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How capacity building of district health managers has been conceptualised, operationalised and evaluated in sub-Saharan Africa: a scoping review and best fit framework analysis

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Abstract

Objectives: We aimed to understand how capacity building programmes of district health managers have been conceptualised, operationalised, and evaluated in sub-Saharan Africa. We focused on identifying the underlying assumptions behind leadership and management capacity building programmes at the district level.

Design: Scoping review

Data sources: We searched five electronic databases (MEDLINE, Health Systems Evidence, Wiley Online Library, Cochrane Library and Google Scholar) on 6 April 2021 and 13 October 2022. We also searched for grey literature and used citation tracking.

Eligibility criteria: We included all primary studies (a) reporting leadership or management capacity building of district health managers (b) in sub-Saharan Africa, (c) written in English or French, and (d) published between 1987 and 13 October 2022.

Data extraction and synthesis: Three independent reviewers extracted data from included articles. We used the best fit framework synthesis approach to identify an *a priori* framework that guided data coding, analysis and synthesis. We also conducted an inductive analysis of data that could not be coded against the *a priori* framework.

Results: We identified 2523 papers and ultimately included 44 papers after screening and assessment for eligibility. Key findings included (1) a scarcity of explicit theories underlying capacity building programmes, (2) a diversity of learning approaches with increasing use of the action learning approach, (3) a diversity of content with a focus on management rather than leadership functions, and (4) a diversity of evaluation methods with limited use of theory-driven designs to evaluate leadership and management capacity building interventions.

Conclusion: This review highlights the need for explicit and well-articulated programme theories for leadership and management development interventions and the need for strengthening their evaluation using theory-driven designs that fit the complexity of health systems.

Strengths and limitations of this study

- We have used a systematic approach to search for a best-fit framework against which to code the data and a comprehensive strategy to search for primary studies.
- Three reviewers performed the screening and data extraction.
- We did not appraise the quality of the included papers, as scoping reviews do not require a quality appraisal.
- We may have missed other relevant literature not available publicly or published in languages other than English or French.
- We have made some trade-offs between comprehensiveness and feasibility, as is often the case in scoping reviews.

Key words: Leadership, Management, Capacity building, District Health Managers, sub-Saharan Africa

Introduction

Many countries in sub-Saharan Africa failed to achieve the health-related millennium development goals.[1] The continent accounts for almost half of all deaths of children under-five years worldwide and the highest maternal mortality ratio. It bears the highest burden of HIV/AIDS, malaria and tuberculosis in the world.[1 2] This is partly due to health system weaknesses, which may be attributable to multiple causes,[3] including weak leadership and management, especially at the district level.[3-6]

The role of leadership and management in improving the performance of health systems is widely recognised in the literature.[7-11] Effective leadership and management at the district level are crucial since this is the operational level where national policies and resources are translated into effective services and where responsiveness to local needs can be ensured.[12-15] Building leadership and management capacity of District Health Managers (DHMs) is likely to improve the stewardship of the district health system and is required to ensure the achievement of better health outcomes,[7 11 16 17] particularly the health-related sustainable development goals.[18]

Capacity building programmes (CBPs) in the health sector are complex.[11 19] They seek to produce change at the individual, organisational and systemic level.[4 14 20-22] They involve the interactions between several actors, including policymakers, managers, providers, funders, patients, communities, etc. These actors belong to various institutions or social sub-systems, and have different values, norms, decision spaces, and possibly conflicting agendas and expectations.[23-26]

Health districts are complex adaptive systems.[4 13 19] They consist of interacting elements or sub-units (i.e., actors at first-line health facilities, hospitals, district health management teams, community, etc.). Health districts are open systems which are embedded in a broader (social, political, and economic) environment with which they interact continuously. Consequently, health districts adapt to changes in the environment and co-evolve with other systems. From these interactions may arise behaviours that may be unpredictable and non-linear. History also shapes these emergent patterns.[27-31] This complexity has consequences for capacity building: programmes that work in one setting will not necessarily work in another or may not function in the same location later.[32]

Capacity building emerged in the development aid field in the 1970s.[33] It is considered an elusive and broad concept and has been described as an umbrella or multidimensional term that is associated with a range of (sometimes opposite) meanings among academics and practitioners.[2 21 23 34-39] Often, the terms capacity building and capacity development are used interchangeably.[21 40] Some authors prefer to use capacity development to stress the importance of ownership by partner organisations and to emphasise the importance of existing and potential capacities.[33 41] Some authors simplistically refer to training as capacity building.[17 42 43] Such reductionist view tends to restrict capacity building to its tangible or measurable elements (e.g., knowledge and skills, organisational structure, procedures, and resources).[42 44-47] In contrast, other scholars [37 39 48] consider that capacity building should be a systemic approach that also considers less tangible aspects, such as leadership, motivation and organisational culture.[38 49]

The conceptual heterogeneity of capacity building, its various interpretations, and the tensions between holistic and reductionist perspectives may explain the diversity of CBP designs, approaches, models and tools.[2 11 21 23 39] This also contributes to the methodological challenges related to CBP process evaluation [38] and to their effectiveness on organisational performance.[20 21 37 50] Most of these evaluations are focused on individual level interventions and on pre- and post-test approaches.[20 51] Little attention has been paid to the underlying theories, models or frameworks underpinning CBP. In the field of health, few studies set out to assess what works, how and why. Exceptions include papers by Kwamie *et al*,[4] Prashanth *et al*,[24] and Orgill *et al*.[49]

The objectives of this review were to understand how CBPs of DHMs have been conceptualised, operationalised, and evaluated in sub-Saharan Africa. We focused on identifying the underlying

assumptions behind CBPs at the district level. We assessed how far these assumptions and contextual conditions are discussed and, if so, what could be learned from these studies.

Methods

We adopted the scoping review methodology, which is appropriate for a topic that is complex and for which there is a high degree of conceptual heterogeneity.[52 53] We followed the five steps proposed by Arksey and O'Malley[53] for a scoping review and subsequent recommendations.[54 55] These steps are (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting data, and (5) collating, summarizing, and reporting the results. A protocol review (supplementary file 1) was developed and approved by the research team.

We combined the scoping review approach with the "best fit" framework synthesis, which provides a practical and rapid method for qualitative evidence synthesis.[56 57] It allows for both a deductive analysis using an *a priori* framework and an inductive analysis based on new themes from selected studies that are not part of the *a priori* framework[56 57] (figure 1).

Figure 1. Process of best fit framework synthesis [56 58]

Step 1 - Identifying the research questions

Our review aimed at answering the following research questions: (1) How has capacity building of DHMs in sub-Saharan Africa been conceptualised? (2) How have such CBPs been operationalised? and (3) How have such CBPs been evaluated? The answers to these questions allowed us to map the designs, approaches, underlying theories, methodological issues and research gaps.

Step 2. Identifying relevant studies

Identifying primary studies

We used four databases (Medline/PubMed, Health systems evidence, Wiley online library, Cochrane Library) and Google Scholar. We also searched for grey literature from international organisations that support CBPs in health systems in sub-Saharan Africa (incl. WHO, European Union, USAID, Management Sciences for Health, Belgian Development Agency, etc.). In addition, we used the citation tracking to identify papers.

Our search strategy was based on the Joanna Briggs Institute's "PCC approach"[59] :

- **Population**: DHMs are health officers who work in local health systems and spend some of their time in management and/or administrative roles. They can have various profiles (physicians, nurses, pharmacists, administrators, etc.) and play different roles, possibly combining them, within the DHS (district medical officers, hospital directors, clinicians, nursing officers, nurse supervisors, etc.).[60]
- **Concept**: Search terms included "capacity building" or "capacity development" or "capacity strengthening" and "health district management" or "leadership development".
- **Context**: Sub-Sahara African countries according to the World Bank classification.[61]

The supplementary file 2 outlines the search strategies used in PubMed and other electronic databases on April 6, 2021. On October 13, 2022, we performed additional searches in all electronic databases to update the included studies.

Identifying relevant frameworks, models and theories

We used PubMed and Google Scholar to search for suitable published theories or models to generate the *a priori* framework for synthesis. We based our search strategy on the BeHEMoTh approach[56 58]:

- **Behaviour of interest (Be)**: Management and Leadership capacity of health workers
- **Health context (H)**: Capacity building programs, health systems or public health
- **Exclusions (E)**: Non-theoretical/technical models
- **Models of theories (MoTh)**: Theory, Model, Concept, Framework

The supplementary file 2 provides the search strategy in PubMed – (Be AND H AND MoTh) NOT E.

Step 3. Study selection

The selection of primary studies

We selected papers based on their titles and abstracts.[62] In a next step, three reviewers (SB, JE and CK) examined the full texts of the articles independently to decide on their final selection on the basis of the inclusion criteria (Table 1). We selected all studies that met the inclusion criteria regardless of their quality, as we aimed to map key concepts, types of evidence and research gaps.[52 53] Disagreements between reviewers were solved by consensus.[54] We used the Rayyan software to manage the review process.

Table 1. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Type of paper	Papers reporting primary research published in peer-reviewed journals, working papers, intervention reports, research reports	Literature reviews, editorials, opinions, commentaries, workshop reports, conference abstracts, conference proceedings, research protocols
Content of paper (Population, Concept, Context)	Studies related to DHM leadership and management CBPs 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* to 2022	Paper published before 1987

* We chose this year in reference to the Harare declaration on strengthening district health systems.

The identification of frameworks, models and theories

Also here, we selected papers based on their titles and abstracts.[62] Papers that met the following criteria were included (1) papers presenting a model, theory or framework that fit the research purpose, i.e., allow the full description of design, implementation and evaluation of CBPs; (2) papers presenting a description, evaluation or test of a capacity building model, theory or framework with a focus on leadership or on overall management; and (3) papers published in English or French.

Step 4 - Charting data

Generating the a priori framework

Based on the selected models,[63 64] we generated a list of *a priori* themes and codes related to the rationale, process (strategies, implementation, and evaluation), and outcomes of CBPs (table 2). According to Labin *et al*,[63] the need for conducting a CBP affects its process (design, implementation, and evaluation), which, in turn, affects outcomes.

Table 2. The coding framework

Themes from original models	Codes	Definitions
Rationale for conducting capacity	Motivation	Trigger or motivating reasons for conducting a capacity building programme.

building programmes	Assumptions	Suppositions or hypotheses (explicit or implicit) that underlie the actors' desire to engage in a capacity building programme.
	Expectations	Intended outcomes or results expected from a capacity building programme.
	Context	Key features of the environment in which the health organisation targeted by a capacity building programme is embedded.
Strategies of capacity building programmes	Theory	Any (explicit or implicit) theory that can inform the design, implementation, and evaluation of a capacity building programme.
	Mode	How capacity building programme is provided: in-presence, online, written materials, etc.
	Level	capacity building programme entry point: individual, organisational, and system levels.
	Approach	Teaching and learning methods: training, workshop, coaching, mentoring, supervision, technical assistance, community of practice, etc.
	Content	Substance of capacity building programme activities.
Implementation of capacity building programmes	Actors	Providers' profile, participants' profile.
	Duration	Time during which capacity building programme took place
	Barriers	Bottlenecks that hindered the achievement of expected outcomes.
Evaluation of capacity building programmes	Design & methods	Cross-sectional, case study, (quasi)experimental, pre-post, quantitative, qualitative, mix-methods, theory-driven, etc.
	Timeframe	Period within which evaluation is conducted: time after capacity building programme implementation or completion
	Evaluator position	Evaluator may be internal to (involved in) the programme or external (independent) to programme.
Outcomes of capacity building programmes	Individual outcomes	Knowledge, skills, attitudes, and behaviours of health managers
	Organisational outcomes	Leadership and management practices, organisational culture
	Population health outcomes	Access, quality, and equity of health care and services.
	Sustainability	Maintenance of capacity building programme activities and outcomes over time
	Unexpected outcomes	Unintended results: may be positive or negative
	Lessons learnt	Knowledge or understanding gained from capacity building programme process

Data extraction

Using an Excel form, three reviewers (SB, JE, and CK) extracted separately three groups of data from the selected studies: (1) study characteristics (author, year, country, type, objectives, design, and methods); (2) data related to CBPs that were coded against the *a priori* framework; and (3) new relevant data that did not fit the *a priori* codes. We compared results and merged when necessary.

Step 5 - Collating, summarizing, and reporting the results

We described the main characteristics of the included studies using descriptive statistics. We carried out a deductive thematic analysis to summarize the main review findings from the *a priori* framework [52 55 59] and an inductive thematic analysis to generate new themes from data that did not fit the *a*

priori framework. We report the results according to the PRISMA Extension for Scoping Reviews guidelines (supplementary file 3).[65]

Patient and public involvement

Patients or the public were not involved in this research.

Results

Selection of frameworks, models and theories

The search yielded 934 articles. After removing duplicates and screening records based on titles and abstracts, 23 full-text articles were assessed for eligibility. Two full-text articles met the inclusion criteria (figure 2). The two included papers reported on the models of evaluation capacity building: the multidisciplinary model of evaluation capacity building[64] and the integrated model of evaluation capacity building.[63] The two models have similarities as the second model development was largely inspired by the first model.

Figure 2. PRISMA flowchart of the search for models, theories and frameworks

Selection of primary studies

We identified 2704 articles. After removing duplicates and screening records based on titles and abstracts, we assessed 194 full-text articles for eligibility. Thirty-five full-text articles met the inclusion criteria. Nine additional full-text articles were included after reference tracking (n=5) and additional searches (n=4). In total, 44 papers were included in this review (Figure 3**).** The supplementary file 4 provides the description of included papers.

Figure 3. PRISMA flowchart for primary studies

Characteristics of primary studies included

The 44 articles included were published between 1991 to 2021, of which 5 (11%) between 1991 and 2000, 9 (20%) between 2001 and 2010, and 24 (55%) between 2011 and 2020, and 6 (14%) between 2021 and October 2022. Virtually all articles were written in English (93%). Papers were from 12 sub-Saharan countries: Uganda (8 papers, 18%) South Africa (6 papers, 14%), Ethiopia (5 papers, 11%), Ghana (4 papers, 9%), Kenya (4 papers, 9%), the Democratic Republic of Congo (4 papers, 9%), Tanzania (3 papers, 7%), Botswana (2 papers, 5%), Mozambique (2 papers, 5%), Liberia (1 paper, 2%), Zambia (1 paper, 2%), and Gambia (1 paper, 2%). Two papers reported CBP related to three countries: Ghana, Malawi, and Uganda (2 papers, 2%) and Ghana, Tanzania and Uganda (1 paper, 2%).

Rationale for conducting a capacity building programme

Motivation, assumptions and expectations (goals)

The most frequent reason reported for conducting a CBP was weak leadership and/or management capacities of DHMs. Weak leadership and/or management were considered as the major causes of poor health outcomes in low- and middle-income countries.[4 6 19 49 66-87] Frequently mentioned causes of weak leadership and/or management capacity were (1) inadequate profiles of health managers (often being clinicians without formal training on leadership and management),[17 75 77 83 88 89] and (2) inadequate leadership and management courses (usually classroom based and knowledge-focused instead of practice-based and providing know-how to deal with real-life situations).[47 66 72 76 77]

Twenty-three papers presented the assumptions underlying the CBPs. Most programmes assumed that strengthening the leadership and/or management capacities of health managers would improve their leadership and/or management knowledge and skills and enable sound leadership and/or management practices in their workplaces. These improvements would, in turn, lead to improved health system performance and then better health outcomes.[4 17 47 67 70 71 73-76 82-85 87 88 90-92] The CBPs were supposed to trigger health team members' self-confidence to undertake sound leadership and/or management practices which would, in turn, activate their job satisfaction, motivation and sense of ownership.[76 91 92] The sound management practices included: effective and efficient use of resources,[67 71 73 90] priority setting and better planning,[17 67 71 82 87 90] use of data for decision making,[17 87 90] supervision of health workers,[17 67 71 91 92] ensuring monitoring and evaluation,[67 75 93] teamwork and regular meetings.[17 49 71 89] The sound leadership practices included creating a positive work climate,[4 17 70 73] and relationship building among stakeholders.[9 74]

Thirty-seven articles outlined the objectives or expected outcomes of the programme. Analysis shows that they all refer to the improvement of either the management knowledge, skills, and practices of DHMs [4 17 49 67 68 70-72 74-77 79 83-87 89 94-96] or the leadership and management knowledge, skills and practices [4 17 47 70 73 74 85] as the main outputs. The outcomes expected from these main outputs were the increase of health service access and coverage,[82 85 91 94] the improvement of the (quality and equity of) health service delivery,[47 70 73 78 81 83 89 91 95 97 98] the improvement of maternal and child health outcomes.[79 82-84 87 94]

Context of capacity building programmes

The included studies identified various features of the context within which the programme took place. The most cited was the decentralisation from national (or regional) to the district (or sub-district) level.[9 19 47 49 70 71 75 79-84 86-88 90 94 95 98 99] However, seven studies reported narrow decision space of DHMs regarding financial and human resources.[4 49 71 82 87 88 94] Three papers noted the persistence of a hierarchical organisational culture within the decentralisation setting.[9 76 96] Other context features included resource constraints and issues (human, financial, equipment, infrastructures, drugs, and other supplies),[4 75 77 79 83 90 93 95 98 100 101] poor accessibility and availability of health services,[79 91] conflicts and crisis.[99 102]

The capacity building strategies

Underlying theories, frameworks and models

None of the included papers explicitly refers to a theory underlying the reported CBP. Sixteen articles explicitly mentioned seven frameworks or models on which the reported programmes were based (table 3).

Table 3. Capacity building frameworks or models

Frameworks/Models	Description	# Papers	References
Participatory Action Research cycle	The cycle comprises four or five phases related to the problem-solving: problem diagnosis and action planning (plan), action (act), evaluation (observe), and specifying learning achieved (reflect).	5	80 83 84 88 89
Leadership and management competency framework	The framework focuses on core management or leadership skills of health managers, such as problem-solving, planning, resource management, monitoring and evaluation, strategic thinking, etc.	3	47 80 86
Leading and managing framework	The framework includes a set of practices organised into four leadership domains (scanning, focusing, aligning/mobilising, and motivating) and four management domains (planning, organising, implementing, monitoring and evaluation).	3	4 70 85

Potter and Brough's capacity pyramid framework	Systemic capacity-building consists of four levels of a pyramid of needs that contribute to improved performance: tools, skills, staff and infrastructure, structures and systems, and roles.	2	67 79
Thinking environment principles	The thinking environment includes ten elements related to behaviours, attitudes, values, and beliefs that shape the culture and the relationships necessary for good team collaboration. These elements are attention, equality, ease, appreciation, encouragement, feelings, information, diversity, incisive questions, and place.	1	9
Attitudes, knowledge, skills and behaviours framework	The framework posits that relevant attitudes, knowledge, and skills allow students to develop a personal framework of practice to act in and on the health system through various positive behaviours.	1	74
Combination of Kirkpatrick's evaluation model and Mc Le Roy socio-ecological model of behaviour.	The Kirkpatrick model consists of four levels which are reaction (participants' reaction to training content and methods), learning (what participants learned), behaviour (how well participants apply their training), and results (effects of training on the organisation's outcomes). The Mc Le Roy's socio-ecological behaviour model posits that personal, institutional, and community factors shape behaviour.	1	17

An analysis of approaches used in other CBPs showed that most authors referred implicitly to the management competency framework and/or the participatory action research cycle.

Levels, modes and approaches

We found that CBPs had two entry points: the individual and organisational levels. Nine CBPs focused on strengthening individual health managers' knowledge and skills.[17 67 68 72 74 77 86 93 100] The remaining CBPs took an organisational entry point to strengthen the capacity of the health management teams to perform their managerial functions and achieve health outcomes.

All CBPs reported were delivered face-to-face, either in a specific room, at the workplace or alternating between the two. No online CBP was reported in the included papers of this review.

A diversity of methods was used (alone or in combination) to build health managers' capacity. We summarised these approaches using the classification of Kerrigan and Luke[69]: formal training, on-the-job training, action learning, and non-formal training. Eighteen papers reported on an action learning approach.[4 9 47 68 70 71 73 76 80 81 83 84 86 90 95-98] This approach focuses primarily on the problem-solving cycle (plan, do, study, and act) and emphasizes action as the vehicle for learning.[69] The process includes an alternating mix of workshops or classroom training, actual project implementation, on-the-ground coaching, mentoring or supervision, and review meetings to monitor progress and share experience and learning. Nine papers reported on-the-job training,[67 72 75 79 91 93 100-102] which aimed at supporting health managers in carrying out their tasks through various approaches such as classroom training, on-site mentoring, coaching or supervision visits, and technical assistance. Five papers reported mixed approaches, which consisted of a combination of formal training (usually provided by academic institutions) with on-the-job training,[17 77 78] formal training with action learning,[74] and action learning with on-the-job training.[92]

We analysed the CBP approach using Roger et al.'s (2003) framework cited by Hartley and Hinksman [103] to see to what extent the CBP approaches were individual or collective on the one hand and prescribed or emergent on the other. The prescribed approach refers to a blueprint approach or a

normative process in which inputs (e.g., competencies) and outputs (e.g., standards, performance) required for leadership or management capacity development are specified. The emergent approach entails a dynamic, flexible, or adaptable process that emerges from stakeholders' interactions. We found that most CBP approaches were prescribed and collective,[4 9 19 47 68 70 71 75 79-85 87-92 94-99 102 104] and prescribed and individual.[17 67 72-74 76-78 86 93 100 101] The emergent and collective approach was marginal. [9 49]

Learning content

Twenty-two papers specified the learning contents, which varied in terms of terminology and could be categorised under the headings: problem solving cycle,[4 68 71 76-78 80 81 86 94 95 97] human resource management,[4 17 67 68 75 77 78 80 86 95 97] financial management,[4 17 67 75 77 86 95] leadership development,[4 67 73 74 77 78 86] strategic thinking & management,[17 74 77 78 86] hospital and health service delivery management,[67 72 73 77 78] health information management, monitoring and evaluation,[17 67 75 93] supply chain and fleet management,[67 75 78] governance in health,[67 73] project management,[17 69] supervision of health workers, epidemiology and research methods, [77 78] health policy, ethics, and law,[77 78] complexity and systems thinking,[78] and nursing management.[78]

Implementation of capacity building programmes

Actors: participants and providers

Participants in CBPs were mainly district health and hospital management team members. The composition of these teams varied from one country to another and was often not specified. Other participants included sub-district management team members, [9 83 91] facility managers and staff, [9 17 68 79 92 97] and district administrative and political leaders.[81 84] The programmes were provided by facilitators from the ministry of health at national, regional or district level,[4 49 67 75 76 81 91 97 99 102 104] academic and research institutions,[9 68 74 77 80 83 86 88 89 96] international non-governmental organisations, [79 93] or a mix of these institutions.[17 70 82 87 90 94 95]

Duration

The duration of the programme was highly variable, from 10 days to 8 years. We found one programme of less than one month, [67] 13 programmes of one to twelve months,[4 17 68 70 72 74-76 85 86 95 96 100] 8 programmes of 13 to 24 months, [49 71 73 77 80 81 93 94] and 8 programmes of more than 24 months.[9 75 79 83 90-92 102]

Barriers

Barriers to the successful implementation of CBPs mentioned by authors included human resource issues, such as staff shortage, staff turnover or staff mobility within or across districts,[4 47 71 80 85 89 90 92 95] inadequate support from the national or provincial level,[81 96] insufficient mentorship after course completion,[17 74] insecurity,[85 90] drop out of facilitators due to busy schedules,[67] lack of funding,[80] poor working conditions,[47] the overlapping activities of vertical programmes that negatively affect the availability of supervisors and the regularity of supervisions visits,[99] and the negative influence of donors, such as imposing a standardised intervention with top-down decision making.[71]

Evaluation of capacity building programmes

Approach, design and methods

Almost half of the included papers did not specify an explicit evaluation design. The other papers presented five designs: case study,[4 49 67 79 90 96 98 102 104] pre-post-study,[17 78 86 95] (quasi)experimental design,[47 70 85 87 92] cross-sectional study,[68 73 91 99] and action learning design.[9] Data collection methods included (1) quantitative methods such as checklists, questionnaires, pre- and post-training test, data from health information management systems,[47 70 73 75 78 82 86 87 91 92 95 99 100] (2) qualitative methods using interviews, focus group discussions, observations, and document reviews,[4 9 19 49 67 69 79 83 84 89 90 94 101 102] and (3) mixed methods.[17 66 68 74 80 85 93 98 104] Three studies were theory-based evaluations.[4 49 90]

Seven studies used frameworks for evaluation purposes. These frameworks included the capacity pyramid framework of Potter and Brough,[79] the Competing Values Framework of Quin,[83] the evaluation model of Kirkpatrick,[80] the five core capabilities framework,[66] a framework of 14 leadership and management competencies,[69] a framework of the provincial-level support to DHMs,[104] and the CORRECT criteria framework of WHO/ExpandNet.[89]

Evaluation timeframe

The evaluation of the reported CBPs adopted various timeframes. Some CBPs were evaluated during their implementation: 5 programmes after 0-12 months,[68 75 78 88 89] 6 programmes after 13-24 months,[49 71 73 80 81 94] and 6 programmes after more than 24 months.[74 83 87 90 92 101] Others CBP were evaluated after their completion: 4 programmes after 0-12 months,[4 17 86 91] 3 programmes after 13-24 months,[47 70 79] and 1 programme after more than 24 months.[72] Two programmes were evaluated at different time points during their implementation and after completion.[85 93]

The position of the evaluators

Since we found that the position of the evaluators regarding the programme was often not made explicit, we analysed the authors' affiliations. We found that most CBP evaluations were reported by people involved in the design, implementation or funding.[9 17 47 49 68 70 72 73 75-81 83-89 91 93 95 96 98 101 102] Some programmes were evaluated by people not involved in the design, implementation or funding.[4 49 74 90 94 104]

Outcomes of capacity building programmes

Individual-level outcomes

Individual outcomes of CBPs that were reported include increased knowledge,[17 67 93] improved skills,[67 68 72 74 79 80 86 89 93 95] and positive attitudes, such as more work commitment,[89] openness to being mentored and willingness to implement recommended changes,[98] increased self-confidence to undertake management tasks,[17] and changes in the behaviour of supervisors who became more supportive.[92]

Organisational-level outcomes

Some papers reported on organisational-level outcomes in terms of improvement in overall leadership and management practices, such as systems thinking, change management or performance management,[67] and the use of management tools to systematically set priorities, develop evidence-based work plans and allocate resources.[87 93 101] Other papers reported on district performance,[73 99] financial management,[47 71 75 76 95-98] human resource management,[47 75 77 95] health information management,[47 74 93 101] supply chain and transportation management,[47 71 74 76] supportive supervision,[74 79] or hospital management.[77 78 95 98] Also, improvements at team-level were reported, including more regular and effective team meetings,[4 17 49 68 71 76 79 96] improved team confidence to undertake management tasks,[4 76 80 96] increased team and staff morale, and increased motivation or commitment.[49 71 76 81 88 89 97] Other outcomes include improved work climate or environment,[17 97] improved (quality of) service delivery,[47 76 80 81 97] improved community engagement[76 79] and improved collaboration between district health teams and local administrators.[81]

Four papers reported limited effects of CBPs. A comparison of the effects of two models of supervision (the matrix modified model and the centre for health and social studies model) showed no differences in the quality of care and the job satisfaction of nurses in South Africa.[100] An assessment of facilitative supervision visits by the regional health team to nine district health management teams in northern Ghana showed that the performance of six out of nine districts (67%) was adjudged only fair.[91] The realist evaluation of a leadership development programme in Ghana[4] pointed out the lack of institutionalisation of leading and managing practices and systems thinking. The study by Chuy *et al*[104] highlighted poor coherence and relevance of provincial-level

support, which impeded developing leadership and governance capacity of district health management teams.

Health outcomes

Only one paper reported on health outcomes: a reduction in maternal mortality among pregnant women referred to a district hospital and a markedly reduced incidence of measles cases in a district attributed to a quality assurance programme (that aimed to strengthen district-level management of primary health care services in Uganda) have been reported.[81] Some papers reported improvements in outcomes mostly related to access to health care and services: increased health services utilisation,[70 81 85 97 102] increased immunisation coverage,[77 79 89 102] increased antenatal care and skilled birth attendance,[77 79 89 102] increased yaws and buruli ulcer detection rate,[89] and increased health service coverage.[85] Other reported outcomes were related to the quality of care: improved treatment of malaria, pneumonia and diarrhoea for children[87] and increased tuberculosis cure rate.[89]

Sustainability

Four papers discussed the sustainability of the outcomes and processes of CBPs. Using the sustainability definition of Moore *et al*,[105] we found that all four papers referred to one construct: the continued delivery of the programme. In the Democratic Republic of Congo, De Brouwere and Van Balen[72] reported that doctors trained in the Kasongo project were still applying the skills they had learnt seven years after the last training without saying more about the factors that explain this sustained effect. While acknowledging that it was early to make a final judgement on sustainability, Cleary *et al*[90] reported promising signs in the Population Health Implementation and Training partnerships in Mozambique. They attributed this to the project's flexibility, allowing for adaptations according to local realities and creating a sense of ownership among health system actors. In South Africa, Orgill *et al*[49] were optimistic about the sustainability of the management CBP on the basis of the outputs observed over 18 months of implementation. The emergent nature of the intervention, which ensures ownership and commitment of team members, was cited as the main driver of this sustainability. In Kenya, Seims *et al*[85] reported that two-thirds of the district- and facility-level teams who received leadership development training achieved sustainability of results at least six months after completion of the programme. Underlying factors included *"an improved work climate due to renovated staff quarters, training, or supervision"*.

In eleven papers, the authors mentioned conditions for sustainability. These include collaboration, support, commitment, and ownership by the ministry of health,[75 81 86 98 101] collaboration, transfer of skills and institutionalisation of training to a local academic institution,[17 77 86] alignment with and strengthening of existing local stakeholders and structures,[83 84 94] alignments of management strengthening interventions with the district planning cycles and budget without providing additional resources.[89]

In three papers, the authors raised concerns about sustainability. Kokku[79] reported that health trainers placed in district health management teams moved from a facilitator role to an implementor role in the Simanjiro Mother-Child health capacity building project in Tanzania. Balinda *et al*[67] reported the absence of a rollout plan for the governance, leadership and management training to other districts not supported by the Institutional Capacity Building project in Uganda. In Ghana, Kwamie *et al*[4] reported the lack of institutionalisation of the leadership development programme, which they attributed to changes in leadership at regional, district and sub-district levels.

Lessons learnt

Lessons drawn from CBPs include (1) the need for sufficient time for skill acquisition,[98] continuous learning,[80 89] and institutionalisation of leadership and management practices[4]; (2) the alternation of short workshops and on-the-ground follow-up visits, and the use of action learning approach which links training to real-world practice are essential to enable both theoretical knowledge and practical skills[69 70 77 86 94]; (3) a more reflective and context-sensitive approach in order to address complexity of

health systems,[4] enable flexibility,[77] and promote emergence and self-organisation[49]; (4) the collaboration with stakeholders such as local politicians and government leaders,[81] provincial health authorities,[80] other health partners,[94] and northern and southern academic institutions[86] is central for CBPs as it allows for support, scaling up and accountability; and (5) the importance of mitigating health workforce issues such as turn over by ensuring job satisfaction, job security career, appropriate trajectory and by developing strategies for efficient recruitment and training.[101 93]

Other themes

Our analysis identified other themes to consider in designing, implementing, and evaluating CBPs. These are (1) the certification or accreditation (in the case of training) and (2) the success factors and underlying mechanisms.

