

**Measuring the strength of implementation
of community case management of childhood illness
within the Catalytic Initiative to Save a Million Lives**

Working Paper

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This is a working document originally developed by a group at IIP-JHU that has included (at various points) A Amouzou, J Bryce, E Hazel, N Miller, B Johns, K Gilroy, M Munos and C Victora. Various UNICEF and WHO staff members have also reviewed drafts or presentations of the material and provided inputs, including A George, N Oliphant, T Diaz and B Daelmans.

In March 2011, this paper served as a background document for a meeting on the national evaluation platform approach held at the Rockefeller Foundation's Bellagio Center. The working group on implementation strength at that meeting included G Baugh (PSI), J Bryce (IIP-JHU), L Dandona (Public Health Foundation of India), S Munthali (University of Malawi), J Schellenberg (LSHTM) and Kenny Sherr (University of Washington).

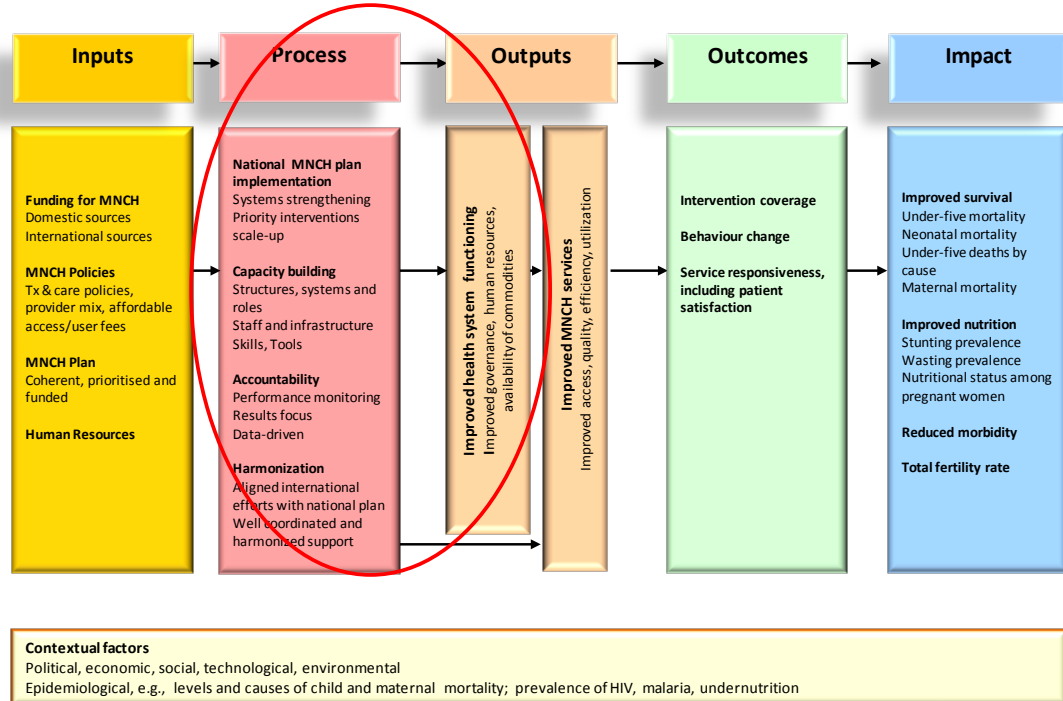
I. Introduction

1. What is “implementation strength”?

Implementation strength refers to the *quantity* of a program strategy that is carried out at the field/population level and incorporates some elements commonly considered as part of the *quality* of service delivery as well. Within the common evaluation framework for the scale-up to MDGs 4 & 5 (Figure 1), implementation strength refers primarily to activities in the “process” and “output” columns of the conceptual framework. The measurement of implementation is intended to reflect the amount of the program that is *delivered*, in contrast to measures of utilization or coverage that reflect the amount of the program *received*.

This document focuses on measuring implementation of community case management of childhood illness (CCM), which is the primary strategy being implemented in six countries in Africa with support from the Catalytic Initiative to Save a Million Lives (CI). These countries are Burkina Faso, Ethiopia, Ghana, Malawi, Mali and Niger. We expect that similar approaches can and should be used to measure the strength of implementation for other public health programs.

