An approach for setting evidence-based and stakeholder-informed research priorities in low- and middle-income countries

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Abstract To derive evidence-based and stakeholder-informed research priorities for implementation in African settings, the international research consortium Collaboration for Evidence-Based Healthcare and Public Health in Africa (CEBHA+) developed and applied a pragmatic approach. First, an online survey and face-to-face consultation between CEBHA+ partners and policy-makers generated priority research areas. Second, evidence maps for these priority research areas identified gaps and related priority research questions. Finally, study protocols were developed for inclusion within a grant proposal. Policy and practice representatives were involved throughout the process. Tuberculosis, diabetes, hypertension and road traffic injuries were selected as priority research areas. Evidence maps covered screening and models of care for diabetes and hypertension, population-level prevention of diabetes and hypertension and their risk factors, and prevention and management of road traffic injuries. Analysis of these maps yielded three priority research questions on hypertension and diabetes and one on road traffic injuries. The four resulting study protocols employ a broad range of primary and secondary research methods; a fifth promotes an integrated methodological approach across all research activities. The CEBHA+ approach, in particular evidence mapping, helped to formulate research questions and study protocols that would be owned by African partners, fill gaps in the evidence base, address policy and practice needs and be feasible given the existing research infrastructure and expertise. The consortium believes that the continuous involvement of decision-makers throughout the research process is an important means of ensuring that studies are relevant to the African context and that findings are rapidly implemented.

Evidence-based approaches to address health problems are recognized as best practice. Evidence-based public health draws on the principles of evidence-based health care and is defined as the “integration of the best available evidence with the knowledge and considered judgments from stakeholders and experts to benefit the needs of a population”.

When allocating resources, policy-makers and health-care practitioners need to consider the significance of the health problem; the potential benefits and harms of the intervention and the quality of evidence on effectiveness. The cost and cost–effectiveness must also be weighed up, along with personal values and preferences, feasibility, acceptability and equity. To achieve evidence-based decision-making, data from rigorous primary research and evidence syntheses relevant to the African context must expand and translation of evidence into policy and practice must be enhanced.

The Collaboration for Evidence-Based Healthcare and Public Health in Africa (CEBHA+) emerged from the Collaboration for Evidence Based Healthcare in Africa (www.cebha.org). CEBHA+ promotes evidence-based health care principles through (i) identifying relevant and context-sensitive research priorities; (ii) conducting robust, internationally competitive research; and (iii) linking primary research with evidence synthesis, implementation research, policy and practice.

Currently, the consortium comprises eight African partners in five countries (Ethiopia, Malawi, Rwanda, South Africa and Uganda), two German partners and two associate part-

Introduction

Mortality in sub-Saharan Africa is still predominantly caused by human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), malaria and other infectious diseases. However, premature deaths due to noncommunicable diseases and unintentional injuries are increasing. Furthermore, Africa is facing significant challenges in the provision of preventative and curative health care. This is the result of a combination of factors – including insufficient human resources, poor health system infrastructure, limited supplies of essential medication and technology and suboptimal health-care seeking.

While there has been a significant increase in health research conducted in the region in recent years, the overall research has not been commensurate with the challenges in terms of quantity or quality. Much of the research undertaken is less informative than it should be, often because of a mismatch between research required by decision-makers and that conducted by academic institutions. In some instances, the research agenda is driven by funders (including industry) and thus concerned with international rather than national or local problems. Furthermore, usability of findings tends to be hampered by limitations in quality of conduct, analysis and reporting of studies. Thus there is a need in the research field “to increase value and to reduce waste”, especially in resource-constrained settings such as Africa.

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Developing research priorities

We followed a three-step participatory process. Representatives of the policy and practice community were involved throughout, as continuous interaction can help identify challenges in need of solutions and increase the chances of research findings being translated into policy.

**Step 1**

Through an online survey and face-to-face consultations we developed a list of priority research areas. To do so, we carried out an online survey with all African partners and African policymakers in the participating countries, with the latter selected to reflect existing interactions between research and practice in each country. Both groups were asked to complete the survey from an institutional perspective, having consulted with colleagues through individual interactions or round table discussions.

