

A photograph showing a woman in a traditional orange headwrap and patterned dress holding a child. A man in a white shirt is visible in the foreground, looking at a digital tablet. The background shows a thatched roof.

Assessing coverage of Community-based Management of Acute Malnutrition

Ernest Guevarra

3 March 2021

 ernest@guevarra.io  ernest.guevarra.io  [ernestguevarra](#)

Outline

- What is coverage?
- Why is coverage important?
- Measuring coverage
- Coverage challenges

What is coverage?

$$\text{coverage} = \frac{\text{No. in the programme}}{\text{No. who should be in programme}}$$

Coverage and CMAM

Coverage estimators - old

$$\text{Point coverage} = \frac{C_{in}}{C_{in} + C_{out}}$$

$$\text{Period coverage} = \frac{C_{in} + R_{in}}{C_{in} + C_{out} + R_{in}}$$

where:

C_{in} = cases in the programme

C_{out} = cases not in the programme

R_{in} = recovering cases in the programme

Characteristics of estimators

- **Point coverage** assesses the programme's case-finding capabilities
- **Period coverage** assesses the programme's case-finding capabilities and its ability to retain a case from admission to cure. Always equal to or higher than point coverage (never lower)
- Period coverage more closely approximates treatment coverage or effective coverage

Bias and limitations of estimators

- Both estimators are unable to detect **cases who have died** and **recovering cases not in the programme**
- **Point coverage** can underestimate true coverage in settings where **case prevalence is low** and **majority of cases are in recovery**
- **Period coverage** can overestimate true coverage in settings where **length of stay in programme is prolonged**

Which estimators to use?

- **Early days of CMAM:** reported both point and period coverage estimators
- **Recent past:** recommendation has been made to report *only one* of the coverage estimators with the choice of estimator to report to be based on programme features such as length of stay and MUAC at admission among others

Coverage estimators - updated

$$\text{Case-finding effectiveness} = \frac{C_{in}}{C_{in} + C_{out}}$$

$$\text{Treatment coverage} = \frac{C_{in} + R_{in}}{C_{in} + C_{out} + R_{in} + R_{out}}$$

where:

C_{in} = cases in the programme

C_{out} = cases not in the programme

R_{in} = recovering cases in the programme

R_{out} = recovering cases not in the programme

What estimators to use?

- We now recommend that *both* estimators be reported as they describe different aspects of the programme relevant to coverage.
- **Case-finding effectiveness** gives an idea of how good the programme is in case-finding – a key factor in coverage
- **Treatment coverage** provides an approximation of true coverage or effective coverage