Certification or accreditation

Four CBPs delivered either a university postgraduate or master diploma[74 77] or a government certificate in health leadership and management.[17 67] Certification or accreditation valued the CPBs and made them attractive to health managers as the resulting diploma offers opportunities for career development.[17]

Success factors and underlying mechanisms

Papers reported various success factors or mechanisms. These include (1) CBP methods, which empower DHMs and activate a can-do attitude (self-efficacy). These methods are team-based training,[9 17 68 70] learning-by-doing approach,[17 70-72 77 80] alternation of short workshops and on-the-ground follow-up visits,[17 80] shift from administrative and control to a supporting model of supervision,[99] placing trainers within the management teams for day-to-day support,[79 95] reflective discussions for continuous learning,[9 47] and combination of learning methods[79]; (2) supportive interactions between facilitators and DHMs,[99] which enable mutual trust and enhance motivation and commitment of DHMs to actively participate in the CBP process and to engage with changes[71 89 97]; (3) safe work environment, which enables teamwork and promotes distributed leadership[9 80 82 89 95]; (4) adaptability and flexibility of CBP processes[79 83 90]; (5) support from and collaboration with the government authorities[75 95]; and (6) the role of the head of health district, who can act as a local champion by using sensemaking and sense giving micro-practices to trigger motivation and buy-in of CBP by the DHMs.[49]

Discussion

This review highlights the growing interest in leadership and management in health systems, especially in the era of millennium development goals and sustainable development goals. Most papers point to weak leadership and management as a leading cause of poor health outcomes in sub-Saharan Africa and assume that better health outcomes cannot be achieved without proper leadership and management. This widespread assumption explains the increasing number of management and leadership CBPs in the last decade, as shown in this review and others.[20 106] The decentralisation movement in sub-Saharan countries has been a solid argument for strengthening DHMs' capacity to steer their health districts.

While most authors agree on the need to strengthen DHMs' leadership and management capacities, there needs to be more consensus on how to do and evaluate this. Strikingly, we did not find one paper explicitly referencing a theory underlying the CBP reported on. Since programmes are *"theories incarnate"*,[107] the lack of an explicit theory may jeopardise the understanding of how these programmes are supposed to work as well as their evaluation. Therefore, while designing a CBP, it is good to make explicit the theoretical assumptions explaining the pathway to the expected outcomes.[108] It provides an opportunity to bring key actors together around eliciting these assumptions and developing common ground. It also provides a framework for evaluation, as it can be tested in subsequent evaluations.

Despite the diversity of learning methods used in capacity building, there is a general tendency to combine methods to foster the acquisition of both theoretical knowledge and practical skills. Action learning is becoming the most widely used method. It is based on Kolb's experiential learning theory, which states that learning occurs through experience[109 110] and emphasizes real-life actions as the vehicle for learning.[69] Action learning features advantages that can help strengthen DHMs' leadership and management capacities. First, it goes beyond knowledge acquisition and enables skills development. It may be an interesting alternative to inadequate leadership and management courses decried in some included papers of this review. Second, action learning stimulates a reflective attitude necessary for individual and collective learning.[111 112] Third, action learning promotes teamwork and distributed leadership within district health management teams.[112] It can thus help to minimise the effects of the hierarchical culture and gradually develop learning management teams that favour innovation, creativity, and flexibility.[111]

The bulk of CBPs was delivered following a prescribed or normative approach, and the scarcity of the emergent approach was striking. This situation reflects the hierarchical culture still predominant in most sub-Saharan health systems[8] and the dominance of international agencies funding or implementing "standardised" CBPs. However, the normative approach has some weaknesses which may limit its effectiveness. First, it reinforces the "command-and-control" system and can hinder learning, innovation and creativity.[4 113] Second, it often assumes linear cause-and-effect relationships and tends to ignore the influence of context and the complex and adaptive nature of district health systems.[49 113 114] Last, it is often externally led and funded, and likely to be less sustainable as the risk of disruption at the end of the programme or funding is high.[49 113 114] Since district health systems are complex and adaptative, some authors[4 49 113 114] argue that CBPs need to be emergent. Unlike the prescribed approach, the emergent approach considers capacity as a result of interactions between system actors and elements. It is often internally led, bottom-up et likely more sustainable as it is *"anchored in the daily routines"*.[4 113] A balance between the two approaches would benefit the DHMs who are at the *"interface between strategic policy direction and operational service implementation"*[115], i.e., the best place of convergence between top-down and bottom-up processes in health systems.

This review highlighted the diversity of learning contents. Our analysis shows that most CBPs emphasised management rather than leadership. The same observation has been made by Johnson *et al*,[106] who noted that some CBP labelled as leadership development focused virtually on management training. This seems to confirm Kotter's statement, quoted by Kwamie,[113] that *"most organisations are over-managed and under-led"*. Therefore, the content of CBPs for DHMs must consider the balance between management and leadership in complex and adaptive health systems, as advocated by Kwamie.[113]

This review found various evaluation designs and methods, reflecting the lack of *"agreed approaches"* to CBP evaluation.[20 106] Most evaluation designs from this review fell under three types of Øvretveit's evaluation design classification: the descriptive, before and after, and comparative design.[116] While these designs help to understand the process and measure the effectiveness of CBPs, such "black box" designs provide limited insights into the conditions of success.[117] We concur with DeCorby-Watson *et al*[51] and Johnson *et al*,[106] who call for strengthening CBP evaluations by basing them on explicit theories that describe how a CBP is supposed to lead to expected outcomes. Therefore, evaluators should go beyond the positivist paradigm and adopt a complex systems perspective that values context, interactions, and emergence.

Most papers in this review pointed out a short timeframe as a limit for achieving changes in leadership or management behaviour, practices, and health outcomes. Indeed, management and leadership CBPs are not one-off processes. They take time to bring about desired changes. Thus, it is crucial to consider a long-term perspective when designing and funding such programmes[90 106] as time allows for progressive adoption and ownership by stakeholders, adaptation based on the context and learning.

Limitations

This review has some limitations. First, we did not appraise the quality of the included papers as scoping reviews do not require a quality appraisal.[52] Yet, we noted that most of the included articles that presented an evaluation had some methodological issues that call for caution when interpreting results. Second, we may have missed other relevant literature not available publicly or published in languages other than English or French. Finally, we have made some trade-offs between comprehensiveness and feasibility, as it is often the case in scoping reviews.[31]

Conclusion

In the era of sustainable development goals, leadership and management capacities are crucial at the health district level. This review showed a paucity of theory-driven CBPs, a diversity of learning approaches, methods and content, and no agreed methods to CBP evaluation of DHMs in sub-Saharan Africa. These results call for more consistent theories to guide the design, implementation, and evaluation of CBPs for DHMs in sub-Saharan Africa. CBPs need a balance between prescribed and emergent approaches, an optimal mix of didactic and practical learning methods, a balance between management and leadership content, and robust evaluations. Considering the complex and adaptative nature of health districts and adopting a long-term perspective will likely enable conditions and mechanisms to sustain management and leadership CBPs.

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Author Contributions

SB, ZB, BM, FC and BC conceptualize the study. SB conducted the database searching. SB, JE and CK screened abstracts and full texts, extracted data and synthetized data. SB drafted the initial manuscript. SB, ZB, BM, FC and BC contributed to manuscript revision. All authors read and approved the final manuscript.

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Data availability statement

All relevant data are available in the article and the supplementary files.

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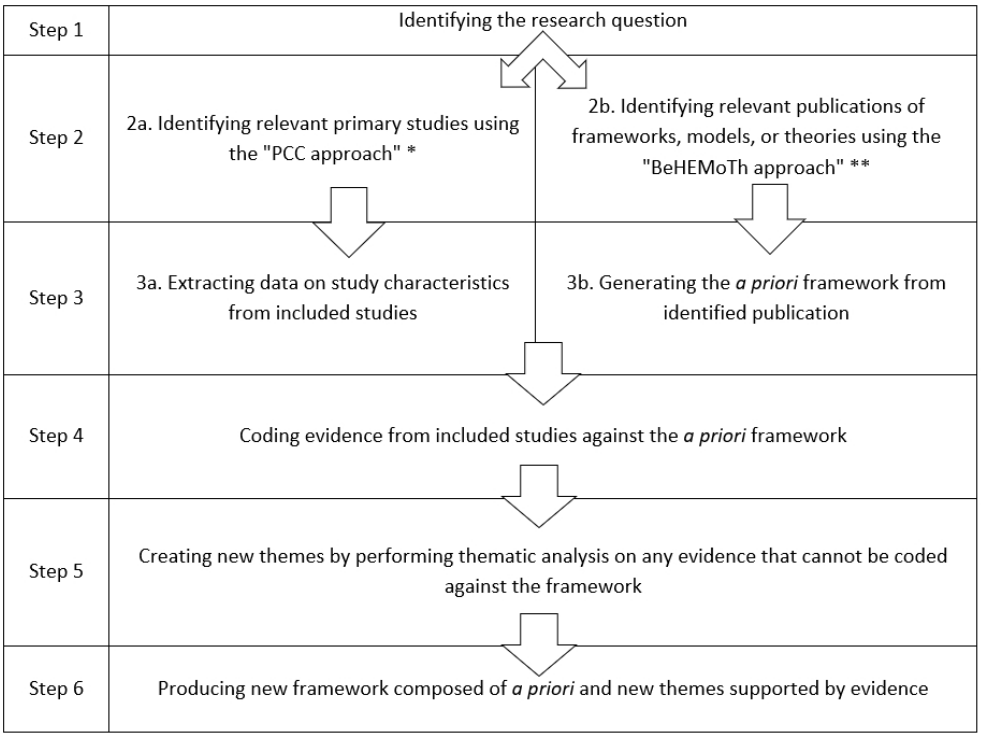
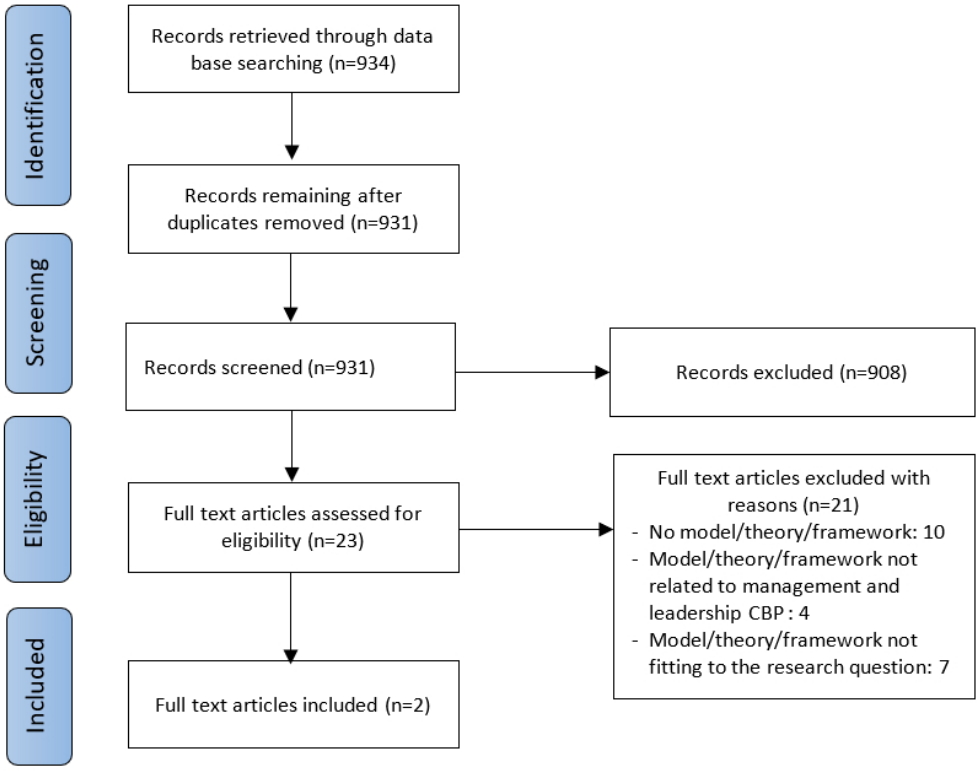


*PCC: Population Concept and Context

**BeHEMoTh: Behaviour of change, Health context, Exclusion Models of Theories

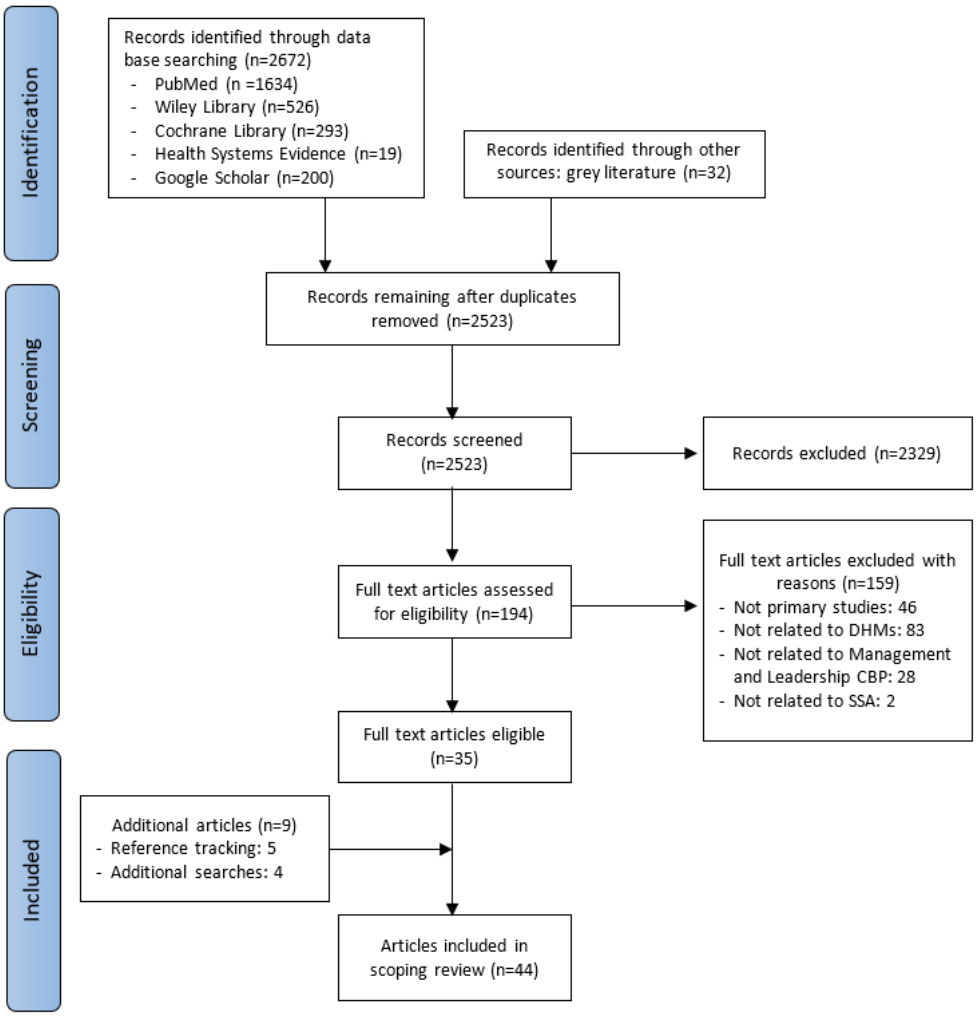
Process of best fit framework

164x131mm (144 x 144 DPI)



PRISMA flowchart for models, theories, frameworks

362x287mm (57 x 57 DPI)



PRISMA flowchart for primary studies

131x137mm (144 x 144 DPI)

Supplementary file 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.

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.

2. *Identifying relevant studies*

Sources

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.

Search strategy

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

- **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

[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:
    - Design: rationale, definition, objectives, underlying theories, intervention components
    - Operationalisation: level (individual, organisational, systemic), type of approaches, actors (providers, participants), duration, setting
    - 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).

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

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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*)

Supplementary file 2. Search strategies

a. Search strategies for primary studies

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

Databases	Search strategies
MEDLINE/PUBMED	((((((((((("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 - 2021/04/06 and from 2021/04/07 – 2022/10/13
Wiley online library	Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub Saharan Africa) Filters: MEDICAL SCIENCE, Journals, 1987 – 2021 and 2021 – 2022
Cochrane library	District Health Systems in Title Abstract Keyword AND management in Title Abstract Keyword OR leadership in Title Abstract Keyword AND capacity building in Title Abstract Keyword AND "sub-Saharan Africa" in Title Abstract Keyword
Health Systems Evidence	Health District AND (Manage* OR Leader*) AND Capacity Building
Google scholar	(Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub-Saharan Africa)

b. MEDLINE search strategy for models, theories or frameworks

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

	Terms	**Search strategy**
Behavior of interest (Be)	Management and Leadership capacity of health workers	("health") AND ("manage*" OR "leader*" OR "work*")
Health context (H)	Capacity building programs, health systems or public health	("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health")
Exclusion (E)	non-theoretical/technical models	"epidemiological model" or "disease model" or "care model" or "statistical model"
Models of theories (MoTh)	Theory, Model, Concept, framework	model* OR theor* OR concept* OR framework*

((((("health") AND ("manage*" OR "leader*" OR "work*")) AND (("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health"))) NOT ("epidemiological model" or "disease model" or "care model" or "statistical model")) AND (model* OR theor* OR concept* OR framework*) Filters: English, French, Humans

Supplementary file 3

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3-4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4 (S1)
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	4 (S2)
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	5-6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	5-6 (Table 2)
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	No applicable

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7 (Fig 2 & 3)
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	7
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	No applicable
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	7 (S5)
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	7-13
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13-14
Limitations	20	Discuss the limitations of the scoping review process.	14-15
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	15
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	15

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Supplementary file 4. Description of included studies

References	Country	Study design	Methods	Levels	Modes	Participants	Providers	Duration
Kanlisi et al., 1991 [76]	Ghana			Organisational	Face-to-face	District Health Management Team (DHMT) members	Regional (Provincial) Management team	Six months
Barnett & Ndeki, 1992 [96]	Tanzania			Organisational	Face-to-face	DHMT members	Centre for Educational Development in Health (CEDHA) and regional staff	Fifty months
Conn et al., 1996 [71]	Gambia			Organisational	Face-to-face	DHMT members		Eighteen months
De Brouwere and Van Balen, 1996 [72]	DRC (Zaïre)			Individual	Face-to-face	Doctors	Resident doctors working as DHMT members and having a secondary-level clinical function	Twelve weeks per training
Omaswa et al., 1997 [81]	Uganda			Organisational	Face-to-face	DHMT members, district's administrative and political leadership	Facilitators from the national quality assurance committee	Eighteen months
Uys et al., 2005 [100]	South Africa		Quantitative methods: checklists, questionnaire	Individual	Face-to-face	Head nurses of clinics and hospital units, primary health care coordinators, programme managers		Three months
Byleveld et al., 2008 [69]	South Africa	Cross-sectional study	Mixed methods: document review, FGD, competency rating scale, interview	Organisational		DHMT members	Various provider including universities, provincial HRD, etc.	
Bradley et al., 2008 [95]	Ethiopia	Pre–post study	Quantitative method: checklist, questionnaire	Organisational	Face-to-face	Hospital management team (HMT) members	Senior Yale – Clinton Foundation and Post-Graduate Fellows	First year of EHMI project

Hartwig et al., 2008 [98]	Ethiopia	Case study	Mixed methods: checklist, document review	Organisational	Face-to-face	HMT members	Senior Yale – Clinton Foundation and Post-Graduate Fellows	First year of EHMI project
Kokku, 2009 [79]	Tanzania	Case study	Qualitative methods: document review, group discussion, feed-back sessions	Organisational	Face-to-face	DHMT members and facility staff	Health Trainers with variety of skills	Six years (2001-2007)
Adjei et al., 2010 [66]	Ghana	Case study	Mixed methods: IDI, questionnaires	Organisational		DHMTs members		
Gill et Bailey, 2010 [97]	Kenya	Case study		Organisational	Face-to-face	Regional team members, DHMT members, facility teams.	National quality assurance core team	
Kebede et al., 2010 [77]	Ethiopia			Individual	Face-to-face	Hospital Managers (CEOs)	Faculty from Yale and Jimma University Schools of Public Health	Two years
Rowe et al., 2010 [86]	Liberia		Quantitative methods: self-administered questionnaire	Individual	Face-to-face	Representative from DHMTs, Government hospitals, international NGOs	Instructors from Yale University and Mother Patern College	Five months by cohort
Kahindo et al., 2011 [102]	DR Congo	Case study	Mixed methods: data from HMIS, document review, semi-structured interviews	Organisational		DHMT members	"Superviseurs polyvalents"	Nine years (2000 à 2008)
Blanchard et Carpenter, 2012 [68]	South Africa	Cross-sectional study	Qualitative methods: FGD	Individual	Face-to-face	District Health Managers, Hospital Managers (CEOs), Facility managers	Researchers from the Centre for Rural Health (CRH)	Eleven months
Kebede et al., 2012 [78]	Ethiopia	Pre–post study	Quantitative methods: checklist	Individual	Face-to-face	Hospital Managers (CEOs)	Yale and Jimma University faculties	Two years

Seims et al., 2012 [85]	Kenya	Quasi-experimental	Mixed methods: interviews, data from HMIS	Organisational	Face-to-face	Health team managers	Mentors or coaches	Six months
Aikins et al., 2013 [91]	Ghana		Quantitative methods: checklist	Organisational	Face-to-face	DHMT members, Sub-District Health Team (SDHMT) members, Community Health Officers (CHOs)	Regional Management Team for DHMTs, DHMT for SDHTs, SDHT for CHOs	Four years
Ledikwe et al., 2013 [93]	Botswana		Mixed methods: questionnaire, interviews, FGD	Individual	Face-to-face	Monitoring & Evaluation officers	Facilitators from the International Training and Education Center for Health (I-TECH) in Botswana	Two years
Mpofu et al., 2014 [101]	Botswana		Qualitative methods: IDI, FGD	Individual	Face-to-face	Monitoring & Evaluation officers	Facilitators from I-TECH in Botswana	Two years
Kwamie et al., 2014 [4]	Ghana	Case study	Qualitative methods: Document review, Observation, Semi-structured interviews	Organisational	Face-to-face	Health Managers and staff	Regional health administration members, and one external consultant	Six months
Edwards et al., 2015 [75]	Mozambique		Quantitative methods: checklist	Organisational	Face-to-face	DHMT members	Regional teams of three persons	The first year of HMM programme
Balinda et al., 2015 [67]	Uganda	Case study	Qualitative methods: review document, authors' experiences of the GLM training	Individual	Face-to-face	All health care staffs with management tasks included DHTM members, regional hospital managers	Senior Ugandan health care managers (national trainers)	Ten days
Katahoire et al., 2015 [94]	Uganda		Quantitative methods: IDI, observation, documents review	Organisational	Face-to-face	DHMT members and Communities	Child Fund International (CFI), Liverpool School of Tropical Medicine (LSTM), and Advocates Coalition for Development and Environment (ACODE)	The first two years of the project

Odaga et al., 2016 [82]	Uganda		Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members and Communities	CFI, LSTM, and ACODE	Five years
Tetui et al., 2016 [19]	Uganda		Mix-methods: IDI	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers	Three years (2013–2015)
Mutale et al., 2017 [17]	Zambia	Cross-sectional	Mix-methods: questionnaire, IDI	Individual	Face-to-face	Health workers	Ministry of Health (MoH), Ministry of Community Development, Mother and Child Health (MCDMCH), Broad Reach Institute for Training and Education (BRITE)	Six to twelve months by phase
Tetui et al., 2017a [84]	Uganda		Data collection: IDI, document review, observation	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers	Three years (2013–2015)
Tetui et al., 2017b [83]	Uganda		Qualitative methods: Semi-structured interviews, FGD	Organisational	Face-to-face	Community stakeholders, Sub-County level stakeholders, District level stakeholders	Makerere University School of Public Health researchers	Three years (2013–2015)
Uduma et al., 2017 [92]	Tanzania	Quasi-experimental	Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members, facility managers, health workers		Twenty months
Cleary et al., 2018a [90]	Mozambique		Qualitative methods: IDI, FGD, observation, document review	Organisational		DHMT members	Sofala Provincial Directorate of Health, African Health Initiative, Eduardo Mondlane University's School of Medicine	Six years (2010 to 2015)

Cleary et al., 2018b [9]	South Africa		Qualitative methods: observation, interview, document review	Organisational	Face-to-face	SDHT members, facility managers	Research team: organizational psychologist, health policy and systems researchers.	Five years (2012 - 2016)
Doherty et al., 2018 [74]	South Africa		Mixed methods: document review, questionnaire, 18 semi-structured interviews	Individual	Face-to-face	Health managers including district health managers	School of Public Health and Family Medicine, University of Cape Town, University's Graduate School of Business	Eighteen months
Martineau et al., 2018 [80]	Ghana, Tanzania, Uganda	Action-research	Qualitative methods: document review, IDI, FGD	Organisational	Face-to-face	DHMT members	Country research teams members of the PERFORM project consortium	Two years
Chuy et al., 2020 [104]	DRC	Case study	Mixed methods: IDI, FGD, observation, questionnaire	Organisational		DHMT members	Provincial health administration staff	
Chelagat et al., 2020 [70]	Kenya	Quasi-experimental	Quantitative methods: questionnaires, data from HMIS	Organisational	Face-to-face	Senior health managers drawn from different levels and sectors of health service	Strathmore Business School, Management Sciences for Health, Ministry of Health	Nine months by cycle
Desta et al., 2020 [73]	Ethiopia	Cross sectional study	Quantitative methods: check list	Organisational	Face-to-face	DHMT members		
Chelagat et al., 2021 [47]	Kenya	Quasi-experimental	Quantitative methods: semi-structured questionnaires	Organisational	Face-to-face	Health care managers and leaders	Strathmore Business School, Management Sciences for Health, Ministry of Health	Six years (2010-2016)
Orgill et al., 2021 [49]	South Africa	Case study	Qualitative methods: IDI, literature review	Organisational	Face-to-face	Extended DHMT members	New District Manager	Two years

Kahindo et al., 2021 [99]	DRC	Cross-sectional study	Quantitative methods: self-administered questionnaire	Organisational	Face-to-face	DHMT members	Provincial health administration staff	
Waissa et al., 2021 [87]	Uganda	Randomised controlled trial	Quantitative methods: LQAS household surveys	Organisational	Face-to-face	DHMT members and communities	CFI, LSTM, and ACODE	Five years
Bulthuis et al., 2022 [89]	Ghana, Malawi and Uganda		Qualitative methods: interviews and group discussions	Organisational	Face-to-face	DHMT members	Country research teams members of the PERFORM2Scale project consortium	Five years (2017-2021)
Kok et al., 2022 [88]	Ghana, Malawi, and Uganda		Multiple participatory methods: individual scoring exercises, country and consortium-wide group discussions and visualizations.	Organisational	Face-to-face	DHMT members	Country research teams members of the PERFORM2Scale project consortium	Five years (2017-2021)

BMJ Open

How capacity building of district health managers has been designed, delivered and evaluated in sub-Saharan Africa: a scoping review and best fit framework analysis

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How capacity building of district health managers has been designed, delivered and evaluated in sub-Saharan Africa: a scoping review and best fit framework analysis

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Abstract

Objectives: We aimed to understand how capacity building programmes of district health managers have been designed, delivered, and evaluated in sub-Saharan Africa. We focused on identifying the underlying assumptions behind leadership and management capacity building programmes at the district level.

Design: Scoping review

Data sources: We searched five electronic databases (MEDLINE, Health Systems Evidence, Wiley Online Library, Cochrane Library and Google Scholar) on 6 April 2021 and 13 October 2022. We also searched for grey literature and used citation tracking.

Eligibility criteria: We included all primary studies (a) reporting leadership or management capacity building of district health managers (b) in sub-Saharan Africa, (c) written in English or French, and (d) published between 1987 and 13 October 2022.

Data extraction and synthesis: Three independent reviewers extracted data from included articles. We used the best fit framework synthesis approach to identify an *a priori* framework that guided data coding, analysis and synthesis. We also conducted an inductive analysis of data that could not be coded against the *a priori* framework.

Results: We identified 2523 papers and ultimately included 44 papers after screening and assessment for eligibility. Key findings included (1) a scarcity of explicit theories underlying capacity building programmes, (2) a diversity of learning approaches with increasing use of the action learning approach, (3) a diversity of content with a focus on management rather than leadership functions, and (4) a diversity of evaluation methods with limited use of theory-driven designs to evaluate leadership and management capacity building interventions.

Conclusion: This review highlights the need for explicit and well-articulated programme theories for leadership and management development interventions and the need for strengthening their evaluation using theory-driven designs that fit the complexity of health systems.

Strengths and limitations of this study

- We have used a systematic approach to search for a best-fit framework against which to code the data and a comprehensive strategy to search for primary studies.
- Three reviewers performed the screening and data extraction.
- We did not appraise the quality of the included papers, as scoping reviews do not require a quality appraisal.
- We may have missed other relevant literature not available publicly or published in languages other than English or French.
- We have made some trade-offs between comprehensiveness and feasibility, as is often the case in scoping reviews.

Key words: Leadership, Management, Capacity building, District Health Managers, sub-Saharan Africa

Introduction

Many countries in sub-Saharan Africa failed to achieve the health-related millennium development goals.[1] The continent accounts for almost half of all deaths of children under-five years worldwide and the highest maternal mortality ratio. It bears the highest burden of HIV/AIDS, malaria and tuberculosis in the world.[1 2] This is partly due to health system weaknesses, which may be attributable to multiple causes,[3] including weak leadership and management, especially at the district level.[3-6]

The role of leadership and management in improving the performance of health systems is widely recognised in the literature.[7-11] Effective leadership and management at the district level are crucial since this is the operational level where national policies and resources are translated into effective services and where responsiveness to local needs can be ensured.[12-15] Building leadership and management capacity of District Health Managers (DHMs) is likely to improve the stewardship of the district health system and is required to ensure the achievement of better health outcomes,[7 11 16 17] particularly the health-related sustainable development goals.[18]

Capacity building programmes (CBPs) in the health sector are complex.[11 19] They seek to produce change at the individual, organisational and systemic level.[4 14 20-22] They involve the interactions between several actors, including policymakers, managers, providers, funders, patients, communities, etc. These actors belong to various institutions or social sub-systems, and have different values, norms, decision spaces, and possibly conflicting agendas and expectations.[23-26]

Health districts are complex adaptive systems.[4 13 19] They consist of interacting elements or sub-units (i.e., actors at first-line health facilities, hospitals, district health management teams, community, etc.). Health districts are open systems which are embedded in a broader (social, political, and economic) environment with which they interact continuously. Consequently, health districts adapt to changes in the environment and co-evolve with other systems. From these interactions may arise behaviours that may be unpredictable and non-linear. History also shapes these emergent patterns.[27-31] This complexity has consequences for capacity building: programmes that work in one setting will not necessarily work in another or may not function in the same location later.[32]

Capacity building emerged in the development aid field in the 1970s.[33] It is considered an elusive and broad concept and has been described as an umbrella or multidimensional term that is associated with a range of (sometimes opposite) meanings among academics and practitioners.[2 21 23 34-39] Often, the terms capacity building and capacity development are used interchangeably.[21 40] Some authors prefer to use capacity development to stress the importance of ownership by partner organisations and to emphasise the importance of existing and potential capacities.[33 41] Some authors simplistically refer to training as capacity building.[17 42 43] Such reductionist view tends to restrict capacity building to its tangible or measurable elements (e.g., knowledge and skills, organisational structure, procedures, and resources).[42 44-47] In contrast, other scholars [37 39 48] consider that capacity building should be a systemic approach that also considers less tangible aspects, such as leadership, motivation and organisational culture.[38 49]

The conceptual heterogeneity of capacity building, its various interpretations, and the tensions between holistic and reductionist perspectives may explain the diversity of CBP designs, approaches, models and tools.[2 11 21 23 39] This also contributes to the methodological challenges related to CBP process evaluation [38] and to their effectiveness on organisational performance.[20 21 37 50] A good deal of the literature of CBP evaluation is based on pre- and post-test only and many programs are not evaluated at all.[20 51] Little attention has been paid to the underlying theories, models or frameworks underpinning CBP. In the field of health, few studies set out to assess what works, how and why. Exceptions include papers by Kwamie *et al*,[4] Prashanth *et al*,[24] and Orgill *et al*.[49]

The objectives of this review were to understand how CBPs of DHMs have been designed, delivered, and evaluated in sub-Saharan Africa. We focused on identifying the underlying assumptions and

evidence behind CBPs at the district level. We assessed how far these assumptions and contextual conditions are discussed and, if so, what could be learned from these studies.

