The building blocks of community health systems: a systems framework for the design, implementation and evaluation of iCCM programs and community-based interventions

Aliya Karim 1,2, Don de Savigny 1,2, Phyllis Awor 3, Daniel Cobos Muñoz 1,2, Daniel Mäusezahl 1,2, Antoinette Kitoto Tshefu 4, Jean Serge Ngama 4, Ugo Enebeli 5, Chinwoke Isiguzo 6,7, Humphreys Nsona 8, Ikechi Ogbonnaya 9, Pascal Ngoy 10, Ayo Alegbeleye 11

ABSTRACT

Introduction Almost all sub-Saharan African countries have adopted some form of integrated community case management (iCCM) to reduce child mortality, a strategy targeting common childhood diseases in hard-to-reach communities. These programs are complex, maintain diverse implementation typologies and involve many components that can influence the potential success of a program or its ability to effectively perform at scale. While tools and methods exist to support the design and implementation of iCCM and measure its progress, these may not holistically consider some of its key components, which can include program structure, setting context and the interplay between community, human resources, program inputs and health system processes.

Methods We propose a Global South-driven, systems-based framework that aims to capture these different elements and expand on the fundamental domains of iCCM program implementation. We conducted a content analysis developing a code frame based on iCCM literature, a review of policy documents and discussions with key informants. The framework development was guided by a combination of health systems conceptual frameworks and iCCM indices.

Results The resulting framework yielded 10 thematic domains comprising 106 categories. These are complemented by a catalogue of critical questions that program designers, implementers and evaluators can ask at various stages of program development to stimulate meaningful discussion and explore the potential implications of implementation in decentralised settings.

Conclusion The iCCM Systems Framework proposed here aims to complement existing intervention benchmarks and indicators by expanding the scope and depth of the thematic components that comprise it. Its elements can also be adapted for other complex community interventions. While not exhaustive, the framework is intended to highlight the many forces involved in iCCM to help managers better harmonise the organisation and evaluation of their programs and examine their interactions within the larger health system.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- Community health interventions, such as integrated community case management (iCCM), are considered highly effective programs with the potential to reduce mortality in underserved areas.
- Such interventions are influenced by elements beyond the normal indices designed to plan, guide and measure them, which generally do not consider interactions and effects at lower levels of implementation.
- Failure to account for these factors can produce suboptimal outcomes and compromise overall program effectiveness.

WHAT THIS STUDY ADDS

- We developed a practical systems framework that can be used in the design, implementation and evaluation phases of community-based programs, applied here to iCCM.
- It accounts for context and stakeholder dynamics, and considers their interactions with program architecture, local policy, supply chain and health information processes, and community mobilisation among other areas, and supports these with a menu of critical questions.

BACKGROUND

Integrated community case management (iCCM) is a strategy designed to provide children in remote areas of low- and middle-income countries (LMICs) with access to lifesaving care directly in their communities. The program integrates traditionally vertical
interventions for childhood illnesses such as pneumonia, malaria and diarrhoea into one care package in which a trained community health worker (CHW) provides diagnostic and treatment services in designated catchment areas.\(^2\) It is touted as both an economical and sustainable strategy towards the attainment of the Sustainable Development Goal (SDG) to reduce child mortality, and is globally promoted by policy-makers and health and development organisations.\(^3,4\) Currently, almost all sub-Saharan African countries are implementing iCCM in some form.\(^5\)

For iCCM to optimise its programmatic potential, it is generally recognised that many systems influences must coalesce to ensure scaleable implementation and equitable coverage.\(^6,7\) Quality and consistent supervision of CHWs, an enabling policy environment, a comprehensive community mobilisation campaign, continuously available commodities, among a host of other conditions are considered necessary to position iCCM as an effective strategy.\(^8-14\) Efforts to categorise these dimensions have led to the creation of indices and benchmarks to assist program planners and managers in measuring success at different phases of implementation.\(^15-17\)

While these indices provide an essential basis for harmonising design and establishing common implementation standards, the benchmark categories prescribed may not necessarily reflect all the thematic areas significant to the iCCM intervention. They are also proposed as a measurable checklist for the core components of iCCM program development and therefore may not comprehensively cover key programmatic interactions or their consideration in design or evaluation. Additionally, because the target audiences for these benchmarks are often high-level stakeholders, they may not account for some of the challenges or nuances of implementation at the decentralised level. Inadequate consideration for this complexity and the range of elements that influence intervention dynamics can lead to suboptimal outcomes or negative unintended consequences.\(^6,16\)

We propose an iCCM Systems Framework that aims to address these elements. The purpose of the iCCM Systems Framework is to elevate the discussion of iCCM from specific measurement criteria to a broader discourse on the interactions that can occur within community health systems, particularly those that underlie an activity and what these might mean for the success of that program component.

Rather than suggesting indicators or accompanying metrics, this framework aims to collate the major systems thematic areas relevant to iCCM with corresponding critical questions that program managers should ask during the planning, implementation and evaluation phases. This allows the planner to move from generic to specific foci, revealing meaningful questions that may be overlooked when focusing on defined indicators.

The utility of the framework lies both in its comprehensiveness and its equal treatment of system components, including the dynamic forces that are challenging to measure yet potentially critical to program success. While the archetypal Building Blocks of Health Systems prescribes the foundational integrants essential to the production of health, this framework better supports the positioning of community health and its determinants effectively within the scope of health systems strengthening.\(^18\) A defining difference of this framework is that it proposes three additional thematic areas, program architecture, context and software, described below. While the framework is not designed to be exhaustive, it does attempt to draw attention to the ‘how’ and the ‘why’ of iCCM and its components. It is intended to complement current iCCM and community-based frameworks with new health systems domains vital to the design and success of the intervention, and to expand existing domains with a broader scope. Finally, the framework is unique in that its contents are guided primarily by contributors of the Global South who are heavily involved with on-the-ground iCCM implementation.

**METHODS**

This framework is the product of the domain charting process of a scoping review for the design, implementation and evaluation of iCCM, and is informed by working groups and structured interviews with stakeholders from the iCCM program and policy community. A scoping review approach was used due to its ability to capture the full breadth of the current iCCM literature landscape. This was supplemented by a document review of selected country iCCM policy and publicly available program documents. The methods and criteria for this scoping review can be found elsewhere.\(^19\) As the domain charting process was part of the methodological approach to the development of the framework, results of the literature search are presented in this section.

**Patient and public involvement**

No patient or health data were collected as a part of the development of this framework, nor were patients or the public involved during the research process.

**Literature review**

**Search strategy**

The primary objective of the review was to assess the key thematic areas of emphasis according to the current body of available literature on iCCM. We conducted a literature search in October 2020 in selected electronic databases.
ISI Web of Science, PubMed, including its archive of full-text articles in PMC, *Ethiopian Medical Journal* and CCM Central using the keywords and Boolean operators “iCCM” OR “integrated community case management” OR “community case management” as prescribed in the scoping review protocol. Testing search terms revealed that the inclusion of “community(-)integrated management of childhood illness”, “community(-)IMCI”, “community(-)based IMCI”, and “CIMCI” in the search strategy was necessary as these antecedent terms served as precursors to the modern definition of iCCM. This search was repeated in October 2021 to include more recently published material. We also manually retrieved relevant peer-reviewed publications from the reference lists of selected articles that were unindexed or did not appear in our original search.

### Screening and eligibility

We assessed publications against prescribed inclusion criteria in two stages.\(^{19}\) In the first stage, we screened titles and abstracts; remaining articles were read in their entirety in the second stage. The search and subsequent application of inclusion criteria were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method for scoping reviews. Figure 1 illustrates the flowchart for the collection of review documents according to PRISMA guidelines.

#### Inclusion and exclusion criteria

The search included only peer-reviewed publications in English that addressed any aspect of iCCM with reference to iCCM, published from 2002. These were not limited to interventional or observational studies, but also included reflections and critical analyses. Studies focusing on neonates or children over 5 years were excluded unless the study in some way assessed the impact of assimilating these age groups into existing iCCM programs and their influence on the intervention. Studies of single CCM interventions such as severe acute malnutrition, intermittent preventive treatment during pregnancy or antenatal care were excluded unless they were integrated into an existing iCCM program where the impact of this expansion on iCCM was assessed in some capacity. If the iCCM structure was simply the delivery mechanism for another intervention (e.g., mass drug administration) with no implications for iCCM, the study was excluded. Research assessing general household understanding and behaviors related to childhood pneumonia, malaria or diarrhea without explicit reference to inform a CCM program was excluded.

#### Data extraction and analysis

The search yielded a total of 8175 hits, of which 625 were included for the coding development of the framework. A complete list of these sources is provided in online supplemental appendix 1. Data from the final set of articles were extracted and analysed using MaxQDA and MS Excel software. We performed a content analysis of the selected literature according to the Standard Framework Approach, categorising key areas and their elements according to emergent areas of emphasis.\(^{20}\) In the event of discrepancies, the investigators discussed until a consensus was reached. To verify the validity of the resulting code list and categories, we compared them to the existing iCCM Interagency Framework and the WHO Systems Building Blocks on which it is based.\(^{15,18}\) Although all domains in our framework emerged organically from the literature, certain domains autonomously mirrored those found in these previous frameworks.

#### Stakeholder consultations and policy document review

We held stakeholder consultations with iCCM experts to supplement and validate this information. These included technical advisors, country program managers and researchers in the field of iCCM and child health. We also reviewed publicly available global and country-specific iCCM program and policy documents.

Following final development of the framework, a set of critical questions were formulated using a modified Delphi approach.\(^{21}\) These questions correspond to each thematic domain category and are designed to be posed to actors at different levels of the programmatic
and administrative hierarchy. The critical questions listed are intended to be non-exhaustive, but are considered important enough to warrant discussion by those planning and implementing iCCM. This list was iteratively circulated among iCCM experts resulting in a final compendium of domains, categories and questions. The resulting framework was developed into an interactive, publicly accessible dashboard.

RESULTS
iCCM systems framework
The iCCM Systems Framework comprises 10 domains, 106 categories and corresponding critical questions relevant to each category (figure 2). Tables for each domain, including category definitions and critical questions, can be found in online supplemental table S2. Online supplemental figure S1 illustrates a mind map of the 10 domains and their categories. An interactive version of the framework is available at https://kumu.io/iccm/iccm-systems-framework (figure 3).

Each of the following sections describes the thematic domain and its categories as they are relevant to the iCCM intervention and includes a list of key questions. The critical questions posed in this framework operate in a variety of ways. They can be asked at different stages of the planning, implementation and evaluation phases of iCCM and can be used to prompt discussion about the potential consequences of an activity, input, design decision or the influence of embedded context or structures.

Figure 2  iCCM Systems Framework domains and categories. CHW, community health worker; iCCM, integrated community case management; HF, health facility; HMIS, health management information systems; M&E, monitoring and evaluation; SOPs, Standard Operating Procedures.

Figure 3  Interactive iCCM Systems Framework. Available at: https://kumu.io/iccm/iccm-systems-framework.

The framework posits that a program’s context, its architecture and intangible elements such as power and agency, personal motivations and social norms may govern the outcomes of iCCM to the same or similar extent as other systems factors, such as the presence of a supportive policy environment or the availability of medicines. Just as these elements may influence each other, so might they overlap. For example, the availability of general guidelines for iCCM implementation is relevant to its structure (program architecture), where more targeted operational guidelines are relevant to their associated domains (ie, guidelines specific to community mobilisation or data transmission). Similarly, the way CHW cadres are structured is relevant to both the programmatic setup—or architecture—of iCCM and its human resources (HR). Outside of these 106 categories, some domains include an additional category entitled ‘Systems Considerations’ which explores synergies between domains.

Domain 1: systems context
The systems context domain comprises the natural and preexisting conditions inherent to the situation and setting of a system. The context of a system sets the stage for an intervention and can determine many of the interactions among its parts. For iCCM, this can mean assessing how the geographical layout, climate and infrastructural makeup of target areas may affect the types and timing of inputs, medicines, transportation and equipment needed for service delivery. The demographic composition of the population and the geopolitical situation may affect where and how activities can take place and who the intervention can (or cannot) target. Optimising CHW density and distribution is
such as the type of primary healthcare models promoted for program longevity and far- or remunerated CHWs can have significant implications of CHWs.\textsuperscript{36–38} In addition, the model of volunteer health service utilisation, quality of care and retention of CHWs can be a critical determinant they deliver health services, and who, if anyone, should provide these buildings can be a critical determinant of health service utilisation, quality of care and retention of CHWs.\textsuperscript{36–38} In addition, the model of volunteer or remunerated CHWs can have significant implications for program longevity and far-reaching systems impacts such as the type of primary healthcare models promoted within the country.\textsuperscript{36–38} Finally, the development of a timely, well-reasoned and practical handover plan for ministry ownership is imperative to ensure fluid transition and sustainability of program gains.\textsuperscript{36–38}

Domain 2: program architecture

The core elements that form the backbone of the iCCM intervention are grouped in the program architecture domain. These are not specific to programmatic processes such as data transmission or supply chain, but rather form the overarching setup and typology of iCCM implemented. Factors such as how the program chooses to allocate and geographically arrange its CHWs can set the foundation for coverage, workload and intervention requirements.\textsuperscript{32} Accounting for how populations fluctuate across target areas is important to tempering expectations and monitoring capacity for service delivery, as is safeguarding a reasonable CHW-to-supervisor ratio to optimise adequate and timely supervision.\textsuperscript{33,34} A judicious approach to defining catchment areas in terms of their breadth and accessibility to the health facility dually ensures better coverage by CHWs and that communities where there is a real need are those targeted for iCCM.\textsuperscript{35}

The program architecture domain also addresses a myriad of other key facets of intervention design and its organisational arrangement. Major context issues can only be overcome with the provision of certain tools and materials, and it is up to programs to either offer these or relay this responsibility to CHWs, supervisors or district managers. Developing ministry-sanctioned and technically vetted protocols and guidelines for CHWs, supervisors and district actors to perform their various functions is indispensable to quality assurance and helps programs align with international standards while measuring achievements. Deciding how CHWs are housed, where they deliver health services, and who, if anyone, should provide these buildings can be a critical determinant of health service utilisation, quality of care and retention of CHWs.\textsuperscript{36–38} In addition, the model of volunteer or remunerated CHWs can have significant implications for program longevity and far-reaching systems impacts such as the type of primary healthcare models promoted within the country.\textsuperscript{36–38} Finally, the development of a timely, well-reasoned and practical handover plan for ministry ownership is imperative to ensure fluid transition and sustainability of program gains.\textsuperscript{36–38}

Domain 3: policy, governance, management and coordination

The extent to which iCCM can be considered a tenable strategy depends on whether and how its basic tenets are enshrined in local policies; how these are advocated by influential political champions; and how the ecosystem of governing structures and management partners organise responsibilities among themselves and other key stakeholders.\textsuperscript{9–47} This is the focus of the policy, governance, management and coordination domain, which describes the coordination among program actors and the policy landscape underpinning the iCCM intervention. Policy players, managing partners and the technical working groups that oversee and steer iCCM implementation can have a palpable impact on intervention success by shaping or enacting legislation that is both thorough and realistic. This facilitates program design that is appropriately aligned with and integrated into country health systems, while promoting its sustained priority as a regular part of the expected health service delivery package.

