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Health research mentorship in low-income and middle-income countries: a global qualitative evidence synthesis of data from a crowdsourcing open call and scoping review

Eneyi E Kpokiri ,[1] Kamryn McDonald,[2] Yoseph Gebreyohannes Abraha,[3] Lyda Osorio,[4] Tilak Chandra Nath,[5,6] Victor A Talavera-Urdanivia ,[7] Olaoluwa Pheabian Akinwale ,[8] Yukari Carol Manabe,[9,10] Barbara Castelnuovo,[10] Weiming Tang ,[11,12] Daniel Yilma,[13] Michael Mihut,[14] Oliver Ezechi,[15] Juliet Iwelunmor,[16] Mirgissa Kaba,[17] Alemseged Abdissa,[18] Joseph D Tucker [1,2]

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EEK and KM contributed equally.

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For numbered affiliations see end of article.

Correspondence to
Dr Eneyi E Kpokiri;
eneyi.kpokiri@lshtm.ac.uk

ABSTRACT

Introduction Research mentorship is critical for advancing science, but there are few practical strategies for cultivating mentorship in health research resource-limited settings. WHO/TDR Global commissioned a group to develop a practical guide on research mentorship. This global qualitative evidence synthesis included data from a crowdsourcing open call and scoping review to identify and propose strategies to enhance research mentorship in low/middle-income country (LMIC) institutions.

Methods The crowdsourcing open call used methods recommended by WHO/TDR and solicited descriptions of strategies to enhance research mentorship in LMICs. The scoping review used the Cochrane Handbook and predefined the approach in a protocol. We extracted studies focused on enhancing health research mentorship in LMICs. Textual data describing research mentorship strategies from the open call and studies from the scoping review were coded into themes. The quality of evidence supporting themes was assessed using the Confidence in the Evidence from Reviews of Qualitative research approach.

Results The open call solicited 46 practical strategies and the scoping review identified 77 studies. We identified the following strategies to enhance research mentorship: recognising mentorship as an institutional responsibility that should be provided and expected from all team members (8 strategies, 15 studies; moderate confidence); leveraging existing research and training resources to enhance research mentorship (15 strategies, 49 studies; moderate confidence); digital tools to match mentors and mentees and sustain mentorship relations over time (14 strategies, 11 studies; low confidence); nurturing a culture of generosity so that people who receive mentorship then become mentors to others (7 strategies, 7 studies; low confidence); peer mentorship defined as informal and formal support from one researcher to another who is at a similar career stage (16 strategies, 12 studies; low confidence).

Interpretation Research mentorship is a collective institutional responsibility, and it can be strengthened in resource-limited institutions by leveraging already existing resources. The evidence from the crowdsourcing open call and scoping review informed a WHO/TDR practical guide. There is a need for more formal research mentorship programmes in LMIC institutions.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Mentorship is key to improving overall research impact and outcomes. Existing strategies have focused on improving mentor and mentee roles, predominantly in high-income settings.

⇒ Embedding research mentorship within institutions will enhance research impact and sustainability in the long term.

WHAT THIS STUDY ADDS

⇒ This global qualitative evidence synthesis highlights practical strategies through which low-income and middle-income country institutions can build and institutionalise research mentorship activities.

⇒ These include recognising research mentorship is a collective institutional responsibility to be provided by all involved and leveraging already existing resources.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings suggest that research mentorship programmes should be embedded within institutions and provided to all researchers for more impact.

⇒ There is a need for supportive policies and further research to implement the proposed strategies with monitoring and evaluation to sustain success.

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INTRODUCTION

Mentorship is fundamental to global health research.[1] Mentorship is often catalytic in launching individual research careers, building research teams at the group level and sustaining research institutions over time.[2] Although the individual and institutional pillars of research mentorship are widely recognised, there are fewer resources focused on enhancing research mentorship at the institutional level.[3] Institutions (eg, universities, research institutes and other groups) establish and shape mentorship expectations, programmes, incentives and policies.

Research mentorship tools have been mainly designed for high-income research institutions, neglecting low/middle-income countries (LMICs).[4] LMIC institutions may have different traditions, structures, cultures and capacities related to research mentorship.[5] Earlier research mentorship models for LMICs have focused on mentor and mentee roles. Specific toolkits and strategies are needed to enhance health research mentorship in LMICs. For example, LMIC institutions often have fewer training grants focused on building research mentorship, comparatively fewer senior mentors per mentee and less institutional support.[6 7] At the same time, there are many indigenous research mentorship strategies that suggest LMIC-centred approaches are feasible and effective.[2] This suggested an opportunity to identify practical strategies to enhance research mentorship at LMIC organisations.