Methods

We adopted the scoping review methodology, which is appropriate for a topic that is complex and for which there is a high degree of conceptual heterogeneity.[52 53] We followed the five steps proposed by Arksey and O'Malley[53] for a scoping review and subsequent recommendations.[54 55] These steps are (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting data, and (5) collating, summarizing, and reporting the results. A protocol review (supplemental text 1) was developed and approved by the research team.

We combined the scoping review approach with the "best fit" framework synthesis, which provides a practical and rapid method for qualitative evidence synthesis.[56 57] It allows for both a deductive analysis using an *a priori* framework and an inductive analysis based on new themes from selected studies that are not part of the *a priori* framework[56 57] (figure 1).

Figure 1. Process of best fit framework synthesis [56 58]

Step 1 - Identifying the research questions

Our review aimed at answering the following research questions: (1) How has capacity building of DHMs in sub-Saharan Africa been designed in terms of theory, mode, level, approach and contents? (2) How have such CBPs been delivered? and (3) How have such CBPs been evaluated and what were the outcomes? The answers to these questions allowed us to map the designs, approaches, underlying theories, approaches content, outcomes, methodological issues and research gaps.

Step 2. Identifying relevant studies

Identifying primary studies

We used four databases (Medline/PubMed, Health systems evidence, Wiley online library, Cochrane Library) and Google Scholar. We also searched for grey literature from international organisations that support CBPs in health systems in sub-Saharan Africa (incl. WHO, European Union, USAID, Management Sciences for Health, Belgian Development Agency, etc.). In addition, we used the citation tracking to identify papers.

Our search strategy was based on the Joanna Briggs Institute's "PCC approach"[59] :

- **Population**: DHMs are health officers who work in local health systems and spend some of their time in management and/or administrative roles. They can have various professional profiles (physicians, nurses, pharmacists, administrators, etc.) and play different roles, possibly combining them, within the DHS (district medical officers, hospital directors, clinicians, nursing officers, nurse supervisors, etc.).[60]
- **Concept**: The main concept is “capacity building”, i.e., any programme or intervention whose aim is to enable an individual or organisation to achieve its stated objectives.[37] CBP comprises both hard or measurable (e.g., knowledge and skills, organisational structure, procedures and resources, etc.) and soft or intangible (e.g., leadership, motivation and organisational culture) components. Search terms included "capacity building" or "capacity development" or "capacity strengthening" and "health district management" or "leadership development".
- **Context**: Sub-Sahara African countries according to the World Bank classification.[61]

The Table 1 outlines the search strategies used in PubMed and other electronic databases on April 6, 2021. On October 13, 2022, we performed additional searches in all electronic databases to update the included studies.

Table 1. Search strategies for primary studies

Databases	Search strategies
MEDLINE/PUBMED	((((((((((("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 - 2021/04/06 and from 2021/04/07 – 2022/10/13
Wiley online library	Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub Saharan Africa) Filters: MEDICAL SCIENCE, Journals, 1987 – 2021 and 2021 – 2022
Cochrane library	District Health Systems in Title Abstract Keyword AND management in Title Abstract Keyword OR leadership in Title Abstract Keyword AND capacity building in Title Abstract Keyword AND "sub-Saharan Africa" in Title Abstract Keyword
Health Systems Evidence	Health District AND (Manage* OR Leader*) AND Capacity Building
Google scholar	(Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub-Saharan Africa)

Identifying relevant frameworks, models and theories

We used PubMed and Google Scholar to search for suitable published theories or models to generate the *a priori* framework for synthesis. We based our search strategy on the BeHEMoTh approach[56 58]:

- **Behaviour of interest (Be)**: management and leadership capacity of health workers
- **Health context (H)**: capacity building programs, health systems or public health
- **Exclusions (E)**: Non-theoretical/technical models
- **Models of theories (MoTh)**: theory, model, concept, and framework

The table 2 provides the search strategy in PubMed – (Be AND H AND MoTh) NOT E.

Table 2. MEDLINE/PUBMED search strategy for models, theories or frameworks

	Terms	Search strategy
Behavior of interest (Be)	Management and Leadership capacity of health workers	("health") AND ("manage*" OR "leader*" OR "work*")
Health context (H)	Capacity building programs, health systems or public health	("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health")
Exclusion (E)	non-theoretical/technical models	"epidemiological model" or "disease model" or "care model" or "statistical model"

Models of theories (MoTh)	Theory, Model, Concept, framework	model* OR theor* OR concept* OR framework*
((("health") AND ("manage*" OR "leader*" OR "work*")) AND (("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health"))) NOT ("epidemiological model" or "disease model" or "care model" or "statistical model")) AND (model* OR theor* OR concept* OR framework*) Filters: English, French, Humans		

Step 3. Study selection

The selection of primary studies

We selected papers based on their titles and abstracts.[62] In a next step, three reviewers (SB, JE and CK) examined the full texts of the articles independently to decide on their final selection on the basis of the inclusion criteria (Table 3). We selected all studies that met the inclusion criteria regardless of their quality, as we aimed to map key concepts, types of evidence and research gaps.[52 53] Disagreements among reviewers were solved by consensus.[54] We used the Rayyan software to manage the review process.

Table 3. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Type of paper	Papers reporting primary research published in peer-reviewed journals, working papers, intervention reports, research reports	Literature reviews, editorials, opinions, commentaries, workshop reports, conference abstracts, conference proceedings, research protocols
Content of paper (Population, Concept, Context)	Studies related to DHM leadership and management CBPs 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* to 2022	Paper published before 1987

* We chose this year in reference to the Harare declaration on strengthening district health systems.

The identification of frameworks, models and theories

Also here, we selected papers based on their titles and abstracts.[62] Papers that met the following criteria were included (1) papers presenting a model, theory or framework that fit the research purpose, i.e., allow the full description of design, implementation and evaluation of CBPs; (2) papers presenting a description, evaluation or test of a capacity building model, theory or framework with a focus on leadership or on overall management; and (3) papers published in English or French. The box 1 outlined the definitions of theories, models and frameworks used.[63 64]

Box 1. Definition of theories, models and frameworks from Bergeron.[63 64]

- "Theories include constructs or variables and predict the relationship between variables";
- "Models are descriptive, simplification of a phenomenon and could include steps or phases"; and
- "Frameworks include concepts, constructs or categories and identify the relationship between variables, but do not predict this relationship".

Step 4 - Charting data

Generating the a priori framework

Based on the two selected models,[65 66] we generated a list of *a priori* themes and codes related to the rationale, process (strategies, implementation, and evaluation), and outcomes of CBPs (table 4). According to Labin *et al*,[65] the need for conducting a CBP affects its process (design, implementation, and evaluation), which, in turn, affects outcomes.

Table 4. The coding framework

Themes from original models	Codes	Definitions
Rationale for conducting capacity building programmes	Motivation	Trigger or motivating reasons for conducting a capacity building programme.
	Assumptions	Suppositions or hypotheses (explicit or implicit) that underlie the actors' desire to engage in a capacity building programme.
	Expectations	Intended outcomes or results expected from a capacity building programme.
	Context	Key features of the environment in which the health organisation targeted by a capacity building programme is embedded.
Strategies of capacity building programmes	Theory	Any (explicit or implicit) theory that can inform the design, implementation, and evaluation of a capacity building programme.
	Mode	How capacity building programme is provided: in-presence, online, written materials, etc.
	Level	capacity building programme entry point: individual, organisational, and system levels.
	Approach	Teaching and learning methods: training, workshop, coaching, mentoring, supervision, technical assistance, community of practice, etc.
	Content	Substance of capacity building programme activities.
Implementation of capacity building programmes	Actors	Providers or facilitators' professional profile, participants' professional profile.
	Duration	Time during which capacity building programme took place
	Barriers	Bottlenecks that hindered the achievement of expected outcomes.
Evaluation of capacity building programmes	Design & methods	Cross-sectional, case study, (quasi)experimental, pre-post, quantitative, qualitative, mix-methods, theory-driven, etc.
	Timeframe	Period within which evaluation is conducted: time after capacity building programme implementation or completion
	Evaluator position	Evaluator may be internal to (involved in) the programme or external (independent) to programme.
Outcomes of capacity building programmes	Individual outcomes	Knowledge, skills, attitudes, and behaviours of health managers
	Organisational outcomes	Leadership and management practices, organisational culture
	Population health outcomes	Access, quality, and equity of health care and services.
	Sustainability	Maintenance of capacity building programme activities and outcomes over time
	Unexpected outcomes	Unintended results: may be positive or negative

	Lessons learnt	Knowledge or understanding gained from capacity building programme process

Data extraction

Using an Excel form, three reviewers (SB, JE, and CK) extracted separately three groups of data from the selected studies: (1) study characteristics (author, year, country, type, objectives, design, and methods); (2) data related to CBPs that were coded against the *a priori* framework; and (3) new relevant data that did not fit the *a priori* codes. We compared results and merged when necessary.

Step 5 - Collating, summarizing, and reporting the results

We described the main characteristics of the included studies using descriptive statistics. We carried out a deductive thematic analysis to summarize the main review findings from the *a priori* framework [52 55 59] and an inductive thematic analysis to generate new themes from data that did not fit the *a priori* framework. We report the results according to the PRISMA Extension for Scoping Reviews guidelines (supplemental table 2).[67]

Patient and public involvement

Patients or the public were not involved in this research.

Results

Selection of frameworks, models and theories

The search yielded 934 articles. After removing duplicates and screening records based on titles and abstracts, 23 full-text articles were assessed for eligibility. Two full-text articles met the inclusion criteria (figure 2). The two included papers reported on the models of evaluation capacity building: the multidisciplinary model of evaluation capacity building[66] and the integrated model of evaluation capacity building.[65] The two models have similarities as the second model development was largely inspired by the first model.

Figure 2. PRISMA flowchart of the search for models, theories and frameworks

Selection of primary studies

We identified 2704 articles. After removing duplicates and screening records based on titles and abstracts, we assessed 194 full-text articles for eligibility. Thirty-five full-text articles met the inclusion criteria. Nine additional full-text articles were included after reference tracking (n=5) and additional searches (n=4). In total, 44 papers were included in this review (Figure 3)**.** The supplemental table 3 provides the description of included papers.

Figure 3. PRISMA flowchart for primary studies

Characteristics of primary studies included

The characteristics of primary studies included in this review are summarised in the table 5.

Table 5. Characteristics of included papers

Characteristics of included studies		Number	Percentage	References
Years	1991-2000	5	11%	68-72
	2001-2010	9	20%	73-81
	2011-2020	24	55%	4 9 17 19 82-101
	2021-2022	6	14%	47 49 102-105

Languages	English	41	93%	4 9 17 19 47 49 68-91 93-96 98-101 103-105
	French	3	7%	92 97 102
Countries	Uganda	8	18%	19 68 83 84 86 91 100 103
	South Africa	6	14%	6 9 49 73 79 99
	Ethiopia	5	11%	76 77 80 90 95
	Ghana	4	9%	4 69 81 101
	Kenya	4	9%	47 78 85 98
	Democratic Republic of Congo	4	9%	70 92 97 102
	Tanzania	3	7%	72 75 82
	Botswana	2	5%	87 89
	Mozambique	2	5%	93 96
	Liberia	1	2%	74
	Zambia	1	2%	17
	Gambia	1	2%	71
	Ghana, Tanzania and Uganda	1	2%	88
	Ghana, Malawi and Uganda	2	5%	104 105

Rationale for conducting a capacity building programme

Motivation, assumptions and expectations (goals)

A good deal of the literature included in this review have reported weak leadership and/or management capacities of DHMs as the most frequent reason for conducting a CBPs. Weak leadership and/or management were considered the major causes of poor health outcomes in low- and middle-income countries.[4 6 19 49 68-71 74-76 81 83-86 88 90 93-95 98-100 103 106] Frequently mentioned causes of weak leadership and/or management capacity were (1) inadequate professional profiles of health managers (often being clinicians without formal training on leadership and management),[17 76 83 93 104 105] and (2) inadequate efficacy of leadership and management courses (usually classroom based and knowledge-focused instead of practice-based and providing know-how to deal with real-life situations).[47 69 70 76 81]

Twenty-three papers presented the assumptions underlying the CBPs. Most programmes assumed that strengthening the leadership and/or management knowledge, skills, and practices of health managers would improve their leadership and/or management capacities. These improvements would, in turn, lead to improved health system performance and then better health outcomes.[4 17 47 69 71 82-86 93-96 98 100 101 103 105] The CBPs were supposed to trigger health team members' self-confidence to undertake good leadership and/or management practices which would, in turn, activate their job satisfaction, motivation and sense of ownership.[69 82 101] The good management practices reported included: effective and efficient use of resources,[71 95 96 100] priority setting and better planning,[17 71 86 96 100 103] use of data for decision making,[17 96 103] supervision of health workers,[17 71 82 100 101] ensuring monitoring and evaluation,[89 93 100] teamwork and regular meetings.[17 49 71 104] The good leadership practices reported included creating a positive work climate,[4 17 95 98] and relationship building among stakeholders.[9 94]

Thirty-seven articles outlined the objectives or expected outcomes of the programme. Analysis shows that they all refer to the improvement of either the management knowledge, skills, and practices of DHMs [4 17 49 69-72 74-76 80 83-85 91 93 94 98-100 103 104] or the leadership and management knowledge, skills and practices [4 17 47 85 94 95 98] as the main outputs. The outcomes expected from these main outputs were the increase of health service access and coverage,[85 86 91 101] the improvement of the (quality and equity of) health service delivery,[47 68 77 78 80 83 90 95 98 101 104] the improvement of maternal and child health outcomes.[75 83 84 86 91 103]

Context of capacity building programmes

The included studies identified various features of the context within which the programme took place. The most cited was the decentralisation from national (or regional) to the district (or sub-district) level.[9 19 47 49 68 71 74 75 77 80 83 84 86 88 91 93 96 98 102 103 105] However, seven studies reported narrow decision space of DHMs regarding financial and human resources.[4 49 71 86 91 103 105] Three papers noted the persistence of a hierarchical organisational culture within the decentralisation setting.[9 69 72] Other context features included resource constraints and issues (human, financial, equipment, infrastructures, drugs, and other supplies),[4 75-77 80 83 87 89 93 96 107] poor accessibility and availability of health services,[75 101] conflicts and crisis.[92 102]

The capacity building strategies

Underlying theories, frameworks and models

None of the included papers explicitly refers to a theory underlying the reported CBP. Sixteen articles explicitly mentioned seven frameworks or models on which the reported programmes were based (table 6).

Table 6. Capacity building frameworks or models

Frameworks/Models	Description	# Papers	References
Participatory Action Research cycle	The cycle comprises four or five phases related to the problem-solving: problem diagnosis and action planning (plan), action (act), evaluation (observe), and specifying learning achieved (reflect).	5	83 84 88 104 105
Leadership and management competency framework	The framework focuses on core management or leadership skills of health managers, such as problem-solving, planning, resource management, monitoring and evaluation, strategic thinking, etc.	3	47 74 88
Leading and managing framework	The framework includes a set of practices organised into four leadership domains (scanning, focusing, aligning/mobilising, and motivating) and four management domains (planning, organising, implementing, monitoring and evaluation).	3	4 85 98
Potter and Brough's capacity pyramid framework	Systemic capacity-building consists of four levels of a pyramid of needs that contribute to improved performance: tools, skills, staff and infrastructure, structures and systems, and roles.	2	75 100
Thinking environment principles	The thinking environment includes ten elements related to behaviours, attitudes, values, and beliefs that shape the culture and the relationships necessary for good team collaboration. These elements are attention, equality, ease, appreciation, encouragement, feelings, information, diversity, incisive questions, and place.	1	9
Attitudes, knowledge, skills and behaviours framework	The framework posits that relevant attitudes, knowledge, and skills allow students to develop a personal framework of practice to act in and on the health system through various positive behaviours.	1	94
Combination of Kirkpatrick's evaluation model and Mc Le Roy socio-ecological model of behaviour.	The Kirkpatrick model consists of four levels which are reaction (participants' reaction to training content and methods), learning (what participants learned), behaviour (how well participants apply their training), and results (effects of training on the organisation's outcomes). The Mc Le Roy's	1	17

	socio-ecological behaviour model posits that personal, institutional, and community factors shape behaviour.		

An analysis of approaches used in other CBPs showed that most authors referred implicitly to the management competency framework and/or the participatory action research cycle.

Levels, modes and approaches

We found that CBPs reported in the included papers of this review had two entry points: the individual and organisational levels. Nine CBPs focused on strengthening individual health managers' knowledge and skills.[17 70 74 76 89 94 99 100 107] The remaining CBPs took an organisational entry point to strengthen the capacity of the health management teams to perform their managerial functions and achieve health outcomes.

All CBPs reported were delivered face-to-face, either in a specific room, at the workplace or alternating between the two. No online CBP was reported in the included papers of this review.

A diversity of methods was used (alone or in combination) to build health managers' capacity. We summarised these approaches using the classification of Kerrigan and Luke[106] in table 7: formal training, on-the-job training, action learning, and non-formal training.

Table 7. Approaches of capacity building programmes

Approach	Description	# Papers	References
Action learning approach	This approach focuses primarily on the problem-solving cycle (plan, do, study, and act) and emphasizes action as the vehicle for learning.[106] The process includes an alternating mix of workshops or classroom training, actual project implementation, on-the-ground coaching, mentoring or supervision, and review meetings to monitor progress and share experience and learning.	18	4 9 47 68 69 71 72 74 77 78 80 83 84 88 95 96 98 99
On-the-job training	This approach aims at supporting health managers in carrying out their tasks through various approaches such as classroom training, on-site mentoring, coaching or supervision visits, and technical assistance.	9	70 75 87 89 92 93 100 101 107
Mixed approaches	Combination of formal training (usually provided by academic institutions) with on-the-job training,	3	17 76 90
	Combination of formal training with action learning,	1	94
	Combination action learning with on-the-job training.	1	82

We analysed the CBP approach using Roger et al.'s (2003) framework cited by Hartley and Hinksman [108] to see to what extent the CBP approaches were individual or collective on the one hand and prescribed or emergent on the other. The prescribed approach refers to a blueprint approach or a normative process in which inputs (e.g., competencies) and outputs (e.g., standards, performance) required for leadership or management capacity development are specified. The emergent approach entails a dynamic, flexible, or adaptable process that emerges from stakeholders' interactions. We found that most CBP approaches were prescribed and collective,[4 9 19 47 68 71 72 75 77 78 80 82-86 88 91-93 96-99 101-

[105] and prescribed and individual.[17 69 70 74 76 87 89 90 94 95 100 107] The emergent and collective approach was marginal [9 49] (figure 4).

Figure 4. CBP approaches using Roger et al. (2003) framework

Learning content

Twenty-two papers specified the learning contents, which varied in terms of terminology and could be categorised under the headings outlined in Table 7. This table indicated that the most prevalent learning contents were the problem-solving cycle, human resource management, financial management and leadership development.

Table 7. Learning content

References	Problem-solving cycle	HR management	Financial management	Leadership development	Strategic thinking & management	Hospital & health service delivery management	Monitoring, Evaluation & HIMS	Supply chain & fleet management	Governance in health	Project management	Supervision of HW	Epidemiology and health research	Health policy, ethics & law	Complexity & system thinking	Nursing management
Kanlisi *et al.*[69]	X														
Conn *et al.*[71]	X														
De Brouwere and Van Balen[70]						X					X				
Omaswa *et al.*[68]	X														
Uys *et al.* [73]											X				
Byleveld *et al.*[79]										X					
Bradley *et al.*[80]	X	X	X												
Gill et Bailey[78]	X	X													
Kebede et *al.*[76]	X	X	X	X	X	X						X	X		
Rowe et *al.*[74]	X	X	X	X	X										
Blanchard *et al.*[99]	X														
Kebede *et al.*[90]	X	X	X	X	X	X		X				X	X		X
Ledikwe *et al.*[89]							X								
Kwamie *et al.*[4]	X	X		X											
Edwards *et al.*[93]		X	X				X	X							
Balinda *et al.*[100]		X	X	X		X	X	X	X						
Katahoire *et al.*[91]	X														
Mutale *et al.*[17]		X	X		X		X			X					
Doherty *et al.*[94]				X	X									X	
Martineau *et al.*[88]	X	X													
Desta *et al.*[95]				X		X			X						
Total	**12**	**10**	**7**	**7**	**5**	**5**	**4**	**3**	**2**	**2**	**2**	**2**	**2**	**1**	**1**

HR: Human Resource; HIMS: Health Information Management System; HW: Health workers

Implementation of capacity building programmes

Actors: participants and providers

Participants in CBPs were mainly district health and hospital management team members. The composition of these teams varied from one country to another and was often not specified. Other

participants included sub-district management team members, [9 83 101] facility managers and staff, [9 17 75 78 82 99] and district administrative and political leaders.[68 84] The programmes were provided by facilitators from the Ministry of Health at the national, regional or district level,[4 49 68 69 78 92 93 97 100-102] academic and research institutions,[9 72 74 76 83 88 94 99 104 105] international non-governmental organisations, [75 89] or a mix of these institutions.[17 80 86 91 96 98 103]

Duration

The duration of the programme was highly variable, from 10 days to 8 years. We found one programme of less than one month, [100] 13 programmes of one to twelve months,[4 17 69 70 72 74 80 85 93 94 98 99 107] 8 programmes of 13 to 24 months, [49 68 71 76 88 89 91 95] and 8 programmes of more than 24 months.[9 75 82 83 92 93 96 101]

Barriers

Barriers to the successful implementation of CBPs mentioned by authors included human resource issues, such as staff shortage, staff turnover or staff mobility within or across districts,[4 47 71 80 82 85 88 96 104] inadequate support from the national or provincial level,[68 72] insufficient mentorship after course completion,[17 94] insecurity,[85 96] drop out of facilitators due to busy schedules,[100] lack of funding,[88] poor working conditions,[47] the overlapping activities of vertical programmes that negatively affect the availability of supervisors and the regularity of supervisions visits,[102] and the negative influence of donors, such as imposing a standardised intervention with top-down decision making.[71]

Evaluation of capacity building programmes

Approach, design and methods

Almost half of the included papers did not specify an explicit evaluation design. The study designs and data collection methods reported in the included study are summarised in table 8. Three studies were theory-based evaluations.[4 49 96]

Table 8. Evaluation designs and data collection methods

		# Papers	References
Evaluation Design	Case study	9	4 49 72 75 77 92 96 97 100
	Pre-post-study	4	17 74 80 90
	(Quasi)experimental design	5	47 82 85 98 103
	Cross-sectional study	4	95 99 101 102
	Action learning design	1	9
Data collection methods	Quantitative methods (checklists, questionnaires, pre- and post-training test, data from health information management systems)	13	47 74 80 82 86 90 93 95 98 101-103 107
	Qualitative methods (interviews, focus group discussions, observations, and document reviews)	14	4 9 19 49 75 83 84 87 91 92 96 100 104 106
	Mixed methods.	9	17 77 81 85 88 89 94 97 99

Seven studies used frameworks for evaluation purposes (table 9).

Table 9. Frameworks/models used to assess CBPs

References	Frameworks/models used	Purposes
Kokku[75]	Potter and Brough's capacity building framework	To assess the Simanjiro Mother and Child Health Capacity Building project in Tanzania.
Tetui *et al.* [83]	Competing Values Framework of Quinn	To assess the DHMs' capacity strengthening within the MANIFEST (Maternal and Neonatal

		Implementation for Equitable Systems) project in Uganda.
Martineau *et al.*[88]	Kirkpatrick's evaluation model	To assess the effects of management development intervention within the PERFORM project in Ghana, Tanzania and Uganda.
Adjei *et al.* [81]	Five core capabilities framework	To assess the capacity development at the district level of the health sector in Ghana.
Byleveld *et al.*[106]	A leadership and management framework developed from the document review	To assess the DHMT members' perceptions of the importance of 14 leadership and management competencies in South Africa.
Chuy *et al.*[97]	A conceptual framework developed from the literature	To assess the coherence and relevance of provincial-level support to develop the capacity of DHMTs in the Democratic Republic of Congo.
Bulthuis et *al.* [104]	CORRECT criteria to from WHO/ExpandNet	To assess the scalability of the PERFORM2Scale project in Ghana, Malawi and Uganda.

Evaluation timeframe

The evaluation of the reported CBPs adopted various timeframes. Some CBPs were evaluated during their implementation: 5 programmes after 0-12 months,[68 75 78 88 89] 6 programmes after 13-24 months,[49 68 71 88 91 95] and 6 programmes after more than 24 months.[82 83 87 94 96 103] Others CBP were evaluated after their completion: 4 programmes after 0-12 months,[4 17 74 101] 3 programmes after 13-24 months,[47 75 98] and 1 programme after more than 24 months.[70] Two programmes were evaluated at different time points during their implementation and after completion.[85 89]

The position of the evaluators

Since we found that the position of the evaluators regarding the programme was often not made explicit, we analysed the authors' affiliations. We found that most CBP evaluations were reported by people involved in the design, implementation or funding.[9 17 47 49 68-70 72 74-77 80 83-85 87-90 92 93 95 98 99 101 103-105] Some programmes were evaluated by people not involved in the design, implementation or funding.[4 49 91 94 96 97]

Outcomes of capacity building programmes

The outcomes of CBPs reported in the included primary studies are summarised in the table 10.

Table 10. Reported outcomes

Levels	Reported outcomes	# Papers	References
Individual level	Increased management or leadership knowledge	3	17 89 100
	Increased management or leadership skills	10	70 74 75 80 88 89 94 99 100 104
	Work commitment	1	104
	Openness to being mentored and willingness to implement recommended changes,	1	77
	Increased self-confidence to undertake management tasks	1	17
	Changes in the behaviour of supervisors who became more supportive.	1	82
Organisational level	Improvement in overall leadership and management practices, such as systems thinking, change management or performance management	1	100
	Use of management tools to systematically set priorities, develop evidence-based work plans and allocate resources	3	87 89 103
	Improved district performance	2	95 102

	Improved financial management	8	47 69 71 72 77 78 80 93
	Improved human resource management,	4	47 76 80 93
	Improved health information management	4	47 87 89 94
	Improved supply chain and transportation management	4	47 69 71 94
	Improved supportive supervision	2	75 94
	Improved hospital management	4	76 77 80 90
	More regular and effective team meetings	8	4 17 49 69 71 72 75 99
	Improved team confidence to undertake management tasks	4	4 69 72 88
	Increased team and staff morale, motivation or commitment	7	49 68 69 71 78 104 105
	Improved work climate or environment	2	17 78
	improved community engagement	2	69 75
	Improved collaboration between district health teams and local administrators	1	68
Health outcomes	Reduction in maternal mortality among pregnant women referred to a district hospital	1	68
	Markedly reduced incidence of measles cases in a district		68
	Increased health service utilisation	5	68 78 85 92 98
	Increased immunisation coverage	4	75 76 92 104
	Increased antenatal care, skilled birth attendance	4	75 76 92 104
	Increased yaws and buruli ulcer detection rate	1	104
	Increased health service coverage	1	85
	Improved (quality of) service delivery	5	47 76 80 81 97
	Improved malaria, pneumonia and diarrhoea treatment for children	1	103
	Increased tuberculosis cure rate	1	104

Four papers reported limited effects of CBPs. A comparison of the effects of two models of supervision (the matrix modified model and the centre for health and social studies model) showed no differences in the quality of care and the job satisfaction of nurses in South Africa.[107] An assessment of facilitative supervision visits by the regional health team to nine district health management teams in northern Ghana showed that the performance of six out of nine districts (67%) was adjudged only fair.[101] The realist evaluation of a leadership development programme in Ghana[4] pointed out the lack of institutionalisation of leading and managing practices and systems thinking. The study by Chuy *et al*[97] highlighted poor coherence and relevance of provincial-level support, which impeded developing leadership and governance capacity of district health management teams.

Sustainability

Four papers discussed the sustainability of the outcomes and processes of CBPs. Using the sustainability definition of Moore *et al*,[109] we found that all four papers referred to one construct: the continued delivery of the programme. In the Democratic Republic of Congo, De Brouwere and Van Balen[70] reported that doctors trained in the Kasongo project were still applying the skills they had learnt seven years after the last training without saying more about the factors that explain this sustained effect. While acknowledging that it was early to make a final judgement on sustainability, Cleary *et al*[96] reported promising signs in the Population Health Implementation and Training partnerships in Mozambique. They attributed this to the project's flexibility, allowing for adaptations according to local realities and creating a sense of ownership among health system actors. In South Africa, Orgill *et al*[49] were optimistic about the sustainability of the management CBP on the basis of

the outputs observed over 18 months of implementation. The emergent nature of the intervention, which ensures ownership and commitment of team members, was cited as the main driver of this sustainability. In Kenya, Seims *et al*[85] reported that two-thirds of the district- and facility-level teams who received leadership development training achieved sustainability of results at least six months after completion of the programme. Underlying factors included *"an improved work climate due to renovated staff quarters, training, or supervision"*.

In eleven papers, the authors mentioned conditions for sustainability. These include collaboration, support, commitment, and ownership by the ministry of health,[68 74 77 87 93] collaboration, transfer of skills and institutionalisation of training to a local academic institution,[17 74 76] alignment with and strengthening of existing local stakeholders and structures,[83 84 91] alignments of management strengthening interventions with the district planning cycles and budget without providing additional resources.[104]

In three papers, the authors raised concerns about sustainability. Kokku[75] reported that health trainers placed in district health management teams moved from a facilitator role to an implementor role in the Simanjiro Mother-Child health capacity building project in Tanzania. Balinda *et al*[100] reported the absence of a rollout plan for the governance, leadership and management training to other districts not supported by the Institutional Capacity Building project in Uganda. In Ghana, Kwamie *et al*[4] reported the lack of institutionalisation of the leadership development programme, which they attributed to changes in leadership at regional, district and sub-district levels.

Lessons learnt

Lessons learnt from CBPs reported in the included papers of this review are (1) the need for sufficient time for skill acquisition,[77] continuous learning,[88 104] and institutionalisation of leadership and management practices[4]; (2) the alternation of short workshops and on-the-ground follow-up visits, and the use of action learning approach which links training to real-world practice are essential to enable both theoretical knowledge and practical skills[74 76 91 98 106]; (3) a more reflective and context-sensitive approach in order to address complexity of health systems,[4] enable flexibility,[76] and promote emergence and self-organisation[49]; (4) the collaboration with stakeholders such as local politicians and government leaders,[68] provincial health authorities,[88] other health partners,[91] and northern and southern academic institutions[74] is central for CBPs as it allows for support, scaling up and accountability; and (5) the importance of mitigating health workforce issues such as turn over by ensuring job satisfaction, job security career, appropriate trajectory and by developing strategies for efficient recruitment and training.[87 89]

Other themes

Our analysis identified other themes to consider in designing, implementing, and evaluating CBPs. These are (1) the certification or accreditation (in the case of training) and (2) the success factors and underlying mechanisms.

Certification or accreditation

Four CBPs delivered either a university postgraduate or master diploma[76 94] or a government certificate in health leadership and management.[17 100] Certification or accreditation valued the CPBs and made them attractive to health managers as the resulting diploma offers opportunities for career development.[17]

Success factors and underlying mechanisms

Papers reported various success factors or mechanisms. These include (1) CBP methods, which empower DHMs and activate a can-do attitude (self-efficacy). These methods are team-based training,[9 17 98 99] learning-by-doing approach,[17 70 71 76 88 98] alternation of short workshops and on-the-ground follow-up visits,[17 88] shift from administrative and control to a supporting model of supervision,[102] placing trainers within the management teams for day-to-day support,[75 80] reflective

discussions for continuous learning,[9 47] and combination of learning methods[75]; (2) supportive interactions between facilitators and DHMs,[102] which enable mutual trust and enhance motivation and commitment of DHMs to actively participate in the CBP process and to engage with changes[71 78 104]. Such interactions require facilitators to have good relational skills, which are central in the adult learning process[110]; (3) safe work environment, which enables teamwork and promotes distributed leadership[9 80 86 88 104]; (4) adaptability and flexibility of CBP processes make them more responsive as they consider the needs of DHMs and their context, which contribute to increased perceived relevance and sense of ownership by DHMs [75 83 96]; (5) support from and collaboration with the government authorities[80 93]; and (6) the role of the head of health district, who can act as a local champion by using sensemaking and sense giving micro-practices to trigger motivation and buy-in of CBP by the DHMs.[49]

From the lessons learnt and success factors of CBPs reported in the included papers of this review, we summarize the key features of an effective leadership and management CBP in the box 2.

