**Supplemental Text 1**

# How capacity building of district health managers has been conceptualised and operationalised in sub-Saharan Africa: a scoping review protocol

## Background

In 2015, health systems in sub-Saharan Africa (SSA), similarly to other low- and middle-income countries (LMICs), failed to achieve the health-related Millennium Development Goals (MDGs) (1). SSA accounts for almost half of all deaths of children under-five years and the highest maternal mortality ratio. It bears the highest burden of HIV/AIDS, malaria and tuberculosis in the world (1,2). This poor performance is partly due to the health system weaknesses, which may be attributable to multiple causes (3), including political instability and insecurity, reliance on and poor coordination of donor funding, limited public accountability, excessive centralization of power, and weak leadership and management, especially at the district level (3–6).

Leadership and management's role in improving health systems performance is widely recognised in the literature (7–12). Effective leadership and management at the district level is crucial since the health district is the operational level within which national policies and resources are translated into effective services to satisfy population needs (13–16). Building leadership and management capacity of district health managers (DHMs) is likely to improve the stewardship of local health systems and is required to ensure the achievement of better health outcomes (8,12,17,18), particularly the health-related Sustainable Development Goals (SDGs) (19).

Capacity building programs (CBP) in health systems are complex (8,20). They seek to produce changes at the individual, organisational and systemic levels (5,13,21–23). They involve the interaction between several actors (policymakers, managers, providers, funders, patients, communities, etc.). These actors belong to various institutions or social sub-systems (national or provincial health administration, district management teams, hospitals, first-line facilities, community, non-government organisations (NGOs), etc.) (24–27), and have different values, norms, decision spaces and attitudes.

1

Local health systems are considered complex adaptive systems (5,20,24). Health districts consist of interacting elements or sub-units (i.e., actors at first-line facilities, hospitals, district management teams, community, NGOs, etc.). They are open systems embedded in a broader (social, political, and economic) environment with which they interact continuously. From these interactions arise new (positive or negative) behaviours that may be unpredictable and non-linear. History also shapes these emergent behaviours, which reflect district adaptation to changing environment (co-evolution) (28–32). As a consequence, a CBP that works in one setting will not necessarily work in another or may not function in the same location later (33).

Capacity building (CB) emerged from the development aid field in the 1980s and became *"the central purpose of technical cooperation"* in the 1990s (34). However, CB remains an elusive, broad, umbrella or multidimensional term associated with a range of (sometimes opposite) meanings among academics and practitioners (2,22,27,35–41).

Some authors (18,42–44), the concept of CB is implicitly or explicitly assimilated in a "simplistic way" to the development of staff's knowledge and skills through training or providing resources. Such reductionist view tends to restrict CB to its hard or measurable elements (e.g., knowledge and skills, organisational structure, procedures and resources) (42,45–48). In contrast, other scholars (13,35,36,49) consider CB as a systemic approach that in addition to hard measures, take into account soft and less tangible aspects such as leadership, motivation and organisational culture (40,50,51).

Other scholars use "capacity building" and "capacity development" (CD) interchangeably (22,52), In contrast, others prefer to use capacity development that stresses the importance of ownership by partner organisations and unlike CB, does not underestimates the potential and existing capacities of partner organisations (34,50,53).

The conceptual heterogeneity, its meanings and holistic versus reductionist perspective explains the diversity of CBP designs, approaches, models and tools (2,8,22,27,35). It also explains the methodological challenges related to CBP process evaluation (40,50) and their effectiveness on organisational performance (22,23,36,54). Most of these evaluations are focused on individual level interventions and on pre- and post-test approaches (23,55). Little attention has been paid to the underlying theories, models or frameworks underpinning CBP. Few studies attempted to understand what works, how, and why, except for Prashanth *et al.* (24), Kwamie *et al.* (5), and Orgill *et al.* (51). Bergeron *et al.* (56) and Whittle *et al.* (27).

To fill this gap, we will carry out a scoping review focused on identifying the underlying theories behind CBP at district- or local health system level. We will explore the processes underlying their effects and the contextual conditions within which these processes are facilitated or hindered. We aim more specifically to understand how CBP of DHMs have been conceptualised, operationalised and evaluated in SSA.

