance. This was a key exercise towards guiding the investigation in the formulation of two different hypotheses on coverage for testing as part of Stage Two.

2.5 MUAC at admission

The MUAC measurement at admission is also part of the data available on the individual admission card and as well captured by the database. The compilation of data collected from each OTP site makes it possible to investigate the timeliness of treatment seeking behaviours.

In order to further understand whether SAM cases are reaching the program on time, the MUAC at admission was plotted for all recorded admissions from Oct 2011 to Sept 2012. The results are as shown in the graph 4 below. The median MUAC at admission was 117 mm. The slight discrepancy is influenced by the fact that the program admission uses weight for height z-score -3 in addition to MUAC <115mm. This captures children earlier before they reach a MUAC of <115mm. However, despite use of W/H, quite a large number of children are identified to be acutely malnourished by MUAC definition\(^7\).

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\(^6\) The mapping exercise proved difficult because the available maps did not have villages or settlements on it. It was also difficult for the team to locate most of the villages on the map from the list provided by the programme.

\(^7\) One point to note is that the people of this area are tall and may easily be considered to be having low W/H in reference to the standard height.
Overall, children appear to be arriving in a relatively timely manner for treatment, the median MUAC on admission can be used as an indicator of beneficiaries' treatment-seeking behaviour. More specifically, it reflects how early or late they seek care. When the median MUAC on admission is higher than the cut-off point (115 mm), the better the health seeking behaviour of the beneficiaries. On the other hand, a median MUAC on admission of < 115 mm usually indicates late treatment-seeking behaviour. For the above analysis in the Aweil East IMSAM programme, the admission median MUAC of 117 mm shows that the program is able to capture SAM children early.

This early arrival at the OTP seems to be positively influenced by use of W/H z-score as one of the admission criteria, the investigation found out that slightly above two thirds of admission are by W/H z-score. This implies that the children are admitted early before they reach the <115 mm which is the MUAC admission criteria.

### 2.6 Programme Exits

Programme exits met the SPHERE standards\(^8\), with the proportion of discharges from therapeutic care who died at <10%, recovered >75% and defaulted <15%. The drop in June was due to increased number of defaulters which is as result of high admissions in the previous months and stock outs. Additionally, prioritization of cultivation as well has a bearing on defaulting. As the availability food at household level reduces, sharing of RUTF could be one of the reasons for reduced cured rate in June.

The following graph presents cumulative program performance indicators Oct 2011 to Sep 2012.

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\(^8\) SPHERE Standards Handbook 2011
2.7 Review of Defaulter Records

To better understand the factors effecting defaulting and potentially affecting coverage, various stages of analysis were conducted specific to defaulting. This was a key exercise towards guiding the investigation in the formulation of two different hypotheses on coverage for testing as part of Stage Two.

Defaulters were treated as uncovered cases; the number of defaulters was examined for signs of worryingly high trends over time.
2.7.1  Defaulter versus admission over Time

In bringing together admissions and defaulters per health facility it was possible to identify a few trends in the graph below.

Health facilities with higher number of admissions also have a higher number of defaulters, such as Malualbai, Malualkon and Lieth with exception of Warawar which is attributed to the high awareness of the OTP services and close proximity to homes of most beneficiaries. Warawar low defaulting can be explained by small population in the area. On the same note, health facilities with lower admissions also have lower defaulting, such as Wargeng and Yargot. Such trends suggest a possible positive correlation between the levels of admissions and the levels of defaulting. The potential correlation seems to be corroborated by the trends in defaulting over time by health facility (Graph 7 below) which follows a similar pattern to that of admissions. The increase in defaulting in June could also be a result of out-migrations to the cultivation areas and increased farming activities.