Box 2. Features of effective capacity building programmes

1. A learning-by-doing approach
2. An alternation of short workshops and on-the-ground follow-up visits
3. A team-based approach
4. The flexibility and adaptability of CBP processes
5. Supportive interactions among facilitators and participants
6. Collaboration with and involvement of different stakeholders
7. A long-term perspective

Discussion

This review highlights the growing interest in leadership and management in health systems, especially in the era of millennium development goals and sustainable development goals. Most papers point to weak leadership and management as a leading cause of poor health outcomes in sub-Saharan Africa and assume that better health outcomes cannot be achieved without proper leadership and management. This widespread assumption explains the increasing number of management and leadership CBPs in the last decade, as shown in this review and others.[20 111] The decentralisation movement in sub-Saharan countries has been a solid argument for strengthening DHMs' capacity to steer their health districts.

While most authors agree on the need to strengthen DHMs' leadership and management capacities, there needs to be more consensus on how to do and evaluate this. Strikingly, we did not find one paper explicitly referencing a theory underlying the CBP reported on. Since programmes are *"theories incarnate"*,[112] the lack of an explicit theory may jeopardise the understanding of how these programmes are supposed to work as well as their evaluation. Therefore, while designing a CBP, it is good to make explicit the theoretical assumptions and evidence explaining the pathway to the expected outcomes.[63] Making the programme theory explicit allows for a better understanding of the programme functioning by different stakeholders and will facilitate its evaluation.

Despite the diversity of learning methods used in capacity building, there is a general tendency to combine methods to foster the acquisition of both theoretical knowledge and practical skills. Action learning is becoming the most widely used method. It is based on Kolb's experiential learning theory, which states that learning occurs through experience[113 114] and emphasizes real-life actions as the vehicle for learning.[106] Action learning features advantages that can help strengthen DHMs' leadership and management capacities. First, it goes beyond knowledge acquisition and enables skills development. It also enables participants to benefit from faculty or supervisor support after having attempted to apply their learning. It may be an interesting alternative to inadequate efficacy of leadership and management courses decried in some included papers of this review. Second, action learning stimulates a reflective attitude necessary for individual and collective learning.[115 116] Third,

action learning promotes teamwork and distributed leadership within district health management teams.[116] It can thus help to minimise the effects of the hierarchical culture and gradually develop learning management teams that favour innovation, creativity, and flexibility.[115]

The bulk of CBPs was delivered following a prescribed or normative approach, and the scarcity of the emergent approach was striking. This situation reflects the hierarchical culture still predominant in most sub-Saharan health systems[8] and the dominance of international agencies funding or implementing "standardised" CBPs. However, the normative approach has some weaknesses which may limit its effectiveness. First, it reinforces the "command-and-control" system and can hinder learning, innovation and creativity.[4 117] Second, it often assumes linear cause-and-effect relationships and tends to ignore the influence of context and the complex and adaptive nature of district health systems.[49 117 118] Last, it is often externally led and funded, and likely to be less sustainable as the risk of disruption at the end of the programme or funding is high.[49 117 118] Since district health systems are complex and adaptative, some authors[4 49 117 118] argue that CBPs need to be emergent. Unlike the prescribed approach, the emergent approach considers capacity as a result of interactions between system actors and elements. It is often internally led, bottom-up et likely more sustainable as it is *"anchored in the daily routines"*.[4 117] A balance between the two approaches would benefit the DHMs who are at the *"interface between strategic policy direction and operational service implementation"*[119], i.e., the best place of convergence between top-down and bottom-up processes in health systems.

This review highlighted the diversity of learning contents. Our analysis shows that most CBPs emphasised management rather than leadership. The same observation has been made by Johnson *et al*,[111] who noted that some CBP labelled as leadership development focused virtually on management training. This seems to confirm Kotter's statement, quoted by Kwamie,[117] that *"most organisations are over-managed and under-led"*. It is also possible that the focus on management is because most DHMs are clinicians who need more basic management knowledge and skills since they have had little training in the area before. In any case, the content of CBPs for DHMs must consider the balance between management and leadership in complex and adaptive health systems, as advocated by Kwamie.[117]

This review found various evaluation designs and methods, reflecting the lack of *"agreed approaches"* to CBP evaluation.[20 111] Most evaluation designs from this review fell under three types of Øvretveit's evaluation design classification: the descriptive, before and after, and comparative design.[120] While these designs help to understand the process and measure the effectiveness of CBPs, such "black box" designs provide limited insights into the conditions of success.[121] We concur with DeCorby-Watson *et al*[51] and Johnson *et al*,[111] who call for strengthening CBP evaluations by basing them on explicit theories and evidence that describe how a CBP is supposed to lead to expected outcomes. Therefore, evaluators should go beyond the positivist paradigm and adopt a complex systems perspective that values context, interactions, and emergence.

Most papers in this review pointed out a short timeframe as a limit for achieving changes in leadership or management behaviour, practices, and health outcomes. Indeed, management and leadership CBPs are not one-off processes. They take time to bring about desired changes. Thus, it is crucial to consider a long-term perspective when designing and funding such programmes[96 111] as time allows for progressive adoption and ownership by stakeholders, adaptation based on the context and learning.

The implications for practice and research suggested by this review are summarized in the box 3.

Box 3. Implications for Practice and Research

1. While designing a CBP, it is good to make explicit the (evidence-informed) theoretical assumptions that explain how different programme components, underlying assumptions, and contextual elements are supposed to lead to the expected outcomes. Such a theory is fundamental for programme implementation and evaluation success.

2. Inadequate training approaches have been identified as a cause of health managers' weak leadership and management capacity. This review highlights the importance of a mix of didactic and practical approaches to acquiring knowledge and skills, self-efficacy and learning through real-life action.
3. This review suggests balancing prescribed and emergent approaches to CBPs. When relying on standards, guidelines, or competency frameworks implemented through a hierarchical structure, it is crucial to leave room for innovation, adaptation and emerging local initiatives. Such "homegrown" initiatives are more likely to boost health managers' ownership, motivation and commitment, and ultimately the sustainability of the intervention.
4. Although conceptually different, leadership and management are closely linked in practice. Indeed, whilst health organisations need strong managers to plan, organise and coordinate activities, these managers need also to be good leaders who can anticipate, inspire, motivate, and bring about changes. Therefore, the content of CBPs for DHMs must consider the balance between management and leadership.
5. There is still a need for strengthening the evaluation of management and leadership CBP evaluations in sub-Saharan Africa. Evaluators or researchers should go beyond the positivist paradigm and adopt a complex systems perspective that values context, interactions and emergence. From such a perspective, theory-driven evaluations are a good fit.
6. Management and leadership CBPs are not one-off processes. They take time to bring about desired changes. Time is necessary for successful implementation as it allows for progressive adoption and ownership by stakeholders, an adaptation based on the context and learning. It is thus crucial to consider a long-term perspective when designing and funding CBPs.

Limitations

This review has some limitations. First, we did not appraise the quality of the included papers as scoping reviews do not require a quality appraisal.[52] Yet, we noted that most of the included articles that presented an evaluation had some methodological issues that call for caution when interpreting results. Second, we may have missed other relevant literature not available publicly or published in languages other than English or French. Third, the fact that we have not included any papers related to online CBPs is a limitation of this review, particularly in the digital and Covid-19 era. Finally, we have made some trade-offs between comprehensiveness and feasibility, as it is often the case in scoping reviews.[31]

Conclusion

In the era of sustainable development goals, leadership and management capacities are crucial at the health district level. This review showed a paucity of theory-driven CBPs, a diversity of learning approaches, methods and content, and no agreed methods to CBP evaluation of DHMs in sub-Saharan Africa. These results call for more consistent theories to guide the design, implementation, and evaluation of CBPs for DHMs in sub-Saharan Africa. CBPs need a balance between prescribed and emergent approaches, an optimal mix of didactic and practical learning methods, a balance between management and leadership content, and robust evaluations. Considering the complex and adaptative nature of health districts and adopting a long-term perspective will likely enable conditions and mechanisms to sustain management and leadership CBPs.

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Author Contributions

SB, ZB, BM, FC and BC conceptualize the study. SB conducted the database searching. SB, JE and CK screened abstracts and full texts, extracted data and synthetized data. SB drafted the initial manuscript. SB, ZB, BM, FC and BC contributed to manuscript revision. All authors read and approved the final manuscript.

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All relevant data are available in the article and the supplementary files.

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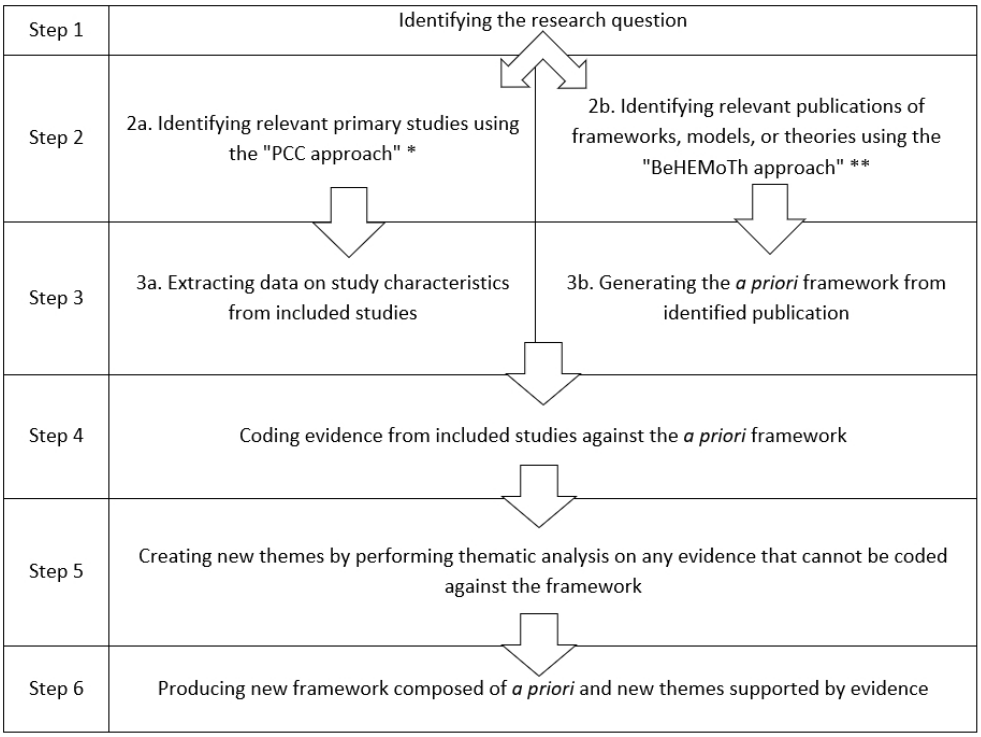
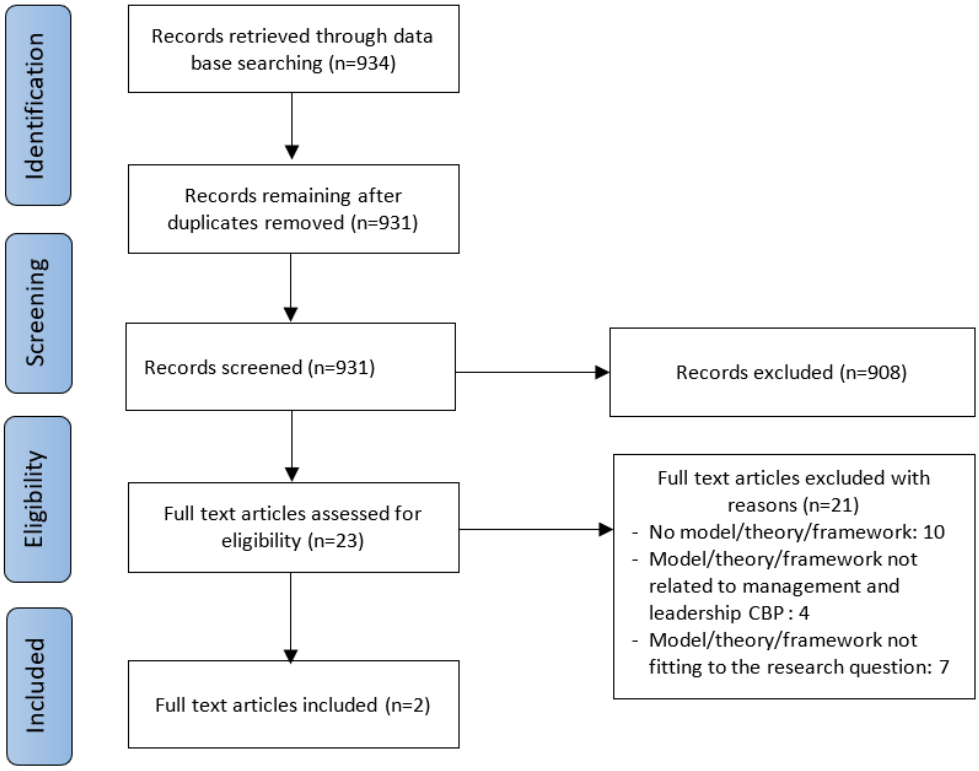


*PCC: Population Concept and Context

**BeHEMoTh: Behaviour of change, Health context, Exclusion Models of Theories

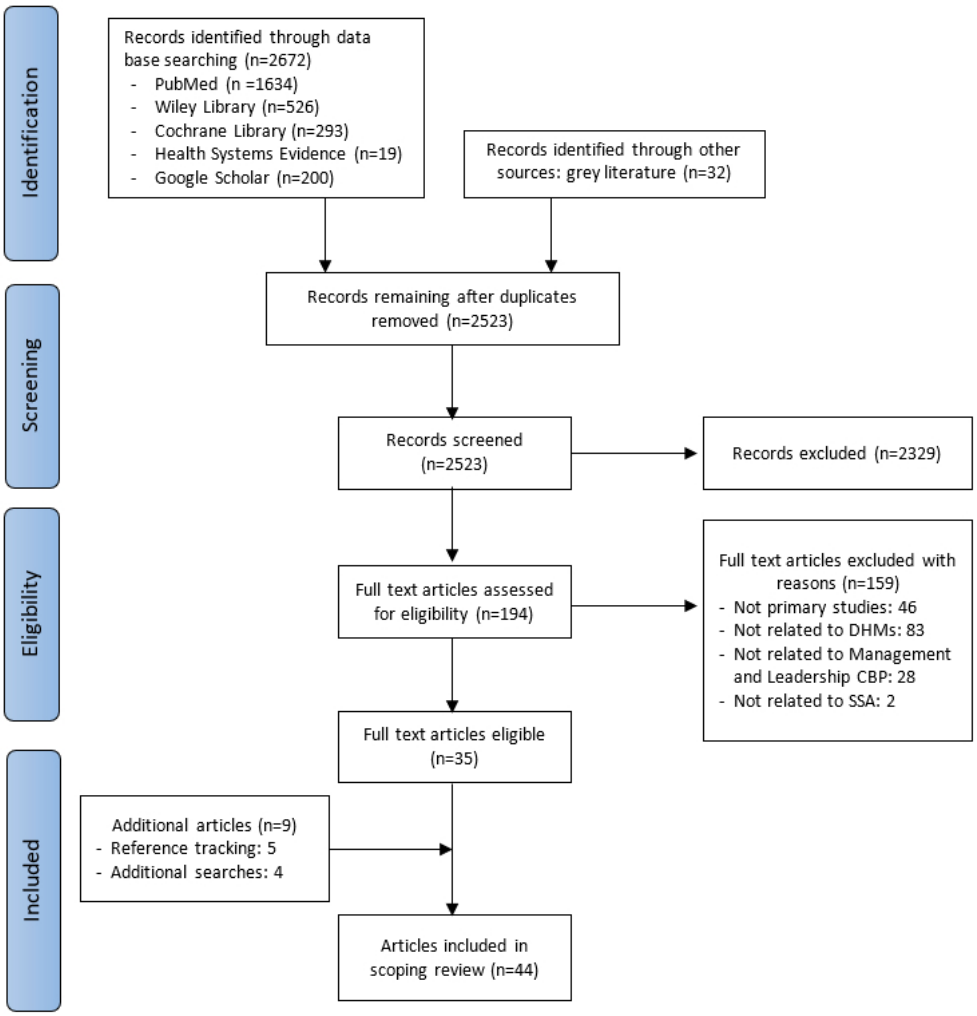
Process of best fit framework

164x131mm (144 x 144 DPI)



PRISMA flowchart for models, theories, frameworks

362x287mm (57 x 57 DPI)



PRISMA flowchart for primary studies

131x137mm (144 x 144 DPI)

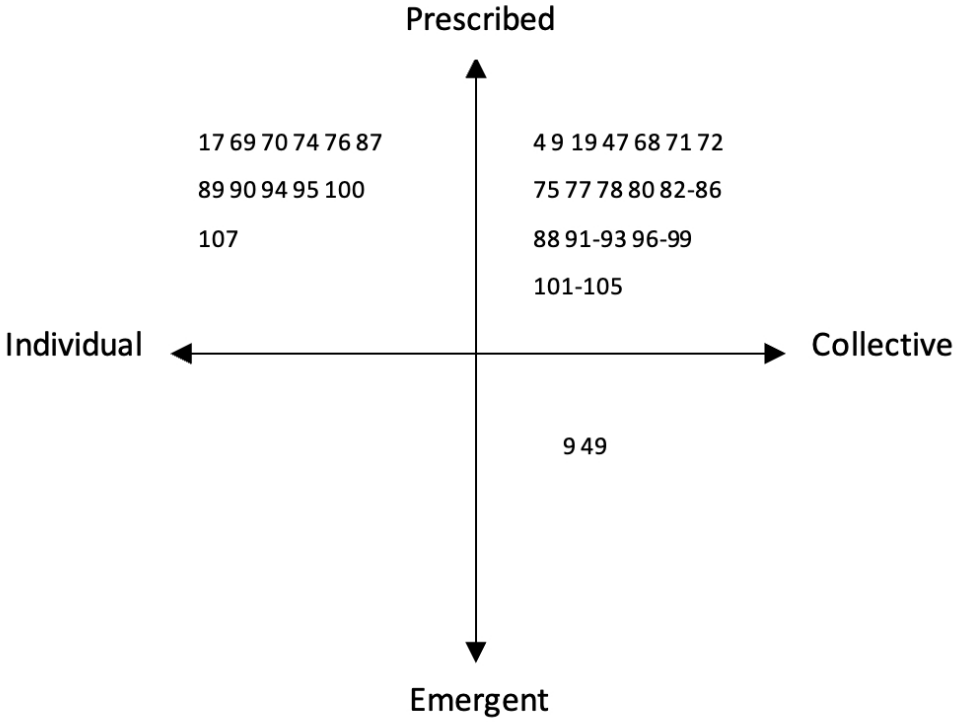


Figure 4. CBP approaches using Roger et al. (2003) framework

178x145mm (144 x 144 DPI)

Supplementary file 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.

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.

2. *Identifying relevant studies*

Sources

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.

Search strategy

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

- **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

[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:
    - Design: rationale, definition, objectives, underlying theories, intervention components
    - Operationalisation: level (individual, organisational, systemic), type of approaches, actors (providers, participants), duration, setting
    - 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).

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

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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*)

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3-4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4 (S1)
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5-6
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7-8
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7-8 (Table 4)
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	No applicable
Synthesis of results	13	Describe the methods of handling and summarizing	8

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		the data that were charted.	
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8-9 (Fig 2 & 3)
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8-9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	No applicable
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8 (S3)
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-17
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	17-19
Limitations	20	Discuss the limitations of the scoping review process.	19
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	19
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	19

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Description of included studies

References	Country	Study design	Methods	Levels	Modes	Participants & size	Providers	CBP Approaches	Duration	Reported outcomes
Kanlisi et al., 1991 (70)	Ghana		Qualitative	Organisational	Face-to-face	District Health Management (DHMT) Team members of Ejisu: the size of DHMT was not described	Regional (Provincial) Management team	Problem solving approach: a series of 3-day workshops aiming at identifying and analyzing management problems, developing strategies and action plans to solve them, and review achievements every three months.	Six months	-Improved financial management; -Improved teamwork; -Improved transport strategy; -Improved community involvement in health
Barnett & Ndeki, 1992 (74)	Tanzania		Qualitative	Organisational	Face-to-face	DHMT members of Same: A total of 17 district staff participated in the complete process	Centre for Educational Development in Health (CEDHA) and regional staff	Problem solving approach: It involved five stages: Identifying & selecting problems, understanding the causes of selected problems, suggesting solutions, implementing solutions, evaluating the impact of the solutions.	Fifty months	-At the Same team level: DHMT confidence to act, weekly meetings to discuss and tackle problems at the district headquarters, improved supervisory meetings. - Following the encouraging results in Same, the Ministry of Health endorsed the strategy, and secured funds to implement it on a wider scale. A further eight districts were introduced to the process, but the important follow-up work necessary from regional level failed to take place in time.
Conn et al., 1996 (71)	Gambia		Qualitative	Organisational	Face-to-face	DHMT members of two out of three health regions (health district) of Gambia: the size	No described	The problem-solving, 'learning by doing' approach: a six-month planning cycle was introduced. This identified health priorities and health service problems.	Eighteen months	-The teamwork facilitated more coordinated supervision and training support to regional health staff;

						of each DHMT was not described		It defined ways to address these priorities and problems within the available resources and in an efficient and integrated way. Teams then made realistic work plans based on this analysis.		-Regular RHT meetings with a new action-oriented format including distribution of regional health data; -Monthly analyse of data on health service delivery for local use; -Improved problem analysis skills; -Improved management of resources; -Team attitude and staff motivation were improved
De Brouwere and Van Balen, 1996 (72)	DRC (Zaïre)		Qualitative	Individual	Face-to-face	Doctors: 18 doctors trained.	Resident doctors working as DHMT members and having a secondary-level clinical function	Learning by seeing and doing (observation and practice at different levels of district health system (referral outpatient clinic, urban health centre, rural health centre, hospital department, district management team).	Twelve weeks per training	-Most of trainees acquired the requisite skills and know-how for health district management.
Omaswa et al., 1997 (73)	Uganda		Mixed method	Organisational	Face-to-face	DHMT members, district's administrative and political leader from three health districts (Jinja, Arua, and Masaka): the exact number of participants was not stated.	Facilitators from the national quality assurance committee	Problem solving approach: selection of clinical or administrative problems from districts to be addressed by means of QI methods, developing work plans, applying solutions, and measuring the resulting changes, identifying further round of problems to be tackled, general meeting at the end of first year for district health teams to share the lessons they had learnt.	Eighteen months	-Improved collaboration between DHT and local administrators and political leaders; -Integration of curative and preventive activities; -Improved the functioning of referral system; -Improvement of service delivery results (decreased maternal mortality, decrease of reported measles cases, reduced outpatient waiting times and increased utilization of outpatient services).

Uys et al., 2005 (75)	South Africa		Quantitative methods: checklists, questionnaire	Individual	Face-to-face	Head nurses of clinics and hospital units, primary health care coordinators, programme managers. Three hospital and six clinics were selected in each district.	No described	In District A, supervisors from both hospitals and clinics were trained in the modified matrix model. In District B, only supervisors from clinics were trained in the CHESS (centre for health and social studies) model. District C was the control region, where no intervention was to take place.	Three months	The general result is that none of the interventions made a significant difference to the quality of care (nursing records or management of chronic conditions) or the job satisfaction of nurses.
Byleveld et al., 2008 (79)	South Africa	Cross-sectional study	Mixed methods: document review, FGD, competency rating scale, interview	Organisational		DHMT members	Various provider including universities, provincial HRD, etc.			
Bradley et al., 2008 (80)	Ethiopia	Pre–post study	Quantitative method: checklist, questionnaire	Organisational	Face-to-face	14 Hospital management team (HMT) members. The average number of beds was240 per hospital, although the number ranged substantially from 74 beds in one hospital to >500 beds in another hospital.	Senior Yale – Clinton Foundation and Post-Graduate Fellows	The EHMI employs a partnership–mentoring model, which incorporates the principles and tools of quality improvement including participatory approaches to organizational change. The Yale University team recruited 24 Senior Yale–Clinton Foundation Fellows and Post-Graduate with experience in hospital administration and/or management to serve for 1 year as management mentors for the medical director and hospital management teams in the 14 hospitals.	First year of EHMI project	-The management skills of the medical directors as perceived by the Yale–Clinton Foundation Fellows improved from August 2006 to May 2007 in several management domains, although their level of confidence in their management skills did not increase generally. -About 60% (45 of the 75) of the management indicators surveyed showed some improvement in the domains of human resources, medical records, nursing standards and practice, infection prevention and control, quality

										management and financial management.
Hartwig et al., 2008 (81)	Ethiopia	Case study	Mixed methods: checklist, document review	Organisational	Face-to-face	HMT members	Senior Yale – Clinton Foundation and Post-Graduate Fellows	The model included needs assessment and baseline evaluation using a hospital management indicator checklist, deployment of 24 Fellows (US and international hospital administrators) for 1 year to work as mentors with hospital management teams in 14 Ethiopian hospitals, continuing didactic and practical training in quality improvement methods for hospital management teams, and 24 management improvement projects to be completed during the year with plans for replication more broadly as appropriate.	First year of EHMI project	-On average, hospitals had 53.2% (SD 16.6) of the 63 key hospital management indicators in place, although there was variation across hospitals and across management domains. -Overall, the presence of key hospital management indicators was lowest in the domains of infection control and quality management and highest in the domains of financial management and nursing standards and practice.
Kokku, 2009 (82)	Tanzania	Case study	Qualitative methods: document review, group discussion, feed-back sessions	Organisational	Face-to-face	DHMT members and facility staff	Health Trainers with variety of skills	A mixture of different approaches was used during the project to achieve the planned outcomes including placing the experts (health trainers) within DHMT. Existing tools for supportive supervision and HMIS system were adopted to suit the local needs and equipment were provided to facilities. The health trainers supported DHMT in day-to-day activities through a process of mentoring and provided technical advice while participating in all planning meetings. The	Six years (2001-2007)	-Better systems for supportive supervision, planning, indent and outreach. -Improved leadership and management skills: regular meetings with agendas and records minutes, better delegation of tasks among DHMTs members. -The establishment and training of 21 village health committees to improve the ownership and laid foundation for launching community health fund.

								health trainers were part of the supportive supervision team and provided on the job training for the facility staff. In short, apart from classroom trainings the project used approaches like mentoring, coaching and on job training to build the DHMT capacity.		-Improved immunization coverage of all antigens from 58 to 85%. [2] Improved Antenatal coverage from 30% to 78%.
Adjei et al., 2010 (83)	Ghana	Case study	Mixed methods: IDI, questionnaires	Organisational		District health workers, with a focus on the DHMT members.	The Government of Ghana and its health sector work with a wide range of development partners (DPs).	Several capacity efforts took place in the districts. The four key efforts identified were: training, provision of technical assistance, infrastructural improvements and knowledge management.		
Gill et Bailey, 2010 (76)	Kenya	Case study	Mixed methods	Organisational	Face-to-face	Regional team members, DHMT members, facility teams.	National quality assurance core team	The intervention described consists of a multidisciplinary core team at the national level, trained as trainers, that provides oversight of regional and district quality assurance teams whose purview is to improve the quality of care and operational functions. Quality assurance teams continuously identify and address systemic barriers to the timely delivery of quality services. In parallel, the process involves improving the management capabilities of facility directors and administrators through the use of quality improvement activities that identify and		-Improved work climate, -Better management, -Higher quality of services, -Greater financial transparency and security, -Substantially increased utilization of services, -Decreased response time and -Raised staff morale and commitment.

								resolve local management and clinical care problems.		
Kebede et al., 2010 (77)	Ethiopia		Qualitative	Individual	Face-to-face	Hospital Managers (CEOs): The program has enrolled two cohorts of hospital leaders (a total of 55 CEOs) and is working in more than half of the government hospitals in Ethiopia.	Faculty from Yale and Jimma University Schools of Public Health	The MHA is split 15% in the classroom and 85% in executive practice at the hospital. Didactic classes (3 weeks of intensive classroom time every 4 months at Jima University campus): classes include formal lectures (pertaining to conceptual principles and technical tools), case applications (in which students work in groups to define and address case-based problems) and expert panel discussions (involving local experts in the topic). Executive practice (between classroom times): comprises the systematic application of classroom tools to specific management projects to improve the functioning and quality of the hospital and is evaluated through monthly reporting and periodic site visits by faculty.	Two years	Several hospital improvements were documented in terms of improved hospital sanitation procedures, improved medical record accuracy, reduced wait times for admissions and outpatient visits and improved human resource monitoring
Rowe et al., 2010 (78)	Liberia		Quantitative methods: self-administered questionnaire	Individual	Face-to-face	Representative from DHMTs, Government hospitals, international NGOs: a total of 97 participants, representing all 15 counties in	Instructors from Yale University and Mother Patern College	-Classroom-based health system management course for health facility and CHT managers was developed and taught by Yale University, Mother Patern College, and CHAI; Follow-up and mentoring for course participants was	Five months by cohort	-In the area of self-assessed personal management skill development, significantly higher proportions of respondents rated their management skills upon completing the course as “strong” or “very strong”

						Liberia, were trained.		provided by Mother Patern faculty, on-site Yale-Clinton Foundation Fellows, and CHAI staff who assisted participants in managing projects and reinforcing course concepts.		in comparison to the beginning of the course in all three cohorts (P-value < 0.001). -In general, at least two thirds of the respondents indicated the course met each objective "extremely well". -In the area of faculty responsiveness, most respondents reported that faculty "definitely" responded effectively to questions and "definitely" related theory to real-life by using workplace problems. -Finally, nearly all respondents reported they would "definitely" recommend the course to colleagues. -There was no significant difference in participants' rating of the course in any areas (all P-values > 0.10), suggesting that the transition from Yale to Liberian faculty was effective.
Kahindo et al., 2011 (84)	DR Congo	Case study	Mixed methods: data from HMIS, document review, semi-structured interviews	Organisational	Face-to-face	DHMT members	Provincial Health Administration staff	Support practices for the development of health districts have two aims: (i) strengthening the skills of the health workforce (provincial health administration staff with broad skills and capable of tackling the problems posed at the health district level	Nine years (2000 à 2008)	-Improved health system governance at the provincial level (internal team building, linking the main actors in the health system around harmonised objectives, optimising the allocation of resources to the health districts)

								comprehensively), (ii) strengthening the working environment.		-Better support for the development of the health districts in the province (increasing the number of supervisions, preparing supervisions based on data analysis, and feedback to the DHMT members). -Improved health outcomes: improved health coverage, improved essential drug supply, improved health information management, improved emergency preparedness, improved use of curative and preventive care exceeding the national averages since 2001: curative service utilisation increasing from 0.36 new cases/inhab/yr in 2001 to 0.50 NC/inhab/yr in 2008. Obstetric coverage reached 87% in 2007 compared to the national average of 54.7%. The vaccination rate for DTP3 is 92.6% compared to a national average of 84.7% in 2007.
Blanchard et Carpenter, 2012 (85)	South Africa	Cross-sectional study	Qualitative methods: FGD	Individual	Face-to-face	17 participants comprising DH Manager and 2 HRMs, six hospitals' CEOs & HRMs, one community	Researchers from the Centre for Rural Health (CRH)	Action learning groups were established. An initial one-day workshop was held where researchers from the CRH introduced participants to the methodology of action learning, and participants were divided into three	Eleven months	The major benefits reported by participants were enhanced teamwork and collaboration, and providing participants with the skills to apply action learning principles

						health center's CEO & HRM		groups. The three groups consisted of four, six and seven participants, respectively, and each comprised members from different institutions. Each group was assigned a facilitator from CRH. The three groups (each with a facilitator) met regularly (approximately monthly) for 4–6 hours over a period of 11 months. In the first meeting with each group, participants had the opportunity to introduce themselves to the group by answering a set of four questions about themselves. Thereafter, individual group members took turns to present a real issue or problem relating to their work in their respective organisations. Generally, each meeting allowed time for one new presentation, as well as feedback on the issues presented at the previous meetings.		to other challenges in their working lives.
Kebede et al., 2012 (86)	Ethiopia	Pre–post study	Quantitative methods: checklist	Individual	Face-to-face	24 Hospital CEOs (16 urban and 8 rural)	Yale and Jimma University faculties	Courses are taught in three 3-week blocks and CEOs work in their hospitals in executive practice between the didactic blocks, resulting in 85% of time in executive practice and 15% of time in the classroom. Supportive supervision was also provided on-site by the teaching staff for evaluation	Two years	-Adherence to hospital performance standards increased significantly during the one-year follow-up (27% compared with 51% of standards met at baseline and follow-up, respectively; p-value < 0.001). -Significant improvement in adherence to

								purposes. In addition, the CEOs who were enrolled in the MHA were provided some on-site technical assistance such as software installation for master patient index or pharmacy inventory control functions, as they implemented hospital improvements.		management standards in 7 of the 12 management domains (p-values < 0.01). -Improvement was more apparent in most domains for which there were detailed implementation guidelines and specific training through the MHA in addition to performance standards. -No statistically significant difference between urban and rural hospitals.
Seims et al., 2012 (87)	Kenya	Quasi-experimental	Mixed methods: interviews, data from HMIS	Organisational	Face-to-face	67 intervention teams of health managers, doctors and nurses were included in the study.	Mentors or coaches	LDP uses a team-based approach to develop leadership and management skills among health workers. The intervention centres around a "Challenge Model" whereby participants select a problem or challenge faced and develop a shared vision and action plan to help address the challenge as a team. Additional components include: stakeholder alignment meetings at the national and subnational levels to generate commitment to and ownership of the LDP among decision makers; four LDP workshops that train participants in various leadership practices including scanning, focusing, aligning and mobilizing, and inspiring. On-the-job team meetings where teams work on action plans to address	Six months	Results showed significant increases in health-service coverage at the district level (p = <0.05) in the intervention teams compared to the comparison teams. Similarly, there were significant increases in the number of client visits at the facility level in the intervention group versus comparison facilities (P < 0.05).

								the selected challenge and plans for monitoring progress in achieving measurable results; and meetings with mentors/coaches where teams review and reinforce LDP content and receive technical assistance for monitoring and evaluating progress on their action plans.		
Aikins et al., 2013 (88)	Ghana	Cross-sectional study	Quantitative methods: checklist	Organisational	Face-to-face	DHMT members, Sub-District Health Team (SDHMT) members, Community Health Officers (CHOs)	Regional Management Team for DHMTs, DHMT for SDHTs, SDHT for CHOs	Facilitative supervision is a system of management whereby supervisors at all levels in an institution focus on the needs of the staff they oversee. The most important part of the facilitative supervisor's role is to enable staff to manage the quality improvement process, to meet the needs of their clients, and to implement institutional goals. This approach emphasizes monitoring, joint problem solving, and two-way communication between the supervisor and those being supervised. Adoption of a facilitative approach leads to a shift from inspection and fault-finding to assessment and collective problem solving to continuously improve the quality of care.	Four years	-The 9 districts differ markedly with respect to their performance on the various items assessed. -Using the overall scores, three DHMTs (i.e., 43% of DHMTs) were graded as good (≥ 80%). All the remaining six DHMTs were adjudged as fair (≥ 79 - 60%). -Using the overall scores, none of the SDHTs were grade as good (= ≥ 80%). Four of the nine districts SDHTs were, however graded fair (≥ 79 - 60%). -Using the overall scores none of the CHOs were grade as good (= ≥ 80%). Seven of the nine districts CHOs were graded as fair (≥ 79 - 60%). The remaining two district CHOs were adjudged as poor (≤ 59%).