The survey aimed to assess potential priority research areas drawing on the international evidence base as well as the expertise and interests of participating institutions. It was structured in four sections: (i) priority diseases, drawing on but not limited to the 25 most important diseases in sub-Saharan Africa based on estimated disability-adjusted life years (DALYs); (ii) the 25 most important risk factors in sub-Saharan Africa also based on estimated DALYS; (iii) priority interventions against diseases and risk factors; and (iv) ongoing projects by partners. We obtained a waiver from the Ethics Committee of the LMU Munich, Germany, given the low-risk nature of the survey. All data were handled anonymously. The survey was conducted in March and early April 2014 using Survey Monkey (https://www.surveymonkey.com/). Survey data were analysed descriptively.

An initial shortlist of priority research areas derived from the online survey provided the starting point for face-to-face consultations during a three-day meeting in Addis Ababa, Ethiopia, in April 2014. Participants included one or more representatives of all partners and high-level health policy-makers from Rwanda, South Africa and Uganda. A two-stage interactive group process was followed to achieve consensus, with participants from a given country initially selecting their first choice, a subsequent grouping of priority research areas and in-depth discussions regarding those selected by at least three countries. With reference to existing checklists,15-16 participants were asked to consider four criteria in prioritizing: (i) magnitude or seriousness of the health problem; (ii) research and other strengths of the consortium in the respective area; (iii) requirements by the funder and related strategic advantages and/or disadvantages; and (iv) feasibility of achieving meaningful results given available resources and timelines.

**Step 2**

Through evidence maps, we identified priority research questions that would fill a gap in the African evidence base. These evidence maps provided an overview of the existing evidence for the priority research areas from step 1. Expanding on previous work,17 we developed methodological guidance comprising seven steps: developing a framework, formulating a clear question, defining criteria for inclusion of studies, conducting systematic searches, selecting studies for inclusion, extracting data and presenting results (Table 1). Importantly, evidence maps focused on systematic reviews. Depending on the question and resources permitting, primary studies and/or guidelines were also considered.

Subsequently, we identified gaps in the evidence base and formulated research questions to fill these gaps. This involved discussion between researchers and decision-makers at the national or provincial level to ensure that the research to be conducted would be able to answer a policy-relevant question and to decide on the most appropriate way to do so. In addition, researchers involved in relevant activities were consulted to check that priority research questions would build on existing research and not duplicate current research by other groups. Between June and October 2014, evidence maps were created by cross-national research teams with methodological support from the LMU Munich.

**Step 3**

We developed study protocols towards a full grant proposal. The cross-national research teams engaged with policymakers to jointly develop protocols using email, voice calls and a two-day face-to-face meeting. Depending on the specific content and methodological expertise required, we involved additional scientists within partner institutions or recruited additional partner institutions. Study protocols were developed between September and December 2014.

**Identified research priorities**

**Priority research areas**

The online survey was completed by seven out of eight partner institutions in six countries (Burundi, Ethiopia, Malawi, Rwanda, South Africa and Uganda) and by policy-makers in Malawi, Rwanda, South Africa and Uganda.