The number of admitted cases that defaulted from the program was from the two high admission sites (Malualkon and Malualbai). However, from the percentage point of view comparing with the total admissions/discharges, it is Omduraman OTP site that reached 11.2% of defaulters. In general, the defaulter rate of the program was lower than the recommended level described in the IMSAM guideline. The centre experienced shortage of supplies as well as beneficiaries who were admitted but later opted to go and seek treatment elsewhere. Distance and lack of awareness were pronounced to be major challenges attributed to the high defaulting in the centre. When mothers arrived on admission, they often feel ashamed to return because of the stigma associated with malnutrition\(^9\), and thus then defaulted.

\(^9\) Local believe that child becomes malnourished when woman has sexual intercourse while breastfeeding her child
2.7.2  Early versus Late Defaulter

The investigation also analysed the timing of defaulting, in an effort to determine possible reasons behind it. Discharged defaulter cards were gathered and separated into categories according to number of visits recorded (Graph 8). The trend line shows a clear picture of defaulting from week 3 to week ten, while the majority of defaulting being from week 4 to week 8. There is a shift from last year where more beneficiaries were defaulting early that had link with returnees and high movements. Large numbers of defaulters in 2012 were related to the high peak season and shortages of RUTF supplies.

2.7.3  Defaulters by Home Location

The investigation also considered the need for locating where the program has high defaulting by mapping the villages from which defaulters come from.

Among the OTP sites in Aweil East County, three sites (Omduraman, Lieth and Malualkon) had defaulter rates of slightly higher than 10%. All the remaining sites had low defaulter rates. The overall defaulting rate was 7.2%, which is far below the acceptable range of 15%. The percentage defaulter as compared to the admitted number of children during their respective months is indicated below (Table 1).

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10 Early defaulters generally suggests; 1) that the child did not recover on its own after (i.e. is affecting coverage) and; 2) it happened most likely for significant reasons. If it happened late it generally means that; 1) the child probably recovered on its own and; 2) it probably happened precisely because “sufficient” progress had been made and cost-benefit balance shifted.
2.7.4 Synthesis of Quantitative and Qualitative Data
In this investigation, a mind mapping exercise was used to synthesise all quantitative data analysed and qualitative information gathered. The exercise allowed the investigation team to collate all the data in such a way to facilitate discussion and interpretation. The exercise was done by putting together pieces of flip chart paper to create a “wall” to write on. The theme or topic being investigated, which for this case was coverage, was put at the centre of the wall and then sub-topics based on the various sources of quantitative data and qualitative information were written down branching out from the central theme. Corresponding data and information were then written down per sub-theme or topic and the process was continued until all points of investigation were exhausted. The mind mapping exercise can also be facilitated and captured using XMind\textsuperscript{11}, a mind mapping software that allows for the recording of a mind map electronically.

2.7.5 Understanding of Malnutrition
Malnutrition is partially recognized in Aweil East communities as a distinct recognisable condition, which to some extent can affect early detection. The mothers do not at the first instance think of malnutrition when the child is unwell. In listing the common diseases (convulsions, cough, skin rush, headache, diarrhoea, fever, malaria, vomiting, measles, Respiratory Tract Infection (RTI), oedema, skin diseases, swollen neck & tetanus) in the community, malnutrition was also mentioned as a disease. They further mentioned that malnutrition usually occurs between the month of April and August.

Diseases mentioned and ranked according to occurrence were: malaria, diarrhoea (yach), and cough. Diarrhoea was said to be occurring frequently during the rainy season that is between March – May and malaria between August-Sept in 2012. The community described symptoms of malnutrition as thin, loss of appetite, weak, sunken eyes, diarrhoea, loss of weight and swollen stomach. The terms used to refer to malnutrition are: Ador which means thin; Chala – thin and lacks appetite, Majuet, Nyuin ;Thiang which refers to a child who is thin, vomiting and has diarrhoea. The respondents also understood that malnutrition affects young children. The communities mentioned that if you want find malnourished children in their areas, the best question to locally ask is like; Mith chiguak? Mith chiroth? Chitiok? Chiduet ?.