However, how successful these actors are depends not only on the development of an enabling policy environment, but also on the arrangement of primary healthcare and how it has evolved within the country’s health system.\textsuperscript{47} The scope of iCCM policy can be shaped by factors such as the ministry jurisdiction under which it is placed, existing policies for CHW cadres that preceded iCCM, and the influence of powerful policy entrepreneurs outside of common dialoguers.\textsuperscript{47} In addition to policy, management and coordination mechanisms among ministries, non-governmental organisations (NGOs), multilateral organisations and other multisectoral partners can be decisive in determining the impact and continuity of iCCM. How these groups liaise with each other and clearly define their roles and responsibilities at the national, state and local levels lays the groundwork for the capacity building necessary to promote successful program handover.\textsuperscript{46} Moreover, mechanisms for such intersectoral partnerships are necessary to act on local social determinants of health for change.\textsuperscript{48} Finally, transparency among political entities, and the presence and influence of corruption in health systems, are important forces influencing health systems behaviour and merit examination in the context of iCCM.\textsuperscript{49}

Domain 4: financing and costing

Uninterrupted, sufficient and well-allocated funding is considered the cornerstone of robust and sustainable health programs.\textsuperscript{50} The iCCM intervention often, if not exclusively, relies on external funding partners that usually operate in parallel with an assembly of financial structures. Different components of the intervention may be funded by multiple entities, resulting in duplicative resources for some areas of iCCM or insufficient allocations for others.\textsuperscript{51} If these mechanisms are not coordinated, they risk creating financial misalignment and fragmenting implementation efforts. The way in which ministries earmark funds for iCCM as part of their health expenditure is not only a question of how much and to
which activities funds are allocated, but also the administrative division to which these funds are directed. If resources are allotted to specific iCCM activities (eg, revitalising an existing cadre of CHWs) in selected administrative areas, scale-up efforts would be remiss not to ensure continuity in the areas of initial implementation before expanding resources to other regions. The kind of financial disbursement mechanisms at lower levels of government and the presence of public–private partnerships may affect which administrative areas and what aspects of the program are prioritised. Planners should anticipate the likely duration of funding streams for inputs and activities and project how the termination of these funds might not only affect gains achieved through the program, but also lead to unwanted effects resulting from local reliance on and abrupt disruption of services. Finally, managers should define the financial and opportunity costs that providers and recipients will incur for the operationalisation of iCCM.

Domain 5: health management information systems and M&E

Health management information systems (HMIS) encompass the processes of data collection, transmission and use within the iCCM intervention, while monitoring and evaluation (M&E) provides a blueprint to ensure the program is operating as intended. In addition to monitoring, the data form the evidential basis for iCCM and are critical to evaluating its deficiencies and impact. This goes beyond data accuracy or how information is transferred between levels of hierarchy. This means ensuring that granular data are not only accessible, but also aggregated in a format that is both useable and useful for effective monitoring and readily available to decision-makers at different levels. How, in what format, and where data are reported and stored can have implications for completeness, transparency, use and even reporting frequency, while influencing how data are linked with the national health system. Critical to overcoming commonplace bottlenecks of evaluation is ensuring that the data elements actually exist to calculate the indicators needed for decision-making and that they are organised in a format conducive to extracting information. The surge of mHealth used in iCCM and other programs in which CHWs frequently participate can impact the data collection burden on CHWs, as well as dependency on hardware that may not always operate effectively. Visibility and visualisation of data, especially at lower levels, have the potential to change the way stakeholders use information to make decisions and influence community understanding of program impacts. A comprehensive M&E plan is necessary to track and measure overall program performance. Finally, it is important to ensure that CHWs, supervisors and ministry stakeholders have the appropriate training and guidelines to inform their data collection and reporting procedures to standardise these activities while maximising data quality and use.

Domain 6: commodities and supply chain

Experts in iCCM globally endorse the mantra ‘There is no program without a product’ (15). Domain 4 of the framework is not solely focused on the ready availability of sufficient quantities of quality medicines at the community level. It also underscores that their procurement and quantification processes, and the formulas that underpin them, can contain overlooked causes of supply chain deficiencies beyond common transport and infrastructural challenges ubiquitous in LMICs. Sufficient resupply and product allocation require accurate projections of actual community demand, which depends on factors that may not be captured simply by measuring aggregate product consumed. The way district authorities and supervisors choose to allocate supply among CHWs can also determine the potential for stockouts to occur, especially in the absence of standardised procedures. The domain also emphasises its interdependence on other areas, such as how treatment and drug consumption data are recorded and aggregated, whether and how district pharmacists are trained in quantification and allocation processes, and the existence and enforcement of regulatory drug procurement and distribution policies. Systems considerations, such as whether an implementing partner uses existing country supply chain mechanisms or develops one in parallel, can affect the ability of local systems to appropriately support product supply and distribution after program handover.

Domain 7: service delivery and referral

Service delivery in iCCM encompasses the series of activities performed by the CHW to ensure an illness case achieves an optimal health outcome. This begins when a case successfully attains contact with the CHW; receives a diagnostic test (in the case of fever or cough and fast breathing); is appropriately treated and/or referred; until finally exiting the care pathway through adhered referral and/or follow-up by the CHW. While these activities require guidelines for diagnosis and case management to ensure quality and consistency, it is insufficient to simply assure the existence of nondescript plans or algorithms. These must address the specificities of diverse treatment options and diagnostic instruments, suit the organisational context and align with country policy. How service delivery standards are defined and organised can affect who receives services, when, and how, impacting the workload for CHWs, their capacity to carry out activities, and the quality of services rendered. Defining the expected and feasible schedule for iCCM service delivery, and setting standards for the physical structures of service provision, are arguably important to achieving better health outcomes by optimising CHW availability. Diagnostic ambiguities persist, particularly in the confirmation of pneumonia at the community level, and thus addressing these with clear and practical guidelines and tools is a pressing need of iCCM. Follow-up procedures in practice can be challenging, as can ensuring a clear counter-referral system.
that both caregivers and supervisors can easily adhere to and verify. This affects accurate reporting of successful case management and evaluators’ subsequent ability to adequately measure outcomes.

**Domain 8: human resources**

There are many actors within the iCCM intervention, and few are as important as the CHWs who provide services and the supervisors who support and oversee them. The HR domain comprises the recruitment, selection and training of CHWs, their terms of reference, and performance quality control provided by supervisors. Who has a say in the selection of CHWs, what expectations are placed on the CHW, or which training modules CHWs and supervisors have or have not completed can significantly affect how services are delivered and how stakeholders relate to and manage their responsibilities. We expand this domain to include CHW retention and attrition, CHW mentorship and their meeting forums and peer groups, the last of these having especially demonstrated support for CHW activities and service delivery quality. The domain also includes categories that examine what support channels are available to iCCM service providers, as well as their potential incentives, benefits and career path. Because these aspects of HR can vary widely in different iCCM programs, designers and managers must weigh which components are most applicable to their respective interventions, while also considering how other HR models might better align with their health system environment and intervention goals.

**Domain 9: caregivers, community and social mobilisation**

The central role that caregivers, the community and local decision-makers play in the success of community programs is increasingly recognised, especially in the case of iCCM. Social mobilisation is the activity that aims to inform these stakeholders and trigger local buy-in and support for the intervention. More than rallying grassroots patronage from local leaders or sensitising communities to the availability and benefits of iCCM, mobilisation sets the tone for how communities and caregivers relate to, support and engage with the CHW and the intervention as a public service. This support, whether moral or material, can arguably serve as an impetus to sustain intervention longevity by both intrinsically motivating CHWs and providing a source of funds that enable them to perform services. Establishing or supporting existing local health and development committees as part of the mobilisation strategy has the potential to safeguard this support in the long term and ensure that it is congruous with program needs.

This domain also encompasses community and caregiver knowledge, attitudes and behaviour, which influence the key intervention steps of timely careseeking, treatment compliance and referral adherence, among others. The content of the information, education and communication component of mobilisation can influence whether caregivers are only aware of disease symptoms and the offer of iCCM services, or if they also understand the voluntary status of the CHW and the necessity of community ownership for its continuity. Who delivers these messages, such as external mobilisers or participating CHWs themselves; and to whom, whether these target female caregivers or the village at large; can affect what information is conveyed and how it is received, and subsequently impact the opportunities for successful integration.

**Domain 10: systems software**

There can be no system without the dynamic interactions of the actors within it. The systems software domain is concerned with the intangible forces at play within community interventions, where the term ‘software’ refers to its derivation from its namesake framework presented by Sheikh and colleagues. These expressions emanate primarily from key stakeholders and can exert profound influence in shaping program outcomes. They include the feelings, motivations, norms and expectations of caregivers, communities, CHWs and their supervisors. These actors can be largely responsible for holding each other accountable through social contracts, especially in the absence of other extrinsic motivational or accountability mechanisms. Factors such as the sense of esteem, recognition, appreciation or support that a CHW enjoys in the community can not only affect morale and motivation, which in turn influence attrition, but also set the precedent for community expectations and standards in their relationship with the intervention. Increased social capital and prestige of the CHW position within the community may encourage more frequent careseeking, higher referral adherence rates and possibly increased chances of financial contributions from communities to support activities. Other factors, such as culture and values, can influence caregiver–CHW relationships and gestures of support, and may also affect the gender composition of CHW cadres. The agency and power dynamics among CHWs, supervisors and district support mechanisms can influence how these actors approach problem solving, or how beholden they feel to each other to complete activities as expected. Feelings of pressure, guilt or fear by the CHW can be greater drivers of service delivery than previously recognised. Finally, ethical considerations should be given to the overall concept and policy of iCCM, where its relationship to labour, intrinsic motivation, human rights and other SDGs merit reflection. How systems software is addressed within iCCM is case-specific and should not be generalised, but exploring these interactions is critical to unpacking unexpected outcomes and mitigating unintended consequences.

**DISCUSSION**

In this paper, we present a comprehensive systems framework to inform the design, implementation and evaluation
of community-based interventions, specifically adapted to the iCCM intervention. Robust and sustainable community health interventions are predicated on a host of systems factors. These include facets implicit to program design and systems context, and how these interface with both structural and intangible properties of the health system. We argue that it is not enough to examine these elements as isolated aspects of the intervention, but rather that it is valuable to pose meaningful questions about their interactions with each other and the system at large. Doing so can also assist designers and implementers to view interventions such as iCCM as a means to an end, rather than the end itself. This is in line with the recent WHO global review on the integrated management of childhood illnesses (IMCI), which discourages standalone approaches to iCCM and subsequent fragmentation of child health services in favour of those which include iCCM as part of a system-wide strategy.116 Our framework views the elements of community health systems through a wide-angle lens, defines their fundamental building blocks and offers a range of critical questions that the programmer, researcher, policy-maker and technical expert can use to navigate the minutiae of this complex intervention while simultaneously considering its macro interactions.

Current resources abound to support different aspects of iCCM planning, implementation and evaluation targeting a variety of audiences. These are commonly in the form of definitive technical guidance and training packages primarily developed by WHO/UNICEF15,16, toolkits produced by supporting agencies14,16, and country-specific IMCI/CCM taskforce manuals, protocols and policies. One of the most recognised CCM-based frameworks and guidance documents is the USAID Maternal and Child Health Integrated Program (MCHIP) iCCM interagency framework and its accompanying benchmark indicator guide, which streamlines core parameters and provides a necessary foundation for intervention M&E.15,16 As a compendium of 48 indicators divided among 8 categories (coordination and policy setting; costing and financing; HR; supply chain management; service delivery and referral; communication and social mobilisation; supervision and performance quality assurance; M&E and HMIS), it focuses on the use of specific activity benchmarks and performance markers to plan and measure progress and certain program processes. Those listed form the backbone of what is most often used to measure coverage of iCCM, and are generally considered essential across different program stages. While this is critical to measuring performance, sole reliance on such metrics risks conflating coverage outputs with intervention success.

For example, the interagency framework indicator ‘case-load by CHW’ is defined as the ‘proportion of CHWs... treating at least x cases per month (to be defined locally)’.16 A high proportion could suggest a well-served population, quality data reporting, strong community awareness resulting in elevated demand or an efficient and skilled CHW. However, it could also indicate a poor CHW allocation strategy and subsequent saturated population density-to-CHW ratio, a volatile epidemiological profile, or an inundated and overburdened CHW. The appropriate caseload figure, as suggested by the interagency framework, is relative and context-dependent, and sits between meeting community needs and maintaining CHW service delivery skills. This calculus is necessary to support the basis of the decision-making processes; however, it is not designed to provide further information. Our framework builds on these metrics to assist managers in exploring their emergent dynamics and underlying factors, helping qualify their interpretation and meaning.

