



Summary report of published literature on capacity building for skills related to health technology assessment in Ghana

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Report prepared by the Norwegian Institute of Public Health

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It can be accessed online through the Norwegian Institute of Public Health Global Health Evidence to Decisions webpage: <https://www.fhi.no/en/gk/global-health-collaboration/evidence-to-decisions/partnering-low-and-middle-income-countries-to-support-local-implementation--/>

- Summary

Ghana has embarked on a programme to initiate and institutionalise Health Technology Assessment (HTA) to inform policy making, priority setting for health interventions, reimbursement, pricing of pharmaceuticals and other health technologies. Although the policy agenda setting for HTA started in Ghana in 2009/2010, the mechanism for institutionalisation of HTA was initiated in October 2019 by the Minister of Health with the inauguration of the HTA Steering Committee, Technical Working Group and Secretariat, who oversee the development of HTA under the auspices of the Ghana Ministry of Health. The Ghanaian approach to HTA is outlined in the Ministry of Health's strategic plan for HTA, whose primary aim is to strengthen the science and practice of HTA in support of evidence-based decisions for improved health in Ghana. While progress has been made in pursuit of HTA in Ghana, much remains to be done, including a better understanding of the factors that are influencing HTA implementation in the country, and the development of local capacity and expertise to conduct and use HTAs, particularly to support selection and pricing of medicines and other health technologies, benefits package design and reimbursements, and policy prioritisation.

To obtain more information about the capacity gaps to conduct HTA in Ghana, we started by reviewing the literature in the area.

1. The primary goal of this review was to identify articles that reported capacity building efforts in skills related to HTA in Ghana; skills such as, information retrieval, clinical evidence synthesis and health economics.
2. Our secondary goal was to identify the published work set in Ghana, including the consortiums or groups that are driving this type (or related type) work and collaborating with Ghanaian governmental authorities, universities and individual researchers in the relevant field.

We searched MEDLINE, Ovid, Embase, Ovid, ERIC, ProQuest, Web of Science Core Collection, and Clarivate Analytics on August 30 2019 for articles that were related to capacity building and skills related to HTA. We also screened reference lists of included and other key papers. Fifty-five articles were included for full-text review, as they were either set in Ghana or a multi-country study that included Ghana, 24 of which met our inclusion criteria. In December 2019, the preliminary findings of the literature review were presented (for validation) at a meeting of stakeholders in Accra (including the HTA Steering Committee, Technical Working Group and the Secretariat, amongst others), Ghana.

Our review identified a limited number of articles that specifically looked at HTA capacity building, and instead we reviewed several articles that were mainly related to the development and use of research (a core skill of HTA). Secondly, time constraints did not allow us to do an extensive review of the grey literature, which given the breadth and various partners that work in HTA, may have yielded more results. Despite the limitations we believe that this summary review provides a useful overview of HTA/research capacity related initiatives, projects and organisations involved in Ghana domestically and internationally.

Our review found that most articles discussed issues related to 1) evidence production, interpretation, and use, 2) Infrastructure, and 3) Partnerships. Only two articles specifically discussed capacity building strategies related to HTA skills. We found that capacity building programmes, irrespective of the subject area, tend to be led by international organisations or universities, and this may pose challenges for sustainability that are not always adequately addressed in project design.

The establishment of the HTA Steering Committee, Technical Working Group and Secretariat in Ghana will help harness the relevant capacities that exist within the country, which will in turn make Ghana better situated to conduct locally relevant HTAs. Stronger coordination from central

authorities to manage the different initiatives, bilateral partners, and improved collaboration with academia and health research centres will support alignment between research agendas and HTA policy needs. There is a need to develop HTA expertise within country to conduct locally relevant HTAs, therefore an assessment of the current skills of HTA committee members can support the development of a tailored capacity building plan for Ghana. Finally, to support sustainability of the HTA functions and institutionalisation at the Ministry of Health, investment needs to be made in the training of professionals that is supported by long-term financing.

- Background

Ghana has embarked on a programme to initiate and institutionalise Health Technology Assessment (HTA) to inform policy making, priority setting for health interventions, reimbursement, pricing of pharmaceuticals and other health technologies. To support this goal of HTA institutionalisation, in 2019 the Minister of Health inaugurated the HTA Steering Committee, Technical Working Group and Secretariat to oversee the development of HTA under the auspices of the Ghana Ministry of Health. The membership of the Steering Committee is multi-agency, with representation from the most relevant agencies, for example, the Ministry of Health, The National Health Insurance Authority, The Ghana Health Service and the Ministry of Finance, to name a few. The role of the Steering Committee is to make recommendations to the Minister of Health on the investment or disinvestment in health technologies, based on evidence in HTAs produced by the Technical Working Group. The Technical Working Group is multidisciplinary by design and includes those experts who have the interest and capabilities to support HTA, therefore representation includes researchers and technical actors from health agencies. The HTA secretariat supports the work of the Technical Working Group and the Steering Committee and manage the HTA process in Ghana.

In late 2019, the Ministry of Health presented its strategic plan for HTA, whose primary aim is to strengthen the science and practice of HTA in support of evidence-based decisions for improved health in Ghana (1). The specific objectives of the strategy are to:

- Establish country structures required to institutionalise HTA in Ghana in line with country policy direction
- Strengthen the science and practice of HTA in Ghana in order to produce quality evidence, informed effective decisions and efficient practice based on agreeable standards for conduction, dissemination and use of HTA
- Provide support for and deploy evidence-based priority setting in policy prioritization, selection of medicines and health technologies, reimbursements, pricing, resource allocation and procurement; with initial emphasis on health care cost and reimbursements

Policy direction on HTA in Ghana is provided by the National Medicines Policy (2017-2021). The policy's goal is "to ensure universal, equitable and sustainable access to priority, efficacious and safe medicines and other health technologies of acceptable quality for all people living in Ghana and promote their responsible use by healthcare providers and consumers." (2) The National Medicines Policy makes recommendations for the implementation of HTA, including the establishment of supporting structures. The Policy proposes the use of HTA to guide the identification of cost-effective medicines, while acknowledging the need to "strengthen the science and practice of HTA" to support evidence-based decision-making.

The progress of HTA implementation in Ghana to date has been well documented (3-6). Several international partners, universities and donors have been collaborating with Ghanaian governmental authorities, universities and individual researchers for decades, mainly focusing on evidence-based decision-making, evidence synthesis, and health policy and systems research. For example, the Better Medicines for Children Project improved the medicines selection process through capacity building interventions targeted at the National Medicines Selection Committee focussing on critical appraisal of evidence, use of randomised controlled trials, evidence summaries, interpretation of evidence, searching for relevant and appropriate literature, GRADEing evidence, assessment of bias etc. This informed the 6th edition of the Standard Treatment Guidelines and Essential Medicines List, 2010 (7). Specific to HTA, there is a longstanding relationship with the [International Decision Support Initiative \(iDSI\)](#), where a flagship project included completing a pilot HTA concerning anti-

hypertensive medicines in Ghana (4-6). Since 2016, PATH/ADP¹ have been collaborating with the Ministry of Health in Ghana in HTA, publishing a review of the institutionalisation of HTA in Ghana, including advising on the formation of the committees and their technical working documents (3). The NIPH together with iDSI and PATH have been providing technical assistance to the Ministry of Health to strengthen the capacity of the country to produce and use HTA.

While the Ministry of Health has made several strides in its pursuit of HTA in country, much remains to be done, including the need for improved understanding of the factors that are influencing HTA implementation in the country, including the development of local capacity and expertise to conduct HTAs and economic evaluations, particularly to support medicines selection. Therefore, our starting point and primary goal for this summary review was to obtain information about the existing capacity building efforts in Ghana, specific to HTA, or in related areas more generally. In this document, HTA skills, refer to the capacity to conduct systematic reviews or other types of evidence synthesis and economic evaluations.