The community believe that malnutrition is caused by: unsafe water, hunger, diseases, poor feeding, lack of balance diet and early weaning.

2.7.6 Health Seeking Behaviour
During the community discussions, the respondents were asked what they do when their children are sick so as to assess their health or treatment seeking behaviour. Overall, these informal discussions revealed a strong traditional health seeking behaviour across the program area.

The majority of respondents start by cooling the child - using soft clothing soaked in water. Others give traditional herbs namely: Lingir, Dhit, Tiit (mahagoni) for treating malaria. Some of them respond by taking the child to the traditional healers-Achimuk, Achor, Adooc and the practice seems to be quite common since some of them believe in the traditional healers before going to hospital when the healer fails.

\textsuperscript{11} XMind can be downloaded free at www.xmind.com.
When the situation becomes very serious the traditional healer can then advise the mother to take the child to the Primary Health Care Centre (PHCC) but still coming back to him to check on the progress; the child will then be taken to the PHCC, where they receive nutritional advice and medication for other identified illnesses. Some of the cases are brought to the health facility too late. The factors considered before seeking treatment from PHCCs are: distance to the PHCC, cost of treatment, accessibility of the health centres due to flooding and impassable roads. At times permission needs to be sought from the household head as well as consideration on who will remain with other siblings. Communities visited were also aware of the existence of the CMAM services. When asked to find out whether they know of a place where this condition can be treated, majority mentioned Panakin mith ador- meaning the OTP centres or dooc – meaning treatment.

The respondents further mentioned to have heard from CNVs, other beneficiaries, clinics, CNWs and community mobilizers. They have also known the OTP centres of giving them Plumpy Nut, Corn Soy Blend (CSB) and drugs. However, when asked whether there are children who have this problem but are not going for treatment, they positively responded and gave the reasons as due to distance, home duties and lack of supplies.

Notable, the communities in Aweil East County have positive perceptions on the CMAM services. They appreciate the services as it treats their children quickly. They pointed out that the means used for identifying children was by use of the MUAC tapes.

2.7.7 Barriers to Access
In order to understand health seeking behaviours in Aweil East, a series of cultural and programmatic factors linked to malnutrition were reviewed. The table below summarizes key findings on possible reasons for defaulting and non-attendance.

Table 3: Reasons for Defaulting & Non-Attendance

| Awareness on malnutrition & treatment available | Malnutrition is partially recognized as a distinct disease by communities. Thus, when a child presents malnutrition signs and symptoms, caregivers begin home medication first by cooling the child, - using soft clothing soaked in water. Others give traditional herbs before going to hospital when the healer fails and from there is when they get to the OTP.

There is still need for continued mobilization and awareness creation of malnutrition as well as the availability of CMAM services. The program is known and accepted, however this is the case for villages around the OTP; those distant are still having a challenge coming to the OTP and mobilization activities have not reached them. |
| Supply shortages | Most OTPs reported shortages of supplies, this may have been caused by communication breakdown in the supply between the base and the OTPs. However, the team also experienced shortage that happened by lack of supply from UNICEF. The impact here is that when mothers travel long distances and are not able to get the supplies, they will go back telling others and as such will not return the next visit till they hear of supply availability. This was also mentioned by CNWs in giving reasons for defaulting in some areas. |
| OTP service provision/ Rejection | The OTP services are well accepted and mothers are happy about it, however there is pronounced complaint of children turned away from the OTP since they do not reach the admission criteria. As a result, the care takers feel cheated, others get annoyed and discouraged. This is caused partly by ‘wrong’ referrals and lack of awareness on the part of the caretakers. There is need to have a way of educating the mothers both at the community and facility level on admission criteria, services provided and what it means to be rejected. The program also need to be very careful on refering the children at the community level or else it may exacerbate |
Distance is somewhat pronounced in Aweil East. The catchment of OTPs is wider and some of the villages require an either 8 hrs walk, or 2 day walk to reach the health facility. This is having an impact especially on defaulting, mothers may bring the child the first time and fail to return back due to distance. Following last year’s SQUEAC investigation, ACF responded to this challenge with additional mobile OTPs, but the needs are still not met.