Figure 1: Focus of CCM implementation strength within the common evaluation framework for the scale-up to MDGs 4 and 5.



The CI aims to intensify efforts to achieve MDG 4 & 5 by supporting and developing the capacity of country-led health systems to deliver a set of integrated, proven, high impact and affordable interventions, and to assess the effectiveness of these systems in accelerating reductions in maternal, newborn and child mortality. The Bill & Melinda Gates Foundation has provided funds via WHO to support CI efforts in Burkina Faso, Malawi and Mozambique; Canadian CIDA has provided funds via UNICEF to support CI efforts in Ethiopia, Ghana, Malawi, Mali and Niger. The Institute for International Programs at the Johns Hopkins Bloomberg School of Public Health is collaborating with WHO, UNICEF and in-country institutions to evaluate the impact of CI activities in Malawi, Ethiopia and Niger, and to develop and test methods for “real-time” mortality monitoring in the context of CI activities in all CI countries except Burkina Faso and Mozambique.

CCM is only one component of the CI. Methods are also needed to assess the strength of other components of MNCH programs. For example, in Malawi WHO and other partners are supporting the Ministry of Health (MOH) in their efforts to scale up IMCI and strengthen referral care for mothers and children, and to strengthen the planning and management skills of District Health Management Teams. A Working Group has been formed in that country under the leadership of WHO to develop methods for assessing implementation strength for programs other than MNCH, and the work on CCM implementation strength should be considered in that context.

2. *Why do we need to measure CCM implementation strength?*

There are at least two major objectives for measuring the strength of implementation. First, program implementers need measures of CCM implementation strength to assess how widely and at what intensity their programs are being scaled up in countries to reach their intended populations, and to guide their efforts to improve program effectiveness. For the CI this generally means the total population of under-five children in a district, although some CI programs (such as in Malawi) are targeting only specific parts of districts. Managers can use these data to strengthen the processes and intermediate outputs shown in Figure 1, thereby improving program outcomes. Measures of implementation strength may also be useful in revising initial expectations about the impact a program may have on mortality and nutritional status.

Second, program evaluators need measures of CCM implementation strength to assess the relationship between the program (“dose”) and expected outcomes such as increases in intervention coverage and reductions in under-five mortality (“response”). The need for these measures has become especially urgent since recent increases in funding and commitment have led to the rapid scale-up of CCM approaches in most or all districts in these countries, preventing the use of intervention-comparison designs for evaluations. The alternative – referred to as national evaluation platform approaches – uses district-level data on the dose of implementation and changes in coverage and mortality to test the hypothesis that stronger CCM implementation results in greater child health impact.

3. ***Objective of this working paper***

The objective of this working paper is to present a practical plan for measuring implementation strength for the purpose of the independent evaluation of the CI in Malawi, Ethiopia and Niger, and potential application in other CI countries.

II. Context and principles

The independent evaluation of the CI is committed to working with those implementing the program to generate evidence that is both formative, helping to strengthen the program during the project period, and summative, producing replicable evidence of the effectiveness of CCM in reaching the population and improving child health and survival.

Below we list key challenges and contextual factors to be considered in the development and application of the implementation strength measures.

1. ***Respecting the needs of program implementers***

As explained above, Ministries of Health, UN agencies and other partners working to implement CCM need measures of implementation to track progress in scaling up the program while maintaining quality. These needs are important, and the development of measures of implementation strength for the evaluation should draw on those developed by implementers whenever possible. This requires careful coordination, the development and maintenance of consensus, and procedures to ensure that reports generated by implementing partners are comparable across districts and over time.