Both partners and decision-makers identified infectious diseases and non-communicable diseases as the two most important problems but differed in their ranking of mental health, environmental health and unintentional injuries. At least three countries selected malaria, HIV/AIDS, lower respiratory tract infections, diarrhoeal diseases, protein-energy malnutrition, road traffic injuries, tuberculosis, maternal disorders and diabetes as priority problems for CEBHA+ (Fig. 1). At least three countries listed childhood overweight, suboptimal breastfeeding, high blood pressure, dietary risks, sanitation, high-fasting plasma glucose, unimproved water and physical inactivity as priority risk factors (Fig. 1). They prioritized population-level (i.e. primary prevention, secondary prevention, health systems and health policy interventions) over individual-level interventions (i.e. individual-level health care and tertiary prevention).
| Step | Description | Example |
|------|-------------|---------|
| 1. Developing a framework | Describe broad research area and/or use logic model to illustrate framework, using published logic model templates | Comprehensive models of care for diabetes and hypertension |
| 2. Formulating a clear question | Formulate broad question using the PICO format | What are the effects of comprehensive service delivery models for management of chronic diseases (with a focus on diabetes and hypertension) in adults, across the whole spectrum of prevention, early diagnosis and treatment? |
| 3. Defining criteria for inclusion of studies | Develop criteria related to population, intervention/indicator and study designs | Participants: Adults (> 18 years), excluding pregnant women. Interventions: Any comprehensive model of service delivery or model of care, addressing prevention, early diagnosis or treatment of diabetes and/or hypertension, or a combination of these. Studies: systematic reviews, defined as those that had predetermined objectives, predetermined criteria for eligibility, searched at least two data sources, of which one was an electronic database, and performed data extraction and risk of bias assessment. We also considered randomized controlled trials in case of finding a limited number of systematic reviews. |
| 4. Conducting systematic searches | Pre-specify a search strategy focusing on population and intervention. Search for published and unpublished systematic reviews in the following systematic review and health research databases: Cochrane database (www.cochranelibrary.com), Health Evidence (www.healthevidence.org), EPPI Centre database (http://eppi.ioe.ac.uk/cms), 3ie database (www.3ieimpact.org/evidence/), Prospero (ongoing systematic reviews) (www.crd.york.ac.uk/PROSPERO), PubMed (www.ncbi.nlm.nih.gov/pubmed), Embase (www.elsevier.com/online-tools/embase), AfricaBib databases (in particular Africana Periodical Literature and African Women) (www.africabib.org), WHO’s Global Health Library (www.globalhealthlibrary.net), TRIP database (www.tripdatabase.com). Consider searching other relevant databases, as needed. Time and resources permitting, subsequently conduct searches for primary studies and/or guidelines, with the most important guideline databases being GIN database (www.g-i-n.net/library/international-guidelines-library), National guideline clearinghouse (USA) (www.guideline.gov). | A combination of search terms related to delivery of health care, diabetes, hypertension and systematic reviews was used and the search string adapted to each database. Specific search strategies are reported for each database. |
| 5. Selecting studies for inclusion | Select studies for inclusion by first screening titles and abstracts for potentially eligible studies. Conduct full text screening of potentially eligible studies. | One author screened all the titles and abstracts of the search outputs to discard the citations that were not relevant to the question. Both authors then did a second round of screening to identify potentially eligible studies. Full text screening of seemingly relevant studies was done by two authors independently. |
| 6. Extracting data | Pre-specify data extraction form, which should include citation details, characteristics of the systematic review, primary study or guideline, characteristics of the population, intervention and comparisons, primary and secondary outcomes and quantitative or qualitative results. Extract relevant data onto data extraction form. | One author extracted data of the included systematic reviews onto a form containing: Study ID and citation; Included study designs; Geographical details; Number of included studies and participants; Characteristics of populations; Characteristics of interventions and comparisons; Reported outcomes; Main results. |
Following face-to-face consultation on these findings, partners selected tuberculosis, diabetes, hypertension and road traffic injuries as the priority research areas to focus on within the consortium. Despite their importance in terms of disease burden, mental health and environmental health topics were not selected, primarily because of insufficient expertise within the consortium to undertake high-quality research. There was consensus that all research activities required a population and/or health systems perspective and that each research activity would need to be taken forward jointly by at least three partner institutions. It was agreed that the research should be led and owned by African partners rather than by European collaborators or funding bodies.

**Priority research questions**

Two evidence maps on diabetes and hypertension and one on road traffic injuries were developed; an evidence map on tuberculosis–HIV was initiated but not completed.

