CMAM FORUM Technical Brief 1: October 2012

Assessment of Coverage of Community-based Management of Acute Malnutrition

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This technical brief is divided into three parts: the first provides an overview of what coverage is and why it is important; the second outlines the range of methodologies available to assess coverage directly and common questions arising; and the third summarises some of the new areas of work or outstanding issues. A detailed resource section can be found at the end.

For any feedback, clarifications, additional comments to add or questions relating to this brief please write to cmamforum@gmail.com. For specific technical questions please refer to the reference documents and EN-NET coverage discussion forum.

Acronyms:

CMAM	Community-based Management of Acute Malnutrition
CSAS	Centric Systematic Area Sampling
CTC	Community-based Therapeutic Care
IMAM	Integrated Management of Acute Malnutrition
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
OTP	Outpatient Therapeutic Program
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SC	Stabilisation Centre
SFP	Supplementary Feeding Program
SLEAC	Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage
SQUEAC	Semi-Quantitative Evaluation of Access and Coverage
S3M	Simple Spatial Survey Method

For further information refer to resources at end and especially:

Coverage Assessment Methods Toolkit: comprehensive set of tools, articles and presentations based on a recent coverage workshop available at http://www.validinternational.org/coverage/resourcekit.zip

Coverage Discussion Forum EN-NET: for all technical questions on coverage go to http://www.en-net.org.uk/forum/16.aspx

Coverage Monitoring Network: includes reports of recent assessments and coverage-related work that can be accessed at http://www.coverage-monitoring.org/

Semi-Quantitative Evaluation of Access and Coverage (SQUEAC)/ Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage (SLEAC) Technical Reference. Myatt M, et al. FANTA III/FHI360 2012.
http://www.validinternational.org/coverage/techRef/coverageTechRef.pdf or
http://www.fantaproject.org/downloads/pdfs/SQUEAC-SLEAC-Technical-Reference-Oct2012.pdf

PART 1: WHAT IS COVERAGE;WHY MEASURE COVERAGE?

The aim and priority in community-based services for the management of acute malnutrition is to reach as many of those affected as possible and to access acutely malnourished children in the early stages of their disease. Achieving these goals will maximise impact and the capacity of the service to meet need. Good coverage is a key determinant in meeting need. It is important therefore to evaluate coverage, not just to assess the degree to which need is being met, but also to understand what factors affect access and uptake of services, in order to initiate action to ensure the greatest number of people needing treatment are able to benefit from it.

Coverage can be defined as the proportion of all people needing or eligible to receive a service who actually receive that service. For community-based management of acute malnutrition (CMAM)[1] or integrated management of acute malnutrition (IMAM) this will be the proportion of children with severe acute malnutrition (SAM) who receive therapeutic care[2]. This is also known as **treatment coverage**.

$$\text{Treatment coverage} = \frac{\text{Children with SAM receiving therapeutic care}}{\text{Total number of SAM children}}$$

Treatment coverage should **not** be confused with **geographical coverage**. There is no standard definition of geographical coverage. It is most commonly defined as the ratio of healthcare facilities in a catchment area delivering services for the management of SAM to the total number of healthcare facilities in the catchment area.

$$\text{Geographical coverage} = \frac{\text{Healthcare facilities delivering treatment for SAM}}{\text{Total number of healthcare facilities}}$$

This indicator attempts to measure the availability of services for the management of SAM as a result of the decentralisation and scale-up of CMAM. Availability of services does not, however equate with service access and uptake. Geographical coverage will therefore always be greater than direct treatment coverage.

This technical brief focuses on treatment coverage. Whenever coverage is stated, this refers to treatment coverage unless otherwise stated. For further discussion on geographical coverage, refer to forthcoming technical brief on geographical coverage.

Although CMAM programming includes both Severe and Moderate Acute Malnutrition (MAM), when assessing treatment coverage the assessment is normally of SAM treatment coverage even when both SAM and MAM services are available. See question 3 on page 17 for further explanation of this.

The **effectiveness** of CMAM services and the coverage it achieves are directly linked. Effective services must have 1) thorough case finding and early treatment seeking; 2) high levels of compliance; and 3) good retention from admission to cure (i.e. little or no defaulting). These are the same features we observe in services with high coverage. Effectiveness and coverage rely upon the same key factors. **An effective CMAM service achieves good coverage and a service with good coverage is an effective service.** Good coverage supports effectiveness. Effectiveness supports good coverage. Maximizing coverage maximises effectiveness and met need (*Figure 1*).

1 Previously known as Community based Therapeutic Care
2 Coverage is more commonly estimated for the treatment of severe acute malnutrition (SAM) rather than for moderate acute malnutrition (MAM): refer to question section at the end of this document.

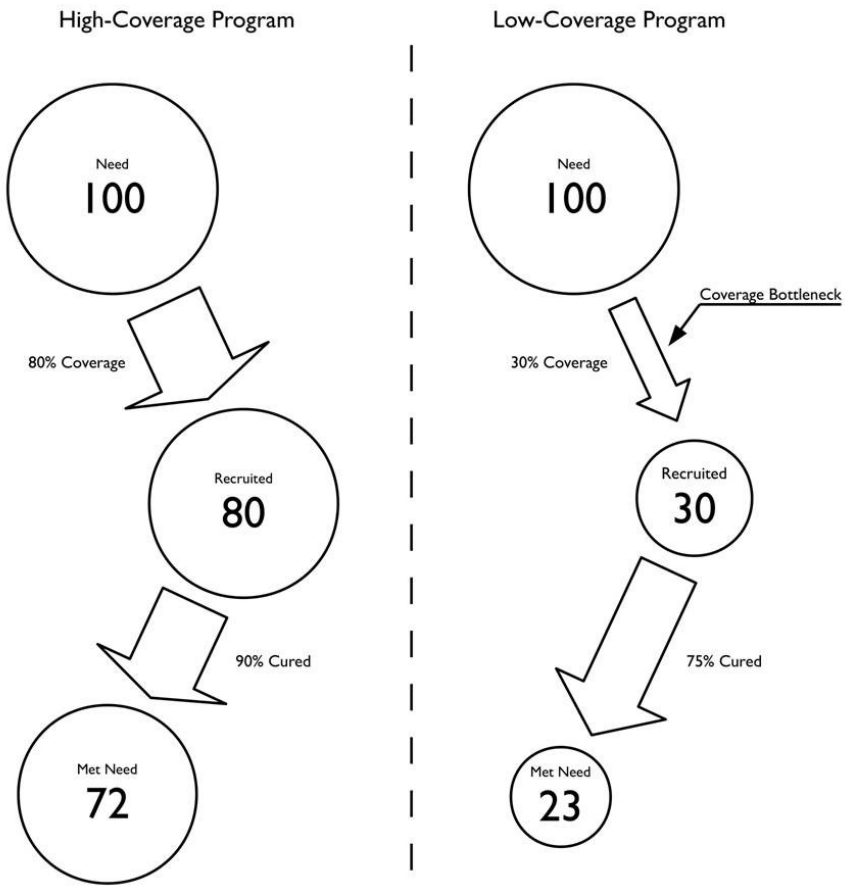

Figure 1: Coverage, cure rate and met need

Met need is the product of the coverage and the cure rate.

$$met\ \ need = coverage \times cure\ \ rate \times 100$$

where coverage and cure rate are expressed as proportions. For example in *Figure 1*, for a service with coverage of 80% and a cure rate of 90%, the met need can be calculated as follows:

$$met\ \ need = \frac{80}{100} \times \frac{90}{100} \times 100 = 72\%$$

Thus we can say that the program is meeting 72% of need.