2. ***Remaining focused on the evaluation questions***

We will use the measure(s) of implementation strength in analyses designed to answer the following questions:

- (1) Did stronger implementation of CCM result in greater increases in coverage for treatment of childhood illnesses than weaker or no implementation of CCM? (yes or no)
- (2) Did stronger implementation of CCM result in greater reductions in under-five mortality relative to weaker or no implementation of CCM? (yes or no)

There are other important implementation research questions that need to be answered, but that will require complementary methods. Examples of questions that the use of these measures alone will not be able to answer include questions about why the extent of implementation varies across districts, or the mechanisms through which measurements of implementation are associated with changes in coverage or mortality. Some conclusions relative to these types of questions may be able to be drawn based on the results of the proposed dose-response analysis and the incorporation of contextual factors in the analysis, but are likely to remain as hypotheses unless further research using mixed/qualitative methods is conducted.

3. ***Addressing service utilization and community demand for services***

Further work is needed on indicators and methods to assess the strength of efforts to generate community demand for MNCH services, and to track utilization of the services over time. For the moment these are envisaged as being separate from the measurement of CCM implementation strength, but are important complementary information needed for the evaluation of CCM programs.

4. ***Producing valid results within constraints of time and context***

The development of measures of implementation for use in the evaluation of the CI must take into account the programmatic and evaluation context in which we are working. Some of the issues to be considered include the following:

- Need for measures that are objective and can be replicated. The data to be used in the analysis must meet standards of replicability, and must be comparable across the districts or other subunits at least within each country and ideally across countries to provide the information needed for global learning and priority setting.
- Need for measures that can be used both in CI and non-CI districts. The aim of the evaluation is to assess the contribution of the CI relative to existing (routine) services provided in each country, as well as similar strategies implemented at district level by other partners. Pilot projects working in limited geographic areas within districts are not the focus of this effort. This means that the measures of implementation that we develop must be appropriate for use both in districts implementing the CI strategy and in districts that are implementing other CCM strategies – whether routine or supported by other partners. It is also essential that implementation strength is measured in exactly the same manner throughout the country to allow comparisons among different geographical areas.
- Need for both cross-country and country-specific measures. In all countries, the aim of the CCM strategy is the same – to increase access to treatment for children with pneumonia, diarrhea and malaria by having trained community-based workers provide treatment for childhood illnesses at community level– but there are important differences in how the strategy is being implemented across the six settings. For example, the community-based health workers charged with implementing CCM have differing levels of education and preparation across countries; in some countries the CHWs are paid government workers while in others they are volunteers; and training and supervision strategies differ (sometimes within as well as across countries). In addition, each country has adopted a specific set of complementary strategies to support CCM in their context regarding health system features such as the recruitment and retention of the CHWs, strengthening district management and improving the management of drugs and commodities, as well as activities aimed at

increasing the demand for CCM services. We therefore propose a set of five core indicators of CCM implementation that we anticipate will produce results that are comparable across the six countries, complemented by additional measures that capture the extent to which complementary and country-specific support strategies are being implemented in each setting.

- Complementarity of measures with existing reporting requirements. This effort will attempt to align the measurement of implementation with the reporting requirements for the CI and for Ministries of Health in the participating countries, in line with the Paris Principles. Measuring implementation strength is also relevant to the equity-based approach to program implementation recently adopted by UNICEF.
- Time frame. The implementation of the CI is currently expected to end in 2012 for activities supported by the BMGF under the Rapid Scale-Up and in early 2013 for activities supported by UNICEF under the IHSS project, although the potential for extension is currently under discussion. . MOHs, UNICEF, WHO and other partners have monitoring plans as part of their implementation of CCM. The independent evaluation team developed guidelines for documenting program implementation and began using them in January 2010 in Malawi, and in mid-2010 in Burkina Faso; This documentation, conducted by the IET, draws on and compiles the routine monitoring data available at district level.

III. Proposed approach

1. *What are we measuring?*

Based on available evidence, the minimum prerequisites for providing correct treatment for childhood pneumonia, diarrhea and malaria require:

- a. A health worker who is trained, capable and motivated to provide care
- b. Accessible to the population
- c. With needed essential drugs and commodities available at all times
- d. Who receives regular, supportive supervision

These four elements do not guarantee correct treatment of childhood illness because they address only the supply side of the equation. They do, however, provide a reasonable basis for assuming that services of adequate quality are available should they be demanded by the population. We discuss demand-side activities below.