**Evidence map 1**

We reviewed the effects of comprehensive service delivery models for the management of diabetes and hypertension in adults across the whole spectrum of prevention, early diagnosis and treatment. Eligible outcomes were incidence of diabetes and hypertension, adherence to care, number and severity of complications, avoidable hospital admissions and mortality. Searches retrieved 5516 records, with 55 full texts screened. Twenty-four articles were included, reporting on 16 systematic reviews. These addressed interventions delivered by pharmacists (four reviews), interventions delivered by nurses, community health workers and other non-physician health-care workers (three reviews), screening interventions (three reviews), disease and care management interventions (two reviews), health system and organization of care interventions (two reviews) and multifaceted interventions (e.g. combining educational, provider roles, organizational interventions; two reviews). No systematic review addressed integrated models of care for diabetes or hypertension. Most systematic reviews included studies in high-income settings, with only two systematic reviews focusing on studies in low- and middle-income countries. Based on the identified evidence gaps, we formulated questions on the effectiveness of screening approaches and integrated models of care for diabetes and hypertension in sub-Saharan Africa.

**Evidence map 2**

We reviewed the effects of population-level interventions for preventing diabetes and hypertension. Eligible interventions comprised policies, regulations and environmental changes addressing risk factors for diabetes and hypertension, such as unhealthy diets and excessive body weight. We considered outcomes related to process (e.g. coverage), behaviour (e.g. physical activity, nutritional intake) and health (e.g. cardiovascular morbidity and mortality). Due to time constraints, only 2976 of 5528 records identified through searches were screened, with 82 full texts assessed and 14 systematic reviews included. These covered workplace (three reviews), school (five reviews) and community or population-based interventions (six reviews). Most reviews focused on evidence from high-income settings, reporting on widely differing types of interventions and outcomes; many did not report synthesized results. Based on the analysis of the existing evidence, a question on the effectiveness of population-level interventions to prevent diabetes and hypertension in sub-Saharan Africa was formulated.

**Evidence map 3**

We reviewed the effects of interventions for the prevention and response to road traffic injuries addressing road users, vehicles, physical road environments and legislation or care protocols. Outcomes of interest were hospital admissions and mortality attributable to road traffic injuries. Both systematic reviews and randomized controlled trials were considered. Systematic searches retrieved 968 records, yielding 15 eligible studies. Using the reference lists of included studies, an additional 11 eligible records were retrieved, yielding a total of 26 studies. Most concentrated on the...
effectiveness of interventions to reduce the occurrence of road traffic crashes, i.e. education and training, licencing, alcohol restriction and enforcement of alcohol limits, visibility enhancement for road users, street lighting and visibility aids, enforcement of speed limits, bicycle helmet and booster seat legislation. Only two studies were concerned with the response by ambulance and hospital staff after the crash. Except for South Africa, the systematic reviews only included data from high-income countries; randomized controlled trials were all from high-income countries. Thus a need to strengthen the evidence base regarding the implementation of road traffic injury prevention in sub-Saharan Africa was recognized.

**Study protocols**

Four study protocols were developed to address identified priority research questions; a fifth promoted a rigorous methodological approach across all research activities: (i) evidence-informed policies and practices on integrated models of health care delivery for hypertension and diabetes in sub-Saharan Africa (Ethiopia, Malawi, Rwanda, South Africa); (ii) evidence-informed policies and practices on integrated models of health care delivery for hypertension and diabetes in sub-Saharan Africa (Ethiopia, Malawi, Rwanda, South Africa); (iii) evidence-informed policies and practices on population-level interventions to prevent diabetes and hypertension in sub-Saharan Africa (Ethiopia, Malawi, Rwanda, South Africa); (iv) improved implementation of road traffic injury prevention interventions in sub-Saharan Africa (Rwanda, South Africa, Uganda); and (v) promotion of an integrated, rigorous methodological approach across research tasks and components (all five countries).

Each protocol represents a full research package, where different sub-questions are addressed using a range of methods, including situation analysis, diagnostic studies, observational epidemiology, intervention effectiveness, qualitative research and process evaluation, as well as systematic reviews, overviews of systematic reviews, guidelines and evidence-informed policy briefs. As shown in Fig. 2, all five protocols are embedded within the CEBHA+ research and implementation framework that intends to link primary research, evidence synthesis and implementation with policy and practice. The protocols are complemented by and integrated with activities on capacity-building and networking aiming to develop knowledge and skills, long-term infrastructure and research-to-policy collaborations.