Indeed, there is growing recognition of the need to transcend current constructs for conceptualising and assessing complex health systems, with a clarion call to better capture the foundational determinants of the production of health.118 Several efforts have coalesced specifically around the adaptation or inclusion of community health in systems frameworks.17,119-123 Each maintain their advantages, as there can be no panacea that is well suited to every context or program. The proposed iCCM Systems Framework aims to complement its contemporaries, specifically the iCCM Interagency Framework, by offering some specific advantages. First, it provides three additional areas of consideration: the systems context, programmatic architecture and systems software domains. These often underrepresented, measurable areas of systems forces can provide necessary insights when determining the configuration and implementation of community interventions. Second, it supports a more profound exploration of existing components in the interagency framework. For example, the coordination and policy setting component of the interagency framework and indicators suggests partner mapping, the identification of existing of CCM policy, and measuring the degree to which policy supports CHW practice of the three illness. Our framework supplements this with the proposed examination of the composition and depth of those policies, how they evolved within the landscape of primary healthcare within the country, where governance and execution of iCCM policies are placed, the drivers of and evidence use in their development, and the processes and entrepreneurs that support or hinder them. Similarly, the interagency framework supply chain component details drug registration, availability, stockouts and commodity validity. Benchmarks validate whether quantifications for supplies have been completed, procurement plans developed and implemented, and a resupply logistics system in operation. Our systems framework probes further into the calculations underlying these quantification procedures, drug procurement processes, transport and distribution mechanisms at different administrative levels, commodity inventory and storage practices, and the various health systems factors affecting their resupply and allocation methods. It particularly expounds on the areas of community and social mobilisation, supporting the existing recognition of caregiver knowledge and communication, and elevating these to the inclusion of local oversight, ownership, demand, engagement of traditional structures and barriers to careseeking.

Third, this framework recognises that lower-level stakeholders may be better versed in understanding local
consequences of upstream decision-making and planning. It therefore encourages users to pose questions at a granular level, fostering a broader consideration of decentralised effects on implementation.\(^9\)\(^9\) Finally, because this framework is not a finite checklist of tasks or indicators, but rather a guide designed to comprehensively address community health as a whole, it pairs intention with consequence, transcribing a normative input-output-outcome formula in favour of a holistic translational approach.

The framework is versatile in its utility. It can be used alongside planning documentation to guide decision-makers in their design processes of new or restructured iCCM programs by cultivating a dialogue of the latent consequences of certain design decisions. Such forecasting helps support sustainability at the onset of program preparation. It can also be used to assess where barriers to scale of iCCM may exist, especially where and how structural arrangements may collide with contextual realities. It also provides a robust blueprint to outline evaluations of iCCM programs organised according to each dimension and its subcategory, where responses to critical questions can be assessed to either supplement or constitute the evaluation.

The framework poses some limitations. Further research is required to validate its usability and comprehensiveness. Furthermore, it is not intended to be exhaustive. However, it is expected to cover a variety of systems issues anticipated within the iCCM intervention across various stages of planning and operationalisation. While there is substantive need to streamline implementation efforts, there remains an exigency to recognise that every iCCM program is different.\(^9\)\(^6\) Their varying requirements within diverse environments can yield starkly different outcomes, necessitating a context-driven approach to program architecture and implementation. The framework is intended to serve as an aide alongside planning and monitoring guides and tools to provoke discussion and an enriched examination of intervention dynamics.

CONCLUSIONS

Approaches to improving health in the world’s most remote and underserved areas continue to evolve, and iCCM is no exception. True systems integration of these interventions surpasses simply combining various health service packages or focusing on outcomes; it requires a thoughtful examination of their intentions, effects and appropriateness across a spectrum of areas. Our systems framework ultimately aims to support context-driven solutions, reduce fragmentation in health systems, and better enable sustainable impact in community health.

REFERENCES


30 Oliver M, Genets A, Winters N, et al. What do community health workers have to say about their work, and how can this inform improved programme design? A case study with CHWs within Kenya. Glob Health Action 2015:8;27168.


43 Chaudhry RG, de Boer M, Perkins S. Five steps towards implementing a deliberate health sector element Phase-out. United States Gulf of my national strategy for new (USDG) 2012.


69 Nyanama AS. Bridging the gaps in the health management information system in the context of a changing health sector. BMC Med Inform Decis Mak 2010;10:36.


96 Sebert Kuhlmann AK, Altmann L, Galavotti C. The importance of community mobilization in interventions to improve sexual,


102 Chimpolopolo A, Burrowes V. Use of social mobilization and community Mobilizers by Non-governmental health organizations in Malawi to support the eradication of polio, improve routine immunization coverage, and control measles and neonatal tetanus. *J Trop Med Hyg* 2010;113:65–90.


## SUPPLEMENTARY APPENDIX 1

**Table S1. Final Studies Selected for Coding Analysis**

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page</td>
<td>Reference</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
</tr>
</tbody>
</table>


Awor, P., Peterson, S., Gautham, M. Delivering child health interventions through the private sector in low and middle income countries: challenges, opportunities, and potential next steps. BMJ. 2018;362:k2950. doi:10.1136/bmj.k2950


Bennett S, Dalglish SL, Juma PA, Rodriguez DC. Altogether now... understanding the role of international organizations in iCCM policy transfer. Health Policy Plan. 2015;30 Suppl 2:i26-i35. doi:10.1093/heaply/cvz071


Berhanu D, Oktawaji YB, Belayneh AB, et al. Protocol for the evaluation of a complex intervention aiming at increased utilisation of primary child health services in Ethiopia: a before and after study in intervention and comparison areas. BMC Health Serv Res. 2020;20:339. doi:10.1186/s12913-020-05151-3


Dalglish SL. Methods for the strategic review of programmes for integrated management of childhood illness and community cases. BMJ. 2018;362:k2989. doi:10.1136/bmj.k2989


Doherty T, Tran N, Sanders D, et al. Role of district health management teams in child health strategies. BMJ. 2018;362:k2823. doi:10.1136/bmj.k2823


Druetz T, Ridde V, Haddad S. The divergence between community case management of malaria and renewed calls for primary healthcare. CRITICAL PUBLIC HEALTH. 2015;25(2):165-177. doi:10.1080/09581596.2014.886761


Heldén O, Källander K, Peterson S, Alfvén T. [Integrated Community Case Management - one piece of the puzzle to achieve the ambitious global goals for child health]. Lakartidningen. 2019;116:HDT.


Jacobs M, Merson M. Introductory commentary: a strategic review of options for building on lessons learnt from IMCI and iCCM. BMJ. 2018;362:bmj.k3013. doi:10.1136/bmj.k3013


<table>
<thead>
<tr>
<th>Page</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>296</td>
<td>Kozuki N, Ericson K, Marron B, Lainez YB, Miller NP. The resilience of integrated community case management in acute emergency: a case study from Unity State, South Sudan. J Glob Health. 8(2):020602. doi:10.7189/jogh.08.020602</td>
</tr>
<tr>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td></td>
</tr>
<tr>
<td>317</td>
<td></td>
</tr>
<tr>
<td>318</td>
<td></td>
</tr>
<tr>
<td>319</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td></td>
</tr>
<tr>
<td>321</td>
<td></td>
</tr>
<tr>
<td>322</td>
<td></td>
</tr>
<tr>
<td>323</td>
<td></td>
</tr>
<tr>
<td>324</td>
<td></td>
</tr>
<tr>
<td>325</td>
<td></td>
</tr>
<tr>
<td>326</td>
<td></td>
</tr>
<tr>
<td>327</td>
<td></td>
</tr>
<tr>
<td>328</td>
<td></td>
</tr>
<tr>
<td>329</td>
<td></td>
</tr>
<tr>
<td>330</td>
<td></td>
</tr>
<tr>
<td>331</td>
<td></td>
</tr>
<tr>
<td>332</td>
<td></td>
</tr>
<tr>
<td>333</td>
<td></td>
</tr>
<tr>
<td>334</td>
<td></td>
</tr>
<tr>
<td>335</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td></td>
</tr>
</tbody>
</table>
Supplemental material


372 Mischlinger J, Dudek V, Ramharter M. Predictive performance of rapid diagnostic tests for malaria and its impact on integrated community case management of malaria in Africa. TROPICAL MEDICINE & INT'L HEALTH. 2021;26:82-82.


Palazuelos, D., Ellis, K., Da Eun Im, D., et al. 5-SPICE: the application of an original framework for community health worker program design, quality improvement and research agenda setting. Glob Health Action. 2013;6:10.3402/gha.v6i0.19658. doi:10.3402/gha.v6i0.19658


Supplemental material


Shah R, Miller NP, Mothabbir G. Approaches to support continued iCCM implementation during a flooding emergency in rural Bangladesh. J Glob Health. 9(2):021001. doi:10.7189/jogh.09.021001

Supplemental material


Strachan CE, Nuwa A, Muhangi D, Okui AP, Helsinki MEH, Tibenderana JK. Community understanding of the concept of pre-referral treatment and how this impacts on referral related decision-making following the provision of rectal artesunate: a qualitative study in western Uganda. BMC Health Serv Res. 2018;18:470. doi:10.1186/s12913-018-3209-4


## SUPPLEMENTARY APPENDIX 2

**Table S2. iCCM Systems Framework**

Domains, Categories, Definitions, and Critical Questions

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain Name</th>
<th>Category No.</th>
<th>Category Name</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
</table>
| 1          | Systems Context    | 1.1          | Epidemiological Profile              | Describes the burden of disease of the areas of implementation. | • What is the under-five mortality burden attributable to malaria, pneumonia, and diarrhea?  
  • How does this burden potentially waver across target areas?  
  • Are there other diseases or conditions relevant to the under-five mortality burden that can be incorporated into the iCCM service delivery package? |
|            |                    | 1.2          | SES, Livelihood & Living Standards   | Describes the socio-economic context of areas of implementation, including both the recipients and providers of care. | • What are the general socioeconomic conditions of target populations and the CHWs that serve them? To what extent does this affect their ability to perform their roles within the iCCM intervention? (For example, the community’s ability to assist CHW, caregivers’ abilities to adhere to referral, CHW’s ability to forego income to serve community, etc.)  
  • To what extent does the socioeconomic status (SES) of caregivers influence careseeking behavior at health facilities? How does this influence iCCM?  
  • To what extent does the SES of the CHW impact their ability to provide services and perform other iCCM-related activities? |
|            |                    | 1.3          | Geography & Topography              | Describes the geophysical context of the areas of implementation, including the geographic spread of administrative areas. | • What is the topographical makeup of iCCM target areas? (i.e. lakes, mountains, rivers, physical boundaries, etc.) How does this affect iCCM activities and service delivery?  
  • What is the geographical positioning of the target areas? Is this fairly homogenous? How does this affect iCCM activities and service delivery?  
  • What is the geographical spread of iCCM target areas? Are iCCM clusters relatively condensed, or spread across a wide territory? Is this relatively homogenous? How does this affect the need for iCCM, the implementation of iCCM activities, and service delivery?  
  • How is this geographical positioning and spread related to distance from conventional health facilities?  
  • Are there other geographical considerations (i.e. sea level) that could impact iCCM service delivery? |
<table>
<thead>
<tr>
<th>Domain</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
</table>
| 1.4 Climate & Seasonality | Describes the climate and its seasonal change of the areas of intervention. | - What is the climate of iCCM target areas? How and to what extent does this affect infrastructure on which iCCM activities and service delivery are reliant?
- How does the seasonality of iCCM target areas affect disease incidence and demand for iCCM services?
- Are iCCM target areas affected by imminent climate change that could hinder or usurp iCCM activities? |
| 1.5 Roads & Buildings Infrastructure | Describes the condition of the public and private building and transportation infrastructure of areas of implementation. | - What are the conditions of roads between districts* and health facilities, and health facilities and iCCM catchment areas?
- To what extent is the iCCM intervention dependent upon functional transport infrastructure?
- Does the iCCM strategy take variation in infrastructure into consideration in planning activities and targets? |
| 1.6 Internet, Telephone & Power Source Infrastructure | Describes the electrical infrastructure of the areas of implementation, and inputs or program operations that may be dependent upon them. | - How reliable is the telephone network in iCCM target areas?
- Do CHWs, supervisors, and/or district staff have regular access to the internet? How reliable is this connection?
- Is the program or any of its applications dependent upon the availability of a specific cellular or mobile network, and if so, is this available in program areas?
- What is the electricity or power source infrastructure of implementation areas? How might this vary across sub-administrative areas?
- What is the main source of energy or power source in households? (i.e. public electricity network; private solar panel; generator; electric; nothing; other, etc.) |
| 1.7 Population & Cultural Demographics | Describes the ethnographic makeup of the population of areas of implementation.** | - What is the demographic makeup of the target population? How does this affect how iCCM service delivery and its recipients?
- Is there a primary religious denomination of iCCM target areas? How does this affect iCCM service delivery and its recipients?
- For CHWs that practice iCCM in assigned external communities: are local language differences taken into consideration in the placement of CHWs? |
| 1.8 Geopolitical Context | Describes the geopolitical situation of the areas of implementation, including themes of political unrest and migratory or refugee populations. | - What is the distinct geopolitical situation of iCCM target areas? How could this affect the safety of CHWs, their ability to carry out activities, and/or the sustainability of iCCM services?
- Are refugee settlements in proximity to target areas? Are children under five in these settlements eligible for iCCM services? |
### 1.9 Health System and Health Program Context

Describes the organizational health systems infrastructure, including the landscape of current health interventions, the structure of health care services, and other health systems context considerations.

- What are the current community health and child health programs, services or interventions in the areas of implementation? How does this affect the implementation of iCCM?
- Are there other CHW-based programs currently in operation? How does this affect iCCM, and are there synergies upon which iCCM can capitalize?
- What is the current PHC service delivery structure in the areas of implementation, and how does iCCM fit into this? What are the consequences of iCCM on the current PHC structure?
- Do health facilities charge user fees for Integrated Management of Childhood Illness (IMCI) services? How could this affect iCCM, specifically care seeking for referral, supervisor support of the CHW, etc.?
- For supervisors based at a referral health facility: are supervisor salaries dependent upon user fees? Would iCCM absorb supervisors’ clientele, and if so what are the unintended consequences of this?