In late 2010, UNICEF and the independent evaluation team used the four elements as the basis for defining a set of six core indicators for use by programs to measure the four supply-side elements

described above, which were subsequently reviewed with WHO and other stakeholders. UNICEF staff in the country offices of the CI countries and other programs and partners working in CCM reviewed and accepted these indicators in principle and attention shifted to the development of plans for measuring the indicators in each country. For implementation partners, these plans often rely on information available from routine training and supervision reports, collected by the MOH and partners. For example, in Ethiopia the UNICEF office has coordinated the development of a joint monitoring plan involving all partners who support CCM implementation.

The independent evaluation team used these elements as the starting point for developing plans for the measurement of implementation “dose” for use in the dose-response analyses that will be conducted as a part of the evaluation platform design. We tried to produce reports on the indicators using the results of documentation efforts in Malawi, and in discussions with partners refined the plans for measurement to try to make the approach both “lighter” (less resource-intensive) and yet better in terms of producing accurate data on the six indicators. As a result of these efforts, we now propose a revised list of five core indicators to measure supply-side CCM implementation strength for the dose-response analysis. They are:

1. Coverage of deployed community-based health workers (cadre targeted for CCM)
2. Proportion of CHWs trained in CCM (relevant time frame to be added at country level)
3. Proportion of CHWs with no stockouts of CCM commodities (drugs and essential equipment and supplies) in the last 3 months
4. Proportion of CHWs supervised in CCM in the last 3 months
5. Proportion of supervision visits (last 3 months) with reinforcement of clinical practice

Ideally these core indicators would reflect integrated CCM for malaria, diarrhea and pneumonia. This will not be possible in all settings at this time, because in some countries the program is being implemented in stages, usually with CCM for malaria and diarrhea implemented first, followed later by CCM for pneumonia. It is also possible that stockouts may affect some drugs but not others, and in this case, implementation strength may vary by disease. UNICEF is also interested in reporting these indicators disaggregated by the gender of the CHW.

The rationale behind these indicators is as follows:

- a. *A health worker who is trained, capable and motivated to provide care* is operationalized as the presence of a worker (indicator 1, including paid and/or volunteer workers who are targeted for CCM) who has been trained in CCM (indicator 2). CCM training strategies and curricula vary across the CI countries. For example, in Malawi refresher training sessions are being planned so that a single worker might have received both basic and supplemental training. It may be useful

to develop a more refined measure of training that takes into account the duration and/or frequency of training and its quality, possibly reflected in the proportion of training time dedicated to clinical practice which is one of the indicators often used by WHO in assessing training quality. The capability and motivation of the CHWs are challenging to measure and would profit from further attention; in this proposal, we propose supervision as an imperfect proxy measure of inputs to health worker capability and motivation as well as quality.

- b. *A health worker who is accessible to the population* would ideally include measures of geographic, cultural and financial accessibility based on household surveys. These data are not currently available in the documentation guidelines for the independent evaluation, so the indicator of the number of CHWs deployed will be combined with a population denominator to give the number of CHWs relative to the total population of children under the age of five years in the district or other specific target areas defined by a particular country. Further work is needed to determine whether this worker could be based in a health post (as in Niger) rather than in settings where there is no fixed health facility, as is commonly assumed.
- c. *A health worker with needed essential drugs and commodities available at all times* can be measured through a yes/no variable (Indicator #3) indicating whether there were any reported stockouts in the previous quarter of the following essential commodities:
 - ORS packets to prevent dehydration in children with diarrhea
 - Zinc for the treatment of diarrhea
 - ACTs for malaria or fever/presumed malaria
 - Antibiotics for pneumonia
 - A functioning timer for counting respiratory rates
 - Rapid diagnostic tests for malaria where they are part of the program
- d. *The proportion of CHWs supervised in CCM in last quarter and the proportion of CHWs who received supervision (last quarter) that included reinforcement of clinical practice* reflects studies documenting an association between the frequency of supervision and health worker performance, and more specifically the finding that supervision visits that include observation of a health worker managing child illness with immediate feedback can improve and sustain correct performance. Standard WHO training guidelines for IMCI recommend that all supervisors receive training and that supervision include the observation of case management. Further discussion is needed about how “reinforcement” would be operationalized in this indicator, and whether it is feasible to obtain valid results.