In response, we organised a crowdsourcing open call and scoping review to identify strategies to enhance health research mentorship in LMICs. A crowdsourcing open call has a group of people to solve a problem and then implement selected solutions.[8] The open call and scoping review were commissioned by the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, TDR. TDR Global is a global group of scientists and experts passionate about building capacity for research on neglected infectious diseases.

The aim of this global qualitative evidence synthesis was to identify strategies to enhance health research mentorship in LMIC institutions and included data from the crowdsourcing open call and scoping review.

METHODS

We used a qualitative evidence synthesis approach with findings from a crowdsourcing open call and a scoping review to better understand research mentorship in LMIC organisations.

Crowdsourcing open call

The crowdsourcing open call on research mentorship was organised by Social Entrepreneurship to Spur Health (SESH), TDR Global and the Armauer Hansen Research Institute (AHRI). The open call was implemented using stages outlined in the TDR/SESH/Social Innovation in Health Initiative (SIHI) practical guide on crowdsourcing,[9 10] that included the following steps: (1) organised a multisectoral steering committee; (2) engaged the community to contribute; (3) independently evaluated submissions; (4) recognised finalist participants; and (5) refined ideas and implemented (develop practical guide) selected ideas (table 1). The open call was launched on 21 October 2021 and closed on 15 February 2022.

We organised a multisectoral steering committee from key stakeholders across diverse geographic regions. Steering committee members were recruited based

Table 1 Outline of the main steps of the crowdsourcing open call

Stages	Organised steering group	Engaged community to contribute	Evaluated submissions	Recognised finalists	Shared solutions and implemented
Details	Steering group convened online and included diverse individuals including advocates, researchers, leaders. Purpose was to develop strategies to enhance research mentorship	Global mentorship networks (TDR Global, AHRI, SESH) leverages to promote the open call	Prespecified criteria and judging rubric used among 12 independent judges. 60 total submissions and 46 were eligible	12 semi-finalists recognised and 3 finalists invited to in-person working group and designation*	Data from open call directly informed the development of a WHO/TDR practical guide on research mentorship in LMICs
Rationale	Increases potential for community engagement, leverages social networks	Participatory action research suggests the importance of robust community engagement. Monitor sufficiency of submissions†	Each judged evaluated no more than 20 submissions. This judging framework is internally consistent and externally valid	Standard principles from inducement prize contest theory inform prizes	Open access science principles underpin sharing, in addition to practical and ethical issues

Developed based on the TDR/Social Innovation in Health Initiative (SIHI)/SESH practical guide on Crowdsourcing in Health and Health Research and the SIHI Crowdsourcing Open Call guidelines.
*A designathon is a crowdsourced process that facilitates multi-disciplinary cooperation.
†We used social media analytics to access quantity of website viewers and preliminary quantitative analysis to assess the preliminary quality of the submissions.
AHRI, Armauer Hansen Research Institute; LMICs, low/middle-income countries; SESH, Social Entrepreneurship to Spur Health.

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on previous experience in research mentorship projects, their country of residence (prioritising LMIC researchers), and their previous experience with TDR Global. The 24-person steering committee members included public health experts (n=6), government leaders (n=5), training directors (n=5), social media and communications experts (n=4) and clinical physicians (n=5).

The open call was announced on the SESH website, social media channels and through partner organisation networks. Participants were invited to submit ideas for strategies that strengthened existing initiatives, established new mentorship programmes, and aimed to create and sustain strong cultures of research mentorship. The website included a translation widget to facilitate non-English speaker participation. The website included the purpose of the open call, background information, judging criteria, eligibility criteria, formatting details and deadlines. All participants were also asked to complete a brief online survey that gathered demographic data including age, gender, country of residence and education level.

The open call was promoted through digital networks (table 1) including social media (Twitter, Facebook and LinkedIn), email listservs and networks of collaborating organisations represented by the steering committee. We used real-time social media analytics, website visiting frequency and submissions received to assess regional engagement and re-direct promotion efforts. All promotional materials, social media cards, and emails were translated into Spanish and French.