Investigating coverage, and the factors influencing coverage, is essential to improving both coverage and effectiveness and, through them, to meeting need. For example, services with high coverage have been shown to treat SAM at its early and uncomplicated stage. This early treatment ensures high cure rates which in turn increase effectiveness which in turn further increases coverage. A virtuous cycle of high coverage and high effectiveness is therefore achieved leading to maximisation of met need. Coverage is therefore one of the most important indicators of how well need is being met. Services with low coverage fail to meet need.

Coverage as a key indicator for the management of acute malnutrition: The 2011 Sphere standards[3] (see *Box 1*) set the minimum acceptable levels of coverage for the management of acute malnutrition in different settings during a humanitarian response. These stress the importance of measuring coverage and set minimum standards for key indicators. The Sphere standards serve as a guideline for humanitarian response. The development context in which the integration of CMAM into national health systems and national scale up takes place maintains coverage as a key indicator for service quality but should consider different cut-off levels.

The Sphere standards for coverage should be used with caution for the following reasons:

- **Overall vs. local estimates.** The spatial, and potentially heterogeneous (i.e. patchy) nature of coverage over a wide area, is not taken into consideration. It is not clear whether the standard should apply everywhere or just represent an overall estimate.

- **Time to reach standards.** Whether a service is new or well established will have an effect on what is realistically achievable, what can be judged as acceptable and over what time period we can expect standards to be reached. In developmental settings reaching standards may take longer than in emergency settings.

- **Different standards in different settings.** Urban and camp settings are prescribed with much higher coverage minimums (70% and 90% respectively) as compared to 50% in rural settings. It is assumed that urban and camp settings, by default, afford easier access to services than in rural locations. Experience, however, has shown that urban and camp settings often prove more programmatically challenging and services often fail to achieve even 50% coverage.

- **Level of the standard.** Stating a minimum standard may act as a brake on ambition, as over time it would be hoped that these standards are exceeded. Coverage should increase over time and once a standard has been met, a new and higher standard should be set. This should ensure continual and incremental improvements in line with an audit cycle which aims to achieve and maintain best practice.

Box 1: Sphere Handbook reference to coverage; 2012

Key Action: Maximise access and coverage through involvement of the population from the outset.

Key Indicator: Coverage is >50 per cent in rural areas, >70 per cent in urban areas and >90 per cent in a camp situation (see guidance note 2).

Guidance Note 2: Coverage refers to individuals who need treatment against those actually receiving treatment. Coverage can be affected by the acceptability of the service, location and accessibility of program sites, security situation, frequency of distributions, waiting time, service quality, extent of mobilisation, extent of home visiting and screening, and admission criteria alignment. Program sites should be close to the targeted population in order to reduce the risks and costs associated with travelling long distances with young children and the risk of people being displaced to them. Methodologies to measure coverage vary in the level of reliability and type of information generated. The method used must be stated when reporting. Current guidance should be consulted when deciding which method is appropriate in the given context. Coverage assessment should be seen as a management tool so should not be left to the end of an emergency support phase. http://www.spherehandbook.org/en/management-of-acute-malnutrition-and-micronutrient-deficiencies-standard-2-severe-acute-malnutrition/

3 The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response. http://www.spherehandbook.org/en/management-of-acute-malnutrition-and-micronutrient-deficiencies-standard-1-moderate-acute-malnutrition/

Experience over the past decade has shown that investigation of coverage and factors affecting coverage using methods such as ***CSAS***, ***SQUEAC*** and ***SLEAC*** can inform reforms which improve service coverage and effectiveness. Services that have adopted a "build it and they will come" approach tend to achieve Sphere minimum cure-rates (i.e. 75%) and coverage proportions below about 20% (i.e. 15% met need). Services that give adequate attention to building the community aspect of CMAM and audit coverage using ***CSAS***, ***SQUEAC***, or ***SLEAC*** methods can achieve cure rates exceeding 85% and coverage proportions exceeding 70% (i.e. 60% met need). The current challenge is to achieve these levels of performance in CMAM services provided on a national scale.

Assessing coverage: Before 2002 no specific methods existed for investigating coverage of feeding programs. The ***Centric Systematic Area Sampling (CSAS)*** method was specifically developed for the Community-based Therapeutic Care (CTC) research program and was used to assess the coverage of CTC programs for several years. The ***CSAS*** method was replaced by the ***Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage*** or ***SLEAC*** (a lower cost classification-based development of ***CSAS***) and the ***Semi-Quantitative Evaluation of Access and Coverage*** or ***SQUEAC*** (a semi-quantitative approach concentrating on a detailed investigation of factors influencing coverage). The adoption of the CMAM/IMAM model at national levels has led to requests for methods that can provide information about coverage over wide areas. This need is being met by adaptations of the ***SLEAC*** method and also by the ***Simple Spatial Survey Method*** or ***S3M***, an adaptation of the ***CSAS*** method but with improved spatial sampling and a more effective use of data.

Part 2 outlines in more detail what each method of assessing coverage can offer. This is followed by a table summarising the features of the different survey methods.

PART 2: DIRECT COVERAGE METHODOLOGY

Centric Systematic Area Sampling (CSAS)

CSAS was developed in 2002 and was initially used to test and reform the CTC model of service delivery, later referred to as CMAM or IMAM. Since then it has been used as an evaluation tool but has proved too resource intensive to be used for routine monitoring. Although largely superseded in this area by the less resource intense ***SQUEAC*** and ***SLEAC***, ***CSAS*** is still an effective method for estimating and mapping coverage with useful precision and can be used by teams experienced with the technique and for final evaluations.

Design
CSAS uses a two-stage sampling design. The first stage is a systematic spatial sample of the entire service area to select the communities to survey. The sample is therefore representative of the whole area. The second stage is an active and adaptive case-finding[4] method that finds all or nearly all SAM cases in the communities being surveyed. Hence, the sample is representative of the communities surveyed.

Results
CSAS yields the following results:

- Overall coverage estimate
- Local coverage estimates which can be represented as a coverage map
- Ranked list of barriers[5]

Figure 2 and *Figure 3* show typical ***CSAS*** outputs from a coverage assessment of an NGO-delivered CMAM service undertaken in two neighbouring health districts in Niger.

4 Active and adaptive case-finding is a type of within-community sampling used in all coverage surveys. The method actively searches for SAM cases with the intention of finding all (or nearly all) cases of SAM in the sampled communities. This type of sampling is also known as ‘snowball sampling’, ‘optimally biased sampling’, or ‘chain-referral sampling’.