During the rainy season, some lowlands become main barrier to access. In addition, road networks also become worse and impassable, limiting access during the rainy season. In some sites flooding becomes the main obstacle.

It was also noted that some contributing factors associated with non-attendance are job seeking by the caretakers, drunkenness while others migrate to some areas for green pasture.

Some of the villages visited away from the OTP reported having not seen someone doing the screening in their villages. These was further corroborated by the CNVs focus group discussions where the main complaint was the distance to the villages and were asking for increase in number of OTP sites, bicycles for transportation during mobilization days.

RUTF is recognized and even has a local name muguak mieth Ado (food for malnourished child) meaning feeding centres. When the beneficiaries were asked on how they normally give RUTF to the children, various prescriptions were mentioned such as three times a day, two times a day, 4 times a day which is a signal to acceptance of the RUTF. Despite increased mobilization some community members refer to RUTF as food, which can have implication in that caregivers will attend the health facility without understanding the admission criteria/malnutrition treatment, be rejected and relay this information back to communities.

Malnutrition is seen to have been associated with social stigma in some of the communities. It s believed to be linked with having sexual contact between the parents when the mother is still breastfeeding the child. For this reason, they normally describe such malnourished children as Mith ci dor, mith ci guak, and mith cike thiong. They also consider that malnourished children are from irresponsible families hence some mothers feel ashamed.

### 2.8 Areas of High and Low Coverage

Based on the information collected and analyzed in Stage One, there were observations of high and low coverage as seen in the admissions per home location. The investigation concluded that coverage is likely to be relatively low in distant areas from the OTP.

The hypothesis was therefore that:

- **Coverage is high** in areas around the program to a distance of 3 hour walk.
- **Coverage is low** in areas beyond a 3 hour walk to reach treatment.

To test this hypothesis, eight villages were selected, based on the investigation, as the most representative of the hypotheses. The second stage is then undertaken to confirm the hypothesis.

### 3. STAGE TWO

The objective of Stage Two was to confirm the locations of areas of high and low coverage as well as the reasons for coverage failure identified in Stage One (above) using small area surveys.
Six (6) villages were sampled. It was expected that in three (3) of the six (6) villages the coverage would be high as they are located within 3 hour walk while in the other three (3) villages the coverage would be low due to longer distance (more than 3 hours walk). Four teams were formed for the small area survey which was conducted in two days.

3.1 Active and adaptive case finding

**Active**
- Target SAM cases instead of doing house to house screening

**Adaptive**
- Use key informants to help find SAM cases
  - Village headman/elder
  - Traditional healer
  - Senior women and elders
  - Religious leaders
  - Beneficiaries

3.2 The definition of a Case

- MUAC less than 115 mm
- Bilateral oedema
- Aged 6-59 months
- <-3 Z-score; in this investigation, the criterion of Z-score was not considered to identify cases since it is a criterion generally used at the health facility level only and this measurement is not part of the community based approach.\(^{12}\)

Based on the information collected, coverage was classified against a threshold of 50%\(^{13}\). A decision rule (d) was calculated using the following formula:

\[
d = \frac{n \times p}{100}
\]

Where:
- \(n\) = total number of cases found
- \(p\) = coverage standard set for the area

3.3 Stage Two – Small Area Survey (Findings)

In the test of hypothesis exercise for high coverage areas, the following results were found and calculations in order to classify coverage are as follows.

3.3.1 High coverage areas

Total SAM found = 8; IN program = 5; NOT in program = 3; \(D = \frac{50}{100} \times 8 = 4\)

Since 4>4, then coverage is above 50% and the hypothesis was accepted.