A total of 12 independent judges rated each submission 1–10 scale (1 as low and 10 as high) in five categories: (1) clear description; (2) potential for enhancing research mentorship in LMICs; (3) innovation; (4) potential for transferability in diverse LMIC settings; (5) promotion of equity and fairness. In addition, each judge gave an overall score of 5–50. Judges with a conflict of interest recused themselves from reviewing that entry. Conflicts were defined as collaborating, coauthoring, helping, receiving, or providing monetary or other support, or anything that could be perceived as a conflict of interest. The non-English entries were evaluated for initial eligibility with the use of translation software and then were judged by those proficient in the language of the entry. An overall score that averaged the means for each of the five subcomponents (clear description, potential for enhancing research mentorship in LMICs, innovation, potential for transferability in diverse LMIC settings, promotion of equity and fairness) was calculated.

An overall score of greater than 35 (a threshold prespecified by the steering committee,) on the 5–50 scale received a commendation of excellence on behalf of TDR Global, SESH and AHRI. Five finalists were ultimately selected based on the judging criteria. The five open call finalists were invited to join a WHO/TDR virtual working group to contribute to the development of a WHO/TDR practical guide to institutionalise research mentorship in LMIC. Three finalists were also invited to attend a TDR Global/AHRI conference on research mentorship in Addis Ababa, Ethiopia on 23 June and 24 June 2022.

Scoping review

A concurrent scoping review was conducted according to the Joanna Briggs Institute proposed methodology and reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.[11] The purpose was to summarise available practices, lessons and gaps/needs of health-related research mentorship programmes in LMICs. Keyword search was conducted in PubMed, EMBASE, Cochrane Database of Systematic Reviews, JBI Evidence Synthesis, EBSCO, SciELO (Scientific Electronic Library Online) and AJOL (African Journals Online). Grey literature was also searched using included ProQuest Dissertations and Theses, Google Scholar, and institutional websites (National Institute of Health) (online supplemental appendix 1). The search results were screened using a predefined set of inclusion and exclusion criteria, and eligible articles for inclusion in the review were collated for data extraction. Inclusion criteria were focused on quantitative, qualitative and mixed methods studies on both formal and informal health research mentorship programmes in LMIC as defined by the World Bank.[12] Studies on mentorship of non-research health activities (eg, clinical and administrative) were excluded (online supplemental appendix 2).

Data analysis

From the open call submissions, we received both quantitative data and qualitative data and we used a parallel mixed methods approach to analyse and present the data.[13] The quantitative data, included the participants demographics and submission characteristics. These data were analysed and presented using basic descriptive frequencies. Quality of studies contributing to the review findings was assessed using the Critical Appraisal Skills Programme (online supplemental appendix 3). The data included articles and the content of the submissions were mostly textual qualitative data, and this was analysed thematically using the framework approach including familiarisation with the data, coding, charting and mapping out themes for interpretation.[14 15] The themes identified from the open call were further strengthened with findings from the scoping review (figure 1). To ensure validity and reliability in presenting findings, the eligible submissions and included articles were coded separately by two independent reviewers (EEK and KM) and discrepancies were reviewed by a third team member (JDT). We used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to assess confidence in the certainty of the review findings.[16] This includes an assessment based on methodological rigour, coherence of the review finding, adequacy of the data and relevance of the included