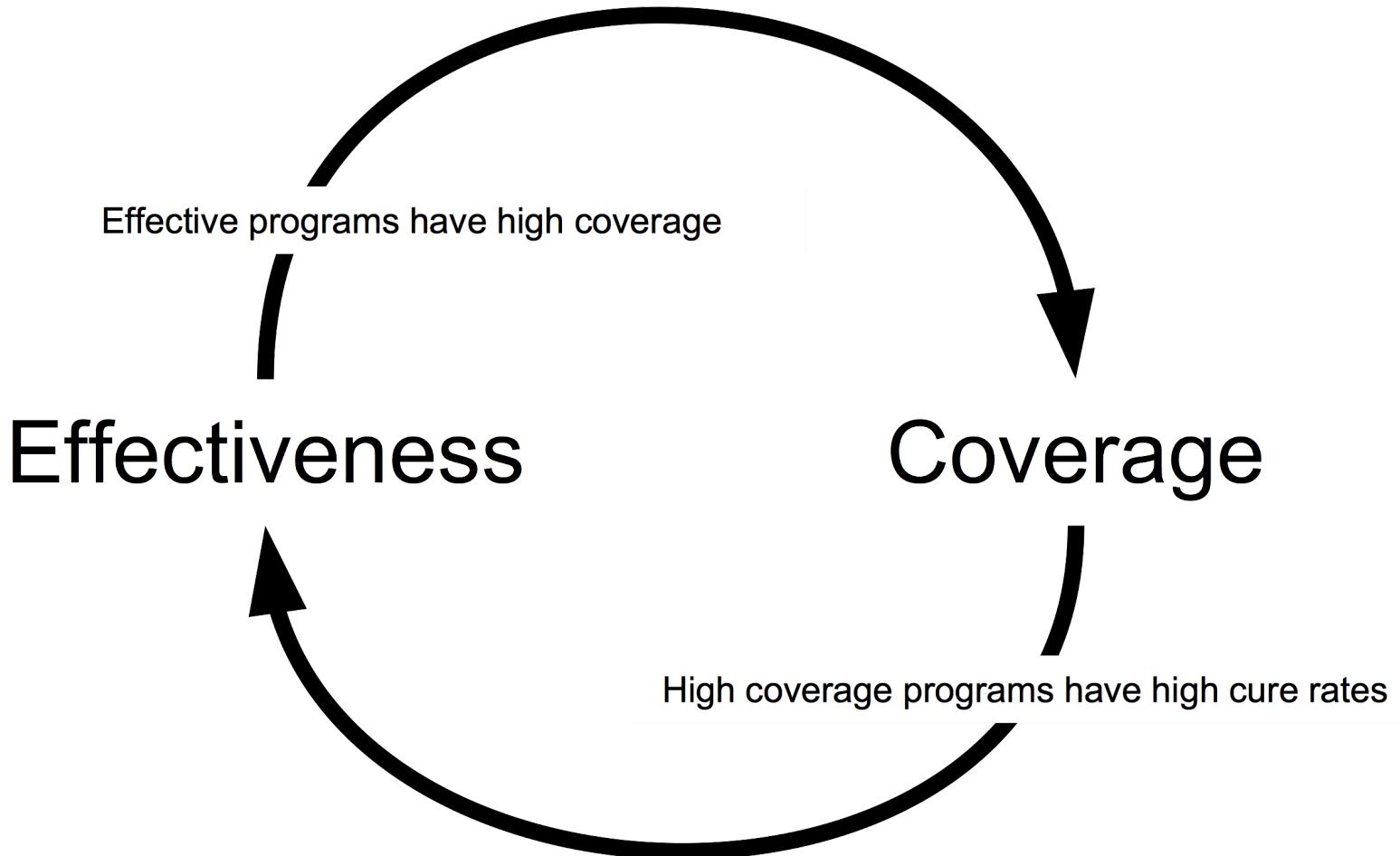
Why coverage?

Effective CMAM meets needs

- **Efficacy** of CMAM - cure rate in ideal and controlled settings - is near 100%
- **Effectiveness** of CMAM - cure rate in programme conditions - still room for improvement
- Effectiveness depends on:
 1. Thorough case-finding and early treatment-seeking;
 2. High-level of compliance; and,
 3. Good retention from admission to cure.

High coverage CMAM meets needs

- **Coverage** of CMAM – the proportion of all children eligible to receive CMAM who actually receive it – contributes to effectiveness as well
- Coverage directly depends on:
 1. Thorough case-finding and early treatment-seeking; and,
 2. Good retention from admission to cure.
- It also indirectly depends on **compliance**.