3.3.2 Low coverage areas

Total SAM = 5; IN program = 1; NOT in program = 4; \(D = \frac{50}{100} \times 5 = 2.5 < 2\)

Since 1<2, then the coverage is below 50%.

---


13 Threshold was set at 50% based on the SPHERE minimum for rural areas.
The actual numbers for each village are represented in the table below.

<table>
<thead>
<tr>
<th>Villages</th>
<th>SAM cases</th>
<th>Cases Not In Program</th>
<th>Cases in Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manyiel</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Bakok</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Kanajak</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rum pan awuut</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Low Coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mayen</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hal Bul</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Majang Awar</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ameth akok</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

The hypothesis that coverage is high in areas around the program to a distance of 3 hour walk and low beyond that was proven, demonstrating that good coverage of the program is limited to areas around 3 hours walk around program sites. This implies that coverage across the program area is patchy and not homogenous, and that far away areas are likely to have really low coverage.

4. STAGE THREE

The objective of Stage 3 was to provide an estimate of overall program coverage using Bayesian techniques. To do this, the evaluation relied on the standards Bayesian beta to binomial conjugate analysis.

4.1 Developing a Prior

All the positive and negative factors identified affecting the coverage were listed, ranked and weighted according to their relative contribution to the overall coverage. Positive and negative factors ranked highest were automatically given a ±5% weight while lowest ranked factors were weighted ±1%. Factors ranked in between were given weights of ±3% according to their perceived positive or negative contribution to the coverage. The positive and negative weights for the factors were then added up.
All positive factors were added to the minimum possible coverage (0%) while all the negative factors were subtracted from the highest possible coverage (100%).

Table 5: Measuring Contributing Factors (Prior)

<table>
<thead>
<tr>
<th>Positive Factors</th>
<th>Value</th>
<th>Negative Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard of service</td>
<td>3</td>
<td>Outreach</td>
</tr>
<tr>
<td>Understanding of malnutrition</td>
<td>3</td>
<td>Health seeking behaviour</td>
</tr>
<tr>
<td>Awareness of CMAM</td>
<td>3</td>
<td>Follow up</td>
</tr>
<tr>
<td>Perception of CMAM</td>
<td>5</td>
<td>Distance</td>
</tr>
<tr>
<td>Performance Rates</td>
<td>4</td>
<td>Floods/Rivers</td>
</tr>
<tr>
<td>Admissions over time</td>
<td>2</td>
<td>Supplies stock-outs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community mobilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Opportunity cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Logistical challenges</td>
</tr>
<tr>
<td>Added to Minimum Coverage (0%)</td>
<td>20</td>
<td>subtracted from Maximum Coverage (100%)</td>
</tr>
<tr>
<td>Median</td>
<td>45.5</td>
<td>α value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β value</td>
</tr>
</tbody>
</table>

The distribution of prior coverage estimate was determined through a beta distribution of the belief of perceived coverage estimates. This was done by using the Bayes SQUEAC calculator\(^\text{14}\) to plot the mode and all the perceived other possible coverage proportions. An average was calculated and used as the median for a trial distribution curve (Prior) plotted using the Bayes SQUEAC Calculator. The final curve that was generated is as shown in Graph 9.

![Graph 9: Prior of program Coverage](image)

### 4.2 Sampling Methodology

#### 4.2.1 Minimum Sample Size

To estimate the minimum number of cases (children) needed in the small area survey (n), the following formula is used:

\[
n = \frac{\text{mode} \times (1 - \text{mode})}{\left(\frac{\text{precision}}{1.96}\right)^2} - (\alpha + \beta - 2)
\]

\(^\text{14}~\text{Software specifically designed and developed for SQUEAC investigations and can be downloaded free at www.brixtonhealth.org}\)
Using $\alpha$ (17.2) and $\beta$ (20.8) values and a mode of 45.5% (see section 3.1), the following minimum sample is as follows:

\[
\begin{align*}
n &= \left[ \left( 0.455 \times (1-0.545) / (0.115^{15}/1.96)^2 \right) - (17.2 + 20.8 - 2) \right] \\
n &= (0.247975/0.003443) - 36 \\
n &= 72.03182 - 36 \\
n &= 36.03182 \\
n &= 36 \\
\end{align*}
\]

In order to achieve a confidence of +/- of 10%, a minimum of 36 cases needs to be identified.