In some countries, additional indicators may be available, as for example those relating to demand creation such as distribution of educational materials, community meetings, etc.; to the extent that

these further indicators are available, they should be used to construct a second dimension of implementation, namely demand-creation activities. The numbers of materials distributed, number of community meetings held, mass media campaigns conducted, etc., require documentation and measures related to the target population. It is likely that there will be an interaction between supply-side and demand-side implementation strength, with high levels of both being associated with the greatest impact.

Further, some data on utilization, such as the number of children seen by CHWs or the amount of drugs distributed by CHWs, may be available. We will not incorporate measures of utilization into the implementation strength score because utilization is part of the causal chain leading from program implementation (or provision) to increased coverage and reduced mortality. Nevertheless, there may also be an interaction between strong implementation and utilization; if utilization is low, implementation is unlikely to have an impact on coverage or mortality. For these reasons, it is essential to estimate utilization in all areas in the evaluation design as a separate measure

2. *What are the assumptions underlying the proposed approach?*

We will need to give careful attention to our assumptions in this work. A preliminary list is provided below; there are likely to be others we have overlooked.

- a. The approach assumes that the measures of implementation explain variation in outcomes (coverage and impact). In fact there are likely to be other factors that are equally or even more important in each setting. The CI evaluation teams are trying to track contextual factors prospectively; these will form an important backdrop for the analysis of the implementation measures.
- b. This approach assumes that the CI is aiming to increase CCM coverage and reduce mortality in a substantial proportion of the district's population who not receiving CCM services at baseline, if not in the whole district. This needs to be confirmed, and the implications discussed for settings like Malawi, where the initial CI focus is on geographic subunits ("hard to reach areas") smaller than districts. The Independent Evaluation Team in Malawi has prepared a separate methodological note on this issue which is available upon request.
- c. There will be sufficient variability by district within individual countries to support the analysis.

IV. Proposed data collection methods

Operationalizing these prerequisites into measurable variables that can be assessed using the

information collected routinely by partners or through the documentation component of the CI evaluations is not straightforward. Ideally, the measurement of implementation would rely on routine data sources such as the health and management information systems (HMIS). The documentation component of the CI evaluation establishes reporting systems with District Health Management Teams (DHMTs) that produce detailed reports on implementation at six-month intervals. Additionally, in some countries, such as Ethiopia, implementing partners will be responsible for collecting expanded monitoring data. To the extent possible, and after proper validation assessments, these data will be used to gather information on the strength of program implementation.

However, at present the HMIS in the six CI countries are not producing the information needed, at levels of quality that are sufficient for use in the evaluation analyses. Not all of the needed information is available through routine sources and even when data are available, they need confirmation by independent researchers to ensure that they are of adequate quality.

A variety of methods could be used, depending on the type of information needed. Taking into account the limitations of available data and the importance of having reliable measures of program implementation, we propose that primary data collection, where a sample of health workers will be interviewed, will be necessary in most if not all countries with full evaluations. This primary data will serve to validate the data collected through documentation and to fill in the gaps where data are not available through routine systems. Based on the experience to date in Malawi, the probable methods would include the following:

- Abstraction from district records and reports
- Interviews with key personnel at district level
- Verbal interviews with a sample of CHWs and supervisors
- Inspection visits to a sample of CHWs at the site of work

The first two methods – abstraction from records and reports and interviews with district-level personnel – are needed as a source for indicator one and possibly indicator two, and could be carried out through regular documentation activities. Their usefulness for indicators three, four and five is likely to be limited by data availability and quality issues highlighted above. In terms of primary data collection methods, information could be gathered through verbal interviews carried out through phone calls to a sample of CHWs or during meetings with CHWs at a gathering place, such as the district health office. Collecting data directly from CHWs in interviews allows us to obtain information that may not be available through routine data sources, such as frequency of supervision and stock-outs of each type of drugs. First-person reporting by CHWs is also more likely to provide accurate information and will permit calculation of indicators at the level of the CHW (i.e. proportion of CHWs who received supervision). Such a protocol has been piloted in one district of Malawi, where a sample of CHWs were contacted by mobile phone and at their health center catchment area. The CHWs interviews collected information on stockouts and supervision status. The final report is forthcoming