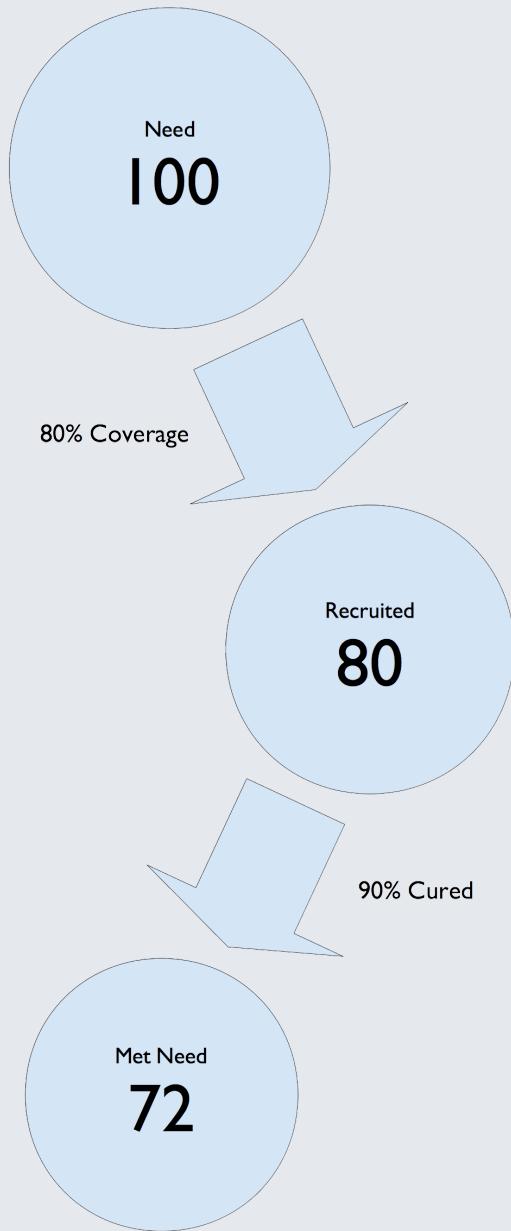


Meeting needs require both high effectiveness and high coverage

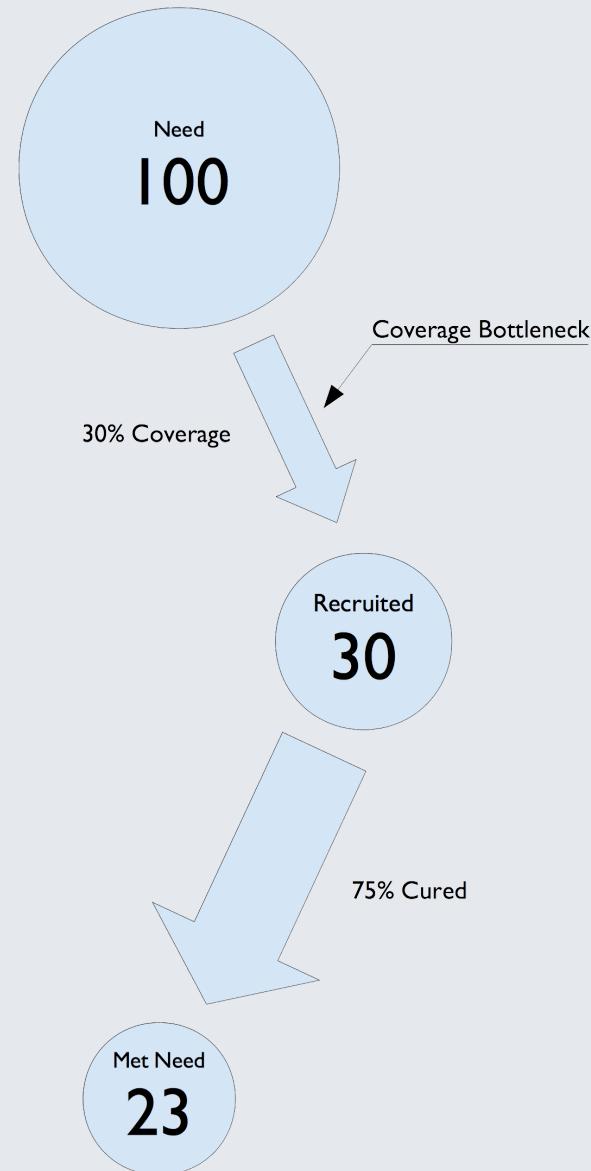
- Good coverage supports good effectiveness
- Good effectiveness supports good coverage
- Maximising coverage maximises effectiveness and met need

Met need = effectiveness × coverage

High-Coverage Program



Low-Coverage Program





Questions?

How to measure coverage?

Indirect estimation of coverage

$$\text{coverage} = \frac{\text{Total cases admitted in programme}}{\text{Estimated number of cases}}$$

- **Numerator** is based on programme data
- **Denominator** is a caseload estimation based on total population in programme area and known prevalence estimate and known incidence
- Issues mainly stem from estimation of denominator

Direct estimation of coverage

- Coverage estimation through a survey.
- Old approach: include coverage indicator in nutrition surveys that assess prevalence of undernutrition (SMART surveys)
- Issues with old approach: sample size
- Current approaches: surveys specifically assessing coverage

History of methods development

- Coverage and its assessment was an integral component of the development process of CMAM (then called CTC)
- **Centric Systematic Area Sampling (CSAS)** was the first coverage assessment method developed
- However, **CSAS** was not as commonly used as it was deemed too costly and hard to implement

History of methods development

- **SQUEAC** and **SLEAC** were then developed as quick and easy (hence less costly) methods to assess coverage
- **SQUEAC** and to some extent **SLEAC** now widely used and considered the standard, off-the-shelf methods
- With CMAM programmes getting scaled up to national scope, a wide area/large scale method such as **S3M** has been recently developed