5 A barrier or coverage bottlenecks (Tanahashi, 1978) is anything that restrains, obstructs, or delays access to a program or restrains coverage. A booster is anything that encourages or enables access to a program or leads to an increase in coverage.

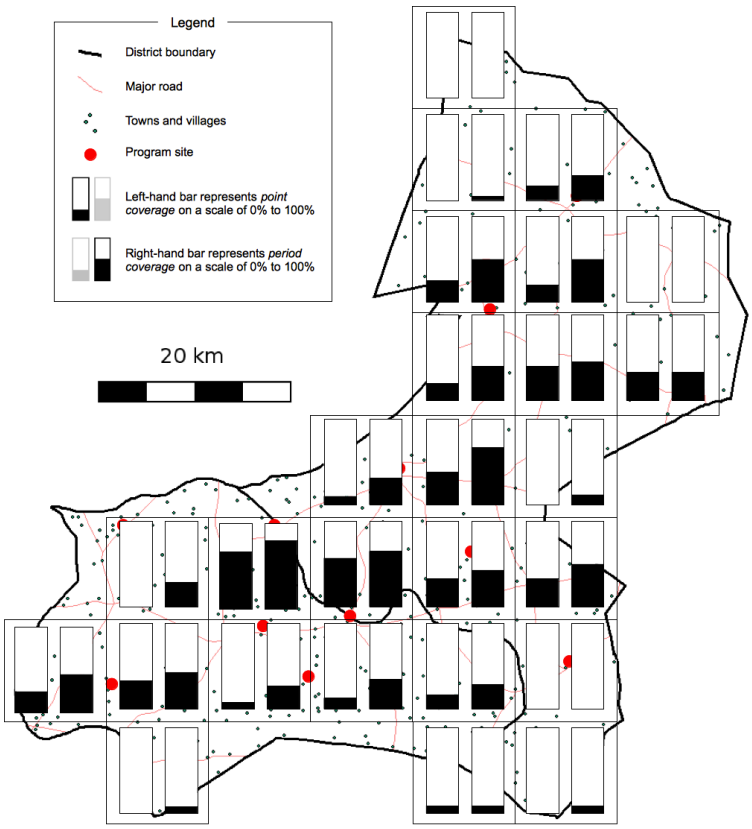

*Figure 2: Map showing the spatial distribution of point and period coverage in a CMAM service produced using the **CSAS** method*

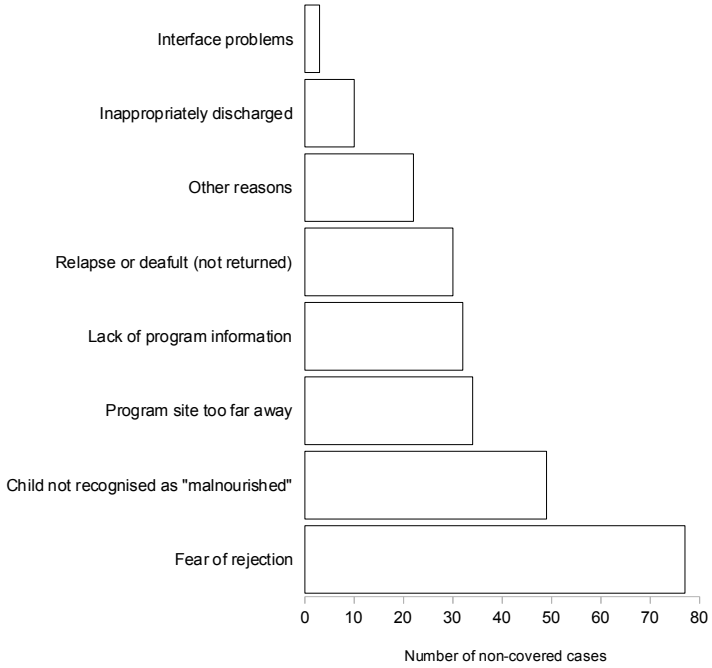

*Figure 3: Barriers to service uptake and access in a CMAM service reported by carers of non-covered cases produced using the **CSAS** method*

Semi-quantitative Evaluation of Access and Coverage (SQUEAC)

SQUEAC is a semi-quantitative method that provides an in-depth analysis of barriers and boosters to coverage. It is designed for use as a regular service monitoring tool through the intelligent use of routine monitoring data complemented by other relevant data that are collected on a "little and often" basis.

Design

SQUEAC is more an investigation than a survey. ***SQUEAC*** is made up of three stages:

> *Stage 1:* Semi-quantitative investigation into factors affecting coverage. This is carried out using the ***SQUEAC*** toolkit, which is a set of simple and rapid tools and methods for collecting and analysing data related to coverage. *Stage 1* will typically identify barriers to coverage and investigate the spatial pattern of coverage. Stage 1 alone is capable of providing a great deal of information about coverage that may be used to reform the service.
>
> *Stage 2:* Confirm areas of high and low coverage and other hypotheses relating to coverage identified in stage 1 through small studies, small surveys, and small-area surveys.
>
> *Stage 3:* Estimate overall coverage using Bayesian techniques . A *likelihood* survey is conducted as part of this stage. This survey utilises a two-stage sampling design. The first stage is a systematic spatial sample. The second stage is an active and adaptive case-finding. This two-stage sampling design is the same as with all other coverage survey methods described here. *Stage 3* is optional and is done if the reporting of an overall coverage estimate is a key information requirement in addition to the rich information on barriers and boosters to coverage already gained from *Stages 1* and *2*.

Results

SQUEAC provides the following results:

- Concept map of barriers and boosters to coverage
- Coverage map using small area surveys through a "risk mapping" approach
- Estimation of coverage proportion using Bayesian[6] techniques

Figure 4 shows the relations between factors influencing coverage and effectiveness in a MoH-delivered CMAM service in Sierra Leone. *Figure 5* shows a coverage map obtained through a risk mapping approach taken from a joint MoH / NGO-delivered CMAM service in Sudan.

6 **Bayesian** is the interpretation of probability as a measure of confidence (or belief) that something is true. In Bayesian inference, belief is modified as fresh evidence is observed. At each step, the initial belief is called the 'prior', the fresh evidence is called the 'likelihood', and the modified belief is called the 'posterior'. Taken from glossary of Handbook for ***SQUEAC*** http://www.brixtonhealth.com/handbookSQUEAC/glossary.pdf