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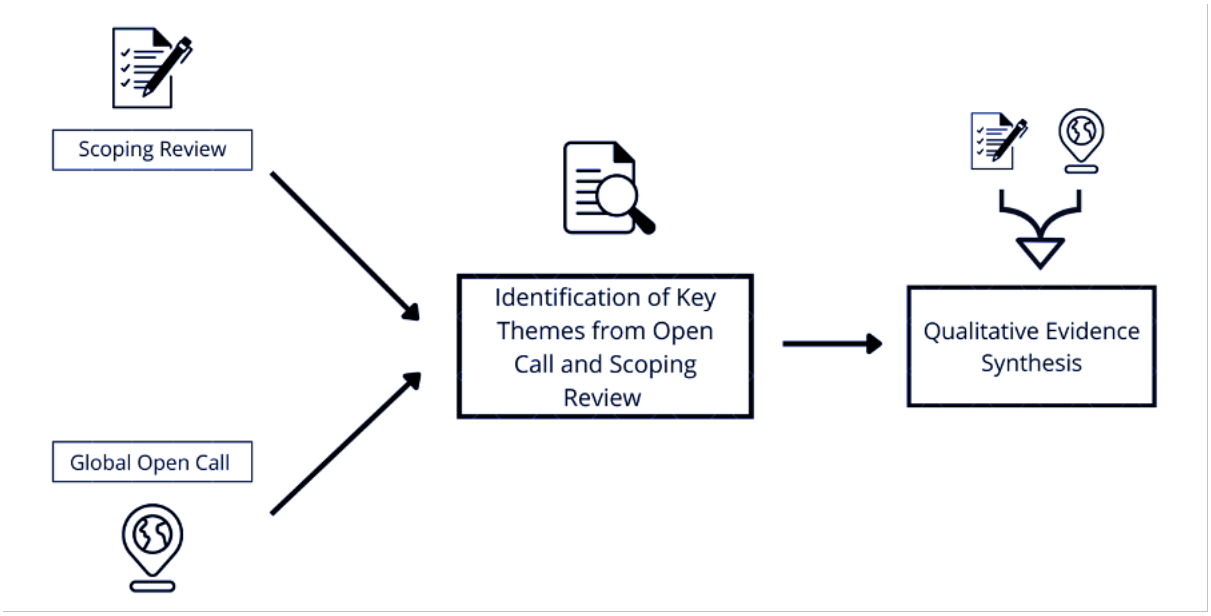

Figure 1 Stages in the identification of key themes.

studies to the review question.[16–21] Each of these components was assessed and made into an overall judgement on the confidence in each review finding (very low, low, moderate, high).

Patient and public involvement

This study was carried out as a crowdsourcing open call for ideas and a scoping review. No patients were involved. The scoping review used publicly available research on research mentorship. Our crowdsourcing open call solicited ideas for institutionalising researcher mentorship. A practical guide was developed by the same authors with the findings for mentorship in health research.[22] This guide is open access and available online, to the public and provides practical advice for research mentorship practice in LMICs.

RESULTS

The open call received a total of 60 submissions and 46 submissions were eligible for judging. Twelve submissions met the prespecified criteria for excellence (figure 2).