### 4.2.2 Minimum number of villages

The minimum number of villages to be sampled was then calculated with the use of the following values.

<table>
<thead>
<tr>
<th>Target Sample Size:</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average village population:</td>
<td>427</td>
</tr>
<tr>
<td>Prevalence of SAM:</td>
<td>3.0%</td>
</tr>
<tr>
<td>% Children aged 6-59 months:</td>
<td>20%</td>
</tr>
</tbody>
</table>

Values were used in the following formula

\[
n_{villages} = \frac{n}{\text{average village population all ages} \times \text{percent of population 6-59 months} \times \text{prevalence}}
\]

\[
n_{villages} = \frac{36}{(427 \times 0.2 \times 0.03)} \\
n_{villages} = 36/2.562 \\
n_{villages} = 14.05152 \\
n_{villages} = 14
\]

As a result, a minimum of 14 villages had to be sampled in order to reach the minimum sample size of children.

### 4.2.3 Spatial Representation

In order to achieve spatial representation, the Stage Three investigation involved a two-stage sampling:

1) Village selection: First, a list of all the villages in the catchment areas was generated. The following procedure was then followed in selecting villages to be surveyed:

   a. Listed all villages in the catchment per OTP
   b. Sort them according to distance to the respective OTP
   c. Assigned numbers 1-175
   d. The required number of villages is 14, the sampling interval was 12.
   e. Randomly selected the beginning number, which was 12
   f. Added 12 to the starting number 12 and continued adding 12 till 168
   g. From those numbers, the villages were identified.

2) Within-community sampling method: a combined active & adaptive case-finding & mass screening approach was used in Stage Three to ensure selected communities were sampled exhaustively. The wide area survey was carried out over four days (Oct 2$^{nd}$ – 5$^{th}$) by four teams of four people, each composed of three enumerators and was overseen by the Surveillance and Nutrition Program Officers and Surveillance Program Manager. Case definition used in Stage Two was reviewed with field teams and replicated in this stage of the process.

---

15 The precision was put at 11% instead of 10% since the sample size was hard to reach.
4.3 Wide Area Survey Results

Main results for the wide area survey are summarised in Table VI.

Table 6: Stage Three (wide area survey) Main Findings

<table>
<thead>
<tr>
<th>Types of Cases</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of current (SAM) cases</td>
<td>46</td>
</tr>
<tr>
<td>Number of current (SAM) cases attending the programme</td>
<td>11</td>
</tr>
<tr>
<td>Number of current (SAM) cases not attending the programme</td>
<td>35</td>
</tr>
<tr>
<td>Number of recovering cases attending the programme</td>
<td>23</td>
</tr>
</tbody>
</table>

The main reasons for not attending CMAM services available are summarised.

Graph 90: Main reasons for Non-Attendance

4.4 Overall Coverage Estimation

Point coverage is presented as it provides a more accurate picture of the actual coverage of SAM cases at the time the investigation was conducted. This is corroborated by the fact that distance is a massive issue, that case finding is weak. Period coverage\(^1\) is as shown in the foot note 12.

Point coverage provides a snapshot of program performance and places strong emphasis on the coverage and timeliness of case-finding and recruitment. To calculate point coverage, the numerator and the denominator were selected from the results for the wide area survey using the formula

\[
\text{Point Coverage} = \frac{\text{No. of current (SAM) cases attending the programme}}{\text{No. of current (SAM) cases}}
\]

Selected data was used as a denominator (46) and numerator (11) when entered into the Bayes SQUEAC Calculator.