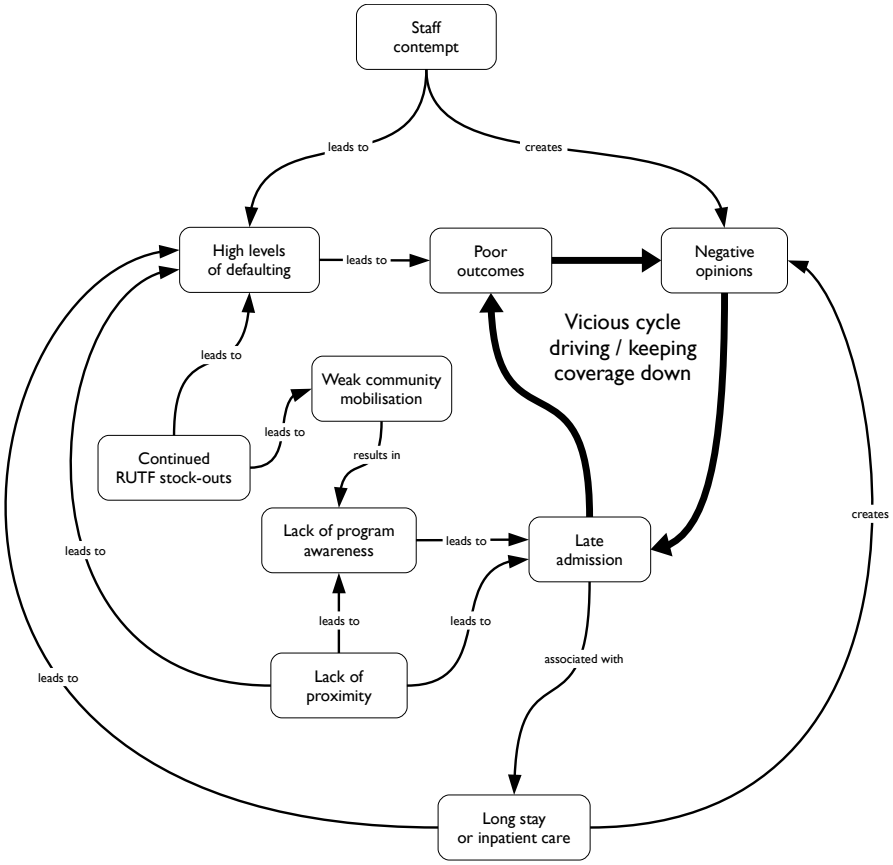

*Figure 4: Concept map showing relations between factors influencing coverage and effectiveness produced by a **SQUEAC** assessment.*

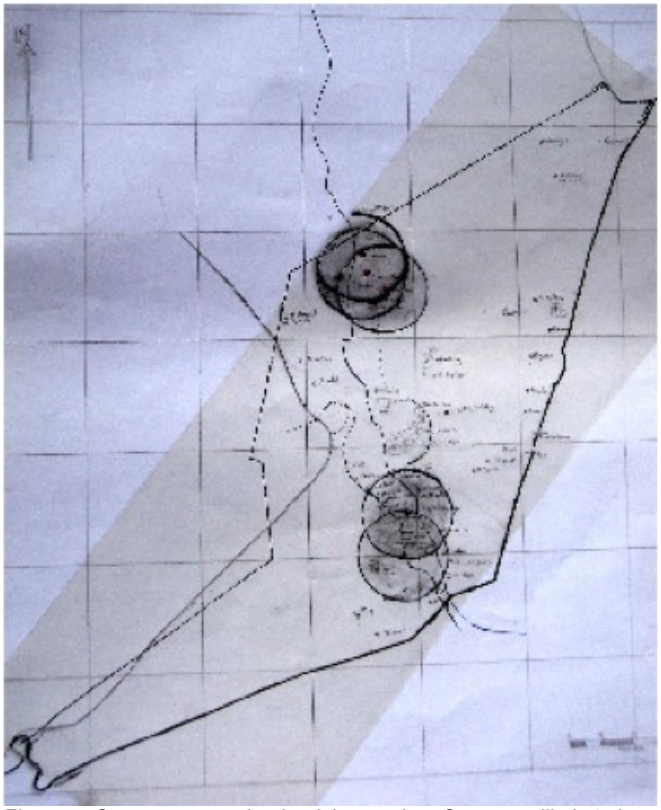

Figure 5: Coverage mapping by risk mapping. Coverage likely to be low outside of shaded areas.

Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage (SLEAC)

SLEAC is a rapid low-resource survey method that classifies coverage at the service delivery unit (SDU) level. The SDU may be a health centre catchment area, commune, or district. A ***SLEAC*** survey identifies the category of coverage (e.g. "low", "moderate" or "high") achieved by the service delivery unit being assessed. The advantage of this approach is that relatively small sample sizes (e.g. $n \leq 40$) are required in order to make an accurate and reliable classification.

SLEAC can also estimate coverage over several service delivery units and is suited to wide-area use. Coverage is still classified for the individual service delivery units, then, data from individual service delivery units are combined and overall coverage for the wide area is estimated. ***SLEAC*** was originally developed as a companion method for ***SQUEAC*** but has recently been used for mapping of coverage classes in service delivery units over very wide-areas (e.g. national level).

Design

SLEAC uses a first stage systematic spatial sample similar to that used in ***CSAS***. Only small sample sizes ($n \leq 40$) are required for each service delivery unit in which coverage is being classified. The second stage sample is an active and adaptive case-finding method as with the other coverage survey methods.

Results

SLEAC yields the following results:

- Coverage classifications
- Can be used over wide areas to provide local coverage classifications with a coverage map and a wide area estimate
- Ranked list of barriers

Figure 6 shows a map of coverage classifications for all administrative districts in an MoH-delivered CMAM service in Sierra Leone. ***SLEAC*** also provides output similar to *Figure 3*.
It is typical to use ***SLEAC*** to identify areas for further investigation using the ***SQUEAC*** method (*Figure 7*).