but this method was found to be feasible and relatively inexpensive. Inspection visits to a sample of CHWs at their place of work goes one-step further by permitting us to not only interview the CHW, but also to directly observe patient registers, drug stocks and stock cards, and potentially carry out an assessment of CHW knowledge and quality of care provided. Observing registers, stock cards, etc. may also be possible through interviews at a central meeting place if the CHWs bring these materials with them for a scheduled meeting (e.g. when they pick up their monthly salaries). Demand-side activities promoting CCM at population basis should also be recorded.

Where alternative sources of data exist, a process of triangulation would be used in which different data sources for identical information would be compared, and a decision made (and documented) about the most valid estimate to be used in constructing the score for CCM implementation.

Table 1 below shows the core indicators, their numerators, denominators, and the proposed methods of data collection. Table 2 provides the example of four CI countries – Burkina Faso, Ethiopia, Malawi and Niger – to assess the applicability of different data collection methods within individual countries.

A grant, supported by USAID in 2011 through their “TRAction” project, provides funding to IIP-JHU, Save the Children and in-country research partners to develop and test innovative methods to measure and collect CCM implementation indicators in Malawi and Mali. The grant complements and builds on the implementation strength work in Malawi, and may provide opportunities for novel approaches to data collection to be tested and validated.

Table 1: Core indicators of program implementation

	Numerator	Denominator	Documentation of routine data (MOH or IP at district level)	Verbal interviews (cell phones or at gathering place)	Inspection visits (audits & interviews at CHW site)
Supply-side indicators					
1. CHW available (deployed)	# CHWs working at time of assessment	Total population under 5 years	++ ¹	--	--
2A. CHW trained in CCM	# CHWs trained in CCM	# CHWs working at time of assessment (or # of CHWs surveyed)	+	++	++
2B. CHWs providing CCM services	# CHWs who have seen a sick child in the past seven days	# CHWs working at time of assessment (or # of CHWs surveyed)	+/- ²	++	++
3. CHWs with supply of key CCM drugs in last 3 months (items reported individually)	# CHWs with no stockouts of more than 7 days of key drugs (AB, ACT, ORS, ZN, timer, RDT) in last 3 months	# CHWs working at time of assessment (or # of CHWs surveyed)	+/- ²	+ ³	++ ³
4. CHWs supervised in CCM in last 3 months	# CHWs supervised in CCM in last 3 months	# CHWs working at time of assessment (or # of CHWs surveyed)	+/- ²	++	++
5. Supervision in last 3 months with reinforcement of clinical practice	# CHWs supervised in last 3 months with reinforcement of clinical practice (observation of case management, practicing case scenarios, mentoring at a health facility)	# CHWs working at time of assessment (or # of CHWs surveyed)	+/- ²	++	++
Demand-side indicators					
	Further discussion is needed with implementing partners to propose a core set of indicators in this area.				
Utilization indicators					
	Utilization of services should be tracked in all areas participating in the evaluation.				

¹++ = yes, + = yes, but there may be data quality issues, +/- = possibly, -- = no

² This information rarely available, complete or reliable at the district level.

³ Best to examine stock records and the drug stocks during a visit to minimize recall bias.

Table 2: Sample CI countries and methods of data collection planned

Country	Documentation of routine data (MOH or IP at district level)	Verbal Interviews (Cell phones or at gathering place)	Inspection visits (Audits & interviews at CHW site)
Burkina Faso	Yes – Extracted from implementing partners' routine data collection	No – cell phone coverage low (?)	No*
Ethiopia	Yes – Extracted from implementing partners' routine data collection	No – cell phone coverage low in Ethiopia.	Yes – In sample of health posts
Malawi	Yes – Ongoing full documentation	Yes – Pilot test of phone interviews	Yes – If feasible to validate phone interviews
Niger	Yes – Extracted from UNICEF monitoring	?	?