### 1.10 Systems Considerations

Describes context-related considerations for iCCM and the health system.

- Is iCCM well-suited to the epidemiological, geographic, socio-economic, cultural, and health systems context of areas of implementation?

*The term “district” is intended as universal nomenclature in this document to encompass all types of sub-national administrative units

**Cultural demographics are distinguished from cultural norms in that this category pertains to the presence of ethnic and religious groups in an area, as opposed to the values and practices associated with these.
## Domain 2: Program Architecture

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain No.</th>
<th>Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
</table>
| 2          | Program Architecture | 2.1 | CHW Density & Distribution | Describes the number of CHWs trained for iCCM, their geographic distribution, and how these are determined. | • How many CHWs were trained in iCCM? How was this number determined, and using which information?  
• How is the geographic density and distribution (i.e. CHWs per square kilometer or population) determined? Is there a strategy for concentrating or assigning CHWs, or is this based on a preexisting contextual setup?  
• Is CHW allotment and distribution based on the number of children under five in a defined catchment area, or based on the number of households?  
• Can more than one CHW be assigned to the same catchment area or community?  
• Can catchment communities overlap with each other? |
| 2.2 | CHW-to-Catchment Population Ratio | Describes questions related to the catchment populations assigned to CHWs. | • What is the defined minimum and maximum catchment population assigned to one CHW?  
• Is the defined maximum population a feasible figure for one CHW? Is this a feasible number for service provision?  
• Does the CHW arrangement strategy allot more communities or a greater geographic catchment breadth to CHWs to fulfill a defined CHW-to-population ratio?  
• In the case that the catchment population exceeds the defined maximum, is another CHW assigned to the area, or is the area split into two catchment areas?  
• How does the program adapt to rapidly fluctuating populations in target areas? |
| 2.3 | CWH-to-Supervisor ratio | Describes questions related to the number of CHWs allotted to supervisors. | • What is the current minimum and maximum number of CHWs that are assigned to a supervisor?  
• What is the theoretical maximum threshold for the number of CHWs assigned to supervisors to ensure timely, frequent, and quality supervision for iCCM services?  
• How were these determined? |
| 2.4 | CHW Profile, Demographics, & Cadre Structure | Describes the demographic and service delivery profile of CHW cadres. | • Does the program engage iCCM practicing CHWs based on a preexisting cadre of CHWs, or are CHWs newly nominated and trained for iCCM?  
• Are CHWs chosen for practice within their own communities, or are they dispersed to other communities?  
• What is the current and/or intended sex and age distribution of CHWs practicing iCCM? Has the program identified a target sex distribution?  
• Is the iCCM program based on a volunteer service provision structure? Are iCCM-practicing CHWs performing services on a volunteer basis, or as a remunerated job? Are they expected to have a primary vocation, or practice service delivery full-time?  
• Does this align with national standards for CHW cadres?  
• Are there other CHW-like cadres which can support, complement or interfere with iCCM implementation (i.e. community-medicine distributors, traditional birth attendants, etc.)? |

Supplementary Appendix 2- iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
<table>
<thead>
<tr>
<th>2.5 Housing &amp; Residency</th>
<th>Describes the housing and residency requirements and situation of CHWs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Is there an official policy outlining housing and residency requirements for iCCM-practicing CHWs?</td>
</tr>
<tr>
<td></td>
<td>Are housing and residency standards and expectations addressed by policy or any official documentation? If so what are these standards and requirements?</td>
</tr>
<tr>
<td></td>
<td>Are CHWs expected to reside in the catchment area where they provide iCCM services?</td>
</tr>
<tr>
<td></td>
<td>Who is expected to fund CHW residency costs in catchment areas? Do these costs fall on the CHW, the community, or the program?</td>
</tr>
<tr>
<td></td>
<td>What proportion of CHWs currently reside in their catchment areas?</td>
</tr>
<tr>
<td></td>
<td>In the case that the CHW rents a housing structure or builds an area to provide iCCM services, are these costs expected to be borne by the CHW?</td>
</tr>
<tr>
<td></td>
<td>Is the onus on the CHW to facilitate renting contracts and facility locations for residency and the provision of iCCM services in locations of which they are not a community member?</td>
</tr>
<tr>
<td>2.6 Service Delivery Location</td>
<td>Describes the official designated locations and areas of practice for iCCM as defined by program standards.</td>
</tr>
<tr>
<td></td>
<td>Where are CHWs expected to provide iCCM services: from their homes, from a separate clinic structure, a public facility, in a designated outdoor space, home visits, or other?</td>
</tr>
<tr>
<td></td>
<td>Who is expected to search for and/or provide this structure?</td>
</tr>
<tr>
<td></td>
<td>Do standardized requirements for the location of iCCM service delivery exist?</td>
</tr>
<tr>
<td></td>
<td>If so, what do these comprise? Do these requirements include stipulations for roofing standards, waste disposal, sanitary facilities, and/or drug storage areas?</td>
</tr>
<tr>
<td></td>
<td>What are possible consequences of home service delivery that could compromise the quality of iCCM services? Of other service delivery locations?</td>
</tr>
<tr>
<td></td>
<td>Is the community expected to provide a service delivery location for the CHW?</td>
</tr>
<tr>
<td>2.7 Catchment Area</td>
<td>Describes the definition and geophysical determination of catchment areas for iCCM practice.</td>
</tr>
<tr>
<td></td>
<td>Are there strict boundaries defined for catchment areas, and are CHWs and/or supervisors expected to know these?</td>
</tr>
<tr>
<td></td>
<td>How is a catchment area defined, and what are the specific criteria for a catchment area to be termed as an iCCM-eligible area? Is this based on predetermined administrative area criteria or physical geography? Can this entail one village or a cluster of villages?</td>
</tr>
<tr>
<td></td>
<td>How are iCCM catchment areas determined within the context of the national child health strategy? This could mean processes required to establish that a catchment area requires iCCM.</td>
</tr>
<tr>
<td></td>
<td>What is the maximum breadth of a catchment area?</td>
</tr>
<tr>
<td></td>
<td>Is geographic spread used to determine target catchment areas?</td>
</tr>
<tr>
<td></td>
<td>Are population estimates used to determine defined catchment areas?</td>
</tr>
<tr>
<td></td>
<td>Can the CHW be feasibly accessed on foot by those residing in the entire breadth of the catchment area?</td>
</tr>
<tr>
<td></td>
<td>Can the entire catchment area breadth be feasibly accessed by the CHW?</td>
</tr>
<tr>
<td></td>
<td>In the case that the catchment area breadth exceeds the defined maximum, is this separated into two catchment areas, or are multiple CHWs assigned to this catchment area?</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>2.8</td>
<td><strong>Health Facility Accessibility</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td><strong>Protocols, Guidelines, Algorithms, &amp; SOPs</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2.10</td>
<td><strong>Inputs, Tools, Supplies, Equipment, Transport &amp; Logistics</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Do CHWs receive flashlights or a lighting source to perform iCCM services in the absence of the availability of electricity or alternative power source?

3. Do CHWs receive protective equipment to enable them to travel and perform iCCM activities in difficult weather conditions?

4. Do CHWs receive gear to protect iCCM documents and drugs supplies from the elements during transport?

5. In the case of an epidemic, do CHWs receive adequate personal protective equipment (PPE)?

2.11 Supportive or Alternative iCCM Service Structures

- Describes the existence of other mechanisms that aid and/or support the iCCM service delivery structure, such as pharmacies.

- Do supportive or alternative structures, such as private dispensaries or certified drug shops, act as product distribution channels for iCCM?

- If so, how does this influence or interact with coexisting classical iCCM structures?

2.12 Implementation & Sustainability Plan

- Describes the plan for implementation, as well as the existence and/or development of an overall sustainability or transition plan that details how programs are to transition from ownership of one entity to another, especially to local government.

- How long is the expected duration of the implementation of iCCM, via the supporting agent(s) and/or thereafter?

- If implementation occurs as an initial standalone pilot intended for scale-up, what aspects of iCCM are to be addressed?

- Has a transition plan or roadmap been developed during the initial planning and implementation stages of the iCCM program?

- Does this sustainability plan designate the roles and responsibilities of national and international stakeholders post-transition?

- Does the sustainability plan designate feasible financing mechanisms for the continuity of iCCM?

- How does program design engender Ministry of Health ownership in the case where iCCM implementation is supported by third parties?

2.13 Systems Considerations

- Describes program design considerations for the overall health system, and synergies between domains.

- Is the iCCM program designed to be integrated as a formal part of the health system?

- Does the program use existing national/public structures and processes for service delivery, data transmission and reporting, drug procurement and supply, mobilization, or are these designed for or tailored specifically to the program?

- Are existing systems developed for iCCM service delivery expected to be integrated or aligned with national systems?
## Domain 3: Policy, Governance, Management & Coordination

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain</th>
<th>Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
</table>
| 3          | Policy, Governance, Management, & Coordination | 3.1 | Child Health Policy Landscape and Evolution | Describes the general Primary Health Care (PHC) and child health policy environment of the areas of implementation, including predating IMCI programs, and how these evolved over time. | • What kind of child health policies predicated the implementation of iCCM?  
• What is the history of the PHC model of the country, and the role of CHWs?  
• What is evolution of IMCI policy within the country?  
• How are policy and subsequent ministry administrative responsibilities for PHC, child health, community health, and malaria divided? |
| 3.2 | ICCM Policies | Describes the current existence of ICCM specific policies, their content, scope, and conflicts or areas of contention with other policy. | What are the current ICCM-specific policies that exist within the country of implementation?  
• What aspects of ICCM do these policies entail? Are they generic or specific?  
• Do these policies form an explicit part of the national health strategy or the national Maternal and Child Health policy?  
• Are CHW responsibilities for ICCM predicated on a pre-existing country policies for CHWs?  
• Are there sub-administrative unit (i.e. state or district) specific policy documents for ICCM? If so, what are their content and scope?  
• Does ICCM policy or its aspects contradict pre-existing policy for other aspects of the health system? (i.e. emphasis on decreasing reliance on CHWs, gravitation away from community-based care, etc.)  
• What is the timeline for ICCM policy revision? |
| 3.3 | ICCM Policy "Housing" & Placement | Describes where ministerial responsibilities for ICCM policy development and implementation lie. | In which ministry departments is ICCM policy housed? In other words, which administrative units are tasked with the development, management and implementation of ICCM policies (Child health department, malaria department etc.)  
• Is ICCM policy couched within one department or shared administratively? How does this affect management and implementation of ICCM policy? |
| 3.4 | Policy Entrepreneurs | Describes the actors involved in the influence, development, and implementation of ICCM policy and policies which influence ICCM. | • Who are the stakeholders involved in the influence of, development and implementation of ICCM policy?  
• Are these actors shared evenly between program partners and local ministry?  
• Are there other policy actors which influence policy that indirectly affects ICCM?  
• Do sub-national actors influence ICCM policy? |

Supplementary Appendix 2- iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
| 3.5 | Policy Drivers & Evidence Use | Describes the drivers of iCCM policy development, and how evidence is used to underpin this. |
| 3.6 | Policy Processes, Roles & Responsibilities | Describes the policy-making processes, (i.e. steps), and the roles of entities in policy development and/or implementation. |
| 3.7 | Compatibility with International Guidelines | Describes the extent to which iCCM policy is compatible with international guidelines. This encompasses drug-specific policies and pharmaceutical regulation. |
| 3.8 | Policy Implementation | Describes how iCCM policy is actually realized, and to what extent implementation mirrors policy design. |
| 3.9 | Dissemination Fora | Describes the different discussion fora of iCCM policy and decision-making, and the dissemination of policy-related decisions. |
| 3.10 | Management Structures & Coordination Mechanisms | Describes the management structures which oversee iCCM, and the coordination mechanisms in place. |

- Who or what drove the emphasis of iCCM as a strategy within country? Was this primarily internal or external?
- How is evidence used in the development and prioritization of the iCCM strategy?
- What are the concrete steps necessary to developing iCCM-specific policy, or policies which enshrine iCCM as a core part of the national health strategy?
- Who are the actors involved in these steps, and what are their roles and responsibilities with regards to policy development or implementation?
- What pre-existing policies overlap with iCCM-specific policy? For example, CHW policies, essential drugs and medicines, etc.
- Is iCCM policy the way it is detailed in ministry-sanctioned documentation compatible with international guidelines?
- Do overlapping policies encompassed by iCCM align with global standards? (i.e. iCCM drugs are on the essential medicines list, etc.)
- What mechanisms, timelines, or benchmarks are in place to realize the implementation of iCCM policy?
- To what extent does iCCM in areas of implementation mirror policy? How does this differ?
- How is policy information disseminated from political actors to implementers?
- What are the different arenas or opportunities for the discussion and decision-making of iCCM policy?
- What are the managing structures which oversee the implementation and management of iCCM?
- How do managing partners for iCCM coordinate with each other? In what capacity, forum, and with what frequency?
### 3.11 Management

**Ministry Roles & Responsibilities**

Describes the roles and responsibilities of management entities, with particular emphasis on those of ministry partners. This includes contractual agreements related to iCCM between the national government and external parties, or lower levels of government.

- Are there clearly defined roles and responsibilities for all entities implementing iCCM? This includes international partners, NGOs, national, and sub-national ministry departments.
- Are these roles and responsibilities outlined in any documentation?
- Is there an assigned manager to oversee each thematic domain (i.e. supply chain, social mobilization, etc.) at the state, regional, and/or national level?
- What is the level of national and sub-national ministry member involvement in the management and implementation of iCCM?
- To what extent are NGOs and partner organizations which manage iCCM tasked with implementation? How is responsibility shared between the ministry and partners?
- Are ministry-led focal persons or teams developed specifically for the current and future implementation of iCCM?
- Are there any memorandum of understandings (MoUs) between the national government and member states or external entities? If so, do these detail expected roles and responsibilities of implicated parties?
- To what extent is ministry capacity built and applied in the implementation of iCCM?
- Do ministry personnel or teams accompany state- or district-level program partners in the implementation of iCCM? If yes, in what capacity, and if not, how can this be improved?