CSAS: Design

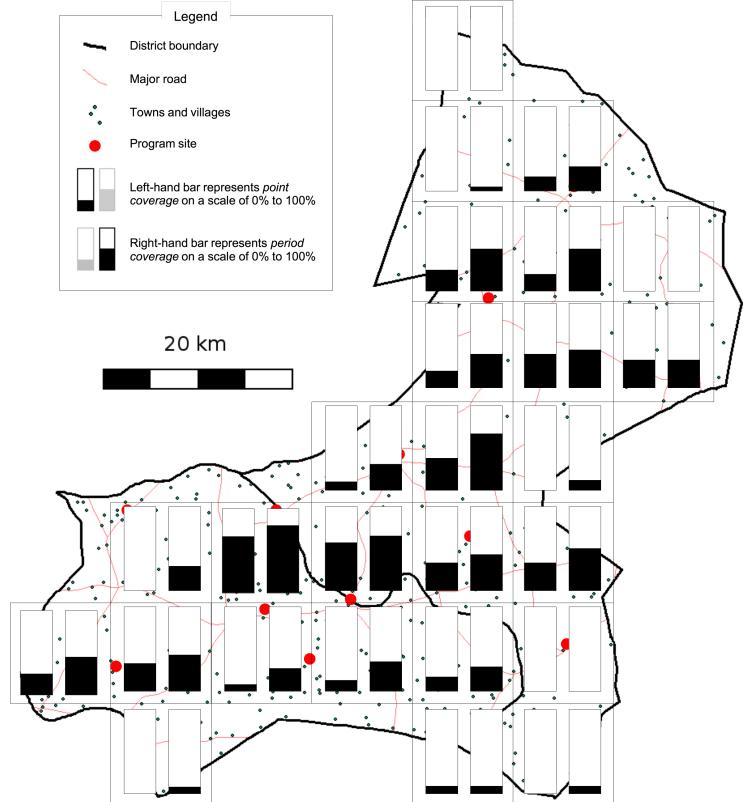
- CSAS uses a two-stage sampling design
- The first stage is a **systematic spatial sample** of the entire service area to select the communities to survey.
- The second stage is an **active and adaptive case-finding method** that finds all or nearly all cases in the communities being surveyed.

CSAS: Results

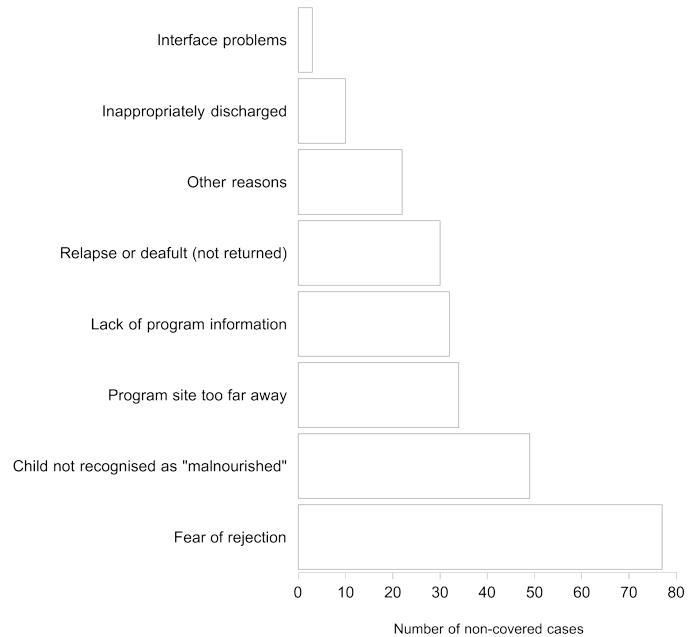
- Overall coverage estimate
- Local coverage estimates which can be represented as a coverage map
- Ranked list of barriers