*Possible to use this method in Burkina Faso, but it is not planned as part of evaluation activities

V. Data summary and analysis

The existing in-country research partner in the CI evaluations would be responsible for reviewing all data sets and ensuring that they are complete and correct, consulting with DHMTs as needed. Construction of the scores would be carried out using standard formulas and a second level of checking would be carried out by IIP-JHU.

The results would be presented in tabular form for each CI country; an example is presented below for Malawi.

Once the data have been collected and assessed, the next step is to determine the best analytic methods to determine the effect of the program. If there is sufficient variability in scores across districts, regression analysis is likely to be the best choice for this analysis. Four methods are available:

1. *Use each indicator separately.* Include each of the indicators separately in the analysis. However, in this type of analysis, it is unlikely that the six indicators will be independent of each other, and multi-collinearity problems may arise in the regression specification. Further, the six indicators may have interactions with each other that will need to be assessed and taken into account. Given that these indicators are likely to be assessed at the district level, there will be a limited number of observations available, and including all six indicators plus interaction terms is likely to mean that the regression will be weakly specified. That is, the number of independent variables in the regression will come close to the number of

- observations available, meaning that the regression will have little power to detect any differences in the outcome variable.
2. *Define a multiplicative function of the five indicator variables:* This option would combine the six variables in a fashion where the separate variables are not weighted. For example, a multiplicative function could be used: $\text{CHW} / \text{population} * \% \text{ trained} * \% \text{ with no stock-outs} * \% \text{ supervised}$. This method is likely too reductive in that it does not allow for 'partial' implementation, and the final product will be a very small number, possibly with limited variability. It assumes that only implementation among CHWs trained, supervised, and with a full stock of drugs are actually implementing the program, whereas CHWs without supervision or only partial drug stocks are likely to be doing some CCM activities, albeit not at full quality or quantity. This method also does not deal well with measurement error in that measurement error in one variable will be cascaded through all the other variables, potentially magnifying the measurement error of the composite indicator.
 3. *Pick a selected set of indicators, or use only one indicator:* A compromise between the first two options would be to use a subset of indicators thought to be well measured and indicative of program implementation as proxies for the others. For example, $\text{CHW} / \text{population} * \% \text{ trained} * \% \text{ with drugs}$, could be used in an analysis. This method may be the only possible method in some areas depending on data availability and quality, but might not use all of the data available. It is also possible to create more than one variable, each including a few of those from the original set of five. In the example above, in addition to the variable described (availability of trained CHWs with drugs) one may also create a second variable describing the strength of supervision, and use both in the regression.
 4. *Use principal components analysis (or a similar method) to assign weights to the variables and develop an index – also known as an instrumental or latent variable – reflecting program implementation strength (note that more than one factor may emerge from the analysis).* This method uses all of the data available, and helps to correct for measurement error if measurement error is random. Through combination of different variables, to some extent variables measured too high will compensate variables measured too low. This method does not correct for systematic error in data collection; for example if an indicator is systematically under-reported, this bias cannot be corrected with this method but will have to be detected in the quality assurance work done in during data collection. Work is ongoing to explore this option and further clarify the methods. Similar to option 3, this option may result in more than one latent variable, for example one that summarizes training and another related to supervision.

Implementation strength can essentially be thought of as a 'dose' and used in a regression model as an independent variable(s) to determine whether the intervention is associated with the outcome variable. This type of analysis has implications for the sample size, especially with consideration of

the number of districts included; the analysis will only be viable if a sufficient number of districts are included.

Decisions about how best to carry out the analyses should not be based only on statistical considerations. Ongoing discussions with those involved in the implementation of the program at country level are needed to assess the face validity of separate variables as well as of composite indicators. Such discussions, for example, may end up leading to other approaches, for example creating separate CCM implementation strength variables for pneumonia, diarrhea and malaria in countries where training activities for each disease were not integrated, or where stock-outs affected some drugs but not others.

Finally, we reiterate the importance of recognizing that CCM is only one part of effective programs to reduce mortality among women and children. All measures of CCM implementation strength can best be understood in the context of broader MNCH and health system characteristics within each country setting.