## Methods

Given the complexity of CBP, the conceptual heterogeneity of CB and the need to identify underlying theories and mechanisms of CBP, the scoping review methodology proved appropriate. The scoping review is a suitable approach to map key concepts, different types of evidence and research gaps related to a defined research area (57,58). We will follow the five steps proposed by Arksey and O'Malley (57) for a scoping review while taking into account the recommendations of Levac *et al.* (59)  and Daudt *et al.* (60).  These steps are:

1. Identifying the research question
2. Identifying relevant studies
3. Study selection
4. Charting data
5. Collating, summarizing and reporting the results

### *1. Identifying the research question*

Our scoping review aims to answer the following research questions:

– How has the CB notion been conceptualised in the health systems management literature?
– How has CBP of district health managers been operationalised at the local health systems (health districts) in SSA?
– How has CBP been evaluated at the local health systems (health districts) in SSA?

The answers to these questions will allow us to:

– Map the different conceptions of CBP of DHMs in SSA.
– Identify the approaches used to build the management capacity of DHMs and their underlying theories in SSA.
– Identify methodological issues and research gaps.

3

## 2. *Identifying relevant studies*

<u>Sources</u>

We will use five databases (Medline/PubMed, Health systems evidence, and Wiley online library, Cochrane Library, and Google scholar) for scientific literature search. The reasons for choosing these databases are presented in table 1.We will also search for grey literature from international organisations that support CBP in health systems of SSA (e.g. World Health Organisation, European Union, USAID, Management Sciences for Health, Belgian Development Agency, etc.). We will complete these literature searches using the citation tracking and snowball techniques.

*Table 1: Reasons for the choice of research databases*

| Databases | Reasons for the choice |
|---|---|
| **PubMed** | PubMed is the leading, most used, and free-access research database for biomedical literature in the world. It contains more than 32 million citations from MEDLINE, among which papers that deal with management CBP of DHMs in SSA are likely to be included. |
| **Wiley library online** | Wiley library online is one of the largest, most authoritative and free-access databases of online journals in the life, health, social, and physical sciences. Among its 7.5 million articles from over 1,600 journals, it is possible to find some papers related to our research questions. |
| **Cochrane library** | Cochrane Library is made of databases containing various forms of high-quality, independent evidence to inform healthcare decision-making. We hope to find some articles related to our research questions, especially within the Cochrane Effective Practice and Organisation of Care (EPOC). |
| **Health Systems Evidence (HSE)** | HSE is one of the world's most comprehensive, free access points for evidence to support policymakers, stakeholders, and researchers interested in strengthening or reforming health systems. Since this purpose fits our research topic, HSE appears to be an interesting database to search for evidence. |
| **Google Scholar** | Google Scholar gives free access to a wide variety of scholarly literature from different disciplines, including biomedical and health sciences. It has the advantage of containing articles published or not in peer-review journals and indexed in the above databases. |

<u>Search strategy</u>

We constructed our  search strategy based on the Joanna Briggs Institute's "PCC approach" (Population, Concept and Context) (61).

4

- **Population**: DHMs are health officers who work in local health systems and spend some of their time in management and/or administrative roles. They have various profiles (physicians, nurses, pharmacists, administrators, etc.) and play different roles within the district health system (district medical officers, hospital directors, nursing officers, nurse supervisors, etc.) (62).
- **Concept**: Search terms will include "capacity building" or "capacity development" or "capacity strengthening" and health district management or leadership development.
- **Context**: SSA countries according to the World Bank countries classification by income[1].

Appendix 1 outlines the search strategy to be used in PubMed. We will conduct an updated search to identify possible new studies.

### 3. *Study selection*

We will use the Rayyan software and select papers based on their titles and abstracts (63). Two reviewers will then examine the full texts of the articles independently to decide on their final selection based on the inclusion criteria listed in Table 1. In cases of persistent disagreement between the two reviewers, we will consult a third reviewer (59).

We will select all studies that meet the inclusion criteria regardless of their quality, as we aim to map key concepts, types of evidence and research gaps (57,58).

*Table 2: Inclusion and exclusion criteria*

|  | **Inclusion criteria** | **Exclusion criteria** |
|---|---|---|
| **Type of paper** | Original articles published in peer-reviewed journals, working papers, intervention or research reports | Editorials, opinions, commentaries, workshop reports, conference abstracts, conference proceedings, research protocol |
| **Content of paper** (Population, Concept, Context**)** | Studies related to DHMs' leadership and management CBP in SSA countries | Studies related to other health workers, the management of specific diseases or waste management; and non-SSA countries |
| **Language** | Paper published in English or French | Paper published in another language than English and French |
| **Time** | Paper published from 1987[2] to 2021 | Paper published before 1987 |

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[1] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

### 4. *Charting data*

Two reviewers will extract the data, which will then be checked and validated by a third reviewer. Following the best fit framework approach (64,65), we will systematically search for an *a priori* framework against which to code the data. This *a priori* framework must allow a description of the design, implementation and evaluation of CBP.