- Methods

This project had two objectives:

- The primary goal was to seek evidence about the existing capacity building efforts in Ghana, specific to HTA, or in related areas more generally with a focus on HTA related subject areas (e.g. health economic, evidence synthesis) to support the development of this area of work.
- Our secondary goal was to identify the published work set in Ghana, consortiums or groups collaborating with Ghanaian governmental authorities, universities and individual researchers (hereafter actors/networks) focusing on evidence-based decision-making, evidence synthesis and health policy and systems research, to obtain more information about the capacity gaps for HTA in Ghana.

The project protocol was not registered or published as a public record; it was kept in the NIPH Global Health cluster server as an archive document for the team to refer to. The present report follows the reporting guidance provided in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (8).

Search methods for identification of articles

Electronic searches

An information specialist developed and tested the search strategy in consultation with the review authors. The search was conducted on August 30 2019 with no language limitation. Upon completion, the results from each database were documented and the references were imported into a bibliographic management software to eliminate duplicates (i.e., EndNote). The complete and final search strategy is provided in Appendix 1.

We searched the following databases with no language limit:

1. MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to August 29, 2019, Ovid
2. Embase 1974 to 2019 Week 34, Ovid
3. ERIC 1966 to 2019, ProQuest
4. Web of Science Core Collection, 1987-2019, Clarivate Analytics

¹ Access and Delivery Partnership is a partnership including PATH, the Japanese Government, UNDP, WHO, and TDR, <https://adphealth.org/>

Searching other resources

Grey Literature is defined here as research work not published in (commercial) or official mainstream literature, for example government reports, global health agencies reports and dissertations. For this project, we completed google searches to meet the secondary goal of our review, to identify consortiums, donors or funders collaborating with Ghanaian governmental authorities, and universities.

Selection of literature

The selection of records followed pre-specified criteria described in Appendix 1. Two out of three project team members (EP, AE, and AD) independently read identified titles and abstracts and determined if records should be included for full-text review. Full text was done independently by one out of four review team members (EP, AE, AD, and LC). Reviewers were focusing on records conducted in Ghana or a multi-country setting including Ghana, and HTA or related area (e.g., health economics, clinical effectiveness), and included terms related to capacity building.

During the full text stage of the review, papers were prioritised against the criteria below. We included records that were classified as #4 or #5 only:

- #1-2. Irrelevant, mention Ghana or capacity building but little or no information available for extraction, no mention of HTA
- #3. Some reference to HTA and other items...
- #4. Reference to HTA and the primary goal of the study
- #5. All terms of interest included

See Appendix 2 for a list of articles included in the review that were prioritised as 5 or 4 for relevance.

Exclusion criteria

The following exclusion criteria was applied:

- Articles published before 2005
- Articles that were ranked #1, #2, and #3.

Data Extraction

We developed data extraction forms a priori to capture information on each document included in the project. The forms were piloted by members of the review team and refined based on feedback from the exercise. We extracted data for the pre-defined outcomes. We used an online platform for the team (i.e., google forms). Data was extracted by one team member (either AD, AE, and LC) and checked by another (EP) we resolved disagreements by discussion or by referring to a third author. Data was extracted for the two project objectives: 1) information on HTA, Ghana and capacity building, and 2) relevant actors/networks in Ghana. Both are described in more detail below.

Objective a: Extraction of evidence of HTA or HTA related skills in Ghana

During data extraction reviewers extracted findings in the studies related to HTA, or HTA skills (such as information retrieval, clinical evidence synthesis and health economics), or evidence-based decision-making, or evidence synthesis, or health policy and systems research.

Objective b: Extraction of relevant actors/networks in Ghana (i.e., consortiums, donors or funders collaborating with Ghanaian governmental authorities, universities)

During data extraction several organisations were identified related to our topic of interest. To better understand the situation and actors in the field of health research, evidence-based decision-making,

HTA, economic evaluation and capacity building, we collected information on organisations, networks and initiatives relevant for Ghana.

Data Synthesis

We synthesized data from the included records on both objectives (e.g., HTA+capacity building+Ghana and actors/networks) (if reported), producing tables and graphs with key characteristics of each included record meeting our criteria (title, publication year, key findings, etc).

The data synthesis was done in three parts,

- 1) a description of the types of articles we identified; (Objectives a and b)
- 2) the thematic content of the articles; (objective a) and
- 3) relevant initiatives and organisations identified in the review. (objective b)

We identified several thematic areas relevant to understanding capacity building efforts for skills related to HTA, and synthesise them as follow: Evidence (production, interpretation, and use), Infrastructure, and Partnerships. As a result, this report presents information about the existing capacity building efforts in Ghana, specific to HTA, or in related areas more generally with a focus on HTA related subject areas to support the development of this area of work. The identified thematic areas are organised into barriers and facilitators for capacity building related to HTA, and are presented in Table 2.

The preliminary findings of the review were presented at a meeting of the Ghana HTA Steering Committee and Technical Working Group, held in Accra in December 2019. Key stakeholders were brought together, with at least 30 participants invited to comment on the findings and make recommendations for their strengthening. The lessons from these deliberations were used to strengthen the report.

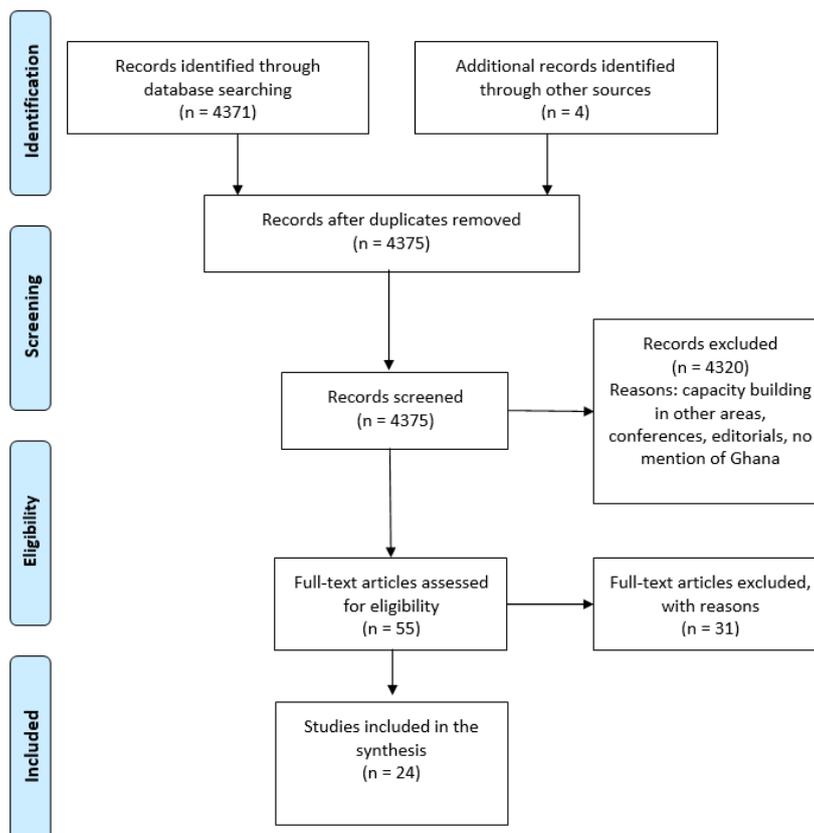
- Results

Results of the search

The databases and other sources searches yielded 4375 records. After de-duplication and title and abstract screening, we included 55 articles for full-text review. Of these, only 24 records met our inclusion criteria. (See Figure 1).