**Discussion**

To identify priority research areas and questions relevant for the African context, we developed and applied a structured participatory approach. This approach connects the international evidence base with the needs of policymakers and the expertise and interests of researchers. Major evidence gaps and research needs were highlighted regarding prevention and integrated treatment of hypertension and diabetes and prevention of road traffic injuries in...
sub-Saharan Africa. Five study protocols—four on priority research questions and one on accompanying methods—were developed and included in a grant proposal for a five-year implementation phase between 2016 and 2020, which the German Federal Ministry of Education and Research has decided to fund.20 Notably, this pragmatic approach for deriving research priorities for an international research consortium can be applied rapidly, even in low- and middle-income settings.

**Strengths and limitations**

Health research priority-setting is conducted to identify research with the greatest potential health and societal benefits. A general framework for setting priorities in health research does not exist.18,21,22 To date such undertakings are very heterogeneous in terms of scope and target audience as well as methods employed. Indeed, the optimal approach depends on the needs of a given exercise,23 with methods selected based on context, time and resource constraints.24

A major strength of our approach is that it is grounded in evidence, both as a starting point for the initial list of priority research areas in step 1 and as a means of identifying specific research questions in step 2. Evidence maps as a means of assessing the evidence base in a relatively quick way are the most novel feature of the approach. A comprehensive assessment of the current evidence base is often lacking in research priority-setting exercises, with these usually making use of simple literature reviews or expert consultation.18,20

The product of evidence mapping is, however, not necessarily comprehensive, especially where searches are limited to systematic reviews. Indeed, for several of the priority research questions CEBHA+ partners thought it was necessary to conduct a more comprehensive and thorough but more time-consuming overview of systematic reviews or to undertake systematic reviews of sub-questions as part of the full proposal. Evidence maps can be developed more rapidly than systematic reviews. Nevertheless, the process tends to take two to three months and requires a dedicated research team with expertise in undertaking searches, screening records and extracting and interpreting data. Due to limited time and lack of personnel, there was incomplete screening of the search results for the evidence maps on population-level interventions to prevent diabetes and hypertension. Also, a fourth evidence map on the implementation of tuberculosis-HIV interventions was initiated but not completed; consequently, no research task was developed for infectious diseases.

Our guide to evidence maps could be adapted to derive research priorities for different audiences and purposes in the African setting and beyond. It could be applied to any area of health research at any level, whether local, national, regional or international. We learnt, however, that it cannot be taken for granted that this guide is self-explanatory; instead, its rigorous application requires specific, ideally hands-on, training.

We employed a combination of metric- and consensus-based approaches to derive priority research areas. A weakness of our approach is that, due to time and resource constraints, we did not utilize a formal method for building consensus, such as a Delphi or nominal group technique. In view of the purpose of our exercise, i.e. for an international research consortium to develop a joint grant proposal, the selection of priority research questions was based on analysis of the evidence maps and discussion with decision-makers. Planning for implementation is inherent in our approach.15 Very few priority-setting exercises systematically assess whether the research priorities generated have any impact.20 While we will only be able to evaluate impact on research and policy and practice in a few years’ time, the fact that our proposal secured a large grant can be considered an intermediate indicator of success.

There was continuous involvement of relevant decision-makers throughout the research process from identification of the question and proposal development through to study conduct, publication and use of results. This was necessary to develop research questions that would address policy and practice needs and that would be achievable given existing resources. This involvement should facilitate a more rapid uptake of research results in policy and practice, although whether this is achieved will need to be evaluated carefully. Involving a broad range of stakeholders is considered an important feature of valid research priority-setting.20,22,23 Partners felt strongly that research must be owned by African partners, and that having Africans choose their own research priorities is an important means to achieve this goal.