### 3.12 Partnerships

Describes the global entities that may not be explicit policy entrepreneurs, but are partnered in the implementation of iCCM and may curry political influence.

- Who are the global partners actively involved or have a stake in the implementation of iCCM or the development of iCCM policy?
- What kind of inter-sectoral action is necessary to support change on the local social determinants of health?
- Which partners are necessary to support such change?
- How does partner involvement affect program sustainability, dependency of local ministries, and the potential for autonomous governmental iCCM implementation?

### 3.13 Transparency & Corruption

Describes extent to which iCCM political processes are transparent to stakeholders at different levels of the program and system. It also examines if and how the presence of corruption by policy actors can impact the development and implementation of iCCM policies or activities.

- How are political and managing processes transparent, if at all? What is impeding transparency between actors and entities?
- Is there a potential for corruption to occur in the implementation of iCCM? If so, how, and what measures can be taken to prevent or mitigate this?
- How would this impact the policy development and/or implementation of iCCM?
3.14 Systems Considerations

- Describes governance and management-related considerations for the overall health system, and synergies between domains.

- Is the design of iCCM policy in this country context intended such that iCCM is considered a short-term solution, or a long-term one? What is the expected duration of this strategy with regards to policy development?
- Does the way iCCM policy is embedded into the country’s health strategy encourage its scale-up and/or sustainability? If this is intended outcome, what is required in order for this to occur?
- How does policy recognition of national dependency on a volunteer structure for health service delivery affect the priorities and future development of the country’s healthcare system?
- Is local capacity used for priority-setting, planning, contracting and/or coordination?
- How does volunteer labor to fulfill the implementing country’s goal of reducing child mortality relate to international labor law or the SDGs?
- How does the presence of community-based programs and external partners to continue supporting them affect governmental responsibility towards the construction and sustained functioning of the overall health system?
- What is the overall organizational, policy, and management, and institutional readiness for change in the context of iCCM adaptation?
- Is there a vision that is collectively owned, with clear change management strategies for leadership of change?
### Domain 4: Financing & Costing

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain</th>
<th>Category No.</th>
<th>Categories</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Financing</td>
<td>4.1</td>
<td>Costing &amp; Financial Planning</td>
<td>Describes short- and long-term financial planning for iCCM, including what information is collected and used for this purpose.</td>
<td>• Does an itemized costing document exist to plan for the appropriate allocation of funds for inputs and activities required for iCCM implementation?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Financing Sources</td>
<td>Describes the potential and actual types and sources of funds applicable to iCCM.</td>
<td>• Does the country have a specific resource mobilization plan for iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3</td>
<td>Financing Recipients</td>
<td>Describes what stakeholders or entities are entitled to receive funds intended for iCCM.</td>
<td>• What proportion of these sources are publically provided by the national health system?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4</td>
<td>Financing Mandates</td>
<td>Describes current or potential government-based financing mandates that are applicable to iCCM.</td>
<td>• What are the current and potential sources of funding for iCCM, and who are the primary financing actors?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>Public-Private Partnerships</td>
<td>Describes any public-private partnerships that contribute towards iCCM.</td>
<td>• What components of the intervention will these sources cover?</td>
</tr>
</tbody>
</table>

Supplementary Appendix 2- iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions

<table>
<thead>
<tr>
<th>Section</th>
<th>Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>Financing &amp; Disbursement</td>
<td>Describes how financing dispersal structures operate, and how funds are allocated and distributed.</td>
</tr>
<tr>
<td></td>
<td>Structures</td>
<td>• What are the primary financial dispersal structures that allot funds for iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Who controls these, and how do these function?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How are funds intended for iCCM allocated and distributed at lower-level administrative units? Upon what criteria is this dependent?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are funds for iCCM appropriated and disbursed in a timely manner and in accordance with deadlines or due dates? If not, then what are the reasons for this?</td>
</tr>
<tr>
<td>4.7</td>
<td>Budgets</td>
<td>Describes how national and subnational budgets allocate for iCCM, and the operational stakeholders that control and influence these.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do budgets at the decentralized administrative division (i.e. district) clearly earmark funds for iCCM or activities related to iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What actors implementing iCCM have access to and provide input towards these budgets?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To what extent do budgets take into consideration external sources of funding?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are budgets transparent regarding the intended recipients (administrative areas, expected inputs) of funds allocated for iCCM?</td>
</tr>
<tr>
<td>4.8</td>
<td>Duration &amp; Sustainability</td>
<td>Describes the existence and development of financial plans to ensure the continuity of iCCM, and the sustainability of current funding sources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Does a financial plan exist for the planning and sustainability of iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How long are these funding sources expected to provide financing intended for iCCM or its inputs and/or activities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What financial avenues could be pursued to ensure continued funds for iCCM?</td>
</tr>
<tr>
<td>4.9</td>
<td>Out-of-Pocket Expenditures</td>
<td>Examines out-of-pocket expenditures and opportunity costs of service delivery providers, supervisors, and recipients of care in the implementation of iCCM.</td>
</tr>
<tr>
<td></td>
<td>(OOPs) and Opportunity Costs</td>
<td>• In what ways do stakeholders providing iCCM services incur out-of-pocket expenditures in the implementation of iCCM activities? What is the valuation of these expenditures?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In what ways do stakeholders providing iCCM services incur opportunity costs in the implementation of iCCM activities? What is the valuation of these costs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What is the fiscal value of person-time that CHWs allocate to service delivery? (i.e. local value of labor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Does the iCCM program strategy compensate these costs, or provide a plan to mitigate them?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are there social cash transfer programs, community-based cost sharing funds, or other financing mechanisms or health insurance schemes that support OOPs incurred by care recipients?</td>
</tr>
<tr>
<td>4.10</td>
<td>Systems Considerations</td>
<td>Describes finance-related considerations for the overall health system, and synergies between domains.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What are the unintended outcomes of interrupted funding for iCCM activities? Are there mechanisms in place to protect against these?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How do donor priorities, “Big Disease” funding, and external funding cycles affect iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In the future provision of funding for primary healthcare, are national strategies, plans or budgets diverting financing away from building other components of local health systems to focus on expanding iCCM, CHW cadres, and/or community-based care? If so, what are the potential consequences of this?</td>
</tr>
</tbody>
</table>
## Domain 5: Health Management Information Systems and Monitoring & Evaluation

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain Details</th>
<th>Category No.</th>
<th>Category Details</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
</table>
| 5          | Health Management Information Systems and Monitoring & Evaluation | 5.1 | Indicators & Data Elements | Describes the availability of data elements necessary to collecting useable data on the intervention, how they inform indicator definitions, how these align with the national health system. | • How are standard country-wide indicators for iCCM defined? (i.e. according to national guidelines, global benchmarks, etc.)
• Using routine data collected for iCCM, is it possible to calculate critical case pathway indicators such as: (i) proportion of cases tested; (ii) proportion of positive test results; (iii) proportion of cases treated; (iv) proportion of cases not treated due to stock-out; (v) proportion of cases referred; (vi) proportion of cases adhered to referral?
• Can these be disaggregated by condition or symptom? (i.e. fever, diarrhea, cough + fast breathing)
• Can these be disaggregated by sex (male and female)?
• Have iCCM reporting indicators changed recently, and are these changes reflected across data collection tools, registries, and databases?
• To what extent do data elements and indicators collected for iCCM align with those collected by the national health information system?
• Does data exist and is available on the population per CHW catchment area?
• Is geographical data available and updated on the breadth of the catchment area?
• Is geodata available and updated on the distribution of CHWs?
• Is there an available and updated list of active CHWs per supervisor?
• Can the number of patients and the number of cases, especially in the case of comorbidities, be differentiated across aggregated forms? (i.e. The same child presents with malaria-positive fever and diarrhea)
• Can critical case pathway indicators be calculated and disaggregated by health facility or supervisor using the data system available at national level?
• Are key iCCM indicators integrated into a national electronic health platform such as District Health Information Systems (DHIS2)? If so, what data elements are not available or cannot be calculated using DHIS2?
• Are both global and country-wide iCCM indicators incorporated into the national monitoring system? |
| 5          | Health Management Information Systems and Monitoring & Evaluation | 5.2 | Forms, Registers, & Reporting | Describes the types and formats of registries and reporting forms, and other reporting mechanisms. | • Have standardized registers and reporting documents been developed and reviewed for iCCM?
• At which levels are forms, registers, and reporting documents paper-based, and at which levels are they electronically-based?
• Which data elements can only be found in paper format?
• If paper forms or registries are used, what data elements are lost in the transfer of data to electronic databases? In other words, what information cannot be transferred into electronic format, or what information cannot be extracted from electronic databases which can be from paper registries? |

Supplementary Appendix 2: iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
By what mechanisms do CHWs report data to their supervisors, and supervisors to district staff?
How many forms are CHWs expected to fill and/or submit to their supervisor or mentor?
Are reporting forms integrated with other nationally standardized community health data collection forms, or are these specific only to iCCM?
Do data elements on these forms overlap with each other? If so, which type of data overlap with each other and on which forms?
How can data collection at CHW and supervisor level be optimized to economize on repetitive recording?
Who is responsible for physically transporting monthly forms from the health facility to the district, and what is the procedure?
Is supervision data reported by both CHWs and supervisors? Does supervision data reported by both the CHW and supervisor appear on monthly aggregate forms reported to the district?
Which forms are used to calculate official supervision rates? Are these corroborated by forms provided by CHWs?
Where are supervision forms stored?
How is replenishment of physical forms and registry booklets organized?
Are iCCM data collected and reported using a system that is separate from the national health information system (NHIS)?
To what extent is this system, if separate from the NHIS, interoperable?
To what extent are registers and reporting documents aligned with the NHIS?
What quality control mechanisms are in place at the different steps in the data chain to reduce factors affecting data quality, such as missing fields, miscalculations, or poor reporting? Is there a specific data verification process that occurs between the CHW and supervisor?
What quality control mechanisms are built into the data transmission scheme to ensure that forms and information are not lost, and arrive in a timely manner to their destination?
In the case of calculation errors or mismatched data elements submitted by CHWs, are these reported as-is in consolidated supervisor forms, or are these changed by the supervisor? If these are changed, on which forms are these changes made?
If these are changed, are these corrections made in reference to the original registry data, or changes to simply ensure alignment of totaled figures?
How are errors corrected in the aggregation process, including inaccurate data inputs or missing fields on incomplete forms?
How is completeness of reporting defined?
Are number of CHWs per supervisor available on reporting forms to calculate true completeness of reporting per month?
If a monthly form is submitted late, is this data aggregated with the month it was generated, or the current month’s data?
How often is a Data Quality Assessment (DQA) conducted?
Is the DQA conducted internally or externally?
Are there elements excluded from the DQA that could better inform the assessment?

5.3 Accuracy, Completeness & Quality

Describes data quality in the recording and aggregation process, including accuracy of data entry, how completely forms are filled, the proportion of CHWs reporting, and the availability and use of quality control checks.

Supplementary Appendix 2- iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
### 5.4 Data Aggregation
Describes the processes by which data is accumulated and compiled across different levels, and the granularity of iCCM data.

- At which steps in the data aggregation processes, from CHW, to supervisor, to district, can data aggregation and entry errors occur?
- What is the lowest level of granularity visible in the national or provincial-level electronic database of iCCM routine monitoring indicators? (i.e. health facility/supervisor, CHW)
- When data is aggregated at the supervisor, is this done by CHWs, supervisor, or both? Whose calculation is used for submission to the next administrative level?
- Who aggregates data at the district level? How is this done?

### 5.5 Data Transmission
Describes the data transmission processes at different levels, and responsibilities of stakeholders involved in these processes.

- What is the data transmission process at each level? Are there multiple mechanisms by which data or forms are delivered?
- Where is this transmission executed—at the community level or at the health facility?
- Who is expected to transmit data and forms from CHW to supervisor, and from supervisor to the next administrative level?
- Do CHWs drop off monthly forms with the supervisor, or does the supervisor review each form with the CHW when it is received?
- Is there a group meeting forum during which monthly forms are submitted between the CHW and supervisor?
- Are all iCCM data elements submitted by the CHW in the same format, or are some submitted electronically while others are submitted on paper?
- If a CHW is unable to submit their monthly form, how is this transmitted?
- What feedback loops exist to ensure data and information has been transmitted, received, and in necessary cases, acted upon?

### 5.6 Data Management & Storage
Describes how, where and in what format iCCM data is managed and stored.

- Is DHIS2 or a national online system used in the management of iCCM indicators?
- Is there any separate program, or physical or electronic database that stores only iCCM data?
- For data elements which can only be found in paper format, where are these forms stored?
<table>
<thead>
<tr>
<th>5.8</th>
<th>Data Use &amp; Usability</th>
<th>Describes if and how data is used in decision-making, and to what extent collected data is usable in generating useful information.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Questions</strong></td>
<td>Do CHWs or village health authorities use community-level data for decision-making? How?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this data is used, is the impact of iCCM assessed to better understand how to improve or change the organization of the local health system and/or PHC?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do supervisors or health facility staff use aggregate community-level data for decision-making? How? Is this standardized procedure, or are there guidelines dictating how this should be done?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can the instruments used for data collection generate pattern or trend information directly at the CHW or supervisor level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How is supervision data used?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Have district personnel, supervisors, and/or CHWs been trained in how to use this data, or the significance of indicators?</td>
</tr>
<tr>
<td>5.9</td>
<td>Data Communication</td>
<td>Describes how iCCM data is communicated to different stakeholders. This category is distinct from data transmission in that it does not address the physical transfer of data, but rather its interpretation and conveyance so that it is understood.</td>
</tr>
<tr>
<td></td>
<td><strong>Questions</strong></td>
<td>In what ways are iCCM data communicated (not simply transferred) to stakeholders at different levels, including community members, district staff, etc.?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do stakeholders and health providers visually present data to different members of their own level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are data trends visually represented, discussed or reported at the community level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are data trends visually represented, discussed, or reported at the health facility/supervisor level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What are the primary critical feedback loops in communicating iCCM data? Who are the stakeholders involved in these, and what are the gaps?</td>
</tr>
<tr>
<td>5.10</td>
<td>HMIS Guidelines &amp; SOPs</td>
<td>Describes the HMIS-specific guidelines and SOPs related to the availability, collection, transmission, and use of data for iCCM.</td>
</tr>
<tr>
<td></td>
<td><strong>Questions</strong></td>
<td>Are there clear designated roles and responsibilities defined for iCCM data collection and transmission procedures?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do country- or program-specific iCCM reporting guidelines exist for CHWs, supervisors, and district representatives?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Have district-level HMIS officers been trained in the entry and use of iCCM data?</td>
</tr>
<tr>
<td>5.11</td>
<td>Monitoring &amp; Evaluation (M&amp;E)</td>
<td>Describes the general Monitoring &amp; Evaluation of iCCM throughout the life of the program.</td>
</tr>
<tr>
<td></td>
<td><strong>Questions</strong></td>
<td>Does a comprehensive M&amp;E plan exist for iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does this the M&amp;E plan include program objectives and indicators for measurement and tracking progress?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How is data used, and which data is used, for M&amp;E objectives?</td>
</tr>
</tbody>
</table>
Does it include standardized tools for data collection, how often this information is to be collected, at which administrative levels, and the methodology of collection?