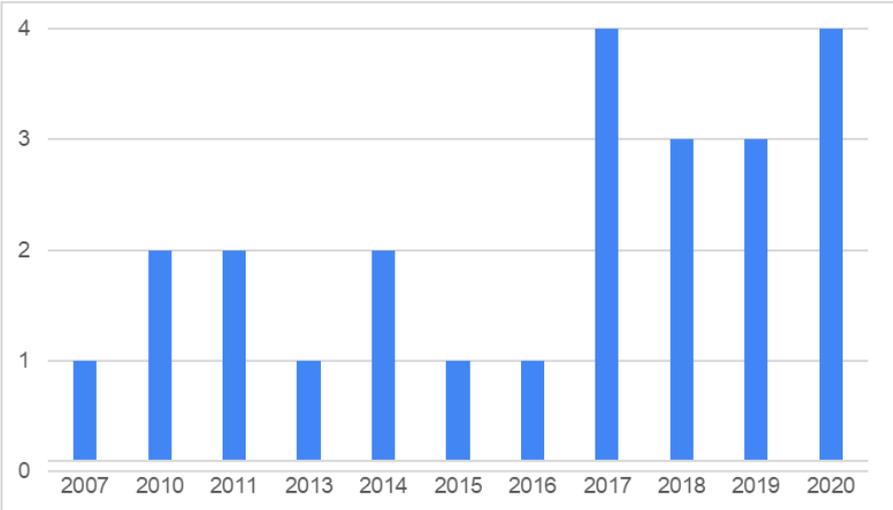
After prioritisation of the records included for full-text review, 20 records were categorised as either «5» All terms included (n=3) or «4» reference to HTA and relevant to the primary goal of the study (n=17) and included in the study for data extraction (see Appendix 1 for additional information about the methods). An additional four articles were identified through our network and related Google search performed in June 2020 and added for data extraction. Only one of the articles identified through our search strategy covered both capacity building and HTA (7).

Figure 1: PRISMA flow diagram of articles identified



Our results indicate that HTA is becoming more popular for published research in in Ghana. Figure 2 is an illustration of the 24 publications included for data extraction and where they were published.

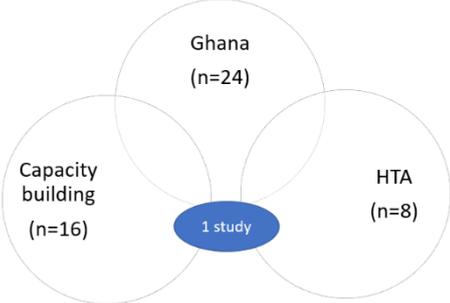
Figure 2: Articles reviewed, and year published



The findings section is divided into three sections: 1) a description of the types of articles we identified; 2) the thematic content of the articles; and 3) relevant initiatives and organisations identified in the review.

From the articles and reports which were included for data extraction, we identified several thematic areas relevant to understanding capacity building efforts for skills related to HTA, these were: Evidence (production, interpretation, and use), Infrastructure, and Partnerships. As a result, this report presents information about the existing capacity building efforts in Ghana, specific to HTA, or in related areas more generally with a focus on HTA related subject areas to support the development of this area of work. The identified thematic areas are organised into barriers and facilitators for capacity building related to HTA, and are presented in Table 2. Figure 3 indicates of those 24 articles that were included for data extraction and how they fit against the inclusion criteria.

Figure 3: Categorisation of articles included for data extraction and how they fit against the inclusion criteria



Section 1: Description of articles included

Our search identified records related to capacity building (n=16) with fewer records mentioning HTA specifically (n=8). Table 1 presents the 24 records identified and areas of interest discussed in these records.

Table 1: Records identified in search strategy and grey literature searches

Area of interest (as identified in search strategy)	No of articles	First author (year)
Capacity building efforts in Ghana	2	Bates, I. et al. (2011), Hedt-Gauthier, B. L. et al. (2017),
Capacity building efforts in Ghana, specific to HTA, or in related areas	14	Abekah-Nkrumah, G. et al. (2018), Agyepong, I. A. et al. (2018), Agyepong, I. A. et al. (2015), Al-Bader, S. et al. (2010), Anderson, F. et al. (2014), Aryeetey, R. et al. (2017), Bates, I. et al. (2007), da Silva, A. T. C. et al. (2019), Gureje, O. et al. (2019), Kok, M. O. et al. (2017), Motani, P. et al. (2019), Njelesani, J. et al. (2014), Sam-Agudu, N. A. et al. (2016), Shah, N. et al. (2017).
HTA ²	8	Addo, R. et al. (2020), Gad, M. et al. (2020), Hollingworth, S. A. et al. (2020a), Hollingworth, S. A. et al. (2020b), Sinclair, D. et al. (2013). <u>Papers related to economic evaluation (rather than HTA more broadly)</u> ³ Aboagye, A. (2011), Jehu-Appiah, C. (2010), Uneke, C. J. (2018).

Capacity building efforts in Ghana

Regarding capacity building, the review identified two papers that made specific recommendations to support capacity building in Ghana (9, 10). Bates et al. (2011) identified five usual challenges with research capacity building projects, including lack of, 1) trainee background; 2) mentorship, teaching and trainee support; 3) infrastructure and logistics; 4) institutional support and buy-in; and 5) sustainability and funding (10). And in regards to the sustainability of capacity building, Bates et al. (2011) recommends: 1) early engagement of stakeholders; explicit plans for scale up; strategies for influencing policies; quality assessments (awareness and experiential stages); 2) improved resources; institutionalisation of activities; innovation (expansion stage); and 3) funding for core activities secured; management and decision-making led by southern partners (consolidation stage) (11).

Capacity building efforts in Ghana specific to HTA, or related areas

Hollingworth et al. (2020) (6) highlighted the "learning by doing approach" for the technical training in the sense that there was established a multi-stakeholder technical working group which conducted the before-mentioned HTA pilot study, with support from Global Health and Development Group at Imperial College (6). This pilot study contributed to local capacity to conduct and use HTA, by hands-on experience (4).

Our review found that capacity building efforts related to HTA or research tend to be led or initiated by international organisations. Of note is how international partners engage and collaborate with partners in country, and the negative influence of that monitoring and evaluation indicators (often based on impact requirements from donors or funders) have on these projects, for example, pressure from donors to deliver on products rather than have a flexible approach to collaboration that can be more responsive to country needs. These reporting frameworks tend to be tied to the funding of these projects, and can be unrelated or irrelevant for learning and strategic planning within country (11). Generic monitoring indicators are described in Table 2 of Bates et al. (11), where phases and common activities to support capacity-building are also described. Hedt-Gauthier et al. suggested that the funders of research capacity building activities need to be more flexible (10).

² Health Technology Assessment (HTA), Health Technology Management (HTM), or application of evidence-based policy decision support.

³ Economic evaluation, health economics, cost-effectiveness analysis, cost-benefit analysis, or similar.

Section 2: Thematic content of articles

As most of the articles identified in the review were related to capacity building, therefore we have presented the main factors that were identified in this aspect of the review. The findings from our thematic analysis were divided by three thematic areas: 1) Evidence production, interpretation, and use, 2) Infrastructure, and 3) Partnerships and collaboration. Table 2 presents a synthesis of the influencing factor for the barriers and facilitators for capacity building related to HTA.