Ledikwe et al., 2013 (89)	Botswana		Mixed methods: questionnaire, interviews, FGD	Individual	Face-to-face	Monitoring & Evaluation officers	Facilitators from the International Training and Education Center for Health (I-TECH) in Botswana	Trainings were conducted two to three times a year and included skill-building workshops and didactic sessions. On-site mentoring visits lasted 1 to 2 days with the purpose of reinforcing knowledge and skills gained during trainings as well as troubleshooting other work-related challenges. Mentoring was tailored to the individual needs of the District M&E Officers.	Two years	Knowledge scores significantly increased ($p < 0.05$) during the three trainings in which pre/post tests were administered. Over 1 year, there were significant improvements ($p < 0.05$) in self-rated skills related to computer literacy, checking data validity, implementing data quality procedures, using data to support program planning, proposing indicators, and writing M&E reports.
Mpofu et al., 2014 (90)	Botswana		Qualitative methods: IDI, FGD	Individual	Face-to-face	51 M&E officers: university graduates in the field of social sciences with no prior health information exposure	Facilitators from I-TECH in Botswana	M&E officers were provided with on-the-job training and mentoring to equip them with the knowledge and skills necessary to carry out M&E responsibilities in health districts across the country.	Two years	Data from the in-depth interviews and focus group discussions demonstrate several achievements from the establishment of the district M&E officer cadre. These include improved health worker capacity to monitor and evaluate programs within the districts; improved data quality, management, and reporting; increased use of health data for disease surveillance and public health services planning purposes; introduction of district-led operational research activities; and increased availability of time for nurses and other health workers to

										concentrate on core clinical duties.
Kwamie et al., 2014 (5)	Ghana	Case study	Qualitative methods: Document review, Observation, Semi-structured interviews	Organisational	Face-to-face	Health Managers and staff	Regional health administration members, and one external consultant	The LDP is designed for teams to apply 'leading and managing' practices to service delivery problems (referred to as 'challenges' in the LDP). This is realized through teamwork, defining root causes, action planning, monitoring, and evaluation, and repeating the cycle. The LDP consists of a six-month cycle of root challenge identification, action planning, and monitoring and evaluation. Two-day, face-to-face workshops were held in the capital city Accra three times bi-monthly. Workshops were interspersed with monthly coaching visits, with the facilitation team attending teams and their wider staff in their facilities to ensure organization wide diffusion of LDP teachings.	Six months	The LDP was a valuable experience for district managers and teams were able to attain short-term outcomes because the novel approach supported teamwork, initiative-building, and improved prioritisation. However, the LDP was not institutionalised in district teams and did not lead to increased systems thinking. This was related to the context of high uncertainty within the district, and hierarchical authority of the system, which triggered the LDP's underlying goal of organisational control.
Edwards et al., 2015 (91)	Mozambique	Case study	Quantitative methods: checklist	Organisational	Face-to-face	DHMT members in 10 District Health Directorates	Regional teams of three persons	Mentoring support was provided through three regional teams. Each team was responsible for oversight of three or four districts. By spending time with the managers in their own work environments and assisting them throughout day-to-day challenges, this site-based mentorship approach	The first year of HMM programme	-Of the four domains, district performance in the accounting domain exhibited the strongest and most sustained improvements. -District HR management saw improvements in its ability to pay salaries on time, initiate procedures for health worker career

								provided contextualized guidance and avoided sending staff to costly, off-site workshops, which cause significant disruptions in local service provision.		development, and plan and budget for new personnel. -The M&E capacity domain demonstrated weak progress across year-one. -The one indicator analysed for transportation management suggested progress.
Balinda et al., 2015 (103)	Uganda	Case study	Qualitative methods: review document, authors' experiences of the GLM training	Individual	Face-to-face	All health care staffs with management tasks included DHTM members, regional hospital managers	Senior Ugandan health care managers (national trainers)	The original course comprised 10 modules and took 10 days. However, it was executed in two sessions of five days, with each session covering five modules. The period between the two training sessions was used for participants to work on a Community Health Improvement Project (CHIP). The training consisted of a mixture of adult learning methodologies, including short lectures, questions and answers, small group discussions, plenary presentations, video shows and role plays. Participants from the same district developed their own CHIP together, which was presented to the class and discussed.	Ten days	Practical application skills were observed in the class. There were immediate changes in the behaviour of the participants during the course of the training, as noticed in their team-building processes in group assignments and time management. Other intended competencies which are now being practised include systems thinking, stewardship, change management, performance management, service organization, support supervision and monitoring. This was ascertained through support supervision of the participants. Their increase in knowledge was demonstrated by their post-training test results, which all of the participants passed.

Katahoire et al., 2015 (92)	Uganda		Qualitative methods: IDI, observation, documents review	Organisational	Face-to-face	DHMT members and Communities in 5 health districts	Child Fund International (CFI), Liverpool School of Tropical Medicine (LSTM), and Advocates Coalition for Development and Environment (ACODE)	CODES combines UNICEF tools designed to systematize priority setting, allocation of resources and problem solving with the Community. These tools include LQAS ((using Tanahashi model), Bottleneck analysis, Causal analysis, Continuous Quality Improvement (using the Plan, Do, Study, and Act cycles), Community Dialogues based on Citizen Report Cards and U reports.	The first two years of the project	All five districts health teams with support from the implementing partners were able to adopt the UNICEF tools and to develop district health operational work plans that were evidence-based. Members of the DHTs described the approach introduced by the CODES project as a more systematic planning process and very much appreciated it. Districts were also able to implement some of the priority activities included in their work plans but limited financial resources and fiscal decision space constrained the implementation of some activities that were prioritized.
Odaga et al., 2016 (93)	Uganda		Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members and Communities in 5 health districts	CFI, LSTM, and ACODE	The CODES project combines tools designed to systematize identification of gaps, priority setting, allocation of resources, and problem-solving. The project also empowers and engages communities in monitoring health service provision and to demand quality services through community dialogues based on Citizen Report Cards (CRC) and U reports as a feedback mechanism. The tools include LQAS, Bottleneck	Five years	All five districts were trained and participated in LQAS surveys and readily adopted the tools for priority setting and resource allocation. All districts developed health operational work plans, which were based on the evidence and each of the districts implemented more than three of the priority activities which were included in their work plans. In the five districts, the CODES

								analysis using the Tanahashi model, Causal analysis, and Continuous Quality Improvement, which are the supply-side tools; and community dialogues based on CRC and U reports, which are the demand-side tools. Learning and using of tools is promoted through training, participation, and learning networks (peer-to-peer learning) and through mentoring.		project demonstrated that DHTs can adopt and integrate these tools in the planning process by systematically identifying gaps and setting priority interventions for child survival.
Tetui et al., 2016 (21)	Uganda		Mix-methods: IDI	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers		Three years (2013–2015)	An interative, dynamic and complex model with three sub-process of building a competent health manager was developed. A competent manager was understood as one who knew his/her roles, was well informed and was empowered to execute management functions. Professionalizing health managers which was viewed as the foundation, the use of engaging learning approaches as the inside contents and having a supportive work environment the frame of the model were the sub-processes involved in the model. The sub-processes were interconnected although the respondents agreed that having a supportive work

										environment was more time and effort intensive relative to the other two sub-processes.
Mutale et al., 2017 (19)	Zambia	Cross-sectional	Mix-methods: questionnaire, IDI	Individual	Face-to-face	444 Health workers at different levels of the health system	Ministry of Health (MoH), Ministry of Community Development, Mother and Child Health (MCDMCH), Broad Reach Institute for Training and Education (BRITE)	The course had both theoretical and practical sessions which were supported by mentorship both during and after training. It has been packaged in line with a recent study that recommended experimentation with action learning approaches, including a mix of formal training, on-the-job training, mentoring and support.	Six to twelve months by phase	-On average, knowledge levels increased by 38% after each workshop. -The calculated before and after percentage change for work environment themes ranged from 5.8% to 13.4%. Majority of respondents perceived improvements in the workplace environment, especially in handling human resource management matters. -The smallest improvement was noted in ethics and accountability. -Qualitative interviews showed improvements in the meeting culture and a greater appreciation for the importance of meetings. Shared vision, teamwork and coordination seemed to have improved more in work places where the overall manager had received ZMLA training.
Tetui et al., 2017a (94)	Uganda	Case study	Data collection: IDI, document review, observation	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers	The Participatory Action Research (PAR) approach has five main phases depicted in a cycle – problem identification, deduction of possible solutions, taking	Three years (2013–2015)	The findings indicate that the participatory action research approach enhanced health managers' capacity to collaborate with others,

								action, reflecting on the consequences of the actions and specifying learning.		be creative, attain goals and review progress. The enablers included expanded interaction spaces, encouragement of flexibility, empowerment of local managers, and the promotion of reflection and accountability.
Tetui et al., 2017b (95)	Uganda	Case study	Qualitative methods: Semi-structured interviews, FGD	Organisational	Face-to-face	Community stakeholders, Sub- County level stakeholders, District level stakeholders	Makerere University School of Public Health researchers	MANIFEST was implemented following Gerald Susman's PAR cycle. According to Susman, the PAR cycle has five phases: problem diagnosis, action planning, taking action, evaluation and specifying learning achieved. The cycle repeats itself with a refinement of the problem or a new one. At the centre of the PAR cycle are principles that build and strengthen communities and systems through the inclusive nature of dialogue and actions made at various levels (reflexive critique, critical dialog, collaborative resource, risk, plural structure, theory, practice and transformation).	Three years (2013–2015)	'Being awakened' emerged as an overarching category capturing stakeholder experiences of using PAR. This was described in four interrelated and sequential categories, which included: stakeholder involvement, being invigorated, the risk of wide stakeholder engagement and balancing the risk of wide stakeholder engagement. In terms of involvement, the stakeholders felt engaged, a sense of ownership, felt valued and responsible during the implementation of the project. Being invigorated meant being awakened, inspired and supported. On the other hand, risks such as conflict, stress and uncertainty were reported, and finally these risks were balanced through tolerance, risk-

										awareness and collaboration.
Uduma et al., 2017 (96)	Tanzania	Quasi-experimental	Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members, facility managers, health workers	No described	The intervention components were (a) workshop with district health management teams and facility managers on human resource management, (b) intensive training in supervisory and support skills for managers directly engaged in supervision, aimed at strengthening the capacity of these in-charges at a facility level or (c) action learning sets for staff engaged in supervision at the district and facility level which followed on from the training and continued for a period of 12 months.	Twenty months	The results indicated an improvement in the intervention a + b and a + b + c districts. In both intervention groups, the end-line samples have generally higher scores than the corresponding baseline samples for both supervisors and health workers. However, the difference is more marked in intervention a + b for the supervisors and in intervention a + b + c for health workers. This provides evidence of the positive impact of the intervention on supervisors' behaviours in the intervention groups, compared with the control group and demonstrates that supervisors are making procedural changes within their facilities which will in turn have a positive impact on staff.

Cleary et al., 2018a (97)	Mozambique	Case study	Qualitative methods: IDI, FGD, observation, document review	Organisational		DHMT members	Sofala Provincial Directorate of Health, African Health Initiative, Eduardo Mondlane University's School of Medicine		Six years (2010 to 2015)	Key features of the HSS implementation practice, which were mainly geared towards generating ownership of the intervention by the public health system and strengthening existing routine practices and procedures: 1) integration of the HSS intervention into the health system—and working with the system (the intervention's activities were integrated/ aligned with the priorities of the health system, physically, financially and operationally integrated into the health system), 2) Flexibility, adaptation, responsiveness, and 3) Relational trust-building (integrity: transparent rules, consistent procedures, and fair and impartial decision making ; benevolence : inclusive procedures; competence : sanctions for rule breaking and being seen to achieve fair results).
Cleary et al., 2018b (9)	South Africa	Case study	Qualitative methods: observation, interview, document review	Organisational	Face-to-face	SDHT members, facility managers	Research team: organizational psychologist, health policy and systems researchers.	The overall project approach was one of collaborative action learning. The emergent LD interventions included FM group coaching (seven 2-h long sessions aimed at creating a community of practice), FM short course training in	Five years (2012 - 2016)	- Despite this broader governance context, the SDMT and FMs began to report changes in their understanding of the benefits of relational leadership. These shifts in understanding enabled a larger space for FMs to

								health management (5-day short course), FM peer support (monthly half-day meetings of FMs), Facility supervision (day-long supervision visits to each facility run by SDMT every six months), Relational leadership skills (Day-long workshop on how to enable a Thinking Environment in the workplace), SDMT group coaching (Eight 2-h long sessions aimed at creating a community of practice), Facility strategic workshops (Day-long strategic planning workshops in each facility). Within this emergent design, we drew structure from the Thinking Environment as a methodology that is appropriate for enabling a distributed relational leadership.		exercise discretion. They were positive about their exposure to the set of LD processes and reported benefits from their use of the leadership skills. FMs also mentioned that the sub-district team has really improved in terms of support and feedback. From the perspective of the SDMT, the health system gains attributed to the LD interventions included greater trust and cohesion within the SDMT and in the relationship with FMs and staff.
Doherty et al., 2018 (102)	South Africa		Mixed methods: document review, questionnaire, 18 semi-structured interviews	Individual	Face-to-face	Health managers including district health managers	School of Public Health and Family Medicine, University of Cape Town, University's Graduate School of Business	The Oliver Tambo Fellowship Programme is a health leadership training programme with a post-graduate Diploma at its core, supplemented by management seminars, mentorship and alumni networking. The four residential modules (three of 8 days and one of 5 days) were run over a year. Students completed a range of assignments between each module, always	Eighteen months	- Alumni were retained in the public health sector; they felt empowered and motivated by the program to implement management transformation, demonstrated characteristics of transformational leadership, and received recognition from colleagues and line managers for their improved leadership.

								entailing personal reflection, critical thinking skills and diagnosing and addressing challenges specific to their own workplaces. A final management project that was larger in scope and implemented over the 4 months following the last module, required considerable reflection, planning, implementation and adjustment over time, of a set of small-scale interventions designed to suit the specific context of their workplaces.		-Health organisation's management practices changed through the transformational leadership provided by alumni; health services improved as a result of intervention by alumni; Alumni build health management and leadership capacity within their own institutions (including training and mentoring young managers). Changes reported from district and hospital levels included improving district and sub-district health information system, improving the support given to sub-district and health facility managers, improving supply chain in a district, improving the patient transport system in a district, improving waiting times in a district hospital, improving staff satisfaction at a hospital, getting facilities accredited, etc.
Martineau et al., 2018 (98)	Ghana, Tanzania, Uganda	Action-research	Qualitative methods: document review, IDI, FGD	Organisational	Face-to-face	DHMT members	Country research teams members of the PERFORM project consortium	The intervention was based on the action research (AR) cycle entailing four stages: plan, act, observe and reflect. AR is manifested by the DHMTs in the following process: identify and plan strategies to address problems identified;	Two years	-DHMT members improved management competencies for problem analysis, prioritisation and integrated HRM and health systems strategy development. They learnt how to refine plans as

								implement strategies; observe and record the effects of the strategies and reflect on the processes and effects. Multiple and reinforcing methods used for developing these competencies: situational analysis with support from the CRT, two national workshops, follow-on activities (reflective diaries, CRT visits and interdistrict meetings to review progress and share experiences).		more information became available and the importance of monitoring implementation. - The MSI produced changes in team behaviours and confidence. There were positive results regarding workforce performance or service delivery; these would increase with repetition of the MSI.
Chuy et al., 2020 (99)	DRC	Case study	Mixed methods: IDI, FGD, observation, questionnaire	Organisational	Face-to-face	DHMT members	Provincial Health Administration Staff			The members of the management teams in the health districts generally report that the provincial health administration support is mainly administrative and technical. They raise the problem of its need for a conceptual model, regularity, structuring and systematisation. They also point to constraining factors of this support, such as corruption, irrelevant visits and influence peddling.
Chelagat et al., 2020 (100)	Kenya	Quasi-experimental	Quantitative methods: questionnaires, data from HMIS	Organisational	Face-to-face	Senior health managers drawn from different levels and sectors of health service	Strathmore Business School, Management Sciences for Health, Ministry of Health	The program cohort cycle is implemented within a nine-month period and composed of five workshop modules; four team coaching sessions and one cross-learning site visit. Each workshop module is equivalent to four classroom days, and a	Nine months by cycle	Leadership training and coaching built around priority institutional health service improvement projects in the intervention institutions showed: a) skilled birth attendance increased, on average, by

								coaching session takes between 60 to 120 min. The coaching session acts as a link between (a) the classroom learning; (b) the application of the learned knowledge in the workplace; and (c) team support and accountability. The teaching methodology included: case method, experiential learning, and group work. At the end of the program, the participants were expected to present their project implementation progress to their peers and the program facilitators for feedback.		71%; b) full immunization of children, increased by 52%; c) utilization of in and out-patient services, which on average, increased by 90%; d) outpatient turn-around time reduced on average by 65% and; e) quality and customer satisfaction increased by 38.8% (in all the intervention facilities). These improvements were sustained for 60 months after the leadership training. In contrast, there were minimal improvements in service delivery indicators in the comparison institution over the same period of time.
Desta et al., 2020 (101)	Ethiopia	Cross sectional study	Quantitative methods: check list	Organisational	Face-to-face	DHMT members	LMG trainers? Project staff Zonal Health Department staff (equivalent to regional or provincial level)	The Activity uses various approaches including provision of leadership, management and governance trainings at the district level. The training approach is team-based and experiential learning which entails including two to three people from each district and allowing open discussion to share experiences among themselves. The trained people with their counter parts in their facility work together to scan their current situation, design performance improvement	The LMG training was introduced in the year 2017 and data collected from 284 district health offices during the January to December 2019 fiscal year	A total of 284 districts, 94 LMG and 190 non-LMG, were included in the study. Results of the independent samples t-test revealed that LMG districts scored better average performances of 61.8 ± 121.45 standard deviation (SD) compared to non-LMG districts 56.89 ± 110.39 SD, with t (282243) = −3.407317 and $p < 0.001$, two-tailed. The difference of 4.9 percentage unit in the average performance indicated a statistically significant difference

								projects, identify their stakeholders and mobilize resources and jointly conduct monitoring & evaluation. Onsite coaching and technical support are also provided by LMG trainers, project staff, and Zonal Health Department staff using a standard coaching checklist and following OALFA (Observe, Ask, Listen, Feedback, and Agreed) technique. In addition, learning sessions are organized through performance review meetings (PRM) to share challenges, and success and lessons at different levels.		between the LMG and non-LMG districts.
Chelagat et al., 2021 (48)	Kenya	Quasi-experimental	Quantitative methods: semi-structured questionnaires	Organisational	Face-to-face	Over 200 Health care managers and leaders from 19 counties	Strathmore Business School, Management Sciences for Health, Ministry of Health	The curriculum was designed to provide an opportunity for the teams to practice knowledge, skills, and attitude to address real workplace policy and systems challenges to produce measurable results toward improving health performance. A vital aspect of leadership development training was the integration of facility improvement projects and team coaching in the curriculum. The role of the team coach, therefore, was to help teams demonstrate their own leadership skills through practice by clarifying the project's objective, holding	Six years (2010-2016)	The pretest and posttest means for all the six health system (HS) pillar indicators of the treatment group were higher than those of the control group. The regression method to estimate the DID structural model used to calculate the "fact" and "counterfactual" revealed that training had a positive impact on the intended outcome on the service delivery, information, leadership and governance, human resources, finance, and medical products with impact value ≥1 (57.2).

								the teams accountable, monitoring the project's progress, and participating in experience sharing workshop. These workshops were embedded in the five modules and the project's teams were expected to present their progress after every module break.		
Orgill et al., 2021 (53)	South Africa	Case study	Qualitative methods: IDI, literature review	Organisational	Face-to-face	Extended DHMT members	New District Manager	The DM worked with a combination of existing resources to address challenges within the management team meeting. He designed a suite of bottom-up innovations. These innovations included: introducing a new meeting agenda that focused on all the health system building blocks; developing job descriptions for former hospital chief executive officers (CEOs) who were sent to work in the district office 'without a portfolio'; inviting nongovernmental organisation (NGO) partners to the meeting to foster shared vision and accountability; enforcement of the Health Management and Information Systems (HMIS) policy to promote information use by managers; and efforts to focus on solutions in meetings not only problems	Two years	The new district manager drew on systems thinking, tacit and experiential knowledge to design bottom-up innovations. Capacity was triggered through micro-practices of sense-making and sense-giving which included using sticks (positional authority, enforcement of policies, over-coding), intentionally providing justifications for change and setting the scene (a new agenda, distributed leadership).These micro-practices in themselves, and by managers engaging with them, triggered a generative process of buy-in and motivation which influenced managers and partners to participate in new practices within a routine meeting.

Kahindo et al., 2021	DRC	Cross-sectional study	Quantitative methods	Organisational	Face-to-face	DHMT members	Provincial Health Administration Staff	The functions oriented towards the socio-technical support of the health districts refer, in particular, to the supervision and accompaniment of the health district teams. The option of switching from a hierarchical and normative support model to a coaching model aimed at capacity building, empowerment of teams and support for problem-solving has been taken.		-The health district managers generally less well perceived the support process regarding the frequency of visits, availability of supervisors and overlap with visits from the intermediate level to the health districts. On the other hand, for more than 85% of the district managers, the support provided by the intermediate level was perceived positively in terms of the gradient of the supervisor's skills, the adequacy of the support with the needs, the effective reinforcement of the DHMT member' capacities, the effective support for problem-solving faced by the teams and the actual usefulness of the support provided by the supervisors at the provincial level. -The perception of provincial-level support's effects on the health districts' performance was generally satisfactory. Indeed, in more than 90% of cases, the added value of the support and coaching provided by the intermediate level in strengthening the performance of the health

										districts was perceived to be at least good.
Waissa et al., 2021	Uganda	Randomised controlled trial (RCT)	Quantitative methods	Organisationnel	Face-to-face	DHMTs (8 intervention, 8 control)	CFI, LSTM and ACODE under management of UNICEF and Ministry of Health.	The management intervention involved three mutually reinforcing pillars: pillar 1 consisted of collating, analysing and applying programme and survey data (LQAS, bottleneck analysis using a framework adapted from tanahashi model), pillar 2 involved regularly reviewing and, where necessary, supporting the implementation of district work plans and pillar 3 aimed to stimulate demand for services through community engagement.	Five years	-All intervention districts developed work plans that prioritised bottleneck in managing pneumonia, diarrhoea and malaria. -Intervention districts reported significant net increases in the treatment of malaria (+23%), pneumonia (+19%) and diarrhoea (+13%) and improved stool disposal (+10%). -Coverage rates for immunisation and vitamin A consumption saw similar improvements
Bulthuis et al., 2022	Ghana, Malawi and Uganda		Qualitative methods: interviews & group discussions	Organisationnel	Face-to-face	DHMT members	Project country research teams (CRTs)	The MSI uses a participatory action research cycle. Project country research teams (CRTs) facilitate district health management teams (DHMTs) in executing the plan, act, observe and reflect steps of the action research cycle. In addition, reflection is facilitated through district and inter-district meetings.	2017-2021	-Improved management competencies (strengthened problem-solving capacity, strengthened specific management skills that related to the action research cycle such as analysing problems, planning, the use of data and reflection) --> increased work commitment, -Improved health worker performance (reduction in absenteeism, change in staff attitude) -Improved team work (better working together, more frequent

										communication, having a more open environment to share ideas, improved relationships among staff, improved team spirit and better interaction among units), strengthened collaborations with actors outside the DHMTs, such as subdistrict staff and non-governmental organizations. -Improved health indicators focused by action research: antenatal care coverage, yaws and buruli ulcer detection rate, tuberculosis cure rate
Kok et al., 2022	Ghana, Malawi, and Uganda			Organisationnel	Face-to-face	DHMT members	Project country research teams (CRTs)	The intervention included a participatory action research approach, in which DHMTs conducted a plan-act-observe-reflect cycle related to a prioritized health workforce or service delivery problem. As part of the MSI, broader reflection took place through inter-district meetings, during which three districts reflected upon each other's progress.	2017-2021	DHMTs' willingness to participate in the MSI increased over time, partly because of their positive experiences in terms of problem analysis, problem-solving and teamwork.

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How capacity building of district health managers has been designed, delivered and evaluated in sub-Saharan Africa: a scoping review and best fit framework analysis

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How capacity building of district health managers has been designed, delivered and evaluated in sub-Saharan Africa: a scoping review and best fit framework analysis

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Abstract

Objectives: We aimed to understand how capacity building programmes of district health managers have been designed, delivered, and evaluated in sub-Saharan Africa. We focused on identifying the underlying assumptions behind leadership and management capacity building programmes at the district level.

Design: Scoping review

Data sources: We searched five electronic databases (MEDLINE, Health Systems Evidence, Wiley Online Library, Cochrane Library and Google Scholar) on 6 April 2021 and 13 October 2022. We also searched for grey literature and used citation tracking.

Eligibility criteria: We included all primary studies 1) reporting leadership or management capacity building of district health managers, 2) in sub-Saharan Africa, 3) written in English or French, and 4) published between 1st January 1987 and 13 October 2022.

Data extraction and synthesis: Three independent reviewers extracted data from included articles. We used the best fit framework synthesis approach to identify an *a priori* framework that guided data coding, analysis and synthesis. We also conducted an inductive analysis of data that could not be coded against the *a priori* framework.

Results: We identified 2523 papers and ultimately included 44 papers after screening and assessment for eligibility. Key findings included 1) a scarcity of explicit theories underlying capacity building programmes, 2) a diversity of learning approaches with increasing use of the action learning approach, 3) a diversity of content with a focus on management rather than leadership functions, and 4) a diversity of evaluation methods with limited use of theory-driven designs to evaluate leadership and management capacity building interventions.

Conclusion: This review highlights the need for explicit and well-articulated programme theories for leadership and management development interventions and the need for strengthening their evaluation using theory-driven designs that fit the complexity of health systems.

Strengths and limitations of this study

- We have used a systematic approach to search for a best-fit framework against which to code the data and a comprehensive strategy to search for primary studies.
- Three reviewers performed the screening and data extraction.
- We did not appraise the quality of the included papers, as scoping reviews do not require a quality appraisal.
- We may have missed other relevant literature not available publicly or published in languages other than English or French.
- We have made some trade-offs between comprehensiveness and feasibility, as is often the case in scoping reviews.

Key words: Leadership, Management, Capacity building, District Health Managers, sub-Saharan Africa

Introduction

Many countries in sub-Saharan Africa failed to achieve the health-related millennium development goals.(1) The continent accounts for almost half of all deaths of children under-five years worldwide and the highest maternal mortality ratio. It bears the highest burden of HIV/AIDS, malaria and tuberculosis in the world.(1, 2) This is partly due to health system weaknesses, which may be attributable to multiple causes,(3) including weak leadership and management, especially at the district level.(3-6)

The role of leadership and management in improving the performance of health systems is widely recognised in the literature.(7-11) Effective leadership and management at the district level are crucial since this is the operational level where national policies and resources are translated into effective services and where responsiveness to local needs can be ensured.(12-15) Building leadership and management capacity of District Health Managers (DHMs) is likely to improve the stewardship of the district health system and is required to ensure the achievement of better health outcomes,(7, 11, 16, 17) particularly the health-related sustainable development goals.(18)

Capacity building programmes (CBPs) in the health sector are complex.(11, 19) They seek to produce change at the individual, organisational and systemic level.(4, 14, 20-22) They involve the interactions between several actors, including policymakers, managers, providers, funders, patients, communities, etc. These actors belong to various institutions or social sub-systems, and have different values, norms, decision spaces, and possibly conflicting agendas and expectations.(23-26)

Health districts are complex adaptive systems.(4, 13, 19) They consist of interacting elements or sub-units (i.e., actors at first-line health facilities, hospitals, district health management teams, community, etc.). Health districts are open systems which are embedded in a broader (social, political, and economic) environment with which they interact continuously. Consequently, health districts adapt to changes in the environment and co-evolve with other systems. From these interactions may arise behaviours that may be unpredictable and non-linear. History also shapes these emergent patterns.(27-31) This complexity has consequences for capacity building: programmes that work in one setting will not necessarily work in another or may not function in the same location later.(32)

Capacity building emerged in the development aid field in the 1970s.(33) It is considered an elusive and broad concept and has been described as an umbrella or multidimensional term that is associated with a range of (sometimes opposite) meanings among academics and practitioners.(2, 21, 23, 34-39) Often, the terms capacity building and capacity development are used interchangeably.(21, 40) Some authors prefer to use capacity development to stress the importance of ownership by partner organisations and to emphasise the importance of existing and potential capacities.(33, 41) Some authors simplistically refer to training as capacity building.(17, 42, 43) Such reductionist view tends to restrict capacity building to its tangible or measurable elements (e.g., knowledge and skills, organisational structure, procedures, and resources).(42, 44-47) In contrast, other scholars (37, 39, 48) consider that capacity building should be a systemic approach that also considers less tangible aspects, such as leadership, motivation and organisational culture.(38, 49)

The conceptual heterogeneity of capacity building, its various interpretations, and the tensions between holistic and reductionist perspectives may explain the diversity of CBP designs, approaches, models and tools.(2, 11, 21, 23, 39) This also contributes to the methodological challenges related to CBP process evaluation (38) and to their effectiveness on organisational performance.(20, 21, 37, 50) A good deal of the literature of CBP evaluation is based on pre- and post-test only and many programs are not evaluated at all.(20, 51) Little attention has been paid to the underlying theories, models or frameworks underpinning CBP. In the field of health, few studies set out to assess what works, how and why. Exceptions include papers by Kwamie *et al*,(4) Prashanth *et al*,(24) and Orgill *et al*.(49)

The objectives of this review were to understand how CBPs of DHMs have been designed, delivered, and evaluated in sub-Saharan Africa. We focused on identifying the underlying assumptions and evidence behind CBPs at the district level. We assessed how far these assumptions and contextual conditions are discussed and, if so, what could be learned from these studies.