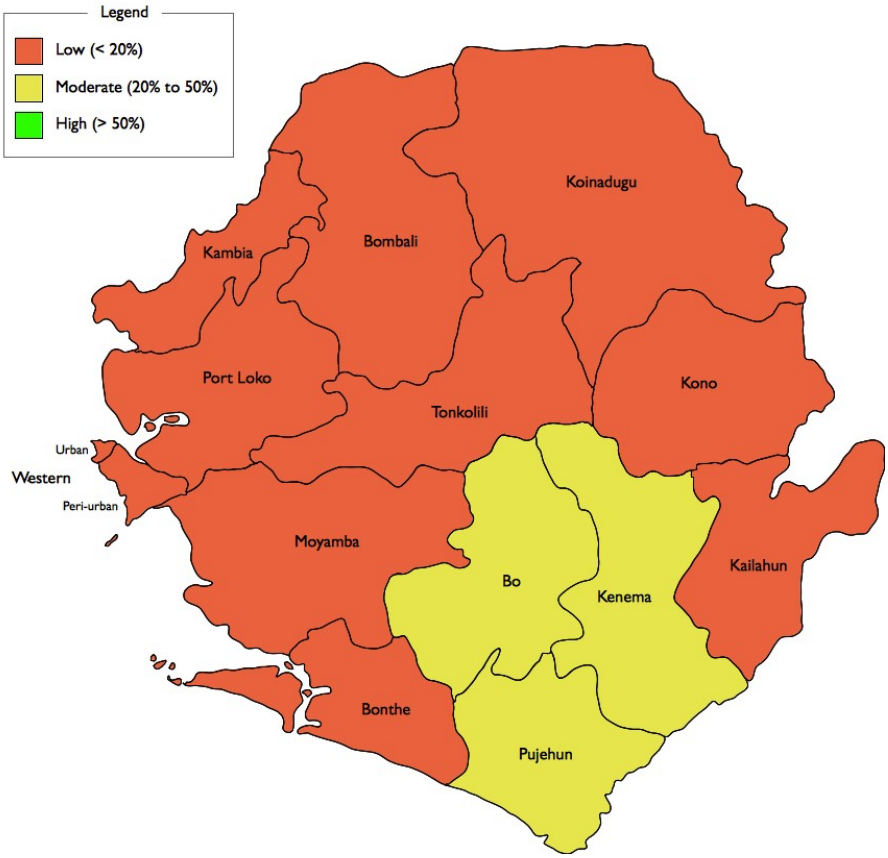

*Figure 6: Map of per-district coverage produced by the **SLEAC** method*

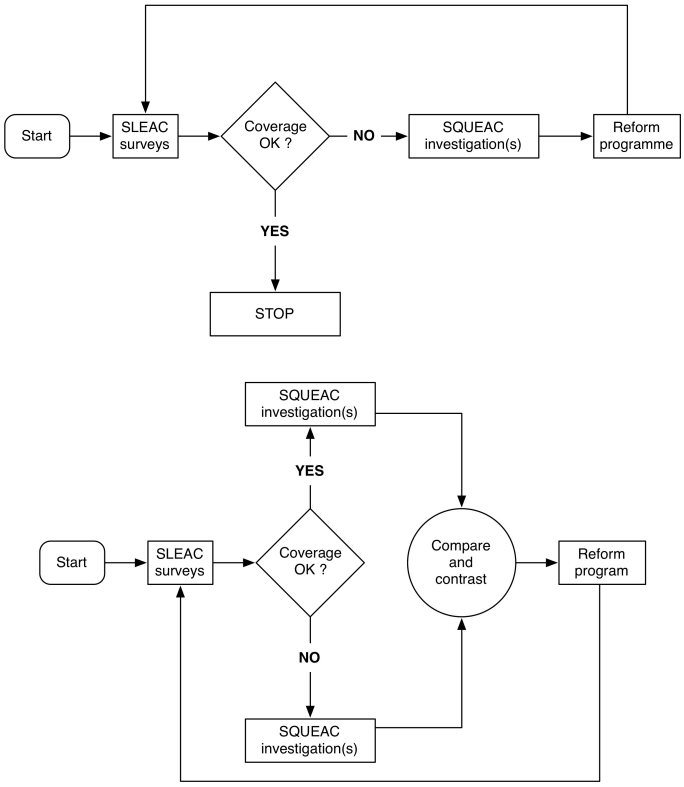

*Figure 7: Using **SLEAC** and **SQUEAC** in failing service delivery units (top) and using **SLEAC** and **SQUEAC** in succeeding and failing service delivery units (bottom)*

Simple Spatial Survey Method (S3M)

S3M is a development of ***CSAS*** for very wide area usage including national level surveys. The key features of ***S3M*** are:

- Sampling points using a triangular irregular network (TIN) rather than a grid
- Highly efficient use of data (c. 6 × reuse of data)
- Lower cost than ***CSAS*** (10 x area for 2 × cost)
- Maps a 'coverage surface'
- Automatic smoothing of data
- Simple to understand

Design

S3M uses a two-stage sampling design. The first stage is a systematic spatial sample using a triangular irregular network rather than a grid to identify communities to sample. The second stage is active and adaptive case-finding as with the other coverage survey methods.

Results

S3M provides the following outputs:

- Coverage map similar to that of ***CSAS***
- Overall estimate of coverage
- Ranked list of barriers to access

Figure 8 shows a map of coverage in a MoH-delivered CMAM service in Niger produced using the ***S3M*** method. *S3M* also provides output similar to *Figure 3*.

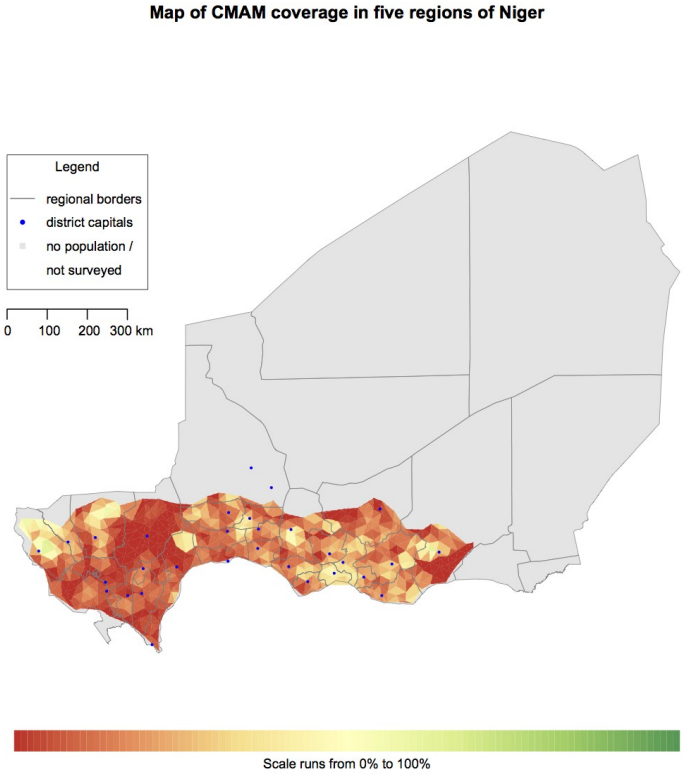

*Figure 8: Coverage map produced by the **S3M** method*

Table 1: Summary features of coverage assessment methods

Program Considerations	CSAS	SQUEAC	SLEAC	S3M
Size of program (local, district, regional or national)	Local area method for program site catchment areas up to district level programs	Local area method for program site catchment areas up to district level programs	Wide area method used to classify and map survey results of district level up to regional and national programs	Large-scale area sampling method used to estimate and map survey results of regional up to national programs
Survey results reported (estimate or classification)	Estimate of coverage Ranked list of barriers	Estimate or classification of coverage Ranked list of barriers	Classification of coverage for each service delivery unit with the possibility of reporting overall estimates depending on sample size reached and homogeneity of results Ranked list of barriers	Classification and estimate of coverage (small area up to overall) Ranked list of barriers
Area level for which survey results are applicable (overall, service delivery units, catchment area of program site)	Local areas (grids on map) and overall for the district	Catchment area of program sites and overall for the district Local (i.e. sub-district) mapping of coverage.	Service delivery units and overall for the district, region or country	Local areas (grids on map) and overall for the region or the country
Component methods	• Area sampling methods using quadrats (squares) • Snowball sampling (active and adaptive case finding) and other high-sensitivity case-finding methods • Sample size calculation with finite population correction • Data mapping principles and methods • Data collection using simple tally sheets and questionnaires • Data analysis using simple estimators	• Use of existing qualitative and quantitative data as part of the investigation process of indicator of interest • Mixed qualitative and quantitative approaches to data collection and analysis • Hypothesis-testing • Snowball sampling (active and adaptive case finding) and other high-sensitivity case-finding methods • Lot quality assurance sampling (LQAS) methods • Spatial mapping principles and methods • Bayesian analysis	• Area sampling methods using either quadrats (squares) or systematic sampling using lists • Snowball sampling (active and adaptive case finding) and other high-sensitivity case-finding methods • Lot quality assurance sampling (LQAS) methods • Sample size calculations for finite (i.e. small populations) • Data mapping principles and methods • Data collection using simple tally sheets and questionnaires • Data analysis using simple classifiers and estimators	• Area sampling methods using triangles • Snowball sampling (active and adaptive case finding) and other high-sensitivity case-finding methods • Sample size calculation with finite population correction • Data mapping principles and methods • Data collection using simple tally sheets and questionnaires • Data analysis using simple estimators