Table 2: Barriers and facilitators for capacity building related to HTA

Thematic areas	Influence	Type	Source
Evidence production, interpretation, and use	Lack of country capacity to conduct HTA	Barrier	(3-7)
	Challenges supporting research capacity building in LMIC	Barrier	(10-14),
	Internationally engaged researchers	Facilitator	(15)
	Lack of local researchers engaged in global health topics	Barrier	(16)
	Research priorities, funding and agendas are not aligned with local needs	Barrier	(10, 15-23)
	Knowledge generation that relies on globally generated evidence	Barrier	(7, 21)
	Monitoring and evaluation outputs tend to be linked to donor needs	Barrier	(11, 23)
	Opportunities for capacity building with hands-on learning	Facilitator	(4)
	Lack of opportunities and platforms that are needed for knowledge transfer	Barrier	(18-21)
	Well documented factors that positively influence or hinder research capacity building programmes	Facilitator	(10-14)
	Gaps in relevant higher education within Ghana (doctoral studies)	Barrier	(9, 19, 22, 24)
	Positive attitudes by decision-makers towards HTA and its potential uses in the health system	Facilitator	(5)
	Lack of country funding for research/HTA	Barrier	(5, 15, 18)
Infrastructure	Sub-optimal internet connectivity and access to costly scientific databases	Barrier	(20)
	Limitations of accessible data sources suitable for HTA	Barrier	(5, 25)
Partnerships and collaboration	Building trust and investing in relationships	Facilitator	(6, 11, 23)
	Close linkages with domestic academic and research partners	Facilitator	(6)
	Weak relationships between policy makers and researchers within Ghana	Barrier	(21)

Evidence production, interpretation, and use

A critical step in the HTA process is the gathering and analysis of existing evidence on the given topic. This can include evidence synthesis, systematic reviews, and evaluation. There is a small, yet growing body of literature that discusses the capacity to conduct HTA in Ghana, and it found that there is a lack of country capacity to conduct HTAs, especially in the interpretation and application of global recommendations at the national level (3-7). Several articles described the challenges supporting research capacity building in LMICs (10-14), for example, the early engagement of stakeholders, improved resources, and institutionalisation of activities such as communities of practice for education (9, 11). These aforementioned factors can be considered to enable implementation of HTA in Ghana.

A key barrier for evidence production and use that was mentioned repeatedly in the literature was that research priorities, funding and agendas not aligned with local needs (10, 15-23). In addition, the knowledge and evidence that has been used in Ghana health policy tends to be globally generated, and not always adapted to the national situation and context (7, 21). An influencing aspect of this is the role that research financing plays in shaping what research is conducted and that international funding (for both aid and research) is targeted towards projects and interventions that may not be of priority to policy-makers in Ghana (23). It was well documented that there is inadequate local funding and that donors direct research priorities and agendas (16-19) that tend to be less relevant

to a country's priorities. This is a common challenge across many countries of the global south (20). In addition, the monitoring and evaluation outputs tend to be linked to donor needs rather than country impact (11). Limited domestic funding for research in Ghana, especially in the budget of the health sector is hampering the development of relevant local evidence or development of local capacity (15, 18).

Regarding dissemination of evidence and platforms for knowledge transfer, several articles mentioned that more opportunities are needed for best practice research evidence to be shared (18-21). This discourse and necessary dissemination can be facilitated by universities. However, there are currently limited options for relevant higher education in Ghana, specifically post-doctoral courses to teach HTA related skills (5, 9, 19, 22, 24). Addo et al. (5) investigated the knowledge and attitudes of Ghanaian health decision-makers and researchers. The study showed that a barrier for the use of HTA include limited human capacity to conduct the assessments. The authors recommended that a plan for building and maintaining human capacity should be included in an overall plan for HTA institutionalisation. This would include adding HTA related subjects to established courses, and offering short courses on HTA for potentials users of HTA (5).

A few articles showed that there are challenges with the hiring and retention of staff (22, 24), which impacts on knowledge production and use. One study found that there was a lack of supervised research training and mentorship (19). Possible alternatives could be a course designed to teach research to health professionals in Ghana (9). Several papers suggested that research capacity building can be applied in Ghana in the future (10-14).

Current use of evidence in Ghana

Our review found that there is a culture of evidence-based policy making in the health sector in Ghana, in addition one study specifically mentioned that the attitudes of health decision makers towards HTA are positive (5). However, our review also found that research findings can be limited to peer reviewed articles published in scientific journals rather than alternative forms of communication and/or dissemination, such as publicly available policy briefs or white papers (18). Ghanaian researchers are considered to be of high competence and are internationally engaged (15), though this engagement seems to be limited to global health research within Ghana, as opposed to being involved in research with international consortiums in other international settings beyond Ghana (16). Two articles indicated that there were gaps related doctoral program in the University of Ghana, School of Public Health, specifically the papers mention health policy health systems research and analysis or health economics (22, 24).

Health intervention research in Ghana has been led by the Health Research Unit of the Ghana Health Service which is the policy implementation entity responsible for health service delivery in the public sector, within the health system in Ghana. There are three institutes that host primary research sites: Navrongo, Kintampo and Dodowa (15). Several articles have identified that there was a need for stronger links between Ministry of Health and the country's research agenda (15, 18, 21).

The types of evidence generated by researchers in Ghana and alignment with policy needs

Regarding knowledge generation, Ghana relies heavily on globally generated evidence, as expressed in one article: "In Ghana ..., decision makers are heavily reliant on globally-generated (often UN) strategies which are then contextualised with support of external or internal evidence brokers (consultants)" (21). This review found that many of the knowledge production activities in Ghana did not fully align with the needs of policy makers, that there is a gap between national needs and the priority setting of research agendas and that academia need to be more closely aligned with decision makers (22). There needs to be greater awareness by national decision-makers with the implementation and contextualisation of global evidence as 'one size does not fit all', and have a

more active role in how the research and knowledge is transferred or adapted to the local context (21). One paper suggested that incentives could be used to ensure that knowledge production meets the needs of policy makers (18). Several articles mentioned that Ghana was missing opportunities in the generating, appraising, contextualising and championing evidence for decision-making (19-21). Decision makers have indicated that they need more research evidence to inform decisions, and would like to be updated about current research (21).

Infrastructure: Access and use of research and data

One aspect of access to research is whether there are challenges related to infrastructure that enables access. The other is whether there is a culture of using the evidence. Our review found both, that electric power cuts, sub-optimal internet connectivity and lack of access to scientific databases impact on access to scientific evidence (20), and the review also identified that more forums or institutional platforms, such as official organisations or committees, to increase the profile and use research knowledge in the country could be of benefit (26). Hollingworth et al. (25) describes the accessible data sources to support HTA in Ghana. They conclude that there are a few sources, but gaps remain, in addition to challenges with respect to the usefulness for HTA. They highlight that joint efforts to leverage existing sources, and develop and maintain new data, are required.

Partnerships and collaboration

In-country partnerships

As discussed above, our review has identified a weak relationship between policy makers and researchers within Ghana, influenced by the lack of platforms to promote this research (21). As a discipline, health policy and systems research has examined the links between policy-makers and researchers. The benefits of these professions working together is well documented (27). The experience in Thailand and the establishment of the Health Intervention & Technology Assessment Programme (HiTAP), suggests that the establishment of such processes need to be systematic, participatory, and transparent (28).

International and north-south collaborations

It is a common theme in the literature that within the global south, whether related to HTA or other areas of global health, that the value and benefit of building trust and investing in relationships supports better research collaboration and project outcomes (6, 11, 23). Previous initiatives that have supported HTA in Ghana have highlighted the importance of people, policy and process (3, 6). Hollingworth et al. underlined the importance of partnerships with country institutions, and to ensure political buy-in, and demand for HTA and capacity building in this regard (6). They highlighted mutual respect between partners and strong relationships as key factors in moving forward in institutionalising HTA.