Methods

We adopted the scoping review methodology, which is appropriate for a topic that is complex and for which there is a high degree of conceptual heterogeneity.(52, 53) We followed the five steps proposed by Arksey and O'Malley(53) for a scoping review and subsequent recommendations.(54, 55) These steps are 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting data, and 5) collating, summarizing, and reporting the results. A protocol review (Supplemental Text 1) was developed and approved by the research team.

We combined the scoping review approach with the "best fit" framework synthesis, which provides a practical and rapid method for qualitative evidence synthesis.(56, 57) It allows for both a deductive analysis using an *a priori* framework and an inductive analysis based on new themes from selected studies that are not part of the *a priori* framework.(56, 57)

The process of the scoping review and best-fit framework synthesis is shown in Figure 1. Based on the research questions (step 1), we searched for and selected primary studies (step 2a). Concurrently, we searched for and selected frameworks, models or theories (step 2b). Next, we summarized the characteristics of primary studies included (step 3a) and generated an *a priori* coding framework from the selected frameworks, models or theories (step 3b). We then coded data from primary studies against the *a priori* coding framework (step 4). We performed a thematic analysis for data that could not be coded against the *a priori* framework (step 5). This resulted in a new framework comprising a priori and new themes supported by the data (step 6).

Figure 1. Process of best fit framework synthesis (56, 58)

Step 1 - Identifying the research questions

Our review aimed at answering the following research questions: 1) How has capacity building of DHMs in sub-Saharan Africa been designed in terms of theory, mode, level, approach and contents? 2) How have such CBPs been delivered? and 3) How have such CBPs been evaluated and what were the outcomes? The answers to these questions allowed us to map the designs, approaches, underlying theories, approaches content, outcomes, methodological issues and research gaps.

Step 2. Identifying relevant studies

Identifying primary studies

We used four databases (Medline/PubMed, Health systems evidence, Wiley online library, Cochrane Library) and Google Scholar. We also searched for grey literature from international organisations that support CBPs in health systems in sub-Saharan Africa (incl. WHO, European Union, USAID, Management Sciences for Health, Belgian Development Agency, etc.). In addition, we used the citation tracking to identify papers.

Our search strategy was based on the Joanna Briggs Institute's "Population Concept Context (PCC) approach"(59) :

- **Population**: DHMs are health officers who work in local health systems and spend some of their time in management and/or administrative roles. They can have various professional profiles (physicians, nurses, pharmacists, administrators, etc.) and play different roles, possibly combining them, within the DHS (district medical officers, hospital directors, clinicians, nursing officers, nurse supervisors, etc.).(60)

- **Concept**: The main concept is “capacity building”, i.e., any programme or intervention whose aim is to enable an individual or organisation to achieve its stated objectives.(37) CBP comprises both hard or measurable (e.g., knowledge and skills, organisational structure, procedures and resources, etc.) and soft or intangible (e.g., leadership, motivation and organisational culture) components. Search terms included "capacity building" or "capacity development" or "capacity strengthening" and "health district management" or "leadership development".
- **Context**: Sub-Sahara African countries according to the World Bank classification.(61)

The Table 1 outlines the search strategies used in PubMed and other electronic databases on April 6, 2021. On October 13, 2022, we performed additional searches in all electronic databases to update the included studies.

Table 1. Search strategies for primary studies

Databases	Search strategies
MEDLINE/PUBMED	((((((((((("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 - 2021/04/06 and from 2021/04/07 – 2022/10/13
Wiley online library	Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub Saharan Africa) Filters: MEDICAL SCIENCE, Journals, 1987 – 2021 and 2021 – 2022
Cochrane library	District Health Systems in Title Abstract Keyword AND management in Title Abstract Keyword OR leadership in Title Abstract Keyword AND capacity building in Title Abstract Keyword AND "sub-Saharan Africa" in Title Abstract Keyword
Health Systems Evidence	Health District AND (Manage* OR Leader*) AND Capacity Building
Google scholar	(Health District Systems) AND (Management OR Leadership) AND (Capacity Building OR Capacity Development OR Capacity Strengthening) AND (Sub-Saharan Africa)

Identifying relevant frameworks, models and theories

We used PubMed and Google Scholar to search for suitable published theories or models to generate the *a priori* framework for synthesizing data from primary studies to be selected. We based our search strategy on the BeHEMoTh approach[56 58]:

- **Behaviour of interest (Be)**: management and leadership capacity of health workers.
- **Health context (H)**: capacity building programs, health systems or public health.

- **Exclusions (E)**: Non-theoretical/technical models, i.e., terms often used in biomedical research such as "epidemiological model", "disease model", "care model" or "statistical model" that do not fit the theoretical focus of the best fit framework strategy.
- **Models of theories (MoTh)**: theory, model, concept, and framework.

The Table 2 provides the search strategy in PubMed – (Be AND H AND MoTh) NOT E.

Table 2. MEDLINE/PUBMED search strategy for models, theories or frameworks

	Terms	Search strategy
Behavior of interest (Be)	Management and Leadership capacity of health workers	("health") AND ("manage*" OR "leader*" OR "work*")
Health context (H)	Capacity building programs, health systems or public health	("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health")
Exclusion (E)	non-theoretical/technical models	"epidemiological model" or "disease model" or "care model" or "statistical model"
Models of theories (MoTh)	Theory, Model, Concept, framework	model* OR theor* OR concept* OR framework*
((("health") AND ("manage*" OR "leader*" OR "work*")) AND (("capacity building" OR "capacity-building" OR "capacity development" OR "capacity strengthening") AND ("health systems" OR "public health"))) NOT ("epidemiological model" or "disease model" or "care model" or "statistical model")) AND (model* OR theor* OR concept* OR framework*) Filters: English, French, Humans		

Step 3. Study selection

The selection of primary studies

We selected papers based on their titles and abstracts.(62) In a next step, three reviewers (SB, JE and CK) examined the full texts of the articles independently to decide on their final selection on the basis of the inclusion criteria (Table 3). We selected all studies that met the inclusion criteria regardless of their quality, as we aimed to map key concepts, types of evidence and research gaps.(52, 53) Disagreements among reviewers were solved by consensus.(54) We used the Rayyan software to manage the review process.

Table 3. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Type of paper	Papers reporting primary research published in peer-reviewed journals, working papers, intervention reports, research reports	Literature reviews, editorials, opinions, commentaries, workshop reports, conference abstracts, conference proceedings, research protocols
Content of paper (Population, Concept, Context)	Studies related to DHM leadership and management CBPs 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* to 2022	Paper published before 1987

* We chose this year in reference to the Harare declaration on strengthening district health systems.

The identification of frameworks, models and theories

Also here, we selected papers based on their titles and abstracts.(62) Papers that met the following criteria were included 1) papers presenting a model, theory or framework that fit the research purpose, i.e., allow the full description of design, implementation and evaluation of CBPs; 2) papers presenting a description, evaluation or test of a capacity building model, theory or framework with a focus on leadership or on overall management; and 3) papers published in English or French. The Box 1 outlined the definitions of theories, models and frameworks used.(63) (64)

Box 1. Definition of theories, models and frameworks from Bergeron et al.(63) (64)

- "Theories include constructs or variables and predict the relationship between variables";
- "Models are descriptive, simplification of a phenomenon and could include steps or phases"; and
- "Frameworks include concepts, constructs or categories and identify the relationship between variables, but do not predict this relationship".

Step 4 - Charting data

Generating the a priori framework

Based on the two selected models,(65, 66) we generated a list of *a priori* themes and codes related to the rationale, process (strategies, implementation, and evaluation), and outcomes of CBPs (Table 4). According to Labin *et al*,(65) the need for conducting a CBP affects its process (design, implementation, and evaluation), which, in turn, affects outcomes.

Table 4. The coding framework

Themes from original models	Codes	Definitions
Rationale for conducting capacity building programmes	Motivation	Trigger or motivating reasons for conducting a capacity building programme.
	Assumptions	Suppositions or hypotheses (explicit or implicit) that underlie the actors' desire to engage in a capacity building programme.
	Expectations	Intended outcomes or results expected from a capacity building programme.
	Context	Key features of the environment in which the health organisation targeted by a capacity building programme is embedded.
Strategies of capacity building programmes	Theory	Any (explicit or implicit) theory that can inform the design, implementation, and evaluation of a capacity building programme.
	Mode	How capacity building programme is provided: in-presence, online, written materials, etc.
	Level	capacity building programme entry point: individual, organisational, and system levels.
	Approach	Teaching and learning methods: training, workshop, coaching, mentoring, supervision, technical assistance, community of practice, etc.
	Content	Substance of capacity building programme activities.
Implementation of capacity building programmes	Actors	Providers or facilitators' professional profile, participants' professional profile.
	Duration	Time during which capacity building programme took place
	Barriers	Bottlenecks that hindered the achievement of expected outcomes.
Evaluation of capacity building	Design & methods	Cross-sectional, case study, (quasi)experimental, pre-post, quantitative, qualitative, mix-methods, theory-driven, etc.

programmes	Timeframe	Period within which evaluation is conducted: time after capacity building programme implementation or completion
	Evaluator position	Evaluator may be internal to (involved in) the programme or external (independent) to programme.
Outcomes of capacity building programmes	Individual outcomes	Knowledge, skills, attitudes, and behaviours of health managers
	Organisational outcomes	Leadership and management practices, organisational culture
	Population health outcomes	Access, quality, and equity of health care and services.
	Sustainability	Maintenance of capacity building programme activities and outcomes over time
	Unexpected outcomes	Unintended results: may be positive or negative
	Lessons learnt	Knowledge or understanding gained from capacity building programme process

Data extraction

Using an Excel form, three reviewers (SB, JE, and CK) extracted separately three groups of data from the selected studies: 1) study characteristics (author, year, country, type, objectives, design, and methods); 2) data related to CBPs that were coded against the *a priori* framework; and 3) new relevant data that did not fit the *a priori* codes. We compared results and merged when necessary.

Step 5 - Collating, summarizing, and reporting the results

We described the main characteristics of the included studies using descriptive statistics. We carried out a deductive thematic analysis to summarize the main review findings from the *a priori* framework (52, 55, 59) and an inductive thematic analysis to generate new themes from data that did not fit the *a priori* framework. We report the results according to the PRISMA Extension for Scoping Reviews guidelines (Supplemental Table 1).(67)

Patient and public involvement

Patients or the public were not involved in this research.

Results

Selection of frameworks, models and theories

The search yielded 934 articles. After removing duplicates and screening records based on titles and abstracts, 23 full-text articles were assessed for eligibility. Two full-text articles met the inclusion criteria (figure 2). The two included papers reported on the models of evaluation capacity building: the multidisciplinary model of evaluation capacity building(66) and the integrated model of evaluation capacity building.(65) The two models have similarities as the second model development was largely inspired by the first model.

Figure 2. PRISMA flowchart of the search for models, theories and frameworks

Selection of primary studies

We identified 2704 articles. After removing duplicates and screening records based on titles and abstracts, we assessed 194 full-text articles for eligibility. Thirty-five full-text articles met the inclusion criteria. Nine additional full-text articles were included after reference tracking (n=5) and additional searches (n=4). In total, 44 papers were included in this review (Figure 3)**.** The supplemental table 2 provides the description of included papers.

Figure 3. PRISMA flowchart for primary studies

Characteristics of primary studies included

The characteristics of primary studies included in this review are summarised in the Table 5.

Table 5. Characteristics of included papers

Characteristics of included studies		Number	Percentage	References
Years	1991-2000	5	11%	(68-72)
	2001-2010	9	20%	(73-81)
	2011-2020	24	55%	(4, 9, 17, 19, 82-101)
	2021-2022	6	14%	(47, 49, 102-105)
Languages	English	41	93%	(4, 9, 17, 19, 47, 49, 68-91, 93-96, 98-101, 103-105)
	French	3	7%	(92, 97, 102)
Countries	Uganda	8	18%	(19, 68, 83, 84, 86, 91, 100, 103)
	South Africa	6	14%	(6, 9, 49, 73, 79, 99)
	Ethiopia	5	11%	(76, 77, 80, 90, 95)
	Ghana	4	9%	(4, 69, 81, 101)
	Kenya	4	9%	(47, 78, 85, 98)
	Democratic Republic of Congo	4	9%	(70, 92, 97, 102)
	Tanzania	3	7%	(72, 75, 82)
	Botswana	2	5%	(87, 89)
	Mozambique	2	5%	(93, 96)
	Liberia	1	2%	(74)
	Zambia	1	2%	(17)
	Gambia	1	2%	(71)
	Ghana, Tanzania and Uganda	1	2%	(88)
	Ghana, Malawi and Uganda	2	5%	(104, 105)

Rationale for conducting a capacity building programme

Motivation, assumptions and expectations (goals)

A good deal of the literature included in this review have reported weak leadership and/or management capacities of DHMs as the most frequent reason for conducting a CBPs. Weak leadership and/or management were considered the major causes of poor health outcomes in low- and middle-income countries.(4, 6, 19, 49, 68-71, 74-76, 81, 83-86, 88, 90, 93-95, 98-100, 103, 106) Frequently mentioned causes of weak leadership and/or management capacity were 1) inadequate professional profiles of health managers (often being clinicians without formal training on leadership and management),(17, 76, 83, 93, 104, 105) and 2) inadequate efficacy of leadership and management courses (usually classroom based and knowledge-focused instead of practice-based and providing know-how to deal with real-life situations).(47, 69, 70, 76, 81)

Twenty-three papers presented the assumptions underlying the CBPs. Most programmes assumed that strengthening the leadership and/or management knowledge, skills, and practices of health managers would improve their leadership and/or management capacities. These improvements would, in turn, lead to improved health system performance and then better health outcomes.(4, 17, 47, 69, 71, 82-86, 93-96, 98, 100, 101, 103, 105) The CBPs were supposed to trigger health team members' self-confidence to undertake good leadership and/or management practices which would,

in turn, activate their job satisfaction, motivation and sense of ownership.(69, 82, 101) The good management practices reported included: effective and efficient use of resources,(71, 95, 96, 100) priority setting and better planning,(17, 71, 86, 96, 100, 103) use of data for decision making,(17, 96, 103) supervision of health workers,(17, 71, 82, 100, 101) ensuring monitoring and evaluation,(89, 93, 100) teamwork and regular meetings.(17, 49, 71, 104) The good leadership practices reported included creating a positive work climate,(4, 17, 95, 98) and relationship building among stakeholders.(9, 94)

Thirty-seven articles outlined the objectives or expected outcomes of the programme. Analysis shows that they all refer to the improvement of either the management knowledge, skills, and practices of DHMs (4, 17, 49, 69-72, 74-76, 80, 83-85, 91, 93, 94, 98-100, 103, 104) or the leadership and management knowledge, skills and practices (4, 17, 47, 85, 94, 95, 98) as the main outputs. The outcomes expected from these main outputs were the increase of health service access and coverage,(85, 86, 91, 101) the improvement of the (quality and equity of) health service delivery,(47, 68, 77, 78, 80, 83, 90, 95, 98, 101, 104) the improvement of maternal and child health outcomes.(75, 83, 84, 86, 91, 103)

Context of capacity building programmes

The included studies identified various features of the context within which the programme took place. The most cited was the decentralisation from national (or regional) to the district (or sub-district) level.(9, 19, 47, 49, 68, 71, 74, 75, 77, 80, 83, 84, 86, 88, 91, 93, 96, 98, 102, 103, 105) However, seven studies reported narrow decision space of DHMs regarding financial and human resources.(4, 49, 71, 86, 91, 103, 105) Three papers noted the persistence of a hierarchical organisational culture within the decentralisation setting.(9, 69, 72) Other context features included resource constraints and issues (human, financial, equipment, infrastructures, drugs, and other supplies),(4, 75-77, 80, 83, 87, 89, 93, 96, 107) poor accessibility and availability of health services,(75, 101) conflicts and crisis.(92, 102)

The capacity building strategies

Underlying theories, frameworks and models

None of the included papers explicitly refers to a theory underlying the reported CBP. Sixteen articles explicitly mentioned seven frameworks or models on which the reported programmes were based (Table 6).

Table 6. Capacity building frameworks or models

Frameworks/Models	Description	# Papers	References
Participatory Action Research cycle	The cycle comprises four or five phases related to the problem-solving: problem diagnosis and action planning (plan), action (act), evaluation (observe), and specifying learning achieved (reflect).	5	(83, 84, 88, 104, 105)
Leadership and management competency framework	The framework focuses on core management or leadership skills of health managers, such as problem-solving, planning, resource management, monitoring and evaluation, strategic thinking, etc.	3	(47, 74, 88)
Leading and managing framework	The framework includes a set of practices organised into four leadership domains (scanning, focusing, aligning/mobilising, and motivating) and four management domains (planning, organising, implementing, monitoring and evaluation).	3	(4, 85, 98)
Potter and Brough's capacity pyramid framework	Systemic capacity-building consists of four levels of a pyramid of needs that contribute to improved performance: tools, skills, staff and infrastructure, structures and systems, and roles.	2	(75, 100)

Thinking environment principles	The thinking environment includes ten elements related to behaviours, attitudes, values, and beliefs that shape the culture and the relationships necessary for good team collaboration. These elements are attention, equality, ease, appreciation, encouragement, feelings, information, diversity, incisive questions, and place.	1	(9)
Attitudes, knowledge, skills and behaviours framework	The framework posits that relevant attitudes, knowledge, and skills allow students to develop a personal framework of practice to act in and on the health system through various positive behaviours.	1	(94)
Combination of Kirkpatrick's evaluation model and Mc Le Roy socio-ecological model of behaviour.	The Kirkpatrick model consists of four levels which are reaction (participants' reaction to training content and methods), learning (what participants learned), behaviour (how well participants apply their training), and results (effects of training on the organisation's outcomes). The Mc Le Roy's socio-ecological behaviour model posits that personal, institutional, and community factors shape behaviour.	1	(17)

An analysis of approaches used in other CBPs showed that most authors referred implicitly to the management competency framework and/or the participatory action research cycle.

Levels, modes and approaches

We found that CBPs reported in the included papers of this review had two entry points: the individual and organisational levels. Nine CBPs focused on strengthening individual health managers' knowledge and skills.(17, 70, 74, 76, 89, 94, 99, 100, 107) The remaining CBPs took an organisational entry point to strengthen the capacity of the health management teams to perform their managerial functions and achieve health outcomes.

All CBPs reported were delivered face-to-face, either in a specific room, at the workplace or alternating between the two. No online CBP was reported in the included papers of this review.

A diversity of methods was used (alone or in combination) to build health managers' capacity. We summarised these approaches using the classification of Kerrigan and Luke(106) in Table 7: formal training, on-the-job training, action learning, and non-formal training.

Table 7. Approaches of capacity building programmes

Approach	Description	# Papers	References
Action learning approach	This approach focuses primarily on the problem-solving cycle (plan, do, study, and act) and emphasizes action as the vehicle for learning.(106) The process includes an alternating mix of workshops or classroom training, actual project implementation, on-the-ground coaching, mentoring or supervision, and review meetings to monitor progress and share experience and learning.	18	(4, 9, 47, 68, 69, 71, 72, 74, 77, 78, 80, 83, 84, 88, 95, 96, 98, 99)
On-the-job training	This approach aims at supporting health managers in carrying out their tasks through various approaches such as classroom training, on-site mentoring,	9	(70, 75, 87, 89, 92, 93, 100, 101, 107)

	coaching or supervision visits, and technical assistance.		
Mixed approaches	Combination of formal training (usually provided by academic institutions) with on-the-job training,	3	(17, 76, 90)
	Combination of formal training with action learning,	1	(94)
	Combination action learning with on-the-job training.	1	(82)

We analysed the CBP approach using Roger et *al.*'s (2003) framework cited by Hartley and Hinksman (108) to see to what extent the CBP approaches were individual or collective on the one hand and prescribed or emergent on the other. The prescribed approach refers to a blueprint approach or a normative process in which inputs (e.g., competencies) and outputs (e.g., standards, performance) required for leadership or management capacity development are specified. The emergent approach entails a dynamic, flexible, or adaptable process that emerges from stakeholders' interactions. We found that most CBP approaches were prescribed and collective,(4, 9, 19, 47, 68, 71, 72, 75, 77, 78, 80, 82-86, 88, 91-93, 96-99, 101-105) and prescribed and individual.(17, 69, 70, 74, 76, 87, 89, 90, 94, 95, 100, 107) The emergent and collective approach was marginal (9, 49) (figure 4).

Figure 4. CBP approaches using Roger et al. (2003) framework

Learning content

Twenty-two papers specified the learning contents, which varied in terms of terminology and could be categorised under the headings outlined in Table 7. This table indicated that the most prevalent learning contents were the problem-solving cycle, human resource management, financial management and leadership development.

Table 7. Learning content

References	Problem-solving cycle	HR management	Financial management	Leadership development	Strategic thinking & management	Hospital & health service delivery management	Monitoring, Evaluation & HIMS	Supply chain & fleet management
Kanlisi *et al*.(69)	x							
Conn *et al.*(71)	x							
De Brouwere and Van Balen(70)						x		
Omaswa *et al.*(68)	x							
Uys *et al*. (73)								
Byleveld *et al*.(79)								
Bradley *et al.*(80)	x	x	x					
Gill et Bailey(78)	x	x						
Kebede et *al.*(76)	x	x	x	x	x	x		
Rowe et *al.*(74)	x	x	x	x	x			
Blanchard *et al*.(99)	x							
Kebede *et al.*(90)	x	x	x	x	x	x		x
Ledikwe *et al*.(89)							x	

Kwamie *et al.*(4)	X	X		X				
Edwards *et al.*(93)		X	X				X	X
Balinda *et al.*(100)		X	X	X		X	X	X
Katahoire *et al.*(91)	X							
Mutale *et al.*(17)		X	X		X		X	
Doherty *et al.*(94)				X	X			
Martineau *et al.*(88)	X	X						
Desta *et al.*(95)				X		X		
Total	**12**	**10**	**7**	**7**	**5**	**5**	**4**	**3**
Other contents include governance in health, (95) (100) project management, (17) (79) supervision of HW, (70) (73) Epidemiology and health research, (76) (90) Health policy, ethics & law, (76) (90) complexity and system thinking, (94) and nursing management. (90)								

HR: Human Resource; HIMS: Health Information Management System; HW: Health workers

Implementation of capacity building programmes

Actors: participants and providers

Participants in CBPs were mainly district health and hospital management team members. The composition of these teams varied from one country to another and was often not specified. Other participants included sub-district management team members, (9, 83, 101) facility managers and staff, (9, 17, 75, 78, 82, 99) and district administrative and political leaders.(68, 84) The programmes were provided by facilitators from the Ministry of Health at the national, regional or district level,(4, 49, 68, 69, 78, 92, 93, 97, 100-102) academic and research institutions,(9, 72, 74, 76, 83, 88, 94, 99, 104, 105) international non-governmental organisations, (75, 89) or a mix of these institutions.(17, 80, 86, 91, 96, 98, 103)

Duration

The duration of the programme was highly variable, from 10 days to 8 years. We found one programme of less than one month, (100) 13 programmes of one to twelve months,(4, 17, 69, 70, 72, 74, 80, 85, 93, 94, 98, 99, 107) 8 programmes of 13 to 24 months, (49, 68, 71, 76, 88, 89, 91, 95) and 8 programmes of more than 24 months.(9, 75, 82, 83, 92, 93, 96, 101)

Barriers

Barriers to the successful implementation of CBPs mentioned by authors included human resource issues, such as staff shortage, staff turnover or staff mobility within or across districts,(4, 47, 71, 80, 82, 85, 88, 96, 104) inadequate support from the national or provincial level,(68, 72) insufficient mentorship after course completion,(17, 94) insecurity,(85, 96) drop out of facilitators due to busy schedules,(100) lack of funding,(88) poor working conditions,(47) the overlapping activities of vertical programmes that negatively affect the availability of supervisors and the regularity of supervisions visits,(102) and the negative influence of donors, such as imposing a standardised intervention with top-down decision making.(71)

Evaluation of capacity building programmes

Approach, design and methods

Almost half of the included papers did not specify an explicit evaluation design. The study designs and data collection methods reported in the included study are summarised in Table 8. Three studies were theory-based evaluations.(4, 49, 96)

Table 8. Evaluation designs and data collection methods

		# Papers	References
Evaluation Design	Case study	9	(4, 49, 72, 75, 77, 92, 96, 97, 100)
	Pre-post-study	4	(17, 74, 80, 90)

	(Quasi-)experimental design	5	(47, 82, 85, 98, 103)
	Cross-sectional study	4	(95, 99, 101, 102)
	Action learning design	1	(9)
Data collection methods	Quantitative methods (checklists, questionnaires, pre- and post-training test, data from health information management systems)	13	(47, 74, 80, 82, 86, 90, 93, 95, 98, 101-103, 107)
	Qualitative methods (interviews, focus group discussions, observations, and document reviews)	14	(4, 9, 19, 49, 75, 83, 84, 87, 91, 92, 96, 100, 104, 106)
	Mixed methods.	9	(17, 77, 81, 85, 88, 89, 94, 97, 99)

Seven studies used frameworks for evaluation purposes (table 9).

Table 9. Frameworks/models used to assess CBPs

References	Frameworks/models used	Purposes
Kokku(75)	Potter and Brough's capacity building framework	To assess the Simanjiro Mother and Child Health Capacity Building project in Tanzania.
Tetui *et al.* (83)	Competing Values Framework of Quinn	To assess the DHMs' capacity strengthening within the MANIFEST (Maternal and Neonatal Implementation for Equitable Systems) project in Uganda.
Martineau *et al.*(88)	Kirkpatrick's evaluation model	To assess the effects of management development intervention within the PERFORM project in Ghana, Tanzania and Uganda.
Adjei *et al.* (81)	Five core capabilities framework	To assess the capacity development at the district level of the health sector in Ghana.
Byleveld *et al.*(106)	A leadership and management framework developed from the document review	To assess the DHMT members' perceptions of the importance of 14 leadership and management competencies in South Africa.
Chuy *et al.*(97)	A conceptual framework developed from the literature	To assess the coherence and relevance of provincial-level support to develop the capacity of DHMTs in the Democratic Republic of Congo.
Bulthuis et *al.* (104)	CORRECT criteria to from WHO/ExpandNet	To assess the scalability of the PERFORM2Scale project in Ghana, Malawi and Uganda.

Evaluation timeframe

The evaluation of the reported CBPs adopted various timeframes. Some CBPs were evaluated during their implementation: 5 programmes after 0-12 months,[68 75 78 88 89] 6 programmes after 13-24 months,(49, 68, 71, 88, 91, 95) and 6 programmes after more than 24 months.(82, 83, 87, 94, 96, 103) Others CBP were evaluated after their completion: 4 programmes after 0-12 months,(4, 17, 74, 101) 3 programmes after 13-24 months,(47, 75, 98) and 1 programme after more than 24 months.(70) Two programmes were evaluated at different time points during their implementation and after completion.(85, 89)

The position of the evaluators

Since we found that the position of the evaluators regarding the programme was often not made explicit, we analysed the authors' affiliations. We found that most CBP evaluations were reported by people involved in the design, implementation or funding.(9, 17, 47, 49, 68-70, 72, 74-77, 80, 83-85, 87-90, 92, 93, 95, 98, 99, 101, 103-105) Some programmes were evaluated by people not involved in the design, implementation or funding.(4, 49, 91, 94, 96, 97)

Outcomes of capacity building programmes

The outcomes of CBPs reported in the included primary studies are summarised in the Table 10.

Table 10. Reported outcomes

Levels	Reported outcomes	# Papers	References
Individual level	Increased management or leadership knowledge	3	(17, 89, 100)
	Increased management or leadership skills	10	(70, 74, 75, 80, 88, 89, 94, 99, 100, 104)
	Work commitment	1	(104)
	Openness to being mentored and willingness to implement recommended changes,	1	(77)
	Increased self-confidence to undertake management tasks	1	(17)
	Changes in the behaviour of supervisors who became more supportive.	1	(82)
Organisational level	Improvement in overall leadership and management practices, such as systems thinking, change management or performance management	1	(100)
	Use of management tools to systematically set priorities, develop evidence-based work plans and allocate resources	3	(87, 89, 103)
	Improved district performance	2	(95, 102)
	Improved financial management	8	(47, 69, 71, 72, 77, 78, 80, 93)
	Improved human resource management,	4	(47, 76, 80, 93)
	Improved health information management	4	(47, 87, 89, 94)
	Improved supply chain and transportation management	4	(47, 69, 71, 94)
	Improved supportive supervision	2	(75, 94)
	Improved hospital management	4	(76, 77, 80, 90)
	More regular and effective team meetings	8	(4, 17, 49, 69, 71, 72, 75, 99)
	Improved team confidence to undertake management tasks	4	(4, 69, 72, 88)
	Increased team and staff morale, motivation or commitment	7	(49, 68, 69, 71, 78, 104, 105)
	Improved work climate or environment	2	(17, 78)
	improved community engagement	2	(69, 75)
	Improved collaboration between district health teams and local administrators	1	(68)
Health outcomes	Reduction in maternal mortality among pregnant women referred to a district hospital	1	(68)
	Markedly reduced incidence of measles cases in a district		(68)
	Increased health service utilisation	5	(68, 78, 85, 92, 98)
	Increased immunisation coverage	4	(75, 76, 92, 104)
	Increased antenatal care, skilled birth attendance	4	(75, 76, 92, 104)
	Increased yaws and buruli ulcer detection rate	1	(104)
	Increased health service coverage	1	(85)
	Improved (quality of) service delivery	5	47 76 80 81 97
	Improved malaria, pneumonia and diarrhoea treatment for children	1	(103)

	Increased tuberculosis cure rate	1	(104)

Four papers reported limited effects of CBPs. A comparison of the effects of two models of supervision (the matrix modified model and the centre for health and social studies model) showed no differences in the quality of care and the job satisfaction of nurses in South Africa.(107) An assessment of facilitative supervision visits by the regional health team to nine district health management teams in northern Ghana showed that the performance of six out of nine districts (67%) was adjudged only fair.(101) The realist evaluation of a leadership development programme in Ghana(4) pointed out the lack of institutionalisation of leading and managing practices and systems thinking. The study by Chuy *et al.*(97) highlighted poor coherence and relevance of provincial-level support, which impeded developing leadership and governance capacity of district health management teams.

Sustainability

Four papers discussed the sustainability of the outcomes and processes of CBPs. Using the sustainability definition of Moore *et al.*,(109) we found that all four papers referred to one construct: the continued delivery of the programme. In the Democratic Republic of Congo, De Brouwere and Van Balen(70) reported that doctors trained in the Kasongo project were still applying the skills they had learnt seven years after the last training without saying more about the factors that explain this sustained effect. While acknowledging that it was early to make a final judgement on sustainability, Cleary *et al.*(96) reported promising signs in the Population Health Implementation and Training partnerships in Mozambique. They attributed this to the project's flexibility, allowing for adaptations according to local realities and creating a sense of ownership among health system actors. In South Africa, Orgill *et al.*(49) were optimistic about the sustainability of the management CBP on the basis of the outputs observed over 18 months of implementation. The emergent nature of the intervention, which ensures ownership and commitment of team members, was cited as the main driver of this sustainability. In Kenya, Seims *et al.*(85) reported that two-thirds of the district- and facility-level teams who received leadership development training achieved sustainability of results at least six months after completion of the programme. Underlying factors included *"an improved work climate due to renovated staff quarters, training, or supervision"*.