How does the M&E plan ensure that information collected during regular monitoring provides a holistic picture of program success or failure? In other words, how does the M&E plan inform managers that the program is operating as intended?

In what ways is impact measured? How is this defined, and what are the necessary data elements to assess this?

Is there an information dissemination plan under M&E? Is there a data use plan?

Does the program have or has it developed implementation strength indicators?

Does operational research and/or evaluation take place in the same setting of the area of practice?

How linked are the iCCM data transmission pipeline and the supply chain for iCCM products? What must be done to assure synchronicity between the two and a seamless transition of this in the case of program handover?

What other health programs exist that are internally or externally operated which rely on community data collection mechanisms? Can these be leveraged or combined for greater efficiency of iCCM? Can their data be used to support operations or inform program implementation?

Can mHealth devices or electronic devices be streamlined across different interventions for better community-level data collection?

Is there a "data collection burden" placed on CHWs and supervisors? How does presence of iCCM or inefficiencies in its processes contribute to this, and what steps is the intervention taking to mitigate this?

Supplementary Appendix 2: iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
## Domain 6: Commodities & Supply Chain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Domain No.</th>
<th>Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Commodities Supply Chain</td>
<td>6.1</td>
<td>Drugs &amp; Commodities</td>
<td>Describes medical products and related materials, including drugs, testing devices, supplies, and other commodities required for the diagnosis and treatment of conditions within the iCCM package.</td>
<td>• Are all key iCCM medicines &amp; diagnostics registered with the National Regulatory Authority (NRA) or similar agency? • Are all iCCM medicines and commodities included in country’s Essential Drug List? • What are the categories and brands of materials and commodities designated for iCCM? • Are these brands or formulations different than their counterparts available in public government health facilities? • What specific diagnostic instruments and tools are required for iCCM services? • What instruments are necessary in the testing of pneumonia? • What is the guaranteed lifespan of these instruments and tools? Is this information taken into consideration in their selection and the resupply plan? • What other supplies and materials are required for diagnosis and treatment of cases? (i.e. water bottles, cups, mid-upper arm circumference (MUAC) measurement material, receptacles for sharp waste, etc.)</td>
</tr>
<tr>
<td>6.2</td>
<td>Quantification</td>
<td></td>
<td></td>
<td>Describes the processes underlying the calculations for the amounts of required drugs and commodities intended for iCCM.</td>
<td>• How often are quantifications for iCCM medicines and supplies performed? • How are quantities of medicines and commodities procured from international suppliers calculated? Are there SOPs determining these? • What specific criteria are procurement and resupply calculations based upon? Do these account for population, seasonality, case rates, number of CHWs, their distribution, among others? • Are individual needs of CHWs calculated and aggregated per supervisor? Is this information used in quantification calculations? • Are quantities intended for downstream iCCM stakeholders based on fixed amounts, or do these vary based on certain criteria? • How are stockouts reported? As the number of CHWs stocked out per month; number of days CHW stocked out of key products; number of stocks received and stocks consumed; or the number of untreated or referred patients due to stockout? How is this information collected for tracking-at CHW level or supervisor level?</td>
</tr>
<tr>
<td>6.3</td>
<td>Procurement</td>
<td></td>
<td></td>
<td>Describes the processes by which these drugs and commodities are procured.</td>
<td>• Has a standard procurement plan for iCCM commodities been developed? If so, where is this documented? • What is the procurement process, and which actors and entities are involved in this? • Is there a public-private partnership encompassing the supply of drugs and commodities? • What are the sources or manufacturers of each drug and commodity? Are these the same as for government-procured commodities and supplies?</td>
</tr>
</tbody>
</table>
### Distribution & Transport
Describes the transportation and distribution mechanisms of iCCM drugs and commodities.

- From where are diagnostic equipment, tools and supplies procured?
- What information gaps affect procurement and resupply procedures?
- By what mechanisms are medicines and commodities transported and distributed from the national level to the community level? Outline each step.
- Who are the main actors and entities implicated in these distribution processes? Are these always the same, or are different stakeholders responsible for the same role?
- To what extent are these roles government-, program-, or privately operated? To what extent are ministry staff involved in the distribution of iCCM supplies?
- Are pre-existing distribution channels used in the transport of iCCM supplies and drugs, or are there separate iCCM-specific distribution mechanisms in place?
- Does distribution of iCCM commodities occur in conjunction with or independent of the resupply of government facilities with general health commodities?
- With what frequency are drugs and commodities expected to be distributed to each restocking point? To what extent does the frequency align with demand?
- With what frequency are drugs and commodities expected to be fetched at each restocking point? To what extent does the frequency align with demand?

### Inventory & Storage
Describes the inventory control system and storage practices for iCCM products.

- Where are iCCM commodities stored at the district, facility, and community level?
- Are storage conditions of iCCM products assessed? How often is this done, and by whom?
- Has a standard inventory control system for iCCM commodities been developed? If so, where is this documented?
- Do these align with national standards?
- Do all CHWs practicing iCCM have access to a standardized drugbox for storage of supplies? Who is expected to supply a drugbox?

### Resupply & Allocation
Describes the frequency of and calculations by which iCCM product allocations are determined for stakeholders at different administrative levels, and the processes governing their resupply.

- Has a standardized resupply logistic system for iCCM drugs and commodities been developed?
- With what frequency is each level in the logistic chain expected to be restocked with drugs and supplies? To what extent are these rates respected/observed?
- Is drug restocking based on a push or pull system? Does this mirror resupply procedure for other community-based commodities?
- Do supervisors determine overall monthly allocations for CHWs?
- If so, how do supervisors determine how much to allocate to their CHWs? How are CHW resupply stocks calculated in general?
- What factors and data are used to calculate district allocations of iCCM commodities to supervisors intended for CHWs?
- Does each level calculate a buffer stock? Upon what criteria is the buffer stock calculation based? Are these orders fulfilled regularly?
<table>
<thead>
<tr>
<th>6.7</th>
<th>Availability &amp; Stockouts</th>
<th>Describes how drug stockouts are handled at different administrative levels, and factors affecting regular availability of drugs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• What is the physical mechanism by which CHWs are resupplied with medicines and commodities? (i.e. delivery, pickup, meetings) Does this ever vary?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How are resupply notifications transferred? In what forms and by what mechanism?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do districts pharmacists use disaggregated stock use data to determine procurement requirements per CHW?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do district pharmacists examine trends of CHW-specific commodity use, and is there a mechanism to do this?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do district pharmacists use any other information or forms outside of monthly summary forms to determine iCCM drug procurement requirements for their districts?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What information or communication gaps affect the regular availability of drugs and commodities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How are stockouts of iCCM commodities handled at each level? How are stockouts communicated to the next procuring level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What mechanisms are triggered at these levels to resupply drugs? How quickly does this occur?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are sufficient stocks intended for health facility use available at health facilities such that community iCCM stocks are not used?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are CHWs expected to continue to provide iCCM services when they are stocked out of key commodities? Do registry forms provide a section that documents this?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What factors drive stockouts at different levels? (i.e. insufficient supply, overwhelming demand, poor distribution of iCCM-practicing sites, oversized catchment populations, erratic seasonal changes in morbidity, poor documentation, etc.)</td>
</tr>
<tr>
<td>6.8</td>
<td>Commodity Quality &amp; Sustainability</td>
<td>Describes the quality and efficacy of drugs provided through the iCCM program, and its continuity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are any of the drugs within the iCCM profile susceptible to drug resistance? If so how does this affect the supply chain, especially in the case of program handover?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is drug resistance tracked, especially for antimalarials and antibiotics?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What is the efficacy and robustness of the different iCCM commodities offered through the iCCM package? Could these change? If so, how?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are the drugs offered as a part of the iCCM portfolio of the same or differing quality than those offered through the routine health system?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How can the sustained quality of commodities be assured?</td>
</tr>
<tr>
<td>6.9</td>
<td>Protocols, Guidelines, Manuals &amp; SOPs</td>
<td>Describes the availability and existence of guidelines, training tools, protocols, and SOPs related to the different steps in the supply chain of iCCM products.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are there protocols, guidelines, or SOPs for district pharmacists for the supply chain procedures for iCCM products? Are these separate than normal guidelines for commodities intended for health facilities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are there standardized protocols and guidelines for supervisors in the calculation or resupply stocks and distribution iCCM products to CHWs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Are district pharmacists trained in iCCM drug allocation and distribution procedures? Is this standardized across districts, and are training tools readily accessible to them?</td>
</tr>
</tbody>
</table>
6.10 Systems Considerations

Describes some supply chain-specific considerations for the overall health system, and synergies between domains.

- Is there an existing logistic management information system that incorporates iCCM?
- What data gaps exist that affect the adequate procurement and quantification of drugs and supplies?
- How is mHealth used in the documentation, quantification, and resupply of drugs and commodities? What are the advantages and disadvantages of this?
- Does the supply chain for iCCM commodities operate in parallel to the country’s existing procurement and delivery system?
- Are there national regulatory supply chain policies that exist that govern how iCCM supplies are procured, distributed and allocated?
- Are commodities supplied by different sources? List these sources.
- Do commodities for iCCM overlap with those of other community programs?
- In communities where supply is not commensurate with demand, are there contextual or social factors which may contribute to this?
### Domain 7: Service Delivery

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Service Delivery</td>
<td>7.1</td>
<td>Availability &amp; Accessibility</td>
<td>Describes the location of iCCM practice and the service delivery schedule maintained by the CHW.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Are CHWs required to reside within the communities they practice iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Have strict definitions of CHW availability been outlined in program documentation?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Do CHWs offer iCCM services outside of their post or catchment area, or treat individuals that are not from their catchment area? Are there guidelines that define these?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• How many days per week and hours per day are CHWs expected to perform iCCM services? Do CHWs designate days and hours for the provision of iCCM services, or are CHWs expected to provide services at any time/day?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Does this vary between communities or is this standardized across the iCCM program?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Is this enough to provide effective coverage within their catchment areas? How has this been measured?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Is this schedule feasible for CHWs to maintain?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Does the defined iCCM service delivery schedule align with the CHW’s actual service delivery times and hours? Do CHWs generally practice iCCM outside established hours and days of practice?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Who developed the iCCM service delivery schedule?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Are caregivers aware of this schedule?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Do caregivers respect this iCCM service delivery schedule, or are CHWs expected to be available outside of these days/times? In other words, what is both the caregiver and official expectation of CHW availability to perform iCCM services relative to their chosen availability?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Are CHWs expected to be on-call between certain hours? Are there guidelines which define communication expectations between CHWs and caregivers?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Are CHWs expected to provide their contact information to all caregivers within their catchment area?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Where are CHWs expected to provide services? Do standardize guidelines exist regarding where CHWs are expected to practice?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Do CHWs provide services out of physical structures, such as their homes, village clinics, public structures (i.e. school or hall)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Do CHWs practice iCCM in a public space or outdoors (i.e. outdoor community or personal space)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• What does a caregiver do in the case of the unavailable CHW? Is this communicated to the caregiver?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Is the CHW’s place of practice easily accessible within the community?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Do CHWs provide services out of a roofed structure? Do guidelines or regulations exist regulating the minimum required structural standards for the provision of iCCM services?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Are there other infrastructural requirements (such as sharp and general waste disposal, water infrastructure) that are defined in program guidelines?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Is there anything about the CHW’s place of practice that would disincentivize caregivers to seek services provided by the CHW, or the ability or desire of the CHW to practice iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• If the CHW practices out of their home, how does this affect availability of iCCM services? What are the advantages and disadvantages of this for the CHW and community?</td>
</tr>
</tbody>
</table>
### 7.2 Assessment, Testing & Treatment

Describes the CHW’s core service delivery package of iCCM activities, including diagnostics, testing, and treatment.

- Do standardized algorithms exist for the assessment, testing, and treatment of fever, diarrhea, and cough and fast breathing by CHWs?
- Does a plan for rational use of medicines exist?
- Do iCCM service delivery protocols align with national standards for assessment, testing and treatment of defined illnesses?
- Are RDTs used to test for malaria?
- How is pneumonia diagnosed through respiratory rate counting, pulse oximetry, or other methods? What are the challenges associated with chosen pneumonia diagnostic methods?
- How are comorbidities handled during the diagnostic process?
- How do protocols, guidelines and algorithms address the potential of failure-to-refer, especially in the case of difficult-to-diagnose severe cases (i.e. severe pneumonia)?
- Are CHW service delivery manuals and protocols available to all actors at all levels? Are these available electronically?
- Do protocols, algorithms, plans, and guidelines emanate from the ministry of health, or are these partner program documents? Do they align with country policy, or exist as separate program documents?

### 7.3 Referral & Adherence

Describes the referral and counter-referral systems, and the protocols for confirming referral adherence by the CHW.