\(^1\) Period Coverage = 60.9% (52.8% - 68.4%).
Based on the existing prior and wide area survey (likelihood) point coverage was estimated to be **33.25% (24.0% - 43.8%)**, while the period coverage was estimated to be **60.9% (52.8% - 68.4%)**. The point coverage was noticeably lower than the point coverage found in 2011 SQUEAC investigation. There are several reasons that contributed to the decrease in point coverage:

1. The insecurity related issues in the county that reached security level 4 due to the clash between the ground force of the Sudan and South Sudan as well as the repeated aerial bombardments by the Sudan Air Force,
2. Existence of larger number of returnees and IDPs in the county,
3. Change in community mobilizers,
4. There was high need for responding. ACF implemented additional OTPs with 4 mobile OTPs but still the need was not fully met,
5. There were supply shortages for both TFP and TSFC.

**CONCLUSIONS**

- Despite strengthening activities the point coverage found during this SQUEAC investigation is noticeably lower than the point coverage (45.5% (35.0% - 56.2%) found during the SQUEAC investigation in November 2011. This difference is associated with insecurity related issues, shortages in RUTF supplies for most of the months and existence of larger number of returnees and IDPs in different parts of the county as well as the change of community mobilizers affected the point coverage

- Main barriers found included limited awareness on malnutrition and treatment in villages more than 3 hours walk from the OTP, health seeking behaviour, supply shortages, OTP service provision (including rejection of children as they don’t fit in the admission criteria), distance and physical barriers to the OTP, limited community mobilization in far away villages, RUTF perceptions and acceptance, and lastly stigma.

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17 All values were calculated using the Bayes SQUEAC calculator.
RECOMMENDATIONS

- Continued improvement on community mobilization and defaulters’ follow up.
  - Update mapping of all villages per OTP catchment. The plan for community mobilization has to be followed for spatial reach, follow up and spot check to be conducted by the community mobilizers on areas that have been mobilized and identify villages that have not been reached.
- For effective implementation of TFP there is a need to ensure constant supply of the commodity. This is vividly pronounced in the program and was voiced by the beneficiaries as well as the OTP staff. ACF will continue to advocate to partners for improvement of supply chain and explore possibilities of buffer stock.
- Although some improvements are observed when compared to last year, still there is a need for more on-job training for CNWs. This may contribute to close monitoring that will in turn increase quality of service delivery.
- During the current as well as the earlier coverage investigation, it was identified that caregivers first consult traditional health practitioners when a child is sick or malnourished. In most cases, this process delays access to appropriate health care in the PHCC and OTP. There is need for continued provision of health education to the community and as well work with the traditional health practitioners to reduce delay in seeking healthcare and can be supportive in the referral to the PHCCs and OTPs.
- Harmonized nutrition education messages throughout the program areas may improve faster the knowledge and practice of community members for tackling malnutrition.
- There is a need to work more closely with CNVs and also increase their motivation (through follow up, training and incentives) in order to improve early detection and referral from the community to the TFP
- For improved coverage, more effort is needed on awareness creation on malnutrition and the CMAM programme.
- Strengthen integration between Nutrition, WASH and Food security and livelihood sectors by using outreach workers from the 3 departments for messaging on CMAM and detection and referral of acute malnourished cases.
## Annex: Seasonal calendar

<table>
<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>RTI</td>
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<tr>
<td><strong>Seasonal Illness</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Malaria</td>
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<td></td>
<td></td>
<td></td>
<td>Diarrhoea</td>
<td></td>
<td>ARI</td>
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</tr>
<tr>
<td><strong>Food security</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hunger Season</td>
<td>Cultivation</td>
<td>Weeding</td>
<td>Harvest</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Enough food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Burning of Bushes</td>
<td>Fishing</td>
<td>Rains</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Important seasonal events</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dry season</td>
<td></td>
<td></td>
<td>Flooding</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Migration</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>