In eleven papers, the authors mentioned conditions for sustainability. These include collaboration, support, commitment, and ownership by the Ministry of Health,(68, 74, 77, 87, 93) collaboration, transfer of skills and institutionalisation of training to a local academic institution,(17, 74, 76) alignment with and strengthening of existing local stakeholders and structures,(83, 84, 91) alignments of management strengthening interventions with the district planning cycles and budget without providing additional resources.(104)

In three papers, the authors raised concerns about sustainability. Kokku(75) reported that health trainers placed in district health management teams moved from a facilitator role to an implementor role in the Simanjiro Mother-Child health capacity building project in Tanzania. Balinda *et al.*(100) reported the absence of a rollout plan for the governance, leadership and management training to other districts not supported by the Institutional Capacity Building project in Uganda. In Ghana, Kwamie *et al.*(4) reported the lack of institutionalisation of the leadership development programme, which they attributed to changes in leadership at regional, district and sub-district levels.

Lessons learnt

Lessons learnt from CBPs reported in the included papers of this review are 1) the need for sufficient time for skill acquisition,(77) continuous learning,(88) (104) and institutionalisation of leadership and management practices(4); 2) the alternation of short workshops and on-the-ground follow-up visits, and the use of action learning approach which links training to real-world practice are essential to enable both theoretical knowledge and practical skills(74, 76, 91, 98, 106); 3) a more reflective and

context-sensitive approach in order to address complexity of health systems,(4) enable flexibility,(76) and promote emergence and self-organisation(49); 4) the collaboration with stakeholders such as local politicians and government leaders,(68) provincial health authorities,(88) other health partners,(91) and northern and southern academic institutions(74) is central for CBPs as it allows for support, scaling up and accountability; and 5) the importance of mitigating health workforce issues such as turn over by ensuring job satisfaction, job security career, appropriate trajectory and by developing strategies for efficient recruitment and training.(87) (89)

Other themes

Our analysis identified other themes to consider in designing, implementing, and evaluating CBPs. These are 1) the certification or accreditation (in the case of training) and 2) the success factors and underlying mechanisms.

Certification or accreditation

Four CBPs delivered either a university postgraduate or master diploma(76, 94) or a government certificate in health leadership and management.(17, 100) Certification or accreditation valued the CPBs and made them attractive to health managers as the resulting diploma offers opportunities for career development.(17)

Success factors and underlying mechanisms

Papers reported various success factors or mechanisms. These include 1) CBP methods, which empower DHMs and activate a can-do attitude (self-efficacy). These methods are team-based training,(9, 17, 98, 99) learning-by-doing approach,(17, 70, 71, 76, 88, 98) alternation of short workshops and on-the-ground follow-up visits,(17, 88) shift from administrative and control to a supporting model of supervision,(102) placing trainers within the management teams for day-to-day support,(75, 80) reflective discussions for continuous learning,(9, 47) and combination of learning methods(75); 2) supportive interactions between facilitators and DHMs,(102) which enable mutual trust and enhance motivation and commitment of DHMs to actively participate in the CBP process and to engage with changes(71, 78, 104). Such interactions require facilitators to have good relational skills, which are central in the adult learning process(110); 3) safe work environment, which enables teamwork and promotes distributed leadership(9, 80, 86, 88, 104); 4) adaptability and flexibility of CBP processes make them more responsive as they consider the needs of DHMs and their context, which contribute to increased perceived relevance and sense of ownership by DHMs (75, 83, 96); 5) support from and collaboration with the government authorities(80, 93); and 6) the role of the head of health district, who can act as a local champion by using sensemaking and sense giving micro-practices to trigger motivation and buy-in of CBP by the DHMs.(49)

From the lessons learnt and success factors of CBPs reported in the included papers of this review, we summarize the key features of an effective leadership and management CBP in the Box 2.

Box 2. Features of effective capacity building programmes

1. A learning-by-doing approach
2. An alternation of short workshops and on-the-ground follow-up visits
3. A team-based approach
4. The flexibility and adaptability of CBP processes
5. Supportive interactions among facilitators and participants
6. Collaboration with and involvement of different stakeholders
7. A long-term perspective

Discussion

This review highlights the growing interest in leadership and management in health systems, especially in the era of millennium development goals and sustainable development goals. Most

papers point to weak leadership and management as a leading cause of poor health outcomes in sub-Saharan Africa and assume that better health outcomes cannot be achieved without proper leadership and management. This widespread assumption explains the increasing number of management and leadership CBPs in the last decade, as shown in this review and others.(20, 111) The decentralisation movement in sub-Saharan countries has been a solid argument for strengthening DHMs' capacity to steer their health districts.

While most authors agree on the need to strengthen DHMs' leadership and management capacities, there needs to be more consensus on how to do and evaluate this. Strikingly, we did not find one paper explicitly referencing a theory underlying the CBP reported on. Since programmes are *"theories incarnate"*,(112) the lack of an explicit theory may jeopardise the understanding of how these programmes are supposed to work as well as their evaluation. Therefore, while designing a CBP, it is good to make explicit the theoretical assumptions and evidence explaining the pathway to the expected outcomes.(63) Making the programme theory explicit allows for a better understanding of the programme functioning by different stakeholders and will facilitate its evaluation.

Despite the diversity of learning methods used in capacity building, there is a general tendency to combine methods to foster the acquisition of both theoretical knowledge and practical skills. Action learning is becoming the most widely used method. This result mirrors those of Geerts et *al.*(113) and Lyons et *al.*(114) who stressed the increase use of experiential approaches to leadership development. Action learning is based on Kolb's experiential learning theory, which states that learning occurs through experience(115, 116) and emphasizes real-life actions as the vehicle for learning.(106) Action learning features advantages that can help strengthen DHMs' leadership and management capacities. First, it goes beyond knowledge acquisition and enables skills development. It also enables participants to benefit from faculty or supervisor support after having attempted to apply their learning. It may be an interesting alternative to inadequate efficacy of leadership and management courses decried in some included papers of this review. Second, action learning stimulates a reflective attitude necessary for individual and collective learning.(117, 118) Third, action learning promotes teamwork and distributed leadership within district health management teams.(118) It can thus help to minimise the effects of the hierarchical culture and gradually develop learning management teams that favour innovation, creativity, and flexibility.(117)

The bulk of CBPs was delivered following a prescribed or normative approach, and the scarcity of the emergent approach was striking. This situation reflects the hierarchical culture still predominant in most sub-Saharan health systems(8) and the dominance of international agencies funding or implementing "standardised" CBPs. However, the normative approach has some weaknesses which may limit its effectiveness. First, it reinforces the "command-and-control" system and can hinder learning, innovation and creativity.(4, 119) Second, it often assumes linear cause-and-effect relationships and tends to ignore the influence of context and the complex and adaptive nature of district health systems.(49, 119, 120) Last, it is often externally led and funded, and likely to be less sustainable as the risk of disruption at the end of the programme or funding is high.(49, 119, 120) Since district health systems are complex and adaptative, some authors(4, 49, 119, 120) argue that CBPs need to be emergent. Moreover, Geerts et *al.*(113) warned that the prescriptive approach for all is not optimal, as if to say *"one size does not fit all"*. Unlike the prescribed approach, the emergent approach considers capacity as a result of interactions between system actors and elements. It is often internally led, bottom-up et likely more sustainable as it is *"anchored in the daily routines"*.(4, 119) The systematic review from Lyons et *al.*(114) suggests that leadership development programmes tailored to meet local needs may result in greater organisational impact than pre-packaged approaches to leadership development. A balance between the two approaches would benefit the DHMs who are at the *"interface between strategic policy direction and operational service implementation"*(121), i.e., the best place of convergence between top-down and bottom-up processes in health systems.

This review highlighted the diversity of learning contents. This result is consistent with that of Lyons et *al.*(114) Our analysis shows that most CBPs emphasised management rather than leadership. The same observation has been made by Johnson *et al*,(111) who noted that some CBP labelled as leadership development focused virtually on management training. This seems to confirm Kotter's statement, quoted by Kwamie,(119) that *"most organisations are over-managed and under-led"*. It is also possible that the focus on management is because most DHMs are clinicians who need more basic management knowledge and skills since they have had little training in the area before. In any case, the content of CBPs for DHMs must consider the balance between management and leadership in complex and adaptive health systems, as advocated by Kwamie.(119)

This review found various evaluation designs and methods, reflecting the lack of *"agreed approaches"* to CBP evaluation.(20, 111, 113, 114) Most evaluation designs from this review fell under three types of Øvretveit's evaluation design classification: the descriptive, before and after, and comparative design.(122) While these designs help to understand the process and measure the effectiveness of CBPs, such "black box" designs provide limited insights into the conditions of success.(123) We concur with DeCorby-Watson *et al*(51) and Johnson *et al*,(111) who call for strengthening CBP evaluations by basing them on explicit theories and evidence that describe how a CBP is supposed to lead to expected outcomes. Therefore, evaluators should go beyond the positivist paradigm and adopt a complex systems perspective that values context, interactions, and emergence.

Most papers in this review pointed out a short timeframe as a limit for achieving changes in leadership or management behaviour, practices, and health outcomes. Indeed, management and leadership CBPs are not one-off processes. They take time to bring about desired changes. Thus, it is crucial to consider a long-term perspective when designing and funding such programmes(96, 111) as time allows for progressive adoption and ownership by stakeholders, adaptation based on the context and learning.

The implications for practice and research suggested by this review are summarized in the box 3.

Box 3. Implications for Practice and Research

1. While designing a CBP, it is good to make explicit the (evidence-informed) theoretical assumptions that explain how different programme components, underlying assumptions, and contextual elements are supposed to lead to the expected outcomes. Such a theory is fundamental for programme implementation and evaluation success.
2. Inadequate training approaches have been identified as a cause of health managers' weak leadership and management capacity. This review highlights the importance of a mix of didactic and practical approaches to acquiring knowledge and skills, self-efficacy and learning through real-life action.
3. This review suggests balancing prescribed and emergent approaches to CBPs. When relying on standards, guidelines, or competency frameworks implemented through a hierarchical structure, it is crucial to leave room for innovation, adaptation and emerging local initiatives. Such "homegrown" initiatives are more likely to boost health managers' ownership, motivation and commitment, and ultimately the sustainability of the intervention.
4. Although conceptually different, leadership and management are closely linked in practice. Indeed, whilst health organisations need strong managers to plan, organise and coordinate activities, these managers need also to be good leaders who can anticipate, inspire, motivate, and bring about changes. Therefore, the content of CBPs for DHMs must consider the balance between management and leadership.
5. There is still a need for strengthening the evaluation of management and leadership CBP evaluations in sub-Saharan Africa. Evaluators or researchers should go beyond the positivist paradigm and adopt a complex systems perspective that values context, interactions and emergence. From such a perspective, theory-driven evaluations are a good fit.
6. Management and leadership CBPs are not one-off processes. They take time to bring about desired changes. Time is necessary for successful implementation as it allows for progressive adoption and ownership by stakeholders, an adaptation based on the context and learning. It is thus crucial to consider a long-term perspective when designing and funding CBPs.

Limitations

This review has some limitations. First, we did not appraise the quality of the included papers as scoping reviews do not require a quality appraisal.(52) Yet, we noted that most of the included articles that presented an evaluation had some methodological issues that call for caution when interpreting results. Second, we may have missed other relevant literature not available publicly or published in languages other than English or French. Third, the fact that we have not included any papers related to online CBPs is a limitation of this review, particularly in the digital and Covid-19 era. Finally, we have made some trade-offs between comprehensiveness and feasibility, as it is often the case in scoping reviews.(31)

Conclusion

In the era of sustainable development goals, leadership and management capacities are crucial at the health district level. This review showed a paucity of theory-driven CBPs, a diversity of learning approaches, methods and content, and no agreed methods to CBP evaluation of DHMs in sub-Saharan Africa. These results call for more consistent theories to guide the design, implementation, and evaluation of CBPs for DHMs in sub-Saharan Africa. CBPs need a balance between prescribed and emergent approaches, an optimal mix of didactic and practical learning methods, a balance between management and leadership content, and robust evaluations. Considering the complex and adaptative nature of health districts and adopting a long-term perspective will likely enable conditions and mechanisms to sustain management and leadership CBPs.

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Author Contributions

SB, ZB, BM, FC and BC conceptualize the study. SB conducted the database searching. SB, JE and CK screened abstracts and full texts, extracted data and synthetized data. SB drafted the initial manuscript. SB, ZB, BM, FC and BC contributed to manuscript revision. All authors read and approved the final manuscript.

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Data availability statement

All relevant data are available in the article and the supplementary files.

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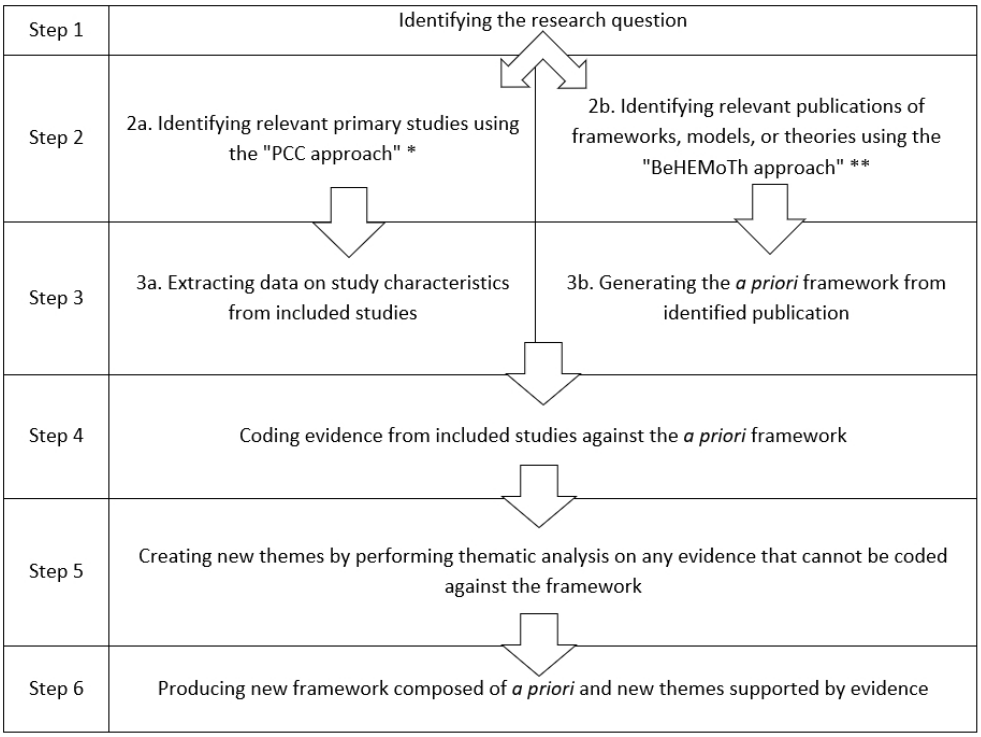
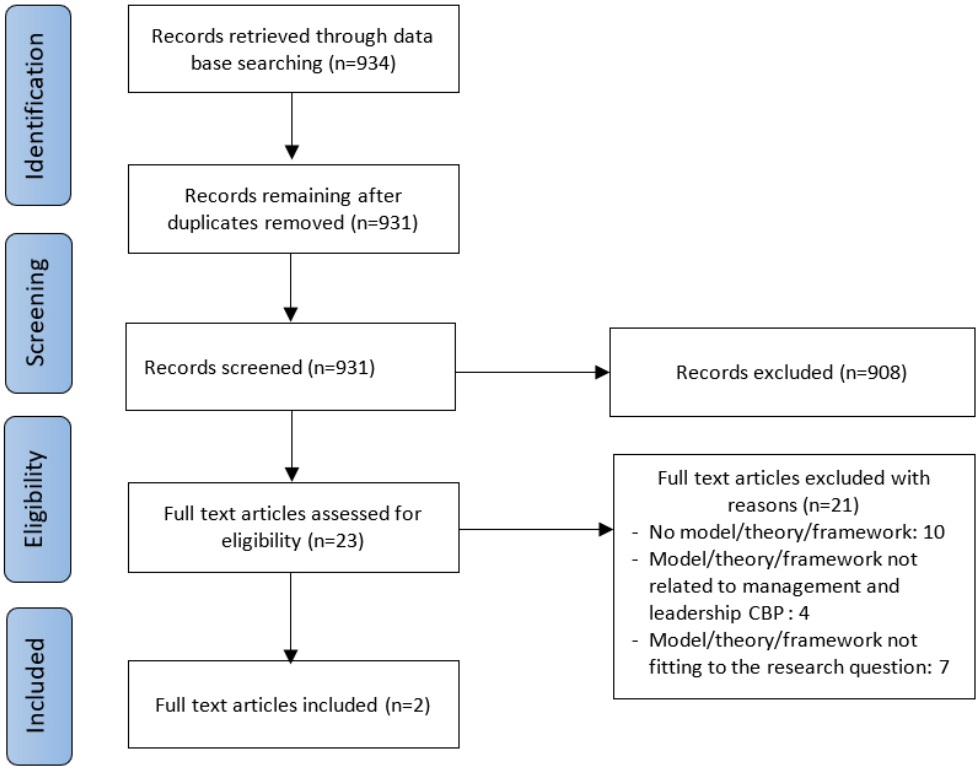


*PCC: Population Concept and Context
**BeHEMoTh: Behaviour of change, Health context, Exclusion Models of Theories

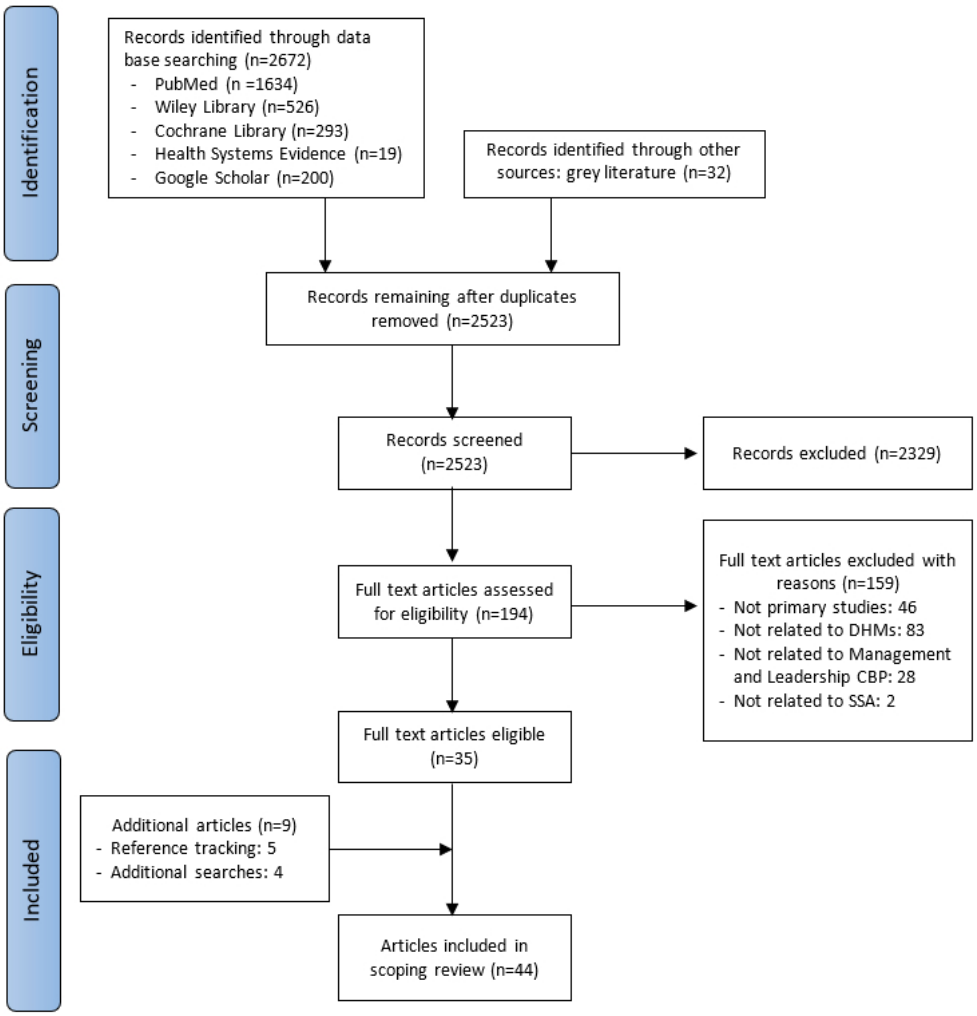
Process of best fit framework

164x131mm (144 x 144 DPI)



PRISMA flowchart for models, theories, frameworks

362x287mm (57 x 57 DPI)



PRISMA flowchart for primary studies

131x137mm (144 x 144 DPI)

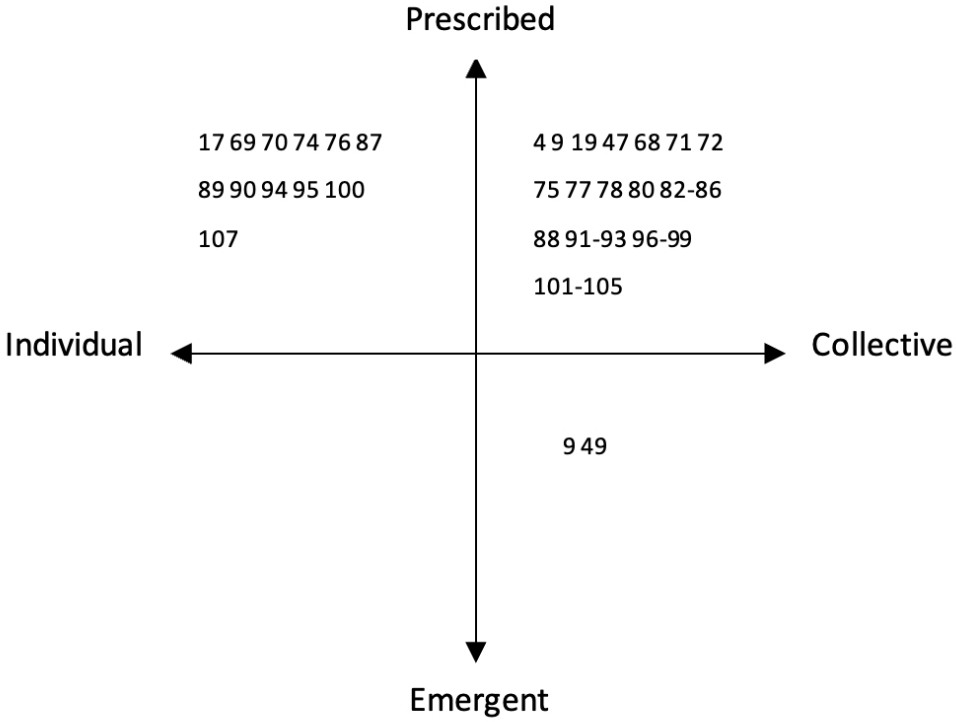


Figure 4. CBP approaches using Roger et al. (2003) framework

178x145mm (144 x 144 DPI)

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.

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.

2. *Identifying relevant studies*

Sources

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.

Search strategy

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

- **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

[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:
    - Design: rationale, definition, objectives, underlying theories, intervention components
    - Operationalisation: level (individual, organisational, systemic), type of approaches, actors (providers, participants), duration, setting
    - 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).

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

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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*)

Supplemental Table 1

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3-4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	4 (S1)
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5-6
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7-8
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7-8 (Table 4)
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used	No applicable

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8-9 (Fig 2 & 3)
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8-9
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	No applicable
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8 (S3)
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	8-17
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	17-19
Limitations	20	Discuss the limitations of the scoping review process.	19
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	19
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	19

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Supplemental Table 2

Description of included studies

References	Country	Study design	Methods	Levels	Modes	Participants & size	Providers	CBP Approaches	Duration	Reported outcomes
Kanlisi et al., 1991 (70)	Ghana		Qualitative	Organisational	Face-to-face	District Health Management (DHMT) Team members of Ejisu: the size of DHMT was not described	Regional (Provincial) Management team	Problem solving approach: a series of 3-day workshops aiming at identifying and analyzing management problems, developing strategies and action plans to solve them, and review achievements every three months.	Six months	-Improved financial management; -Improved teamwork; -Improved transport strategy; -Improved community involvement in health
Barnett & Ndeki, 1992 (74)	Tanzania		Qualitative	Organisational	Face-to-face	DHMT members of Same: A total of 17 district staff participated in the complete process	Centre for Educational Development in Health (CEDHA) and regional staff	Problem solving approach: It involved five stages: Identifying & selecting problems, understanding the causes of selected problems, suggesting solutions, implementing solutions, evaluating the impact of the solutions.	Fifty months	-At the Same team level: DHMT confidence to act, weekly meetings to discuss and tackle problems at the district headquarters, improved supervisory meetings. - Following the encouraging results in Same, the Ministry of Health endorsed the strategy, and secured funds to implement it on a wider scale. A further eight districts were introduced to the process, but the important follow-up work necessary from regional level failed to take place in time.
Conn et al., 1996 (71)	Gambia		Qualitative	Organisational	Face-to-face	DHMT members of two out of three health regions (health	No described	The problem-solving, 'learning by doing' approach: a six-month planning cycle was introduced. This	Eighteen months	-The teamwork facilitated more coordinated supervision and training

						district) of Gambia: the size of each DHMT was not described		identified health priorities and health service problems. It defined ways to address these priorities and problems within the available resources and in an efficient and integrated way. Teams then made realistic work plans based on this analysis.		support to regional health staff; -Regular RHT meetings with a new action-oriented format including distribution of regional health data; -Monthly analyse of data on health service delivery for local use; -Improved problem analysis skills; -Improved management of resources; -Team attitude and staff motivation were improved
De Brouwere and Van Balen, 1996 (72)	DRC (Zaïre)		Qualitative	Individual	Face-to-face	Doctors: 18 doctors trained.	Resident doctors working as DHMT members and having a secondary-level clinical function	Learning by seeing and doing (observation and practice at different levels of district health system (referral outpatient clinic, urban health centre, rural health centre, hospital department, district management team).	Twelve weeks per training	-Most of trainees acquired the requisite skills and know-how for health district management.
Omaswa et al., 1997 (73)	Uganda		Mixed method	Organisational	Face-to-face	DHMT members, district's administrative and political leader from three health districts (Jinja, Arua, and Masaka): the exact number of participants was not stated.	Facilitators from the national quality assurance committee	Problem solving approach: selection of clinical or administrative problems from districts to be addressed by means of QI methods, developing work plans, applying solutions, and measuring the resulting changes, identifying further round of problems to be tackled, general meeting at the end of first year for district health teams to share the lessons they had learnt.	Eighteen months	-Improved collaboration between DHT and local administrators and political leaders; -Integration of curative and preventive activities; -Improved the functioning of referral system; -Improvement of service delivery results (decreased maternal mortality, decrease of reported measles cases, reduced outpatient waiting times and

										increased utilization of outpatient services).
Uys et al., 2005 (75)	South Africa		Quantitative methods: checklists, questionnaire	Individual	Face-to-face	Head nurses of clinics and hospital units, primary health care coordinators, programme managers. Three hospital and six clinics were selected in each district.	No described	In District A, supervisors from both hospitals and clinics were trained in the modified matrix model. In District B, only supervisors from clinics were trained in the CHESS (centre for health and social studies) model. District C was the control region, where no intervention was to take place.	Three months	The general result is that none of the interventions made a significant difference to the quality of care (nursing records or management of chronic conditions) or the job satisfaction of nurses.
Byleveld et al., 2008 (79)	South Africa	Cross-sectional study	Mixed methods: document review, FGD, competency rating scale, interview	Organisational		DHMT members	Various provider including universities, provincial HRD, etc.			
Bradley et al., 2008 (80)	Ethiopia	Pre–post study	Quantitative method: checklist, questionnaire	Organisational	Face-to-face	14 Hospital management team (HMT) members. The average number of beds was240 per hospital, although the number ranged substantially from 74 beds in one hospital to >500 beds in another hospital.	Senior Yale – Clinton Foundation and Post-Graduate Fellows	The EHMI employs a partnership–mentoring model, which incorporates the principles and tools of quality improvement including participatory approaches to organizational change. The Yale University team recruited 24 Senior Yale–Clinton Foundation Fellows and Post-Graduate with experience in hospital administration and/or management to serve for 1 year as management mentors for the medical director and hospital	First year of EHMI project	-The management skills of the medical directors as perceived by the Yale–Clinton Foundation Fellows improved from August 2006 to May 2007 in several management domains, although their level of confidence in their management skills did not increase generally. -About 60% (45 of the 75) of the management indicators surveyed showed some improvement in the domains of human resources, medical

								management teams in the 14 hospitals.		records, nursing standards and practice, infection prevention and control, quality management and financial management.
Hartwig et al., 2008 (81)	Ethiopia	Case study	Mixed methods: checklist, document review	Organisational	Face-to-face	HMT members	Senior Yale – Clinton Foundation and Post-Graduate Fellows	The model included needs assessment and baseline evaluation using a hospital management indicator checklist, deployment of 24 Fellows (US and international hospital administrators) for 1 year to work as mentors with hospital management teams in 14 Ethiopian hospitals, continuing didactic and practical training in quality improvement methods for hospital management teams, and 24 management improvement projects to be completed during the year with plans for replication more broadly as appropriate.	First year of EHMI project	-On average, hospitals had 53.2% (SD 16.6) of the 63 key hospital management indicators in place, although there was variation across hospitals and across management domains. -Overall, the presence of key hospital management indicators was lowest in the domains of infection control and quality management and highest in the domains of financial management and nursing standards and practice.
Kokku, 2009 (82)	Tanzania	Case study	Qualitative methods: document review, group discussion, feed-back sessions	Organisational	Face-to-face	DHMT members and facility staff	Health Trainers with variety of skills	A mixture of different approaches was used during the project to achieve the planned outcomes including placing the experts (health trainers) within DHMT. Existing tools for supportive supervision and HMIS system were adopted to suit the local needs and equipment were provided to facilities. The health trainers supported DHMT in day-to-day activities through a process of mentoring and	Six years (2001-2007)	-Better systems for supportive supervision, planning, indent and outreach. -Improved leadership and management skills: regular meetings with agendas and records minutes, better delegation of tasks among DHMTs members. -The establishment and training of 21 village health committees to improve the ownership

								provided technical advice while participating in all planning meetings. The health trainers were part of the supportive supervision team and provided on the job training for the facility staff. In short, apart from classroom trainings the project used approaches like mentoring, coaching and on job training to build the DHMT capacity.		and laid foundation for launching community health fund. -Improved immunization coverage of all antigens from 58 to 85%. [2] Improved Antenatal coverage from 30% to 78%.
Adjei et al., 2010 (83)	Ghana	Case study	Mixed methods: IDI, questionnaires	Organisational		District health workers, with a focus on the DHMT members.	The Government of Ghana and its health sector work with a wide range of development partners (DPs).	Several capacity efforts took place in the districts. The four key efforts identified were: training, provision of technical assistance, infrastructural improvements and knowledge management.		
Gill et Bailey, 2010 (76)	Kenya	Case study	Mixed methods	Organisational	Face-to-face	Regional team members, DHMT members, facility teams.	National quality assurance core team	The intervention described consists of a multidisciplinary core team at the national level, trained as trainers, that provides oversight of regional and district quality assurance teams whose purview is to improve the quality of care and operational functions. Quality assurance teams continuously identify and address systemic barriers to the timely delivery of quality services. In parallel, the process involves improving the management capabilities of facility directors and administrators through the		-Improved work climate, -Better management, -Higher quality of services, -Greater financial transparency and security, -Substantially increased utilization of services, -Decreased response time and -Raised staff morale and commitment.