- Does a standardize referral and counter-referral system exist?
- Have referral guidelines been developed? Where can these be found (i.e. policy documents, program documents, etc.)
- Are the preexisting referral mechanisms for CHWs at service delivery point?
- Which conditions fall outside iCCM service delivery and are therefore referred?
- What are the mechanisms by which a CHW can confirm that a caregiver has adhered to referral?
- What are the mechanisms by which a district official or supervisor can confirm that a caregiver has adhered to referral? (for data-quality purposes)
- Is referral adherence confirmation dependent upon follow-up?
- How are the data collection system and referral adherence system interlinked? Can this data be accurately derived from existing records at district and/or national level?
- What mechanisms are in place to support or encourage referral? (i.e. Transportation, reduction in service fees at select health facilities?)

### 7.4 Follow-Up

Describes SOPs for follow-up by the CHW, and defined expectations for the service provider and caregiver for follow-up.

- How are follow-up visits organized? Are CHWs expected to make home visits, or are caregivers expected to appear at the CHW?
- How are follow-up visits tracked?
- Are caregivers only expected to follow up with CHWs after a referral is made?
- In the case that a physical follow-up assessment of the child is not performed, how is this recorded? Differentiate between expectation or policy, and what is normally actually done.
7.5 Quality Assurance

- Describes the quality assurance mechanisms that are in place to ensure appropriate case management.
- How is Appropriate Case Management defined for each condition?
- How is quality of care measured?
- To what extent are caregiver experiences integrated into assessments of quality of care?
- Is there a way to track this for each symptom/condition? (For example, by examining registry data can one track appropriate diagnosis and treatment of cough/fast breathing?)
- What quality control checks are in place at different steps of the care continuum or service delivery algorithm to ensure timely and appropriate care?
- Is there a plan to conduct Quality of Care Assessments? If so, who conducts these, and how often are they to be performed?

7.6 Prevention Activities

- Describes prevention activities such as IEC as part of the CHW's package of services, if at all.*
- Are Information, Education, Communication (IEC) or prevention activities considered a core part of CHWs' terms of reference (ToR)?
- If so, how are these organized, and how often are they expected to occur?
- Do these overlap with other CHW program activities?
- What are the advantages and drawbacks of including prevention as a core part of the CHW’s activities for iCCM?

7.7 Systems Considerations

- Describes some service delivery-specific considerations for the overall health system, and synergies between domains.
- How does service availability in communities affect, strengthen, or compromise the relationship of caregivers and the community with local health facilities, and the overall primary healthcare system?
- How is residency or a separate clinic structures associated with availability? How is community support associated with residency or place of practice?
- How are other health personnel that are dependent upon for-profit services for remuneration affected by the provision of free services within communities?
- How are non-national residents of communities and ad-hoc settlements (i.e. refugees and asylum-seekers) treated with regards to their access of iCCM services?
- How is denial of services to non-qualifying recipients of care at community-level (i.e. older than 5 years) viewed from an ethical vantage point?
- Do local community structures support or help coordinate referrals?

*General IEC within the context of the full iCCM program is examined in the Community & Social Mobilization domain.
Domain 8: Human Resources

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain No.</th>
<th>Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Human Resources</td>
<td>8.1</td>
<td>Terms of Reference (ToR)</td>
<td>Describes core responsibilities and expectations of the CHW, including their tasks, schedules, and what services and inputs they are expected to provide.</td>
<td>• What services and activities are iCCM-practicing CHWs expected to provide, including and beyond basic iCCM services? (i.e. pick up drugs, deliver forms, prevention activities, mobilization activities, etc.) Are these services and activities explicitly outlined in documentation agreed upon by the CHW? • What is the additional work burden of iCCM-practicing CHWs? i.e. How many other programs are iCCM-practicing CHWs involved in? How much time are CHWs expected to devote to these separate services? • What is the time allocation for iCCM that is outlined for CHWs? Are CHWs expected to provide iCCM services within a certain time frame or in accordance with a predetermined schedule? • Who determines time allocated for iCCM activities? • Are CHWs expected to be present at home at all times to receive patients? Are they expected to receive night calls? If so, is this explicitly outlined in documentation agreed upon by the CHW? • Are CHWs expected to provide their own finances, equipment, transport or other inputs towards the realization of iCCM activities? If so, is this explicitly outlined in documentation agreed upon by the CHW? • Are CHWs expected to know the total number of people and/or children under five in their catchment population, or report on changes in the population? • What are the roles and responsibilities that fall inside and outside the terms of reference of the CHWs? • Are supervisors expected to incorporate supervision of iCCM activity of CHWs as a regular part of their routine activities? Is this agreement done through spoken or written contract? • Irrespective of whether the CHW is a volunteer or governmental employee, are international labor standards respected in the determination of their terms of reference, including activities and time allocation towards these? • Are there any competing priorities that may override iCCM tasks among CHWs? • Are supervisors able to integrate iCCM activities into their existing ToR?</td>
</tr>
<tr>
<td>8.2</td>
<td>Qualifications, Recruitment, &amp; Selection</td>
<td>Describes the defined selection criteria of the CHW position, how CHWs are recruited to submit their candidature, and the selection processes employed.</td>
<td>• How are CHWs chosen? Does a standardized recruitment and selection process exist? • To what extent do local leaders, village chief(s), and the community influence who is chosen as a CHW? • Is the selection process performed democratically (i.e. by vote)?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8.3 Training

**Supplementary Appendix 2 - iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>If so, are votes cast anonymously (i.e. blind ballot), or publically (i.e. by a show of hands)?</td>
</tr>
<tr>
<td>Is the selection process performed in a public forum? If so, is the audience relatively heterogeneous, or are there more likely to be representatives of a certain demographic participating in selection?</td>
</tr>
<tr>
<td>Are steps taken to encourage gender balance in the recruitment process?</td>
</tr>
<tr>
<td>To what extent do caregivers represent the selection committee? Are there measures in place to ensure their representation?</td>
</tr>
<tr>
<td>Who conducts or presides over the selection process? Could this influence who is chosen?</td>
</tr>
<tr>
<td>How are supervisors chosen to be supervisors of iCCM-practicing CHWs?</td>
</tr>
<tr>
<td>To what extent do supervisors possess different qualifications than CHWs? Is this distinguishable through certification and/or training?</td>
</tr>
<tr>
<td>What are the recruitment and selection criteria for CHWs? Do these include certain educational requirements, village residency requirements, literacy requirements, gender or job requirements, or life-situation requirements?</td>
</tr>
<tr>
<td>What are the unintended consequences of over- or under-qualified recruitment criteria for staff?</td>
</tr>
<tr>
<td>What criteria are CHWs expected to fulfill before application and selection to the position?</td>
</tr>
<tr>
<td>Are those well-connected with influential community leaders more likely to be selected over someone who is better suited to the role, and does the selection process instigate measures to mitigate this likelihood?</td>
</tr>
<tr>
<td>What content are iCCM training packages comprised of, and what knowledge and skills are CHWs and supervisors expected to possess after training?</td>
</tr>
<tr>
<td>How long are training sessions for CHWs and supervisors, and what is their spacing during initial iCCM training? Is this standardized and/or guided by national guidelines?</td>
</tr>
<tr>
<td>How often do refresher trainings occur?</td>
</tr>
<tr>
<td>With what frequency are training sessions conducted?</td>
</tr>
<tr>
<td>Do supervisors receive training on supervision and personnel management skills, beyond basic training for supervision of activities?</td>
</tr>
<tr>
<td>Have supervisors been trained in IMCI?</td>
</tr>
<tr>
<td>How is knowledge and skills retention of CHWs and supervisors tracked and measured?</td>
</tr>
<tr>
<td>8.4</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.5</th>
<th>Mentorship</th>
<th>Describes the continuous practices of skills-building mentorship to CHWs by qualified personnel. This is distinct from refresher training.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Is there a mentorship structure in place for the training of CHWs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If so, how is mentorship executed and by whom?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How often are CHWs expected to be mentored, and to what extent is this schedule respected?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What are the primary reasons for lack of mentorship or poor mentorship?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How can consistent, quality mentorship be arranged to support continuous capacity building of CHWs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How can mentorship be leveraged for stronger links between the community, CHW; and health facility staff?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.6</th>
<th>Peers Support Groups &amp; Cluster Meetings</th>
<th>Describes the different opportunities for key iCCM stakeholders to congregate and exchange information and knowledge in a group setting, including peer support groups and cluster meetings.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• What are the primary forums where supervisors and CHWs meet amongst their peers to exchange information at community, health facility and/or district level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do CHWs meet in peer support groups or cluster meetings format?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Does the iCCM HR strategy incorporate a CHW head or captain for the purposes of organizing group meetings between CHWs?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How often and where are these meetings expected to occur, and how are these organized and reported?</td>
</tr>
<tr>
<td>Section</td>
<td>Topic</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>8.7</td>
<td>Retention &amp; Attrition</td>
<td>Describes the strategies and challenges involved in retaining CHWs to practice ICCM.</td>
</tr>
<tr>
<td>8.8</td>
<td>Compensation, Benefits, &amp; Incentives</td>
<td>Describes the salary models and various incentives provided to CHWs for their services. Describes how incentives and benefits are perceived and expected, and their channels for distribution.</td>
</tr>
</tbody>
</table>

- Is problem-solving, data review, and idea exchange a core component of these group meetings?
- How are these meetings documented and monitored?
- What are the potential benefits of peer support group meetings, and how can these be leveraged to accomplish other tasks by ICCM stakeholders?
- Are there identifiable retention strategies incorporated in the ICCM program plan?
- Does program strategy favor training and retention of CHWs for long durations, or high turnover of CHWs?
- Does the former model impose economic or development challenges on CHWs? Are there measures in place to address these?
- What is the attrition rate of CHWs, and what are the primary reasons attributed to this?
- How does the retention model for ICCM-practicing CHWs affect the sustainability of the program?
- How are CHWs incentivized to perform ICCM services? Which of these are intrinsic and which of these are extrinsic?
- How does the program differentiate between salary, compensation to cover expenses related to the program, inputs to perform program activities, material benefits, and intangible incentives for performing ICCM activities for CHWs?
- Are stipends framed as financial benefits to the CHW?
- Are stipends a set sum or do they waver depending upon expenses incurred?
- Are stipends sufficient to cover CHW and supervisor expenses related to ICCM activities?
- If CHWs are compensated, do these funds originate from government funding, project funding, a combination of these, or multiple funding sources? What are the advantages and disadvantages of this?
- What non-monetary tangible incentives are provided to CHWs performing ICCM services?
- Which of these are expected to be provided by the program, and which are expected to be provided by the community?
- Are there intangible incentives associated with performing the CHW role? What are these?
- Is there an incentive structure where packages increase the longer the CHW performs ICCM activities?
- Do supervisors receive any benefits or financial reimbursement for performing supervision of ICCM activities? Do supervisors expect any benefits?
<table>
<thead>
<tr>
<th><strong>8.9</strong> Support, Tools &amp; Resources</th>
<th>Describes what kind of human resource tools and support mechanisms are available to CHWs and supervisors through the intervention.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What support mechanisms or channels are available to CHWs and their supervisors?</td>
<td></td>
</tr>
<tr>
<td>• Do forums exist where CHWs and supervisors can vocally express their concerns? How is information regarding concerns transferred to the district?</td>
<td></td>
</tr>
<tr>
<td>• What kinds of tools and resources are provided to CHWs and their supervisors to support them in performing iCCM activities?</td>
<td></td>
</tr>
<tr>
<td>• In what way are specific challenges related to gender differences taken into consideration when providing support to stakeholders performing iCCM?</td>
<td></td>
</tr>
<tr>
<td><strong>8.10</strong> Professional Advancement</td>
<td>Describes what kind of career path or certification the program provides, if any, for CHWs practicing iCCM or their supervisors.</td>
</tr>
<tr>
<td>• Does a plan for upward career mobility exist for the CHW or supervisor?</td>
<td></td>
</tr>
<tr>
<td>• Is career development, certification, or extended capacity building built into the framework of CHW training?</td>
<td></td>
</tr>
<tr>
<td>• Is upward career mobility for the CHW or supervisor framed as an incentive for individuals to become CHWs, add iCCM supervision duties, or participate in iCCM activities?</td>
<td></td>
</tr>
</tbody>
</table>

Supplementary Appendix 2 - iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
## Domain 9: Caregivers, Community & Social Mobilization

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain</th>
<th>Category No.</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Caregivers, Community &amp; Social Mobilization</td>
<td>9.1</td>
<td>Local Structures Engagement</td>
<td>Describes how local figures and influential groups, such as traditional leaders and village chiefs, are engaged in the planning and implementation of iCCM.</td>
<td>• Have traditional leaders, local authorities, and local chiefs been contacted and/or are actively engaged in the planning or implementation of iCCM mobilization activities? • How specifically is the village head or chief(s) involved in the implementation of iCCM activities, and the support of the CHW? • How are other local governance structures involved in support and implementation of iCCM? • Have any of these local actors and structures been recruited to provide financial, political, or material support for the continuation of the program? • If not, what evidence is there that demonstrates support from traditional structures and leaders for iCCM? • How will the engagement of traditional leaders and/or committees be ensured after program handover? • How do the traditional leaders and or committee perceive their roles in engaging with the larger community members for ownership and sustainability of iCCM?</td>
</tr>
<tr>
<td>9.2</td>
<td>Awareness &amp; Information Dissemination</td>
<td></td>
<td></td>
<td>Describes the understanding that caregivers and the community have towards CHWs and their roles, the iCCM program and its intent. It also describes IEC activities and communities’ participation in these.</td>
<td>• Are targeted caregivers and the community aware of iCCM services, the intended treatment group and targeted conditions, and why? • Do targeted caregivers and the community understand the intention behind iCCM, and why the treatment group and targeted conditions are rigidly defined? • Are targeted caregivers and the community aware of the CHW and their status as either a volunteer or a remunerated service provider? • Are the community and caregivers aware that the CHW has been trained by certified authority? • Are targeted caregivers and the community aware of the benefits and constraints of the program? • Are targeted caregivers and the community aware of what the CHW can and cannot do, and why? • Do caregivers and/or community members actively participate in information dissemination, communication and/or prevention activities? • Who is the primary audience for IEC activities- mothers, village leaders, or all community members of all genders? • What are the channels for disseminating social mobilization information? • Are IEC materials developed in the local languages using local context? • Are there identified community champions who can attest to the efficacy of the services provided by the CHW who can be a part of the IEC campaign?</td>
</tr>
</tbody>
</table>
9.3 Careseeking, Knowledge & Behavior

Describes caregivers’ tendencies, behaviors and careseeking practices; barriers to careseeking; and their understanding of the symptoms and causes of the illnesses covered in the iCCM package.