Baseline information requirements	1. Detailed map showing each program site and villages/locations is a ***must***. 2. Estimates of population size for all populations and 6-59 month age group of each catchment area of program site	1. At least a complete list of villages/locations within each catchment area of program sites (ideally good detailed maps but optional) 2. Routine program monitoring data 3. Additional data from patient record cards	1. At least a complete list of villages/locations within each service delivery unit (detailed maps optional) 2. Rough estimates of population size (all populations and 6-59 month age group) of each service delivery unit 3. Prevalence estimate (ideally estimate for each service delivery unit but aggregate figure acceptable)	1. Detailed maps showing each service delivery unit and villages/locations are a ***must***. 2. Estimates of population size for all populations and 6-59 month age group of each service delivery unit
Expected Deliverables	1. Estimate of coverage at level of local areas (grids on map) and overall for the district 2. Mapping of coverage estimate at level of local areas (grids on map) 3. Ranked list of barriers to coverage	1. Classification or estimate of overall coverage 2. List of boosters and barriers to coverage with detailed information on how they interact and affect coverage	1. Classification of coverage at level of service delivery unit and overall 2. Mapping of classification of coverage at level of service delivery unit 3. Ranked list of barriers to coverage	1. Estimate of coverage at level of local areas (grids on map) and overall 2. Mapping of coverage estimate at level of local areas (grids on map) 3. Ranked list of barriers to coverage

Specific Questions that Arise with Coverage Assessments

Q1. What is the difference between Point and Period coverage? Which one should be used?

Two estimators of coverage are in common use:

> **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. Point coverage is calculated using the following formula:

$$\textbf{Point coverage} = \frac{\text{Number of SAM cases in treatment}}{\text{Total number of SAM cases in the community}}$$

> **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. Period coverage is calculated using the following formula:

$$\textbf{Period coverage} = \frac{\text{Number of SAM cases in treatment} + \text{number of recovering cases in treatment}}{\text{Total number of SAM cases in the community} + \text{number of recovering cases in treatment}}$$

The point coverage estimator can give a misleading picture of coverage in a service with high coverage given its good case-finding and recruitment and short lengths of stay. In such cases the two estimators will yield very different results. For example, a survey found:

Number of SAM cases in the community	: 2
Number of SAM cases in treatment	: 0
Number of recovering cases in treatment	: 34

The point coverage estimator returns:

$$\textbf{Point coverage} = \frac{0}{2} = 0\%$$

but the period coverage estimator returns:

$$\textbf{Period coverage} = \frac{34}{36} = 0.944 \text{ or } 94.4\%$$

In this example the period coverage estimator is probably the better indicator of coverage. In this example, the point coverage estimate penalises good performance.

The period coverage estimator can give a misleading picture of coverage in services with poor case-finding and recruitment and long lengths of stay due to late presentation and / or late admission. In such cases the two estimators will yield very different results. For example:

Number of SAM cases in the community	: 12
Number of SAM cases in treatment	: 3
Number of recovering cases in treatment	: 22

The point coverage estimator returns:

$$\textbf{Point coverage} = \frac{3}{12} = 0.25 \text{ or } 25\%$$

but the period coverage estimator returns:

$$\textbf{Period coverage} = \frac{25}{34} = 0.735 \text{ or } 73.5\%$$

In this example the point coverage estimator is probably the better indicator of coverage.

The overall coverage estimate varies with the estimator used and results can be difficult to interpret without contextual information.

The choice of estimator to report should therefore be informed by context:

- If there is good case-finding and recruitment (i.e. SAM cases found early in the stage of the disease) and short lengths of stay then the period coverage estimator is likely to be appropriate.

- If there is poor case-finding and recruitment (i.e. SAM cases found late in the stage of the disease) and long lengths of stay due to late presentation and / or late admission then the point coverage estimator is likely to be appropriate.

When conducting a coverage survey it should be decided which estimator is most appropriate to report and report that indicator. Justification of the selection of point or period coverage estimator should be included in the body of the report with reference to findings regarding case-finding and recruitment and lengths of stay. The most appropriate estimator only should be reported. It is **not** legitimate to report both estimators. It is **not** legitimate to pick the estimator on the basis of it yielding the higher coverage estimate.

Q2. Can OTP coverage be representative of ALL coverage? If we proceed with *SQUEAC* for SAM only, can inferences be drawn about SFP coverage based on the coverage figure given for OTP/SC

There is no general reason to think that OTP/SC coverage will be the same as SFP. Although information pertinent to the SFP may be gained during a ***SQUEAC*** focusing on SAM coverage, an independent survey should be carried out to assess SFP coverage. ***CSAS***, ***SQUEAC***, ***SLEAC*** can be used for SFP coverage, but they require the use of house-to-house/door-to-door sampling. This is because the active and adaptive sampling method commonly used lacks case finding sensitivity for MAM cases (only the most severe cases of MAM tend to be detected). This means that we need to use a census type sample to find MAM cases.

Q3. Can coverage methods be used to give an estimate of MAM coverage? What are the realistic assessment implications (time, staffing, resources) of piggy-backing MAM coverage to a survey for coverage of SAM?

SQUEAC is a method designed to assess selective therapeutic feeding services i.e. services with defined criteria of selection or eligibility in order to benefit from the service. For Outpatient Therapeutic Programs (OTP) and Stabilisation Centres (SC), generally, this eligibility is quite clear cut and applicable across the board.

Often there is high variance in the forms of SFP being implemented (blanket, targeted, alternating blanket and target, protection rations etc.). Determining who should be eligible for it is not clear cut, which makes sampling very complicated. In general there is very little value in assessing SFP coverage unless the service uses very clear eligibility criteria. Should SFP coverage assessment be found to be critical and valuable, then adding SFP coverage onto ***SQUEAC*** is quite straightforward, but will potentially require some additional resources in terms of either time or staffing to complete.

If management of MAM is by set criteria e.g. SFP for children aged 6 - 59 months who have MUAC < 125 and ≥ 115, then if we are to assess coverage of both SFP and OTP in one survey, the implications will be as follows:

- In ***SQUEAC*** surveys, you will have to create two priors[7] - one for OTP coverage and one for SFP coverage. This would mean that you will either use more time to do both investigations to come up with two priors, or that you will use more people so that you can do parallel investigations within the same period of time.