Better practice for international and north-south collaborations

Suggestions have been made for improvements in north-south collaborations, one paper recommended to establish a focal point for health innovation to coordinate stakeholders interested in research areas (15). Another study noted that there is a need for research findings to be disseminated more widely and not only limited to published scientific papers (18). In a collaboration between academic and governmental institutions in Michigan and Ghana, they described the benefits and process of designing a project with North and South partners together. They found that, in addition to shared project goals, that transparency about budgets, the collective development of a charter for collaboration helped build trust and had a positive influence on the project. The charter was an agreed set of norms between the research partners, and this article described a set of agreed principles established to guide the technical collaboration. This was developed in the beginning of the project and acknowledged power imbalances and institutional differences (23).

In terms of capacity building, effective partnerships were identified as a key theme in the literature. This includes the importance of taking active steps to build trust in programme development, specifically: the value of identifying common needs, priorities, opportunities, barriers, commitments, and the need to collaborate between actors, internationally and within country (21, 23). It was recommended that these the identification and management of these steps be explicitly discussed in advance (23).

Section 3: Relevant initiatives and organisations identified in the review

At the inception of this review, we were aware that several academic, institution and funding partners had been engaged in relevant initiatives and activities. Therefore, during our data extraction phase we wanted to collect information about these relevant activities and actors/networks identified in the literature. In addition, we conducted Google searches to identify other organisations active in Ghana. Twenty eight relevant initiatives or organisations were identified in the literature and web searches. They were categorised as follows (see Appendix 3 for more information):

- Ghanaian governmental research institutions: the three research centres under the Ghana Health Service (Dodowa, Navrongo, and Kintampo).
- Universities or research institutions: e.g., University of Ghana, Kwame Nkrumah University of Science and Technology, etc.
- Networks and research consortiums: e.g., African Health Economics and Policy Association (AfHEA), African Evidence Network, etc.
- International donors: e.g. iDSI, NIPH, PATH, etc.
- Multilateral organisations: e.g., WHO Head Quarters, regional offices, and country offices, etc.

These initiatives and organisations all either have been or still are involved in evidence-based decision making or health research for decision making in Ghana (or wider Africa/LMICs), and indicate that there are several national and international partners that can be drawn on to support the development and institutionalisation of HTA in Ghana.

- Discussion and conclusion

The government of Ghana has made a large investment and progress in establishing and institutionalising HTA, which is a critical component in the pursuit of Universal Health Coverage. However, our review found limited documentation on work related to the factors that are influencing HTA implementation in the country, development of local capacity, expertise to conduct HTAs, and future sustainability. This review has provided information about the existing capacity building efforts in Ghana, generally with a focus on factors related to the capacity in HTA subject areas and identified the published work set in Ghana, consortiums or groups collaborating with Ghanaian governmental authorities, universities and individual researchers focusing on evidence-based decision making in Ghana.

Our review identified the need for stronger coordination between key stakeholders was a common theme in the reviewed literature. In terms of the challenge of inappropriate application of globally generated evidence, it was noted that strong coordination from central authorities to manage the variety of different initiatives and bilateral partners working in the country, and collaboration with academia and health research centres to support alignment between research agendas and policy needs (7, 21). This has partially been addressed by the Minister of Health's launch of national HTA processes, including HTA Steering Committee, Technical Working Group and Secretariat to oversee the development of HTA in Ghana (2). Such a platform for collective health priorities is an essential component to facilitate the continuation of HTA institutionalisation and planning, knowledge transfer and relationship development. There is still a necessity for stronger linkages between governmental health priorities and the national health research agenda and financing.

The HTA function can support coordination where country health research is discussed, but this cannot replace the need for the relevant expertise within country to complete locally relevant HTAs. Our review identified that the relevant research skills related to information retrieval, clinical research and health economics, however it has been well documented that there is a need for more HTA specific expertise in Ghana (3-6). The review also found that there is an extensive national and international network of projects and partners in Ghana in the field of evidence-based decision making, and evidence production and use (see Appendix 3). There is a breadth of knowledge that can support skill and capacity development. Further work is needed to identify specific gaps based on the expected role of HTA in Ghana. A survey of the skills to undertake HTA should be completed so that a tailored capacity building plan can be developed to meet the aspiration for the institutionalisation of HTA in Ghana.

A key challenge is the sustainability of the HTA functions at the Ministry of Health to support institutionalisation. This needs to be country lead with complementary support from international partners to ensure that it is sustainable. Internationally there are examples of tools and information that discuss sustainability, for example, the EUnetHTA Handbook on HTA Capacity Building provides practical guidance and support on how to establish HTA systems (29). Commitment from politicians and key decision makers, in addition to identifying an appropriate organisation structure for HTA will support sustainability. Further, investments to train professionals are needed and funding should be provided on a long-term basis. Ghana has lacked in-country funding for HTA (5, 15, 18), and there is a need for a mechanism for sustainable (in-country) funding to be able to realize long term strategic plans for HTA, and capacity building for HTA. From a structural perspective, a legal framework for HTA is an important element for formalising HTA (29). Decision makers in Ghana suggested that a policy framework should be developed to ensure the mandate and conduct of HTA (5).

Ghana has made significant progress in the institutionalisation of HTA, but the tangible capacity building needs should be investigated, while coordinating HTA developments towards a common goal of a sustainable HTA system.

Limitations of the review

Some limitations of this review should be noted. Firstly, due to a limited number of articles that specifically looked at HTA capacity building, we reviewed several articles that were mainly related to the development and use of research. The use of a single reviewer for full text extraction and some methodological decisions post-hoc in lieu of the data and resources available mean that this cannot be considered to be a systematic review of the literature. Finally, time constraints did not allow us to do an extensive review of the grey literature, which given the breadth and various partners that work in HTA, may have yielded more results. Despite the limitations we believe that this summary review provides a useful overview of HTA/research capacity related initiatives, projects and organisations involved in Ghana domestically and internationally.

Appendix 1: Methods for the literature search

Research question

The search strategy was design and conducted to fulfil two separate and independent projects. As there was some overlap between the research questions, it was decided to run one search for both projects.

To examine the current literature that documents capacity building in Ghana related to Health Technology Assessment (HTA), or related disciplines/skills such as economic evaluation and evidence synthesis.

Identification of relevant articles

Search strategy

A systematic revision of the literature exploring capacity building (or training or education) and evidence synthesis (or EBM or EBP or systematic review or HTA or health research) and LMICs and decision-making (or policy or healthcare policy). We aimed to find any study or report that involves Ghanaian researchers, government, or other organisations in the areas above.

Four databases (MEDLINE, Embase, Web of science and ERIC ProQuest) were searched using following terms:

- «building capacity» or « capacity building» or «competence» or «training»
- AND «tool» or «checklist» or evaluation» or «assessment» or «assess» or «checklist» or «evaluation»
- AND «HTA» or «health technology» or «health economics» or «cost analysis»
- AND «Low and middle income country» or «developing country»
- Time frame: from 2000 to present

Description of title and abstract screening, full text review

Title and abstract screening conducted by two independent reviewers. Publications were screened in two phases (title and abstract, and full text) and included or excluded on the following basis

Inclusion criteria:

- Set in Ghana or a multi-country study that includes Ghana,

AND

- One of the following:
 - Health Technology Assessment (HTA), Health Technology Management (HTM), or application of evidence-based policy decision support, **or**
 - Economic evaluation, Health economics, Cost-effectiveness analysis, Cost-benefit analysis, or similar

OR

3) Institutional or capacity building

OR

4) Methodology - The methods used in the paper are useful for our project goal

Study selection

Step-wise approach for literature classified as publications conducted either in Ghana and multi-country studies that include Ghana

- a. Full-text screening
 - read publications
 - Identify whether articles meet the Inclusion criteria as above:

Definitions

Health Technology Assessment (HTA): The systematic evaluation of the properties and effects of a health technology, addressing the direct and intended effects of this technology, as well as its indirect and unintended consequences, and aimed mainly at informing decision-making regarding health technologies⁴.