**Conclusion**

The pragmatic approach outlined here facilitates research that is unique, relevant, context-sensitive, feasible and of high-quality in the context of an international research consortium. Our approach to setting evidence-based and stakeholder-informed research priorities emerged as a useful method of strengthening research collaboration within and across continents. Partners from high-income countries primarily contributed methodological expertise; members of the cross-national research teams complemented one another in terms of content, context and methodological expertise and resources as well as research infrastructure. During the implementation phase, we will expand on this collaboration in an effort to build long-term capacity and infrastructure for evidence-based health care and public health in sub-Saharan Africa.
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Abstract
A methodological approach to setting research priorities

Determining priorities for evidence-based practice and policy in low- and middle-income countries is an integral part of the World Health Organization’s strategy to support countries in developing their evidence-based health systems. In this paper, we describe a methodological approach to setting research priorities that was developed by the CEBHA+ project in Africa. The approach involved a collaboration between researchers, policymakers, and practitioners to identify gaps in the evidence base and to develop research priorities that are relevant to the African context. The approach was used to identify research priorities in the areas of tuberculosis, diabetes, hypertension, and road traffic injuries. The research priorities were then used to develop research protocols that were incorporated into grant proposals. The approach was designed to ensure that research is relevant to the African context and that it can be implemented within the existing research infrastructure and capacity. The approach was found to be effective in identifying research priorities that are relevant to the African context and that can be implemented within the existing research infrastructure and capacity. The approach was designed to ensure that research is relevant to the African context and that it can be implemented within the existing research infrastructure and capacity. The approach was found to be effective in identifying research priorities that are relevant to the African context and that can be implemented within the existing research infrastructure and capacity.
Para obtener las prioridades de investigación documentadas y comunicadas a las partes interesadas en países con ingresos bajos y medios

Por medio de un enfoque pragmático, se definieron las prioridades de investigación documentadas y comunicadas a la práctica en los países de ingresos bajos y medios. Al tomar en cuenta la importancia de la colaboración y el intercambio de conocimientos, se crearon protocolos de investigación que fueron aplicados en diferentes contextos, con el objetivo de identificar los principales problemas de salud en la región. Los protocolos de investigación fueron desarrollados por consorcios internacionales, como el CEBHA+ (Collaboration for Evidence-Based Health Care and Public Health in Africa), que se encargó de la coordinación y el seguimiento de los estudios. Los resultados obtenidos permitieron establecer las áreas de investigación prioritarias, así como las estrategias de intervención necesarias para abordar los problemas de salud en los países en desarrollo.
investigación prioritarios identificaron disparidades y asuntos relativos a la investigación prioritaria. Por último, se desarrollaron protocolos de estudio para incluirlos dentro de una propuesta de subvención. Los representantes políticos y prácticos participaron durante todo el proceso. Los sectores de investigación prioritarios seleccionados fueron la tuberculosis, la diabetes, la hipertensión y los traumatismos provocados por accidentes de tráfico. Los mapas documentados abordaron el examen y los modelos de asistencia de la diabetes y la hipertensión, la prevención de la diabetes y la hipertensión a nivel de población, sus factores de riesgo y la prevención y gestión de traumatismos provocados por accidentes de tráfico. Los análisis de estos mapas generaron tres asuntos de investigación de prioridades sobre hipertensión y diabetes y uno sobre traumatismos provocados por accidentes de tráfico. Los cuatro protocolos de estudio resultantes emplean una amplia gama de métodos de investigación primarios y secundarios; un quinto presenta un enfoque metodológico integrado a través de todas las actividades de investigación. El enfoque de la CEBHA+, concretamente los mapas documentados, contribuyó a formular cuestiones y protocolos de estudio sobre la investigación que pertenecerían a socios africanos, subsanarían diferencias en la base de pruebas, abordarían las necesidades sobre políticas y prácticas y serían viables gracias a la infraestructura y experiencia de investigación existentes. El consorcio considera que la constante implicación de los responsables de la toma de decisiones a lo largo del proceso de investigación es un medio importante para garantizar que los estudios se correspondan con el contexto africano y que los resultados se implementen con rapidez.

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