- If you aim to assess SFP and OTP through a nested sample, then this would mean that the second stage sampling method will have to be a census-type of sampling approach (i.e. house- to-house) rather than a snowball sampling approach (i.e. active and adaptive case finding). This is because unlike SAM, MAM cannot be as easily distinguished by mere sight or description so only MAM cases bordering on severe tend to be found adaptively using key words or key informants. This means that the snowball method may not be exhaustive for MAM cases compared to SAM cases. If this is done, this will most likely bias the results upwardly. The implications of a census-type approach in terms of either time or staffing can be minimal. To be able to cover the same number of villages with house-to-house will take

7 In Bayesian inference, the **prior** is a probabilistic representation of available knowledge about a quantity. In SQUEAC, the prior is a probabilistic representation of knowledge relating to program coverage. SQUEAC uses a beta-distributed prior. See *beta-binomial conjugate analysis*, *beta distribution*, *conjugate analysis*, *likelihood*, *posterior*.
http://www.brixtonhealth.com/handbookSQUEAC/glossary.pdf

more time as compared to active and adaptive case finding. However, because MAM is more prevalent than SAM, you will require a lower number of villages to sample to obtain your target sample size. Therefore, you may only need to do MAM case-finding in a small number of villages as compared to more villages with SAM case-finding. Hence, there need not be a great increase in cost. In settings where villages are quite small (i.e. village size of 50 or less households or up to 300 population) house-to-house will be just as quick if not quicker than active and adaptive case finding.

In summary, the technical difference lies in the use of a census approach rather than active and adaptive case-finding, which may impact on the time and/or resources required for a wide-area survey.

Q4. Why do current coverage surveys appear to be giving lower results than earlier published ones? Is it the change in methodology from *CSAS* or the overall situation?

Many recent surveys appear to show coverage results of < 50%, compared with > 70% in the past. This is partly due to the fact that coverage above 50% or 70% is only possible when services prioritise specific actions. While CMAM services are being widely scaled up, there are still issues with the availability of ready-to-use-therapeutic food (RUTF) in many of these programs, which results in loss of trust by the community, if they arrive at a centre and are not able to receive full treatment. Shortage of RUTF stock at centre level is one cause which appears to be gaining in importance. There is often enough RUTF in the country but the situation in the field can be very different; related to challenges with logistics/distribution of supplies. It does not take very long for mothers to become discouraged and to stop attending the program. This is even more evident when other barriers to receiving treatment such as distance, long waiting times to be served, quality of the service, etc. are also involved.

Most of the available research on non-attendance suggests that awareness continues to be the single most important reason why cases that should be enrolled in a nutrition program are not. This covers both awareness of the service (where it is, what it does, who it is for, etc.) as well as the way in which people link the condition that they see in their children with the services that they hear about. This is commonly seen as a population-level problem (i.e. a problem of community awareness) but it is perhaps best seen as a service delivery problem. And that is the point: one of the main reasons why CMAM services are failing to perform as they did before is because the first “C” (Community) is dealt with last. Community sensitisation, when it happens, is mostly a one off, top-down affair. Real, consistent and meaningful community engagement (that understands community perceptions first, and then works on influencing awareness) remains limited. The majority of barriers found in coverage surveys are related to a failure in addressing the community component, including, as mentioned, knowledge of the service, management of rejections, involvement of all key community stakeholders, etc. Local and international NGOs may have a significant role to play to better support the health facility staff in dealing with these issues.

Distance to the nearest health centre continues to be an issue in many areas, as are insecurity and the way in which non-eligible cases are handled at facilities. But what coverage assessments such as ***SQUEAC*** have done is to help programs understand what is happening around them. Their most important contribution is not what it says about coverage estimations, but rather, its ability to tell programs why it is what it is. There are a number of emerging lessons out there, and what we need is for field practitioners to share their experiences, for both good and poorly performing programs to share their lessons, and for the sector to start reviewing the programming and policy implications of these lessons on the way we run such programs.

Q5. Is there a minimum level of SAM, under which it is not worthwhile to do a coverage assessment, because of the difficulties in finding cases? Integrated programs within local health facilities often fall within this category.

In such settings, *stages 1* and *2* of ***SQUEAC*** can be done. This will provide a lot of information regarding barriers to coverage, treatment seeking behaviours, program performance, program outreach, etc. (*stage 1*) and identify issues with spatial coverage (*stage 2*). It can then be decided whether a *stage 3* survey is needed (which is often not the case).

Cases can be hard to find if prevalence is low but wasting is often a "hidden problem" (i.e. a problem that is undiagnosed or not recognised). Data from prevalence surveys may underestimate prevalence due to families hiding sick children and because the PPS sample tends to exclude children in smaller communities (where the SAM cases may be).

It is common to conduct coverage surveys (like ***CSAS***, ***SLEAC***, or *stage 3* ***SQUEAC***) during "lean seasons" to make it easier to find cases. ***SQUEAC*** *stages 1* and *2* do not need large sample sizes and can be conducted when prevalence is low and still yield useful information.

Q6. What do we mean by 'boosters' and 'barriers'? What are some of the recent examples?

A **'booster'** is anything that encourages or enables access to a program or leads to an increase in coverage. Factors commonly identified as having a positive effect on coverage include:

- Active and regular case finding by motivated volunteers
- Good knowledge and understanding of the program by the local population
- Key community figures actively support the program
- Effective systems in place for referral, transfer and follow up of cases
- Good relationships between CMAM actors and adequate support and supervision given to volunteers, health centre staff, and program personnel
- Good and continued supply of RUTF.

A **'barrier'**, also known as a **'bottleneck'** (Tanahashi 1978), is anything that restrains, obstructs, or delays access to a program or restrains coverage. Factors frequently identified as having a negative effect on coverage include:

- Lack of knowledge of the program
- Lack of awareness of malnutrition or mismatch between program definition and community understanding
- Distance to program site
- Previous rejection by health centre staff
- Limited active case finding / few or demotivated volunteers
- Service-related problems (especially RUTF out of stock)

Q7. Can coverage be measured during SMART assessments?

The use of PPS sampling and the small number of SAM cases found by SMART surveys means that estimates of coverage made by SMART surveys may be inaccurate (i.e. biased by taking the sample from the most populous communities) and will usually be imprecise (i.e. due to the small sample size of SAM cases). SMART survey data may, however, be used with other data to inform priors in ***SQUEAC*** *stage 3* surveys. For more information refer to:

Myatt M, Feleke T, Sadler K, Collins S. A field trial of a survey method for estimating the coverage of selective feeding programs. *Bulletin of the World Health Organization* 2005; 83**:**20-6. http://www.who.int/bulletin/volumes/83/1/20.pdf

Q8. How do we measure geographical coverage?

This subject will be covered in a future Technical Brief.