Using an Excel form, we will extract the relevant data about:
- Study characteristics (author, year, country, type, objectives, design, methods)
- Information related to the CB intervention:
  - o Design: rationale, definition, objectives, underlying theories, intervention components
  - o Operationalisation: level (individual, organisational, systemic), type of approaches, actors (providers, participants), duration, setting
  - o Evaluation: duration after implementation, results achieved, underlying mechanisms, success factors, bottlenecks, sustainability, and lessons learned
- Methodological issues and research gaps.

### 5. *Collating, summarizing and reporting the results*

We will describe the main characteristics of the included studies using descriptive statistics. We will use thematic content analysis to categorise the main review findings (57,60,61). During this analysis, we will use the "best fit" framework (BFF) synthesis, which provides a practical and rapid method for qualitative evidence synthesis and program theory development (64,65). It allows both deductive analysis using an "a priori" framework and inductive analysis based on new themes from selected studies that are not part of the a priori framework. The final result is a new framework with a priori and new evidence-based themes (64,65). To identify the a priori framework, we will carry out a parallel search using the BeHEMoTh (Behaviour of interest, Health context, Exclusions, Models or Theories) approach (64,66). Search strategy using the BeHEMoTh approach is presented in appendix 3.

We will report the results according to the PRISMA Extension for Scoping Reviews guidelines (67).

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2 We chose this year in reference to the Harare declaration on strengthening district health systems based on Primary Health Care

Supplemental material

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## Appendix 1: MEDLINE (PubMed) search strategy

We will conduct a systematic electronic search using Mesh terms and free terms Population AND Concept AND Context

(((((((((((((("Health Personnel"[Mesh]) OR ("District health management teams")) OR ("Institutional Management Teams" [Mesh])) OR ("Public Health Administration" [Mesh])) OR (District Health manage*)) OR ("District medical officers")) OR ("Nursing officers")) OR ("Nursing directors")) OR ("Nurse supervisors")) OR ("Nurse Administrators" [Mesh])) OR ("District health administrators"))) AND (((((("Capacity Building"[Mesh]) OR ("Capacity Development")) OR (Capacity Strengthening)) OR (District Health Management Development)) OR (District Health Leadership Development)) OR (District Health System Strengthening)))) AND (((("Sub Saharan Africa") OR ("Africa South of the Sahara"[Mesh])) OR (Angola OR Benin OR Botswana OR "Burkina Faso" OR Burundi OR Cameroon OR "Cape Verde" OR "Central African Republic" OR Chad OR Comoros OR "Democratic Republic of Congo" OR Zaire OR "Republic of Congo" OR "Ivory Coast" OR Djibouti OR "Equatorial Guinea" OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR "Guinea-Bissau" OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR "Sao Tomé and Principe" OR Senegal OR Seychelles OR "Sierra Leone" OR Somali OR "South Africa" OR Sudan OR South Sudan OR Swaziland OR Tanzania OR Togo OR Uganda OR Zambia OR Zimbabwe))) Filters: Humans, English, French, from 1987/1/1 - 2022/04/06

## Appendix 2: Search strategy for best fit frameworks

We will conduct a systematic electronic search using Mesh terms and free terms BeHEMoTh (Be AND H NOT E AND MoTh)

| | Terms | Search strategy |
|---|---|---|
| Behaviour of interest (Be) | District Health Management and Leadership | (Health District) AND ((Manage*) OR (Leader*)) |
| Health context (H) | Capacity Building, Capacity Development, Capacity Strengthening | (((Capacity Building) OR (Capacity Development)) OR (Capacity Strengthening)) |
| Exclusion (E) | Surveillance Model, Epidemiological Model, Disease Model, Care Model | (((("Surveillance Model") OR ("Epidemiological Model")) OR ("Disease Model")) OR ("Care Model") OR ("Statistical Model")) |
| Models of theories (MoTh) | Theory, Model, Concept, framework | (((Theor*) OR (Model*)) OR (Concept*)) OR (Framework*) |

(((((Health District) AND ((Manage*) OR (Leader*))) AND ((((Capacity Building) OR (Capacity Development)) OR (Capacity Strengthening)))) NOT (((("Surveillance Model") OR ("Epidemiological Model")) OR ("Disease Model")) OR ("Care Model") OR ("Statistical Model"))) AND ((((Theor*) OR (Model*)) OR (Concept*)) OR (Framework*)