- Can caregivers within target areas actively recognize and differentiate between different childhood diseases, their causes, their symptoms, their treatment and preventative methods?
- What practices do caregivers within target areas generally undertake to prevent diarrhea, pneumonia, and malaria, and ensure the health of their child?
- What practices of caregivers within target areas can cause diarrhea, pneumonia, or diarrhea in children, or aggravate or worsen their symptoms?
- If caregivers within target areas choose to manage illness within the home, what home management behaviors do they practice?
- What barriers to careseeking exist within communities?
- What providers do caregivers prefer and why?
- What is non-careseeking primarily attributed to? Does iCCM as designed address this gap?
- Does the presence of free services and treatment in the community delay careseeking to a health facility in the case of CHW absence or drug unavailability?

9.4 Need, Demand, Acceptability, and Use

Describes the demand for iCCM services and how this is related to actual demonstrated community need, and how social mobilization is tied to acceptability, buy-in and use of the intervention.

- Is there a social mobilization plan guiding the creation and implementation of informed demand in the communities?
- What drives the underlying need for iCCM? Is this due to: distance or accessibility of the health facility; ill-equipped health facilities; inability to pay for services/transport; general lack of awareness of child health issues; poor careseeking at existing sources of care; a combination of these or other reasons?
- Is demand for iCCM commensurate with services provided?
- Is iCCM acceptable to caregivers when provided by CHWs? Why or why not?
- How do mobilization strategies for iCCM encourage sustained acceptability and buy-in by communities & local patrons for continued financial support?
- How do mobilization strategies influence use?
- How is iCCM used within the community? Is it perceived as a replacement of primary health care services for children, or as supplement to existing health infrastructure?

9.5 Treatment & Referral Adherence

Describes caregivers’ adherence to referral and prescriptive iCCM treatments in domicile (where applicable), and challenges related to these.

- What are the primary reasons for non-adherence to referrals? How has the mobilization strategy attempted to address this?
- How is the tracking system for referral adherence designed, and is this conducive to caregiver participation?
- How are transport and financial constraints associated with non-adherence to referral mitigated through iCCM or its mobilization strategy?
- Are caregivers expected to administer any continuation of treatment at home? If so, do they follow through with the full course of treatment?
- Are caregivers aware of follow up expectations with the CHW, both post-treatment and after referral?

Supplementary Appendix 2 - iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
<table>
<thead>
<tr>
<th>9.6</th>
<th>Mobilization, Support &amp; Community Engagement</th>
<th>Describes the iCCM social mobilization strategy deployed, its stakeholders, processes, content and messages.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Have mobilization efforts practiced needs assessment of specific communities to determine in what ways the community can best support the CHW or iCCM activities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Were the project beneficiaries informed about their roles and responsibilities in the successful implementation and sustainability of the program?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Who are the most appropriate actors to be trained as social mobilizers, (i.e. CHWs, supervisors, independent recruits) and how do these liaise with key iCCM stakeholders?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have mobilization efforts encouraged financial or material support for CHWs or iCCM activities by members in target communities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have mobilization efforts encouraged the provision of services to support the CHW or iCCM activities? (i.e. babysitting, community works, farmhand help)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have mobilization efforts encouraged the provision or development of housing or iCCM service delivery facilities by the community?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Have mobilization efforts encouraged the provision of goods or tokens of support or appreciation by local authorities or members in target communities?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• By what mechanisms is the continuity of such support ensured?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do mobilization efforts present such community support as mandatory or simply encouraged?</td>
</tr>
<tr>
<td>9.7</td>
<td>Local Oversight and Health &amp; Development Committees</td>
<td>Describes how local development structures such as health and development committees are developed, revived, or included in the rollout of iCCM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do any form of community-based organizations, or village health or development committees exist? If not, does the intervention mobilization plan intend to develop these?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How does the iCCM community mobilization plan promote, develop or encourage existing local health and development committees?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Who are these governed by, who are they composed of, how often do they meet, and what are their terms of reference?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Who are the members of these committees? Are CHWs, Social Mobilizers, caregivers, the CHW supervisors, village heads and/or traditional leaders involved, and if so what are their respective roles?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do these actually meet regularly, and how is this recorded?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How do these committees specifically demonstrate support for iCCM, for example, through political championing, appeals for financial or material support?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What structures are in place to ensure the continuity of iCCM within their agendas?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What mechanisms are in place to ensure their sustained use over time?</td>
</tr>
<tr>
<td>9.8</td>
<td>Ownership</td>
<td>Describes the extent to which caregivers and community members have adopted iCCM as a locally-owned community good.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How does the mobilization strategy engender ownership of iCCM?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• How do communities perceive the iCCM intervention? Were their roles and responsibilities clearly defined at the onset of the program?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do community members view iCCM as an intervention that they own and actively participate in, or rather as an imposed intervention?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• What structures, forums, and behaviors are demonstrative of community ownership of iCCM?</td>
</tr>
</tbody>
</table>
## Domain 10: Systems Software

<table>
<thead>
<tr>
<th>Domain No.</th>
<th>Domain</th>
<th>Category</th>
<th>Description</th>
<th>Critical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>System</td>
<td>Accountability &amp; Enforceability</td>
<td>Describes the mechanisms and social contracts that ensure that stakeholders in iCCM are accountable to each other.</td>
<td>To what actors and entities are different iCCM stakeholders accountable? It may be useful to map these connections. What accountability and enforceability mechanisms exist within the iCCM intervention to ensure that activities are carried out according to program standards?*</td>
</tr>
<tr>
<td>10.1</td>
<td>Software</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appreciation &amp; Recognition</td>
<td>Describes the CHWs’ perceptions of being acknowledged, recognized, and appreciated for the work they perform in the context of iCCM.</td>
<td>In what ways are CHW’s roles recognized by their catchment communities? In what ways do CHWs express feeling that their role is recognized by their catchment communities? How important is this to the CHW to carry out their roles? Do caregivers generally understand and acknowledge the CHW’s status as a volunteer? How does this affect how the caregiver may interact with the CHW? Is there an awareness, acknowledgement and/or recognition of their work burden and terms of service? How might caregiver perceptions of the CHW’s role affect how the caregiver interacts with the CHW, CHW morale, and their ability to carry out CHW activities?</td>
</tr>
<tr>
<td>10.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Capital &amp; Prestige</td>
<td>Describes the social capital and prestige associated with the position of the CHW within the community.</td>
<td>What forms of social capital, such as social status and prestige, are associated with the position of CHW? How is this influenced or encouraged by the program? Do CHWs report feeling respected (beyond their role being recognized and appreciated)? What program elements exist to encourage this, if any? Is the CHW role designed to provide CHWs with a voice in local governance or decision-making? How can this affect the motivation of the CHW and/or their ability to carry out iCCM activities? Is the iCCM intervention dependent upon social capital provided to the CHW to function effectively?</td>
</tr>
<tr>
<td>10.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication &amp; Cooperation</td>
<td>Describes the effect and value of effective communication and cooperation between stakeholders within iCCM.</td>
<td>How important is effective communication between CHWs and supervisors to the performance of iCCM? Why? How is communication and cooperation between CHWs supervisors encouraged? What are obstacles to this?</td>
</tr>
<tr>
<td>10.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 10.5 Morale, Confidence & Esteem

Describes CHW’s perceptions and feelings of confidence, esteem and personal morale as they relate to their intrinsic motivation. It also describes potential demotivating factors.

- To what extent is the program dependent upon intrinsic CHW motivation to perform iCCM activities?
- How does the morale, confidence, and motivation and CHW affect this intrinsic motivation?
- What intangible factors can affect the morale of the CHW?
- What different intangible benefits does iCCM provide to CHWs?
- What factors, obstacles, or challenges could be considered demotivating factors? Could these include financial, commodity-related, work burden, or intangible reasons?

### 10.6 Power & Agency

Describes the clout and influence that stakeholders have within the iCCM intervention, and how they exercise these powers over others.

- To what extent do district managers exercise power implementing iCCM?
- To what extent do they exercise power over supervisors? How does this affect the implementation of iCCM?
- To what extent do supervisors exercise power in implementing iCCM?
- To what extent do they exercise power over CHWs? How does this affect the implementation of iCCM?
- To what extent do CHWs have agency within the iCCM intervention? In which ways do they not?
- What other entities and agencies exercise power within iCCM?

### 10.7 Expectations

Describes the expectations of stakeholders within the iCCM intervention.

- Do caregiver expectations of the role of the CHW affect how the CHW performs iCCM services?
- Do caregiver expectations of treatment affect the CHW’s ability to perform iCCM effectively?
- Do CHW and supervisor expectations of what the program does and does not provide affect the performance of activities? How?

### 10.8 Culture, Religion, Values, & Norms

Describes cultural and religious norms and values of CHWs and communities and their effect on iCCM implementation.

- How do religious and cultural norms influence CHWs interactions with caregivers and their communities? Their supervisors?
- How do religious and cultural values affect the way iCCM is rolled out?
- Do religious or cultural norms impose gatekeepers to the success of the iCCM intervention, or social networks that could be capitalized upon for its success?

### 10.9 Gender Equity

Describes specifically gender norms and issues of gender equity as they relate to the iCCM intervention.

- Does the program attempt to incorporate principles of gender equity as a part of its strategy?
- Do gender disparities appear in recruited CHWs performing iCCM? How could this affect their activities and service delivery?
- How do gender norms affect how iCCM is rolled out and its potential effectiveness?
| 10.10 | Trust | Describes the wariness, skepticism and confidence stakeholders have with each other, and how this influences how ICCM operates. | - How does the program determine, measure, or assess community and caregiver trust of CHWs?
- To what extent is the ICCM intervention dependent upon trust? How?
- What might CHWs, supervisors, and caregivers be wary or skeptical of with regards to the ICCM intervention, and each other? How might this influence the ICCM intervention and its outcomes?
- Is there top-down confidence or trust of CHWs demonstrated by supervisors, health facility staff, or district managers in CHW?
- Does caregiver trust influence the implementation and potential outcomes of ICCM? In what ways?
- Is supervisor trust in the CHW’s capacities necessary to effective implementation?
- Are there potential programmatic limitations which may undermine the trust that caregivers place in their CHWs?
- How does the ICCM strategy engender trust among lower-level stakeholders?
- Do caregivers trust the diagnostic instruments, test results, and/or the quality of drugs used in the treatment of their child? How might this influence the ICCM intervention and its outcomes?
- Are CHWs trusted by the health professional staff? How does this affect ICCM services? |
| 10.11 | Guilt & Pressure | Describes how stakeholders may be beholden to each other outside of accountability and enforceability mechanisms. | - To what extent may CHWs feel pressured by or beholden to their communities? Their supervisors?
- Is caregiver pressure to treat in the absence of a diagnosis a viable concern? How does the program prepare CHWs to handle this? |
| 10.12 | Satisfaction | Describes satisfaction of ICCM stakeholders performing their roles, including the recipients of care | - How is satisfaction of CHWs important to the ICCM intervention? Supervisors?
- How is the satisfaction of caregivers important to the ICCM intervention?
- Does the ICCM strategic plan take service provider and care recipient satisfaction into consideration? In what ways? |
| 10.13 | Altruism & Desire to Contribute | Describes the desire of service providers to participate in ICCM to contribute to a perceived higher cause, without expectation of reward. | - To what extent is the success of ICCM dependent upon the CHW’s personal altruistic desire to contribute to the communities that they serve? |
10.14 Fear
Describes how fear may influence decision-making among CHWs performing iCCM, and caregivers from seeking care.

- How and to what extent might fear influence CHWs to continue providing services even in the event that they are no longer able?
- How might fear dissuade community members from seeking services from CHWs?

10.15 Stigma
Describes if and how stigma may be used inadvertently within iCCM, and how CHWs or other stakeholders may experience stigma.

- Is stigma ever used to guide behavior change?
- Are caregivers who seek free iCCM services stigmatized based on their socioeconomic class?
- Do CHWs or caregivers face other forms of stigma within their communities? If so, how and why?

10.16 Willingness to Pay
Describes the willingness to pay for child health services by caregivers. This is also framed as the extent to which CHWs and supervisors are willing to contribute personal funds for the operation of iCCM activities.

- What is the willingness to pay for housing, village clinics, fuel, transport, supplies among CHWs? What is this willingness to subsidize these financial tangibles related to iCCM among the community? How may this affect the success of iCCM?
- What is caregiver willingness to pay for referral adherence or attendance to the health facility? How might this impact initial careseeking and the demand for iCCM, as well as referral adherence?

10.17 Ethics
Describes the potential ethical constructs underlying the iCCM intervention

- What ethical ideals does iCCM help contribute towards?
- In what ways is iCCM unethical? Are there any marginalized actors or groups that do not benefit or may be further disenfranchised as a result of the implementation of iCCM?
- Are any human rights violated in the implementation of iCCM?
- Does the pursuit of iCCM compromise the attainment of other SDGs?

*Accountability and enforceability are distinguishable in that accountability implies a dependency upon approval from a source or entity to whom the actor is accountable. Enforceability encompasses the ability of an entity or actor to impose sanctions, reprimand, or reward upon an agent that is accountable to it.

Supplementary Appendix 2: iCCM Systems Framework: Domains, Categories, Definitions, and Critical Questions
SUPPLEMENTARY APPENDIX 3

Figure S1. Interactive visualization of iCCM Systems Framework, available at: https://kumu.io/iccm/iccm-systems-framework