								use of quality improvement activities that identify and resolve local management and clinical care problems.		
Kebede et al., 2010 (77)	Ethiopia		Qualitative	Individual	Face-to-face	Hospital Managers (CEOs): The program has enrolled two cohorts of hospital leaders (a total of 55 CEOs) and is working in more than half of the government hospitals in Ethiopia.	Faculty from Yale and Jimma University Schools of Public Health	The MHA is split 15% in the classroom and 85% in executive practice at the hospital. Didactic classes (3 weeks of intensive classroom time every 4 months at Jima University campus): classes include formal lectures (pertaining to conceptual principles and technical tools), case applications (in which students work in groups to define and address case-based problems) and expert panel discussions (involving local experts in the topic). Executive practice (between classroom times): comprises the systematic application of classroom tools to specific management projects to improve the functioning and quality of the hospital and is evaluated through monthly reporting and periodic site visits by faculty.	Two years	Several hospital improvements were documented in terms of improved hospital sanitation procedures, improved medical record accuracy, reduced wait times for admissions and outpatient visits and improved human resource monitoring
Rowe et al., 2010 (78)	Liberia		Quantitative methods: self-administered questionnaire	Individual	Face-to-face	Representative from DHMTs, Government hospitals, international NGOs: a total of 97 participants, representing all 15 counties in	Instructors from Yale University and Mother Patern College	-Classroom-based health system management course for health facility and CHT managers was developed and taught by Yale University, Mother Patern College, and CHAI; Follow-up and mentoring for course participants was	Five months by cohort	-In the area of self-assessed personal management skill development, significantly higher proportions of respondents rated their management skills upon completing the course as “strong” or “very strong”

						Liberia, were trained.		provided by Mother Patern faculty, on-site Yale-Clinton Foundation Fellows, and CHAI staff who assisted participants in managing projects and reinforcing course concepts.		in comparison to the beginning of the course in all three cohorts (P-value < 0.001). -In general, at least two thirds of the respondents indicated the course met each objective "extremely well". -In the area of faculty responsiveness, most respondents reported that faculty "definitely" responded effectively to questions and "definitely" related theory to real-life by using workplace problems. -Finally, nearly all respondents reported they would "definitely" recommend the course to colleagues. -There was no significant difference in participants' rating of the course in any areas (all P-values > 0.10), suggesting that the transition from Yale to Liberian faculty was effective.
Kahindo et al., 2011 (84)	DR Congo	Case study	Mixed methods: data from HMIS, document review, semi-structured interviews	Organisational	Face-to-face	DHMT members	Provincial Health Administration staff	Support practices for the development of health districts have two aims: (i) strengthening the skills of the health workforce (provincial health administration staff with broad skills and capable of tackling the problems posed at the health district level	Nine years (2000 à 2008)	-Improved health system governance at the provincial level (internal team building, linking the main actors in the health system around harmonised objectives, optimising the allocation of resources to the health districts)

								comprehensively), (ii) strengthening the working environment.		-Better support for the development of the health districts in the province (increasing the number of supervisions, preparing supervisions based on data analysis, and feedback to the DHMT members). -Improved health outcomes: improved health coverage, improved essential drug supply, improved health information management, improved emergency preparedness, improved use of curative and preventive care exceeding the national averages since 2001: curative service utilisation increasing from 0.36 new cases/inhab/yr in 2001 to 0.50 NC/inhab/yr in 2008. Obstetric coverage reached 87% in 2007 compared to the national average of 54.7%. The vaccination rate for DTP3 is 92.6% compared to a national average of 84.7% in 2007.
Blanchard et Carpenter, 2012 (85)	South Africa	Cross-sectional study	Qualitative methods: FGD	Individual	Face-to-face	17 participants comprising DH Manager and 2 HRMs, six hospitals' CEOs & HRMs, one community	Researchers from the Centre for Rural Health (CRH)	Action learning groups were established. An initial one-day workshop was held where researchers from the CRH introduced participants to the methodology of action learning, and participants were divided into three	Eleven months	The major benefits reported by participants were enhanced teamwork and collaboration, and providing participants with the skills to apply action learning principles

						health center's CEO & HRM		groups. The three groups consisted of four, six and seven participants, respectively, and each comprised members from different institutions. Each group was assigned a facilitator from CRH. The three groups (each with a facilitator) met regularly (approximately monthly) for 4–6 hours over a period of 11 months. In the first meeting with each group, participants had the opportunity to introduce themselves to the group by answering a set of four questions about themselves. Thereafter, individual group members took turns to present a real issue or problem relating to their work in their respective organisations. Generally, each meeting allowed time for one new presentation, as well as feedback on the issues presented at the previous meetings.		to other challenges in their working lives.
Kebede et al., 2012 (86)	Ethiopia	Pre–post study	Quantitative methods: checklist	Individual	Face-to-face	24 Hospital CEOs (16 urban and 8 rural)	Yale and Jimma University faculties	Courses are taught in three 3-week blocks and CEOs work in their hospitals in executive practice between the didactic blocks, resulting in 85% of time in executive practice and 15% of time in the classroom. Supportive supervision was also provided on-site by the teaching staff for evaluation	Two years	-Adherence to hospital performance standards increased significantly during the one-year follow-up (27% compared with 51% of standards met at baseline and follow-up, respectively; p-value < 0.001). -Significant improvement in adherence to

								purposes. In addition, the CEOs who were enrolled in the MHA were provided some on-site technical assistance such as software installation for master patient index or pharmacy inventory control functions, as they implemented hospital improvements.		management standards in 7 of the 12 management domains (p-values < 0.01). -Improvement was more apparent in most domains for which there were detailed implementation guidelines and specific training through the MHA in addition to performance standards. -No statistically significant difference between urban and rural hospitals.
Seims et al., 2012 (87)	Kenya	Quasi-experimental	Mixed methods: interviews, data from HMIS	Organisational	Face-to-face	67 intervention teams of health managers, doctors and nurses were included in the study.	Mentors or coaches	LDP uses a team-based approach to develop leadership and management skills among health workers. The intervention centres around a "Challenge Model" whereby participants select a problem or challenge faced and develop a shared vision and action plan to help address the challenge as a team. Additional components include: stakeholder alignment meetings at the national and subnational levels to generate commitment to and ownership of the LDP among decision makers; four LDP workshops that train participants in various leadership practices including scanning, focusing, aligning and mobilizing, and inspiring. On-the-job team meetings where teams work on action plans to address	Six months	Results showed significant increases in health-service coverage at the district level (p = <0.05) in the intervention teams compared to the comparison teams. Similarly, there were significant increases in the number of client visits at the facility level in the intervention group versus comparison facilities (P < 0.05).

								the selected challenge and plans for monitoring progress in achieving measurable results; and meetings with mentors/coaches where teams review and reinforce LDP content and receive technical assistance for monitoring and evaluating progress on their action plans.		
Aikins et al., 2013 (88)	Ghana	Cross-sectional study	Quantitative methods: checklist	Organisational	Face-to-face	DHMT members, Sub-District Health Team (SDHMT) members, Community Health Officers (CHOs)	Regional Management Team for DHMTs, DHMT for SDHTs, SDHT for CHOs	Facilitative supervision is a system of management whereby supervisors at all levels in an institution focus on the needs of the staff they oversee. The most important part of the facilitative supervisor's role is to enable staff to manage the quality improvement process, to meet the needs of their clients, and to implement institutional goals. This approach emphasizes monitoring, joint problem solving, and two-way communication between the supervisor and those being supervised. Adoption of a facilitative approach leads to a shift from inspection and fault-finding to assessment and collective problem solving to continuously improve the quality of care.	Four years	-The 9 districts differ markedly with respect to their performance on the various items assessed. -Using the overall scores, three DHMTs (i.e., 43% of DHMTs) were graded as good (≥ 80%). All the remaining six DHMTs were adjudged as fair (≥ 79 - 60%). -Using the overall scores, none of the SDHTs were grade as good (= ≥ 80%). Four of the nine districts SDHTs were, however graded fair (≥ 79 - 60%). -Using the overall scores none of the CHOs were grade as good (= ≥ 80%). Seven of the nine districts CHOs were graded as fair (≥ 79 - 60%). The remaining two district CHOs were adjudged as poor (≤ 59%).

Ledikwe et al., 2013 (89)	Botswana		Mixed methods: questionnaire, interviews, FGD	Individual	Face-to-face	Monitoring & Evaluation officers	Facilitators from the International Training and Education Center for Health (I-TECH) in Botswana	Trainings were conducted two to three times a year and included skill-building workshops and didactic sessions. On-site mentoring visits lasted 1 to 2 days with the purpose of reinforcing knowledge and skills gained during trainings as well as troubleshooting other work-related challenges. Mentoring was tailored to the individual needs of the District M&E Officers.	Two years	Knowledge scores significantly increased ($p < 0.05$) during the three trainings in which pre/post tests were administered. Over 1 year, there were significant improvements ($p < 0.05$) in self-rated skills related to computer literacy, checking data validity, implementing data quality procedures, using data to support program planning, proposing indicators, and writing M&E reports.
Mpofu et al., 2014 (90)	Botswana		Qualitative methods: IDI, FGD	Individual	Face-to-face	51 M&E officers: university graduates in the field of social sciences with no prior health information exposure	Facilitators from I-TECH in Botswana	M&E officers were provided with on-the-job training and mentoring to equip them with the knowledge and skills necessary to carry out M&E responsibilities in health districts across the country.	Two years	Data from the in-depth interviews and focus group discussions demonstrate several achievements from the establishment of the district M&E officer cadre. These include improved health worker capacity to monitor and evaluate programs within the districts; improved data quality, management, and reporting; increased use of health data for disease surveillance and public health services planning purposes; introduction of district-led operational research activities; and increased availability of time for nurses and other health workers to

										concentrate on core clinical duties.
Kwamie et al., 2014 (5)	Ghana	Case study	Qualitative methods: Document review, Observation, Semi-structured interviews	Organisational	Face-to-face	Health Managers and staff	Regional health administration members, and one external consultant	The LDP is designed for teams to apply 'leading and managing' practices to service delivery problems (referred to as 'challenges' in the LDP). This is realized through teamwork, defining root causes, action planning, monitoring, and evaluation, and repeating the cycle. The LDP consists of a six-month cycle of root challenge identification, action planning, and monitoring and evaluation. Two-day, face-to-face workshops were held in the capital city Accra three times bi-monthly. Workshops were interspersed with monthly coaching visits, with the facilitation team attending teams and their wider staff in their facilities to ensure organization wide diffusion of LDP teachings.	Six months	The LDP was a valuable experience for district managers and teams were able to attain short-term outcomes because the novel approach supported teamwork, initiative-building, and improved prioritisation. However, the LDP was not institutionalised in district teams and did not lead to increased systems thinking. This was related to the context of high uncertainty within the district, and hierarchical authority of the system, which triggered the LDP's underlying goal of organisational control.
Edwards et al., 2015 (91)	Mozambique	Case study	Quantitative methods: checklist	Organisational	Face-to-face	DHMT members in 10 District Health Directorates	Regional teams of three persons	Mentoring support was provided through three regional teams. Each team was responsible for oversight of three or four districts. By spending time with the managers in their own work environments and assisting them throughout day-to-day challenges, this site-based mentorship approach	The first year of HMM programme	-Of the four domains, district performance in the accounting domain exhibited the strongest and most sustained improvements. -District HR management saw improvements in its ability to pay salaries on time, initiate procedures for health worker career

								provided contextualized guidance and avoided sending staff to costly, off-site workshops, which cause significant disruptions in local service provision.		development, and plan and budget for new personnel. -The M&E capacity domain demonstrated weak progress across year-one. -The one indicator analysed for transportation management suggested progress.
Balinda et al., 2015 (103)	Uganda	Case study	Qualitative methods: review document, authors' experiences of the GLM training	Individual	Face-to-face	All health care staffs with management tasks included DHTM members, regional hospital managers	Senior Ugandan health care managers (national trainers)	The original course comprised 10 modules and took 10 days. However, it was executed in two sessions of five days, with each session covering five modules. The period between the two training sessions was used for participants to work on a Community Health Improvement Project (CHIP). The training consisted of a mixture of adult learning methodologies, including short lectures, questions and answers, small group discussions, plenary presentations, video shows and role plays. Participants from the same district developed their own CHIP together, which was presented to the class and discussed.	Ten days	Practical application skills were observed in the class. There were immediate changes in the behaviour of the participants during the course of the training, as noticed in their team-building processes in group assignments and time management. Other intended competencies which are now being practised include systems thinking, stewardship, change management, performance management, service organization, support supervision and monitoring. This was ascertained through support supervision of the participants. Their increase in knowledge was demonstrated by their post-training test results, which all of the participants passed.

Katahoire et al., 2015 (92)	Uganda		Qualitative methods: IDI, observation, documents review	Organisational	Face-to-face	DHMT members and Communities in 5 health districts	Child Fund International (CFI), Liverpool School of Tropical Medicine (LSTM), and Advocates Coalition for Development and Environment (ACODE)	CODES combines UNICEF tools designed to systematize priority setting, allocation of resources and problem solving with the Community. These tools include LQAS ((using Tanahashi model), Bottleneck analysis, Causal analysis, Continuous Quality Improvement (using the Plan, Do, Study, and Act cycles), Community Dialogues based on Citizen Report Cards and U reports.	The first two years of the project	All five districts health teams with support from the implementing partners were able to adopt the UNICEF tools and to develop district health operational work plans that were evidence-based. Members of the DHTs described the approach introduced by the CODES project as a more systematic planning process and very much appreciated it. Districts were also able to implement some of the priority activities included in their work plans but limited financial resources and fiscal decision space constrained the implementation of some activities that were prioritized.
Odaga et al., 2016 (93)	Uganda		Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members and Communities in 5 health districts	CFI, LSTM, and ACODE	The CODES project combines tools designed to systematize identification of gaps, priority setting, allocation of resources, and problem-solving. The project also empowers and engages communities in monitoring health service provision and to demand quality services through community dialogues based on Citizen Report Cards (CRC) and U reports as a feedback mechanism. The tools include LQAS, Bottleneck	Five years	All five districts were trained and participated in LQAS surveys and readily adopted the tools for priority setting and resource allocation. All districts developed health operational work plans, which were based on the evidence and each of the districts implemented more than three of the priority activities which were included in their work plans. In the five districts, the CODES

								analysis using the Tanahashi model, Causal analysis, and Continuous Quality Improvement, which are the supply-side tools; and community dialogues based on CRC and U reports, which are the demand-side tools. Learning and using of tools is promoted through training, participation, and learning networks (peer-to-peer learning) and through mentoring.		project demonstrated that DHTs can adopt and integrate these tools in the planning process by systematically identifying gaps and setting priority interventions for child survival.
Tetui et al., 2016 (21)	Uganda		Mix-methods: IDI	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers		Three years (2013–2015)	An interative, dynamic and complex model with three sub-process of building a competent health manager was developed. A competent manager was understood as one who knew his/her roles, was well informed and was empowered to execute management functions. Professionalizing health managers which was viewed as the foundation, the use of engaging learning approaches as the inside contents and having a supportive work environment the frame of the model were the sub-processes involved in the model. The sub-processes were interconnected although the respondents agreed that having a supportive work

										environment was more time and effort intensive relative to the other two sub-processes.
Mutale et al., 2017 (19)	Zambia	Cross-sectional	Mix-methods: questionnaire, IDI	Individual	Face-to-face	444 Health workers at different levels of the health system	Ministry of Health (MoH), Ministry of Community Development, Mother and Child Health (MCDMCH), Broad Reach Institute for Training and Education (BRITE)	The course had both theoretical and practical sessions which were supported by mentorship both during and after training. It has been packaged in line with a recent study that recommended experimentation with action learning approaches, including a mix of formal training, on-the-job training, mentoring and support.	Six to twelve months by phase	-On average, knowledge levels increased by 38% after each workshop. -The calculated before and after percentage change for work environment themes ranged from 5.8% to 13.4%. Majority of respondents perceived improvements in the workplace environment, especially in handling human resource management matters. -The smallest improvement was noted in ethics and accountability. -Qualitative interviews showed improvements in the meeting culture and a greater appreciation for the importance of meetings. Shared vision, teamwork and coordination seemed to have improved more in work places where the overall manager had received ZMLA training.
Tetui et al., 2017a (94)	Uganda	Case study	Data collection: IDI, document review, observation	Organisational	Face-to-face	District Health managers	Makerere University School of Public Health researchers	The Participatory Action Research (PAR) approach has five main phases depicted in a cycle – problem identification, deduction of possible solutions, taking	Three years (2013–2015)	The findings indicate that the participatory action research approach enhanced health managers' capacity to collaborate with others,

								action, reflecting on the consequences of the actions and specifying learning.		be creative, attain goals and review progress. The enablers included expanded interaction spaces, encouragement of flexibility, empowerment of local managers, and the promotion of reflection and accountability.
Tetui et al., 2017b (95)	Uganda	Case study	Qualitative methods: Semi-structured interviews, FGD	Organisational	Face-to-face	Community stakeholders, Sub- County level stakeholders, District level stakeholders	Makerere University School of Public Health researchers	MANIFEST was implemented following Gerald Susman's PAR cycle. According to Susman, the PAR cycle has five phases: problem diagnosis, action planning, taking action, evaluation and specifying learning achieved. The cycle repeats itself with a refinement of the problem or a new one. At the centre of the PAR cycle are principles that build and strengthen communities and systems through the inclusive nature of dialogue and actions made at various levels (reflexive critique, critical dialog, collaborative resource, risk, plural structure, theory, practice and transformation).	Three years (2013–2015)	'Being awakened' emerged as an overarching category capturing stakeholder experiences of using PAR. This was described in four interrelated and sequential categories, which included: stakeholder involvement, being invigorated, the risk of wide stakeholder engagement and balancing the risk of wide stakeholder engagement. In terms of involvement, the stakeholders felt engaged, a sense of ownership, felt valued and responsible during the implementation of the project. Being invigorated meant being awakened, inspired and supported. On the other hand, risks such as conflict, stress and uncertainty were reported, and finally these risks were balanced through tolerance, risk-

										awareness and collaboration.
Uduma et al., 2017 (96)	Tanzania	Quasi-experimental	Quantitative methods: questionnaire	Organisational	Face-to-face	DHMT members, facility managers, health workers	No described	The intervention components were (a) workshop with district health management teams and facility managers on human resource management, (b) intensive training in supervisory and support skills for managers directly engaged in supervision, aimed at strengthening the capacity of these in-charges at a facility level or (c) action learning sets for staff engaged in supervision at the district and facility level which followed on from the training and continued for a period of 12 months.	Twenty months	The results indicated an improvement in the intervention a + b and a + b + c districts. In both intervention groups, the end-line samples have generally higher scores than the corresponding baseline samples for both supervisors and health workers. However, the difference is more marked in intervention a + b for the supervisors and in intervention a + b + c for health workers. This provides evidence of the positive impact of the intervention on supervisors' behaviours in the intervention groups, compared with the control group and demonstrates that supervisors are making procedural changes within their facilities which will in turn have a positive impact on staff.

Cleary et al., 2018a (97)	Mozambique	Case study	Qualitative methods: IDI, FGD, observation, document review	Organisational		DHMT members	Sofala Provincial Directorate of Health, African Health Initiative, Eduardo Mondlane University's School of Medicine		Six years (2010 to 2015)	Key features of the HSS implementation practice, which were mainly geared towards generating ownership of the intervention by the public health system and strengthening existing routine practices and procedures: 1) integration of the HSS intervention into the health system—and working with the system (the intervention's activities were integrated/ aligned with the priorities of the health system, physically, financially and operationally integrated into the health system), 2) Flexibility, adaptation, responsiveness, and 3) Relational trust-building (integrity: transparent rules, consistent procedures, and fair and impartial decision making ; benevolence : inclusive procedures; competence : sanctions for rule breaking and being seen to achieve fair results).
Cleary et al., 2018b (9)	South Africa	Case study	Qualitative methods: observation, interview, document review	Organisational	Face-to-face	SDHT members, facility managers	Research team: organizational psychologist, health policy and systems researchers.	The overall project approach was one of collaborative action learning. The emergent LD interventions included FM group coaching (seven 2-h long sessions aimed at creating a community of practice), FM short course training in	Five years (2012 - 2016)	- Despite this broader governance context, the SDMT and FMs began to report changes in their understanding of the benefits of relational leadership. These shifts in understanding enabled a larger space for FMs to

								health management (5-day short course), FM peer support (monthly half-day meetings of FMs), Facility supervision (day-long supervision visits to each facility run by SDMT every six months), Relational leadership skills (Day-long workshop on how to enable a Thinking Environment in the workplace), SDMT group coaching (Eight 2-h long sessions aimed at creating a community of practice), Facility strategic workshops (Day-long strategic planning workshops in each facility). Within this emergent design, we drew structure from the Thinking Environment as a methodology that is appropriate for enabling a distributed relational leadership.		exercise discretion. They were positive about their exposure to the set of LD processes and reported benefits from their use of the leadership skills. FMs also mentioned that the sub-district team has really improved in terms of support and feedback. From the perspective of the SDMT, the health system gains attributed to the LD interventions included greater trust and cohesion within the SDMT and in the relationship with FMs and staff.
Doherty et al., 2018 (102)	South Africa		Mixed methods: document review, questionnaire, 18 semi-structured interviews	Individual	Face-to-face	Health managers including district health managers	School of Public Health and Family Medicine, University of Cape Town, University's Graduate School of Business	The Oliver Tambo Fellowship Programme is a health leadership training programme with a post-graduate Diploma at its core, supplemented by management seminars, mentorship and alumni networking. The four residential modules (three of 8 days and one of 5 days) were run over a year. Students completed a range of assignments between each module, always	Eighteen months	- Alumni were retained in the public health sector; they felt empowered and motivated by the program to implement management transformation, demonstrated characteristics of transformational leadership, and received recognition from colleagues and line managers for their improved leadership.

								entailing personal reflection, critical thinking skills and diagnosing and addressing challenges specific to their own workplaces. A final management project that was larger in scope and implemented over the 4 months following the last module, required considerable reflection, planning, implementation and adjustment over time, of a set of small-scale interventions designed to suit the specific context of their workplaces.		-Health organisation's management practices changed through the transformational leadership provided by alumni; health services improved as a result of intervention by alumni; Alumni build health management and leadership capacity within their own institutions (including training and mentoring young managers). Changes reported from district and hospital levels included improving district and sub-district health information system, improving the support given to sub-district and health facility managers, improving supply chain in a district, improving the patient transport system in a district, improving waiting times in a district hospital, improving staff satisfaction at a hospital, getting facilities accredited, etc.
Martineau et al., 2018 (98)	Ghana, Tanzania, Uganda	Action-research	Qualitative methods: document review, IDI, FGD	Organisational	Face-to-face	DHMT members	Country research teams members of the PERFORM project consortium	The intervention was based on the action research (AR) cycle entailing four stages: plan, act, observe and reflect. AR is manifested by the DHMTs in the following process: identify and plan strategies to address problems identified;	Two years	-DHMT members improved management competencies for problem analysis, prioritisation and integrated HRM and health systems strategy development. They learnt how to refine plans as

								implement strategies; observe and record the effects of the strategies and reflect on the processes and effects. Multiple and reinforcing methods used for developing these competencies: situational analysis with support from the CRT, two national workshops, follow-on activities (reflective diaries, CRT visits and interdistrict meetings to review progress and share experiences).		more information became available and the importance of monitoring implementation. - The MSI produced changes in team behaviours and confidence. There were positive results regarding workforce performance or service delivery; these would increase with repetition of the MSI.
Chuy et al., 2020 (99)	DRC	Case study	Mixed methods: IDI, FGD, observation, questionnaire	Organisational	Face-to-face	DHMT members	Provincial Health Administration Staff			The members of the management teams in the health districts generally report that the provincial health administration support is mainly administrative and technical. They raise the problem of its need for a conceptual model, regularity, structuring and systematisation. They also point to constraining factors of this support, such as corruption, irrelevant visits and influence peddling.
Chelagat et al., 2020 (100)	Kenya	Quasi-experimental	Quantitative methods: questionnaires, data from HMIS	Organisational	Face-to-face	Senior health managers drawn from different levels and sectors of health service	Strathmore Business School, Management Sciences for Health, Ministry of Health	The program cohort cycle is implemented within a nine-month period and composed of five workshop modules; four team coaching sessions and one cross-learning site visit. Each workshop module is equivalent to four classroom days, and a	Nine months by cycle	Leadership training and coaching built around priority institutional health service improvement projects in the intervention institutions showed: a) skilled birth attendance increased, on average, by

								coaching session takes between 60 to 120 min. The coaching session acts as a link between (a) the classroom learning; (b) the application of the learned knowledge in the workplace; and (c) team support and accountability. The teaching methodology included: case method, experiential learning, and group work. At the end of the program, the participants were expected to present their project implementation progress to their peers and the program facilitators for feedback.		71%; b) full immunization of children, increased by 52%; c) utilization of in and out-patient services, which on average, increased by 90%; d) outpatient turn-around time reduced on average by 65% and; e) quality and customer satisfaction increased by 38.8% (in all the intervention facilities). These improvements were sustained for 60 months after the leadership training. In contrast, there were minimal improvements in service delivery indicators in the comparison institution over the same period of time.
Desta et al., 2020 (101)	Ethiopia	Cross sectional study	Quantitative methods: check list	Organisational	Face-to-face	DHMT members	LMG trainers? Project staff Zonal Health Department staff (equivalent to regional or provincial level)	The Activity uses various approaches including provision of leadership, management and governance trainings at the district level. The training approach is team-based and experiential learning which entails including two to three people from each district and allowing open discussion to share experiences among themselves. The trained people with their counter parts in their facility work together to scan their current situation, design performance improvement	The LMG training was introduced in the year 2017 and data collected from 284 district health offices during the January to December 2019 fiscal year	A total of 284 districts, 94 LMG and 190 non-LMG, were included in the study. Results of the independent samples t-test revealed that LMG districts scored better average performances of 61.8 ± 121.45 standard deviation (SD) compared to non-LMG districts 56.89 ± 110.39 SD, with t (282243) = −3.407317 and $p < 0.001$, two-tailed. The difference of 4.9 percentage unit in the average performance indicated a statistically significant difference

								projects, identify their stakeholders and mobilize resources and jointly conduct monitoring & evaluation. Onsite coaching and technical support are also provided by LMG trainers, project staff, and Zonal Health Department staff using a standard coaching checklist and following OALFA (Observe, Ask, Listen, Feedback, and Agreed) technique. In addition, learning sessions are organized through performance review meetings (PRM) to share challenges, and success and lessons at different levels.		between the LMG and non-LMG districts.
Chelagat et al., 2021 (48)	Kenya	Quasi-experimental	Quantitative methods: semi-structured questionnaires	Organisational	Face-to-face	Over 200 Health care managers and leaders from 19 counties	Strathmore Business School, Management Sciences for Health, Ministry of Health	The curriculum was designed to provide an opportunity for the teams to practice knowledge, skills, and attitude to address real workplace policy and systems challenges to produce measurable results toward improving health performance. A vital aspect of leadership development training was the integration of facility improvement projects and team coaching in the curriculum. The role of the team coach, therefore, was to help teams demonstrate their own leadership skills through practice by clarifying the project's objective, holding	Six years (2010-2016)	The pretest and posttest means for all the six health system (HS) pillar indicators of the treatment group were higher than those of the control group. The regression method to estimate the DID structural model used to calculate the "fact" and "counterfactual" revealed that training had a positive impact on the intended outcome on the service delivery, information, leadership and governance, human resources, finance, and medical products with impact value ≥1 (57.2).

								the teams accountable, monitoring the project's progress, and participating in experience sharing workshop. These workshops were embedded in the five modules and the project's teams were expected to present their progress after every module break.		
Orgill et al., 2021 (53)	South Africa	Case study	Qualitative methods: IDI, literature review	Organisational	Face-to-face	Extended DHMT members	New District Manager	The DM worked with a combination of existing resources to address challenges within the management team meeting. He designed a suite of bottom-up innovations. These innovations included: introducing a new meeting agenda that focused on all the health system building blocks; developing job descriptions for former hospital chief executive officers (CEOs) who were sent to work in the district office 'without a portfolio'; inviting nongovernmental organisation (NGO) partners to the meeting to foster shared vision and accountability; enforcement of the Health Management and Information Systems (HMIS) policy to promote information use by managers; and efforts to focus on solutions in meetings not only problems	Two years	The new district manager drew on systems thinking, tacit and experiential knowledge to design bottom-up innovations. Capacity was triggered through micro-practices of sense-making and sense-giving which included using sticks (positional authority, enforcement of policies, over-coding), intentionally providing justifications for change and setting the scene (a new agenda, distributed leadership).These micro-practices in themselves, and by managers engaging with them, triggered a generative process of buy-in and motivation which influenced managers and partners to participate in new practices within a routine meeting.

Kahindo et al., 2021	DRC	Cross-sectional study	Quantitative methods	Organisational	Face-to-face	DHMT members	Provincial Health Administration Staff	The functions oriented towards the socio-technical support of the health districts refer, in particular, to the supervision and accompaniment of the health district teams. The option of switching from a hierarchical and normative support model to a coaching model aimed at capacity building, empowerment of teams and support for problem-solving has been taken.		-The health district managers generally less well perceived the support process regarding the frequency of visits, availability of supervisors and overlap with visits from the intermediate level to the health districts. On the other hand, for more than 85% of the district managers, the support provided by the intermediate level was perceived positively in terms of the gradient of the supervisor's skills, the adequacy of the support with the needs, the effective reinforcement of the DHMT member' capacities, the effective support for problem-solving faced by the teams and the actual usefulness of the support provided by the supervisors at the provincial level. -The perception of provincial-level support's effects on the health districts' performance was generally satisfactory. Indeed, in more than 90% of cases, the added value of the support and coaching provided by the intermediate level in strengthening the performance of the health

										districts was perceived to be at least good.
Waissa et al., 2021	Uganda	Randomised controlled trial (RCT)	Quantitative methods	Organisationnel	Face-to-face	DHMTs (8 intervention, 8 control)	CFI, LSTM and ACODE under management of UNICEF and Ministry of Health.	The management intervention involved three mutually reinforcing pillars: pillar 1 consisted of collating, analysing and applying programme and survey data (LQAS, bottleneck analysis using a framework adapted from tanahashi model), pillar 2 involved regularly reviewing and, where necessary, supporting the implementation of district work plans and pillar 3 aimed to stimulate demand for services through community engagement.	Five years	-All intervention districts developed work plans that prioritised bottleneck in managing pneumonia, diarrhoea and malaria. -Intervention districts reported significant net increases in the treatment of malaria (+23%), pneumonia (+19%) and diarrhoea (+13%) and improved stool disposal (+10%). -Coverage rates for immunisation and vitamin A consumption saw similar improvements
Bulthuis et al., 2022	Ghana, Malawi and Uganda		Qualitative methods: interviews & group discussions	Organisationnel	Face-to-face	DHMT members	Project country research teams (CRTs)	The MSI uses a participatory action research cycle. Project country research teams (CRTs) facilitate district health management teams (DHMTs) in executing the plan, act, observe and reflect steps of the action research cycle. In addition, reflection is facilitated through district and inter-district meetings.	2017-2021	-Improved management competencies (strengthened problem-solving capacity, strengthened specific management skills that related to the action research cycle such as analysing problems, planning, the use of data and reflection) --> increased work commitment, -Improved health worker performance (reduction in absenteeism, change in staff attitude) -Improved team work (better working together, more frequent

										communication, having a more open environment to share ideas, improved relationships among staff, improved team spirit and better interaction among units), strengthened collaborations with actors outside the DHMTs, such as subdistrict staff and non-governmental organizations. -Improved health indicators focused by action research: antenatal care coverage, yaws and buruli ulcer detection rate, tuberculosis cure rate
Kok et al., 2022	Ghana, Malawi, and Uganda			Organisationnel	Face-to-face	DHMT members	Project country research teams (CRTs)	The intervention included a participatory action research approach, in which DHMTs conducted a plan-act-observe-reflect cycle related to a prioritized health workforce or service delivery problem. As part of the MSI, broader reflection took place through inter-district meetings, during which three districts reflected upon each other's progress.	2017-2021	DHMTs' willingness to participate in the MSI increased over time, partly because of their positive experiences in terms of problem analysis, problem-solving and teamwork.