Health Technology Management (HTM): a more active process to influence innovation, adoption, and disinvestment decisions throughout the life cycle of technologies to better support health care decision-makers⁵.

- b. Full text – Prioritisation
 - «5» extremely relevant / findings that will help the projects goals
 - «4» relevant / reference to HTA, economic evaluation or capacity building, findings that will somewhat help the projects goals
 - «3» somewhat relevant / some reference to HTA, economic evaluation nor capacity building
 - «1-2» were considered either irrelevant, or completely irrelevant /no mention of HTA, economic evaluation nor capacity building
- c. Data extraction
 - Data was extracted by one reviewer, and checked by a second one
 - Data extraction of records ranked #4 and #5. Only findings relevant to project goals were extracted and added to the data extraction form.
- d. Decisions made through consensus
 - At data extraction phase inclusion criteria is confirmed by the data extraction reviewer. Any disagreements were discussed with a third person.
- **MEDLINE and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to August 29, 2019, Ovid**
- **Embase 1974 to 2019 Week 34, Ovid**

#	Searches	Results
1	Capacity Building/	6575
2	exp Education/	2134941
3	Professional Competence/	55107
4	Knowledge/	46839
5	or/1-4 [CAPACITY BUILDING]	2185136

⁴ Health Technology Assessment international (HTAi), HTA Glossary, [http://htaglossary.net/health+technology+assessment+\(HTA\)](http://htaglossary.net/health+technology+assessment+(HTA)), last accessed 17 September 2019.

⁵ Canadian Agency for Drugs and Technologies in Health, <https://www.cadth.ca/symposium2018/beyond-health-technology-assessment-what-does-health-technology-management-mean-patients-and-health>, last accessed 4 September 2019.

6	Evidence-Based Practice/	69950
7	Evidence-Based Dentistry/	2464
8	Evidence-Based Medicine/	177444
9	Evidence-Based Emergency Medicine/	767
10	Evidence-Based Nursing/	7593
11	"Review Literature as Topic"/	46873
12	Systematic Reviews as Topic/	2472
13	Meta-Analysis as Topic/	45048
14	Epidemiologic Research Design/	197157
15	Controlled Clinical Trials as Topic/	14466
16	Randomized Controlled Trials as Topic/	227842
17	Technology Assessment, Biomedical/	23169
18	"Costs and Cost Analysis"/	99352
19	Cost-Benefit Analysis/	159476
20	or/6-19 [HTA]	1011312
21	5 and 20	95219
22	((capacity or competenc* or knowledge or skill? or qualification? or education or training) adj6 (evidence based or systematic review* or scoping review* or mapping review* or evidence synthesis or metaanalys* or meta analys* or technology assessment* or health economics or cost analysis or cost benefit analysis or economic evaluation or cost effectiveness)).ti,ab,kf.	23979
23	or/21-22 [CAPACITY BUILDING + HTA]	113970
24	Developing Countries.sh,kf.	83947
25	(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp.	586833
26	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Camerons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji	7417977

	or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjhikistan or Tadjikistan or Tadjhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,kf,ti,ab,cp.	
27	((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.	209736
28	((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.	1149
29	(low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.	576
30	(low adj3 middle adj3 countr*).ti,ab.	29632
31	(lmic or lmics or third world or lami countr*).ti,ab.	14676
32	transitional countr*.ti,ab.	380
33	or/24-32 [LMIC]	7757572

34	23 and 33 [CAPACITY BUILDING + HTA + LMIC]	14640
35	Decision Making/	303150
36	Health Policy/	214722
37	Biomedical Research/	244573
38	Health Services Research/	68492
39	or/35-38	802814
40	5 and 39	130084
41	((capacity or competenc* or knowledge or skill? or qualification? or education or training) adj6 (research evidence or scientific evidence or medical research or health research or health services research or health systems or health policy or health care policy or policy making or decision making)).ti,ab,kf.	22128
42	40 or 41	148258
43	Ghana/ or ghana*.ti,ab,kf.	24060
44	42 and 43 [CAPACITY BUILDING + RESEARCH / POLICY + GHANA]	252
45	limit 34 to yr="2005 -Current"	11676
46	limit 44 to yr="2005 -Current"	225
47	45 or 46	11878
48	47 use ppez [MEDLINE RECORDS]	2960
49	capacity building/	6575
50	exp evidence based practice/	1278806
51	biomedical technology assessment/	23390
52	health economics/	32141
53	exp economic evaluation/	371414
54	or/50-53	1649564
55	49 and 54	776
56	((capacity or competenc* or knowledge or skill? or qualification? or education or training) adj6 (evidence based or systematic review* or scoping review* or mapping review* or evidence synthesis or metaanalys* or meta analys* or technology assessment* or health economics or cost analysis or cost benefit analysis or economic evaluation or cost effectiveness)).ti,ab,kw.	24544
57	55 or 56	25190
58	Developing Country.sh.	91517
59	(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.	573837
60	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina	7413486

<p>or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjhikistan or Tadjikistan or Tadjhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,ti,ab,cp.</p>	
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61	((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.	209736
62	((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.	1149
63	(low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.	576
64	(low adj3 middle adj3 countr*).ti,ab.	29632
65	(lmic or lmics or third world or lami countr*).ti,ab.	14676
66	transitional countr*.ti,ab.	380
67	or/58-66	7754184
68	57 and 67 [CAPACITY BUILDING + HTA + LMIC]	3459
69	capacity building/	6575
70	exp medical education/	459668
71	professional competence/	55107
72	knowledge/	46839
73	or/69-72	553059
74	decision making/	303150
75	health care policy/	186861
76	medical research/	279490
77	health services research/	68492
78	or/74-77	810132
79	73 and 78	49761
80	((capacity or competenc* or knowledge or skill? or qualification? or education or training) adj6 (research evidence or scientific evidence or medical research or health research or health services research or health systems or health policy or health care policy or policy making or decision making)).ti,ab,kw.	22746
81	79 or 80	70833
82	ghana/ or ghana*.ti,ab,kw.	24115
83	81 and 82 [CAPACITY BUILDING + RESEARCH / POLICY + GHANA]	152
84	68 or 83	3597
85	limit 84 to embase [Limit not valid in Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained]	2603
86	limit 85 to yr="2005-Current"	2431
87	86 use oemez	1031
88	48 or 87	3991
89	remove duplicates from 88	3373