PART 3: FUTURE ISSUES:

Much work is currently being done to refine coverage methodologies, and many more countries and agencies are adopting assessment of coverage as a core part of their routine work. Future issues for consideration include:

Practical:

- Ensure donors and governments prioritise budgeting to include regular coverage assessments
- Ensure sufficient training and supervision and skilled implementers to maintain quality surveys where and when required
- Consider greater use of innovative technology for data collection

Technical:

- Document and disseminate coverage assessments conducted in urban settings
- Reach consensus on the measurement of geographical coverage
- Review the appropriateness of the current Sphere standards for coverage and consider a phased approach to establishing standards, where coverage levels are anticipated as lower in the early phase of a program and coverage targets set higher in more established programs
- Establish technical guidelines and document experience on coverage assessment for MAM

On-going work:

- Prioritise community mobilisation activities to ensure good coverage is achieved. Specifically ensure a sociocultural assessment is carried out at program set-up to identify a) resources to undertake case finding and awareness-raising, b) barriers to access c) effective channels of communication and d) health seeking behaviour and local understandings of malnutrition. The findings will enable a context specific, long-term mobilisation strategy to be developed.
- Widening the pool of qualified trainers available. Initiatives such as the Coverage Monitoring Network are currently being implemented to expand and reinforce technical capacity, and making them more accessible to programs around the world.
- Advocacy with donors and governments to fund coverage assessments
- Increasing use of surveys to measure wide scale/country level coverage

Guide to Resources Available for Coverage Surveys

Centric Systematic Area Sampling (CSAS)

Reading materials:
Myatt M, Feleke T, Sadler K, Collins S. A field trial of a survey method for estimating the coverage of selective feeding programs. *Bulletin of the World Health Organization* 2005; 83**:**20-6. http://www.who.int/bulletin/volumes/83/1/20.pdf

Myatt M. New Method for Estimating Program Coverage. *Field Exchange* 2004; 21:11. http://fex.ennonline.net/21/coverage.aspx.

Wegerdt J, Zanchettin M, Myatt M. Assessing sensitivity of case-finding using capture-recapture techniques. *Field Exchange* 2006; 27:13. http://fex.ennonline.net/27/sensitivity.aspx.

Myatt M. *A brief introduction to the CSAS coverage survey method*. Valid International 2006. http://www.brixtonhealth.com/CSASCoverageMethodSimple.pdf

Myatt M. *Notes on required sample sizes for CSAS and similar coverage surveys*. Valid International 2006. http://www.brixtonhealth.com/SampleCSAS.pdf

Myatt M. *Notes on using capture-recapture techniques to assess the sensitivity of rapid case-finding methods*. Valid International 2006. http://www.brixtonhealth.com/CRCaseFinding.pdf

Milne A. The centric systematic area-sample treated as a random sample. *Biometrics* 1959; 15(2): 270-297.
http://www.validinternational.org/coverage/references/Milne.CSAS.BiometricsVolume15No2.pdf

*Estimation and Mapping Software (*all available at http://www.brixtonhealth.com/

OpenCSAS
A simple data-entry and reporting tool for CSAS coverage surveys. Available: http://www.brixtonhealth.com/opencsas.html

CSAS coverage calculator
A spreadsheet (Microsoft Excel '95 format) for calculating coverage estimates and drawing plots and maps from coverage survey data collected using the CSAS methodology. The spreadsheet also provides capture-recapture estimates of the sensitivity of a case-finding procedure. Available: http://www.brixtonhealth.com/CSASCoverEmpty.xls. A spreadsheet containing example data is available at http://www.brixtonhealth.com/CSASCoverExample.xls

Semi-Quantitative Evaluation of Access and Coverage (SQUEAC)/ Simplified LQAS Evaluation of Access and Coverage (SLEAC)

Reading materials:

Myatt M. SQUEAC: Low resource method to evaluate access and coverage programs. *Field Exchange* 2008; 33:3. http://fex.ennonline.net/33/low.aspx

Myatt M, Jones D, Emru E, Guerrero S. Fieschi L. *SQUEAC & SLEAC: Low resource methods for evaluating access and coverage in selective feeding programs.* Valid International. http://www.validinternational.org/demo/reports/SQUEAC.Article.pdf

Myatt M, et al. *Semi-Quantitative Evaluation of Access and Coverage (SQUEAC) /Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage (SLEAC) Technical Reference*. FANTA III/FHI360 2012.
http://www.validinternational.org/coverage/techRef/coverageTechRef.pdf

Schofield L, Gizaw Lacha S, Getachew T. SQUEAC in routine monitoring of CMAM program coverage in Ethiopia. *Field Exchange* 2008; 38:35. http://fex.ennonline.net/38/routine.aspx

Nyawo M, Myatt M. Causal analysis and the SQUEAC toolbox. *Field Exchange* 2012; 42: 37-38. http://www.validinternational.org/coverage/workshop/articles_files/causalENN.pdf

Guevarra E, Myatt M, Guerrero S. Using SLEAC as a wide-area survey method. *Field Exchange* 2012; 42: 39-44.
http://www.validinternational.org/coverage/workshop/articles_files/caseStudySLEAC.pdf

Software:

BayesSQUEAC calculator

A simple calculator for performing Bayesian beta-binomial conjugate analysis designed for use in SQUEAC assessments. Available for Windows, Linux and Macintosh platforms:
http://www.brixtonhealth.com/bayessqueac.html

LQAS Sampling Plan Calculator

A simple LQAS sampling plan calculator for use in SQUEAC and SLEAC assessments. There are two implementations of this calculator. The first (available at www.brixtonhealth.com/hyperLQAS.html) is used for finding sample size required and corresponding decision threshold (*d*) given population and desired *alpha* and *beta* errors. The second (available at www.brixtonhealth.com/hyperLQAS.findD.html) is used for finding *d* given achieved sample size. Both implementations of the software can be made to run online from the links provided. For offline use, the HTML file can be saved onto your computer's hard disk or USB drive and opened locally using any web browser.

XMind

Open source mind mapping software downloadable at www.xmind.net

Other Coverage Related Resources

Reading materials:
Guerrero S, Myatt M, Collins S. 2010. Determinants of coverage in Community-based Therapeutic Care programs: towards a joint quantitative and qualitative analysis. *Disasters* 2010; 34(2):571-585. http://onlinelibrary.wiley.com/doi/10.1111/j.1467_7717.2009.01144.x/abstract

Sadler K, Myatt M, Feleke T, Collins S. A comparison of the program coverage of two therapeutic feeding interventions implemented in neighbouring districts of Malawi. *Public Health Nutrition* 2007; 10(9):907-913.
http://journals.cambridge.org/download.php?file=%2FPHN%2FPHN10_09%2FS1368980007711035a.pdf&code=86be6a44ae3e7da71d84a553e6b92ef1

Tanahashi T. Health service coverage and its evaluation. *Bulletin of the World Health Organization* 1978; 56(2):295-303.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2395571/pdf/bullwho00439-0136.pdf

Coverage Assessment Methods Toolkit: comprehensive set of tools, articles and presentations based on a recent coverage workshop
http://www.validinternational.org/coverage/resourcekit.zip

Coverage Discussion Forum on EN-NET: for all technical questions on coverage.
http://www.en-net.org.uk/forum/16.aspx

Coverage Monitoring Network: includes reports of recent surveys and coverage work.
http://www.coverage-monitoring.org/

Glossary (selected terms in footnotes taken from Handbook for SQUEAC)**, software, documents** and other guidance can be found on
http://www.brixtonhealth.com/handbookSQUEAC/glossary.pdf

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