CSAS: Results

Coverage map produced by CSAS surveys



Ranked list of barriers from a CSAS survey

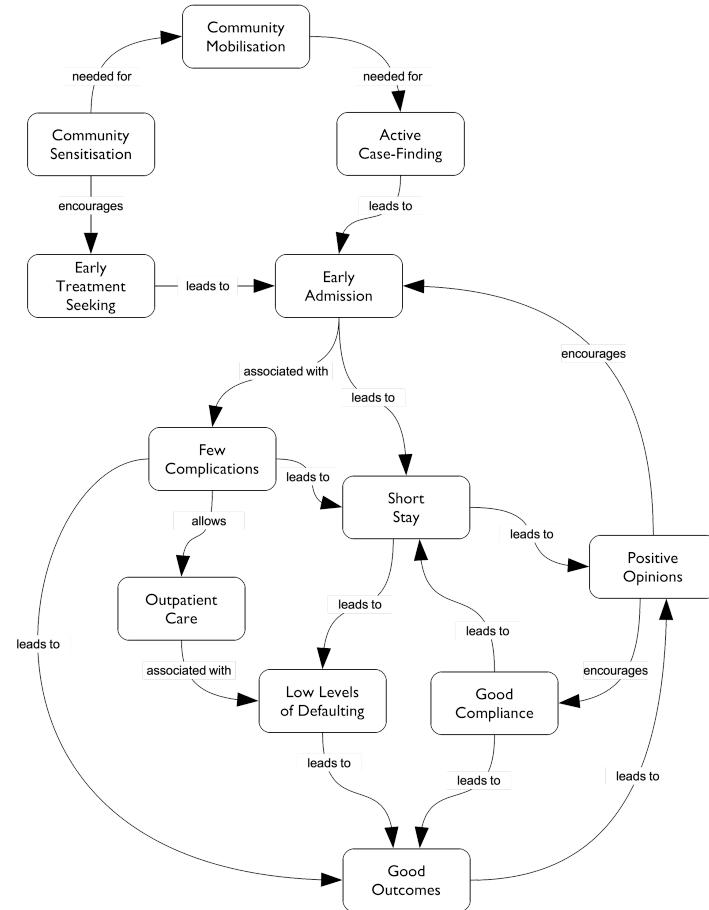


SQUEAC: Design

- **Semi-quantitative Evaluation of Access and Coverage** or SQUEAC is more an investigation than a survey
- **Stage 1:** Semi-quantitative investigation into factors affecting coverage using the SQUEAC toolkit, which is a set of simple and rapid tools and methods for collecting and analysing data related to coverage.
- **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 two-stage sampling design is the same as with all other coverage survey methods.
 - This stage is optional. Should be 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.

SQUEAC: 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 techniques



SLEAC

- **Simplified Lot Quality Assurance Evaluation of Access and Coverage (SLEAC)** is a rapid low-resource survey method that classifies coverage at the service delivery unit (SDU) level.
- Identifies the category of coverage (e.g. “low”, “moderate” or “high”) achieved by the service delivery unit being assessed.
- Relatively small sample sizes (e.g. $n \geq 40$) are required in order to make an accurate and reliable classification.
- 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: Design

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

SLEAC: Results

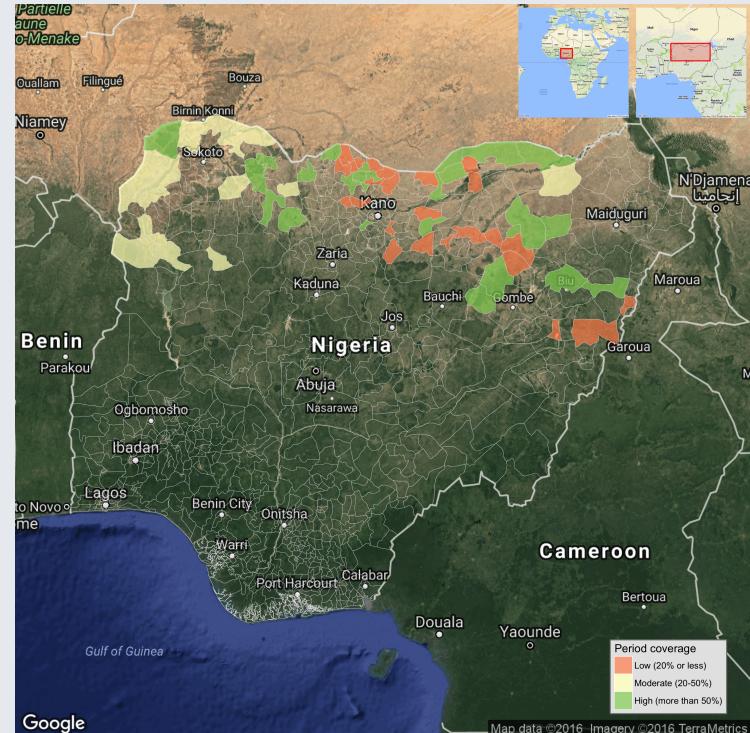
- Indicator classifications
- Can be used over wide areas to provide local indicators classifications with a map and a wide area estimate
- Ranked list of barriers