ERIC 1966 to current, ProQuest

su(("capacity building" OR "building capacity" OR "build capacity" OR "capacity strengthening" OR "strengthening capacity" OR "strengthen capacity" OR "capacity assessment" OR "assess capacity") AND ("evidence based" OR "systematic reviews" OR "scoping reviews" OR "mapping reviews" OR "evidence synthesis" OR "metaanalysis" OR "meta-analysis" OR "health technology assessment" OR "health technology assessments" OR "health economics" OR "cost analysis" OR "cost benefit analysis" OR "economic evaluation" OR "cost effectiveness" OR "research evidence" OR "scientific evidence" OR "medical research" OR "health research" OR "health services research" OR "health systems" OR "health policy" OR "health care policy" OR "medical decision making")) OR ((capacity OR competenc* OR knowledge) AND ("health technology assessment" OR "health technology assessments")))) OR ti(("capacity building" OR "building capacity" OR "build capacity" OR "capacity strengthening" OR "strengthening capacity" OR "strengthen capacity" OR "capacity assessment" OR "assess capacity") AND ("evidence based" OR "systematic reviews" OR "scoping reviews" OR "mapping reviews" OR "evidence synthesis" OR "metaanalysis" OR "meta-analysis" OR "health technology assessment" OR "health technology assessments" OR "health economics" OR "cost analysis" OR "cost benefit analysis" OR "economic evaluation" OR "cost effectiveness" OR "research evidence" OR "scientific evidence" OR "medical research" OR "health research" OR "health services research" OR "health systems" OR "health policy" OR "health care policy" OR "medical decision making")) OR ((capacity OR competenc* OR knowledge) AND ("health technology assessment" OR "health technology assessments")))) OR ab(("capacity building" OR "building capacity" OR "build capacity" OR "capacity strengthening" OR "strengthening capacity" OR "strengthen capacity" OR "capacity assessment" OR "assess capacity") AND ("evidence based" OR "systematic reviews" OR "scoping reviews" OR "mapping reviews" OR "evidence synthesis" OR "metaanalysis" OR "meta-analysis" OR "health technology assessment" OR "health technology assessments" OR "health economics" OR "cost analysis" OR "cost benefit analysis" OR "economic evaluation" OR "cost effectiveness" OR "research evidence" OR "scientific evidence" OR "medical research" OR "health research" OR "health services research" OR "health systems" OR "health policy" OR "health care policy" OR "medical decision making")) OR ((capacity OR competenc* OR knowledge) AND ("health technology assessment" OR "health technology assessments")))) From January 01 2005 to August 08 2019

Web of Science Core Collection, 1987-2019, Clarivate Analytics

("capacity building" OR "building capacity" OR "build capacity" OR "capacity strengthening" OR "strengthening capacity" OR "strengthen capacity" OR "capacity assessment" OR "assess capacity") NEAR/6 ("evidence based" OR "systematic reviews" OR "scoping reviews" OR "mapping reviews" OR "evidence synthesis" OR "metaanalysis" OR "meta-analysis" OR "health technology assessment" OR "health technology assessments" OR "health economics" OR "cost analysis" OR "cost benefit analysis" OR "economic evaluation" OR "cost effectiveness" OR "research evidence" OR "scientific evidence" OR "medical research" OR "health research" OR "health services research" OR "health systems" OR "health policy" OR "health care policy" OR "medical decision making") (Topic)
OR
(capacity OR competenc* OR knowledge) NEAR/6 ("health technology assessment" OR "health technology assessments") (Topic)

Appendix 2: Articles included in the mapping review that were prioritised as 5 or 4 for relevance

Author	Year	Title	Ranked 5 ⁶ or 4 ⁷
Addo, R	2020	The knowledge and attitude of Ghanaian decision-makers and researchers towards health technology assessment.	5
Agyepong, I. A.	2015	Health Policy, Health Systems Research and Analysis Capacity Assessment of the School of Public Health, University of Ghana	5
Aryeetey, R.	2017	Evidence-informed decision-making for nutrition: African experiences and way forward	5
Bates, I.	2007	Evaluation of a learner-designed course for teaching health research skills in Ghana	5
Gad, M	2020	Supporting the development of evidence-informed policy options: an economic evaluation of hypertension management in Ghana.	5
Hollingworth, S	2020	Implementing health technology assessment in Ghana to support universal health coverage: building relationships that focus on people, policy, and process.	5
Abekah-Nkrumah, G.	2018	A review of the process of knowledge transfer and use of evidence in reproductive and child health in Ghana	4
Aboagye, A. Q.	2011	Cost analysis and efficiency of sub-district health facilities in two districts in Ghana	4
Agyepong, I. A.	2018	Strategic leadership capacity building for Sub-Saharan African health systems and public health governance: a multi-country assessment of essential competencies and optimal design for a Pan African DrPH	4
Al-Bader, S.	2010	Science-based health innovation in Ghana: health entrepreneurs point the way to a new development path	4
Anderson, F.	2014	Creating a charter of collaboration for international university partnerships: the Elmina Declaration for Human Resources for Health	4
Bates, I.	2011	Indicators of sustainable capacity building for health research: Analysis of four African case studies	4
da Silva, A. T. C.	2019	Enhancing mental health research capacity: emerging voices from the National Institute of Mental Health (NIMH) global hubs	4
Gureje, O.	2019	Partnership for mental health development in Sub-Saharan Africa (PaM-D): A collaborative initiative for research and capacity building	4
Hedt-Gauthier, B. L.	2017	Research capacity building integrated into PHIT projects: leveraging research and research funding to build national capacity	4
Hollingworth, S	2020	What do we need to know? Data sources to support evidence-based decisions using health technology assessment in Ghana	4
Jehu-Appiah, C.	2010	Efficiency, equity and feasibility of strategies to identify the poor: an application to premium exemptions under National Health Insurance in Ghana	4
Kok, M. O.	2017	Towards fair and effective North-South collaboration: realising a programme for demand-driven and locally led research	4
Motani, P.	2019	Lessons learned from Evidence-Informed Decision-Making in Nutrition & Health (EVIDENT) in Africa: a project evaluation	4
Njelesani, J.	2014	A systematic approach to capacity strengthening of laboratory systems for control of neglected tropical diseases in Ghana, Kenya, Malawi and Sri Lanka	4
Sam-Agudu, N. A.	2016	Building Sustainable Local Capacity for Global Health Research in West Africa	4
Shah, N.	2017	A roadmap for acute care training of frontline Healthcare workers in LMICs	4
Sinclair, D.	2013	Integrating global and national knowledge to select medicines for children: the Ghana National Drugs Programme	4
Uneke, C. J.	2018	Using equitable impact sensitive tool (EQUIST) to promote implementation of evidence informed policymaking to improve maternal and child health outcomes: a focus on six West African Countries	4

⁶⁶ «5» extremely relevant / findings that will help the projects goals

⁷ «4» relevant / reference to HTA, economic evaluation or capacity building, findings that will somewhat help the projects goals

Appendix 3: Relevant initiatives and organisations identified in the literature and web search

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
Ghanaian governmental research institutions			
Under the Ghana Health Service (GHS) <ul style="list-style-type: none"> • Navrongo Health Research Centre • Kintampo Health Research Centre • Dodowa Health Research Centre 	<ul style="list-style-type: none"> • Using the national Demographic Surveillance System based in Community-based Health Planning and Services (CHPS) facilities for research • Research focuses on the major causes of illness in the northern regions and related problems of high fertility and maternal morbidity 	Active	(10, 30-32)
Universities/research institutions			
University of Ghana: <ul style="list-style-type: none"> • School of Public Health <ul style="list-style-type: none"> ○ Ghana Centre for Evidence Synthesis (UGCES) ○ Department of Health Policy, Planning and Management (HPPM) ○ Department for Epidemiology and Disease Control • Institute of Statistical, Social and Economic Research (ISSER) 	<ul style="list-style-type: none"> - Higher education, research - Within HPPM: Health Economics, Systems and Policy Research Group (HESPRG), who do research, capacity building, policy advocacy and consultancy 	Active	(33-36)
Kwame Nkrumah University of Science and Technology (KNUST), School of Public Health	- Higher education, research and community service	Active	(37)
Kumasi Centre for Collaborative Research and Tropical Medicine (KCCR) Partners: KNUST School of Medical Sciences (SMS), Ghana, and the Bernhard-Nocht Institute for Tropical Medicine (BNITM), Hamburg, Germany	- Develop research programs through the acquisition of research grants. Within this context, the development of training facilities and educational programs for Ghanaian postgraduates and technical staff is a priority.	Active	(38)
University of Health and Allied Health Sciences: <ul style="list-style-type: none"> - Institute of Health Research School of Public Health 	- Higher education, research		(39-41)

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
- Centre For Health Policy And Implementation Research (CHPIR)			
Council for Scientific and Industrial Research (CSIR) (includes representatives from ministries, and 40 % from private sector)	<ul style="list-style-type: none"> - Implementation of government policies on scientific research and development - Research programmes cover human and animal epidemiology, including infectious diseases, health policy and nutrition 	Active	(16, 22, 42) (10)
Networks and research consortiums			
African Health Economics and Policy Association (AfHEA)	<ul style="list-style-type: none"> - Promotion and strengthening of the use of health economics and health policy analysis 	Active	(43)
African Evidence Network	<ul style="list-style-type: none"> - Network of researchers, practitioners, and policymakers promoting evidence production and use in decision making in Africa. Focuses on education, health and technology. - Resources 	Active	(14(20, 44)
<p>Building Capacity to Use Research Evidence (BCURE)</p> <p>VakaYiko was included in BCURE. Partner in VakaYiko: Ghana Information Network for Knowledge Sharing (GINKS), Zimbabwe Evidence Informed Policy Making Network (ZEIPNET), Human Sciences Research Council (HSRC), Overseas Development Institute (ODI) and International Network for the Availability of Scientific Publications (INASP).</p>	<ul style="list-style-type: none"> - VakaYiko programme was part of BCURE. Based in Ghana and built capacity for evidence informed decision-making 	Inactive 2013– 2016	(21, 45, 46)
Campbell Collaboration	<ul style="list-style-type: none"> - Contributed to a workshop on May 2019: The University of Ghana, School of Public Health, organised an international workshop titled: Evidence Synthesis for Advancing Innovative, Evidence-Informed, Demand-Driven and Policy-Relevant Research for Strengthening Health Systems and Improving Patient Outcomes in Africa 	Active	(47, 48)

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
<p>Cochrane Nutrition Field South Africa</p> <p>Partners: Cochrane South Africa (SA), the South African Medical Research Council, and the Centre for Evidence-based Health Care (CEBHC), Stellenbosch University, along with international partners</p>	<ul style="list-style-type: none"> - Cochrane Nutrition Field is based in South Africa and seeks to increase coverage, quality and relevance of Cochrane nutrition reviews 	Active	(21, 49)
<p>Ghana Essential Health Intervention Project (GEHIP)</p> <p>Partners: Columbia University Mailman School of Public Health, Ghana's Navrongo Health Research Centre, Ghana Health Service, and the University of Ghana</p>	<ul style="list-style-type: none"> - Assessment of the strengthening of Community-based Health Planning and Services in Reproductive, Maternal, Newborn and Child Health 	Inactive	(13, 50)
<p>Supporting the Use of Research Evidence (SURE) (European Commission's 7th Framework Programme)</p> <p>Several partners: universities, research institutes and MoHs</p>	<ul style="list-style-type: none"> • A collaborative project to strengthen evidence-based decision making in Africa <ul style="list-style-type: none"> - Repository of tools to improve the use of research evidence to inform health policy decisions across different contexts in low and middle-income countries 	Inactive 2009– 2014	(21, 51)
<p>Strengthening Capacity for Evidence Use in Health Policy (SECURE Health)</p> <p>Partners: FHI 360, the East, Central and Southern Africa Health Community (ECSA-HC), the Consortium for National Health Research (CNHR-Kenya), the College of Medicine at the University of Malawi, and UK's Parliamentary Office of Science and Technology (POST)</p>	<ul style="list-style-type: none"> - Optimise individual and institutional capacity of health policymakers and legislators in accessing and utilising health research evidence in decision-making in Kenya and Malawi. 	Inactive 2013– 2017	(21, 52)
<p>INDEPTH Network</p> <p>Several partners. In Ghana: Kintampo HDSS Dodowa HDSS Navrongo HDSS</p>	<ul style="list-style-type: none"> - Network of health and demographic surveillance systems (HDSSs) that provide a more complete picture of the health status of communities. Since they collect data from whole communities over extended time periods, they more accurately reflect health and population problems in low- and middle-income countries (LMICs). 		(53)

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
	The HDSSs increasingly link population and health facility data to implement the new Comprehensive Health and Epidemiological Surveillance System (CHESS).		
International donors (technical & funder, or funder only)			
<p>iDSI</p> <p>Technical work (evidence-informed decision-making) and funder</p> <p>Several partners. Active in Ghana: Imperial College – Global Health and Development Group (formerly NICE International), and Norwegian Institute of Public Health</p>	<ul style="list-style-type: none"> - Supporting HTA institutionalization 	Active	(54)
<p>Norwegian Institute of Public Health (NIPH) – member of iDSI</p> <p>Technical work (evidence-informed decision-making) and funder</p>	<ul style="list-style-type: none"> - Supporting HTA institutionalization 	Active	(55)
<p>Program for Appropriate Technology in Health (PATH)/ADP</p> <p>Technical work (evidence-informed decision-making) and funder</p>	<ul style="list-style-type: none"> - HTA institutionalisation - Supported HPV vaccine introduction in Ghana (collaboration with GAVI). 	Active	(56, 57)
<p>Global Financing Facility (GFF) (under the World Bank group)</p> <p>Funder</p> <p>Several partners – domestic government resources, financing from the International Development Association (IDA) and the International Bank of</p>	<ul style="list-style-type: none"> - Supporting the implementation of a roadmap for universal health coverage (UHC) through the development of a Prioritized Operational Plan and Costing (POP-C) that serves as Ghana’s investment case. The GFF process will enhance targeting and efficiency of resources to support the government’s UHC agenda. 	Active	(58)

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
Reconstruction and Development (IBRD), aligned external financing, and private sector resources			
Results for Development (R4D) Technical work (evidence-informed decision-making) and funder Several partners	<ul style="list-style-type: none"> - Systems strengthening to support sustainable progress in health, education and nutrition. Has had several projects in Ghana. 	Active	(59)
Strategic Purchasing Africa (SPARC) (under R4D) Technical work (evidence-informed decision-making) and funder Several partners	<ul style="list-style-type: none"> - Initiative aimed at strengthening strategic health purchasing in sub-Saharan Africa. 	Active	(60)
USAID Funder	<ul style="list-style-type: none"> • USAID supports the strengthening of Ghana’s health system by: • Improved policy and providing assistance in leadership development, as well as through financial and management support systems at decentralized levels of the Ghana health sector • provides oversight to ensure a high quality of care at all levels of the health system. <ul style="list-style-type: none"> - supporting the continued strengthening of the National Health Insurance Scheme 	Active	(61)
Multilateral organisation			
World Health Organization (WHO) WHO Africa Regional Office (WHO/AFRO) WHO Ghana Country office	<ul style="list-style-type: none"> - Global normative body related to evidence - Manage the essential medicines list adaptations and related update of standard treatment guidelines. - WHO Africa Regional Office (WHO/AFRO) has implemented an African Health Observatory and real-time Strategic Information System, which is operational 	Active	(62)

Name and partners (if applicable)	Contribution to evidence-based decision making/HTA in Ghana (or wider Africa/LMICs)	Status	Reference
	<p>since 2011. One role of the observatory is to compile health-related data and information (including demographic data- civil status, etc.) in one unique centre, and to develop evidence ready to be used for each strategic decision in health.</p>		

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