SLEAC: Results

Sierra Leone National Coverage Map produced by SLEAC



Northern Nigeria coverage map produced by SLEAC

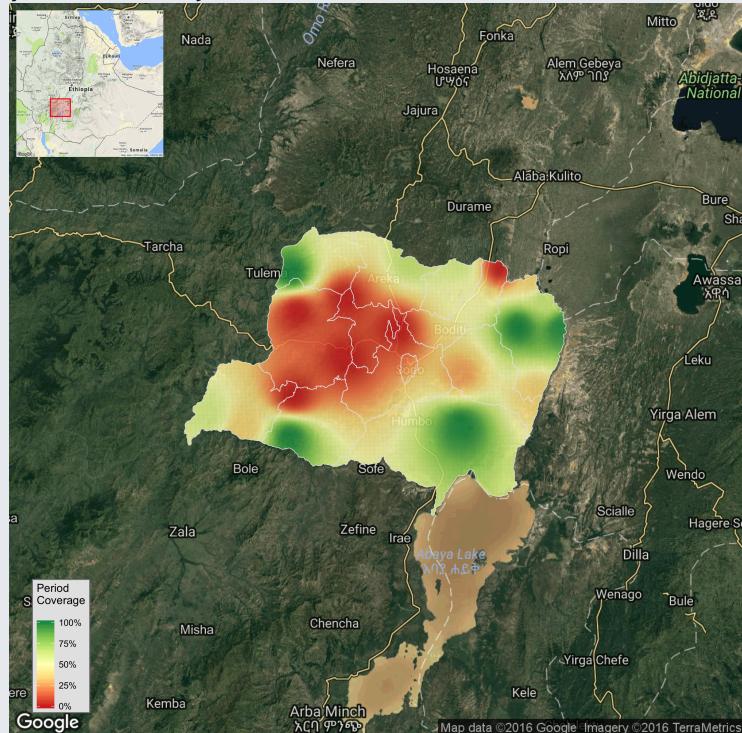


S3M

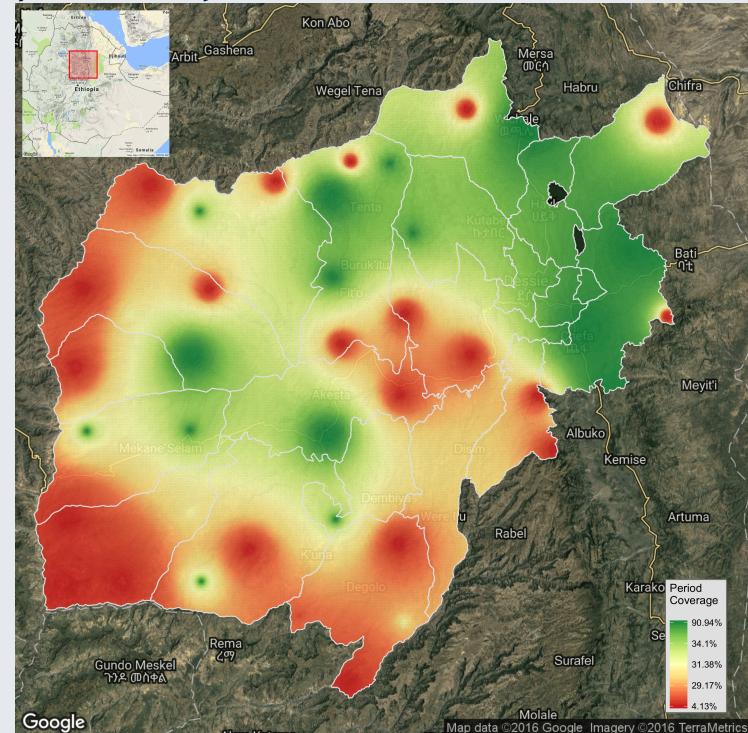
- **Simple spatial sampling method (S3M)** is a development of **CSAS** and uses a similar sampling design.
- The main difference is **S3M** uses a hexagonal grid (as compared to a square grid for **CSAS**).
- Hexagonal grids address the issue of unevenness of spatial sampling created by square grids particularly at scale

S3M: Results

Coverage map of Wolayita Zone, Ethiopia produced by S3M



Coverage map of Wollo Zone, Ethiopia produced by S3M



Coverage challenges

- Global CMAM coverage average is about 30%
- Coverage assessment fatigue (?)
 - Same barriers and boosters are being identified
 - Same low levels of coverage being achieved
 - Better to act on what the current coverage assessments are saying about coverage to try to improve things before more coverage assessments are done
- Which barriers to focus on? Is there a "magic bullet"?

Questions?

Thank you!

This slide deck is available online at <https://ernest.guevarra.io/coverageCMAM>

A PDF copy of this slide deck is available to download from [here](#)

This slide deck is also available as an R Markdown document from [here](#) which you can reproduce using R