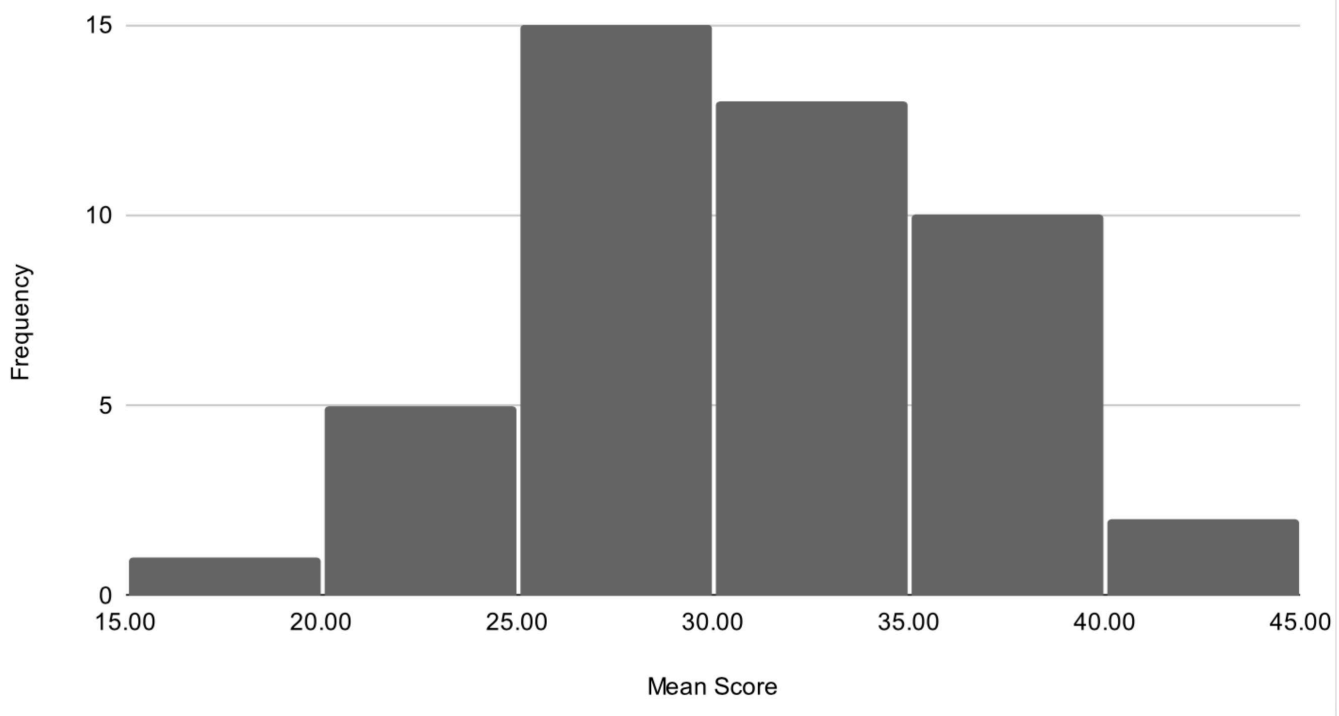

Figure 2 Distribution of mean scores on a 5–50 scale.

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Table 2 Characteristics of global research mentorship open call participants

Characteristics	All eligible participants (N=46)
Region	
Europe	2
Latin America	6
South Asia	2
Sub-Saharan Africa	29
East Africa	4
Middle East and North Africa	1
North America	2
Country economic status	
HIC	4
MIC	18
LIC	24
Gender	
Male	26
Female	20
Degree	
High school diploma	3
Bachelor's degree	7
Masters similar professional degree	13
Doctoral degree	23
Age	
18–27 years old	7
28–37 years old	16
38–47 years old	16
48 years old or older	7

HIC, high-income country; LIC, low-income country; MIC, middle-income country.

Submission characteristics and participant demographics

We received submissions from a total of 33 different countries including 24 submissions from low-income countries, 18 submissions from middle-income countries and 4 submissions from high-income countries. Top countries include Nigeria (10 submissions), Ethiopia (6 submissions) and Malawi (3 submissions) (online supplemental appendix 4). Of the eligible submissions, 40 were in English language and six were submitted in Spanish. We had submissions from 26 male and 20 female participants, most of them between 28 and 47 years of age (32 vs 14 participants), and with a doctoral or professional degree (36 vs 14 participants) (table 2).

Strategies to enhance mentorship

Themes identified from the analysis of the open call submissions have been broadly categorised into strategies that can enhance research mentorship within LMIC institutions. A total of 10 themes were identified from the results. The working group met and examined the evidence supporting each theme and five of these were prioritised as key. Key findings include recognising mentorship as an institutional responsibility, leveraging existing research and training resources, digital tools to kickstart and sustain mentorship relations over time, nurturing a culture of generosity and peer mentorship (figure 3).

Mentorship as an institutional responsibility

Eight strategies and 15 studies[23–37] identified research mentorship as an institutional and collective responsibility which should be expected from and provided by all team members. To support this, some submissions highlighted the development of a quick reference guide or policies to ensure that everyone is engaged in mentorship (five submissions). Specific strategies to ensure institution-wide coverage include building research mentorship training into routine onboarding procedures, requiring research ethics committees to consider mentorship as part of the review criteria and requiring grant applications to support research mentorship.

Digital tools to support mentorship

A total of 14 strategies and 11 studies[31 35 38–46] demonstrated that digital tools enhanced research mentorship in LMICs. Digital tools including apps, websites and other web-based platforms to aid in mentor/mentee matching, communication, and to establish and sustain mentorship relationships over time (14 submissions). While some strategies required internet access and sufficient bandwidth, there were many low-tech solutions that would be relevant in resource-constrained settings. These included mobile instant text messaging apps, social media groups such as Facebook and WhatsApp. However, several studies mentioned that digital approaches may exacerbate inequalities (eight studies) and be less relevant in a large number of LMIC institutions with limited digital infrastructure.[47–54] Additional challenges with digital tools in LMICs include power cuts and constant interruptions to internet access.[55]

Leveraging existing research and training resources

Fifteen open call strategies and 49 studies[7 23 24 26–36 39 41 42 44 46 56–86] showed that leveraging existing research and training programmes facilitated research mentorship. Already existing training programmes with databases of staff, contacts/institutions that can be partnered with to network on mentorship and leverage other institution's resources is beneficial for facilitating sustainability research mentorship. Leveraging established relationships with other institutions to create inter-institutional mentor/mentee relationships (six submissions). Another example is the use of formal research project supervision with mentors acting as supervisors and mentees acting as researchers (seven submissions).

Culture of generosity

Seven open call strategies and seven studies[27 30 33–35 77 87] included in the review emphasised the need for a culture

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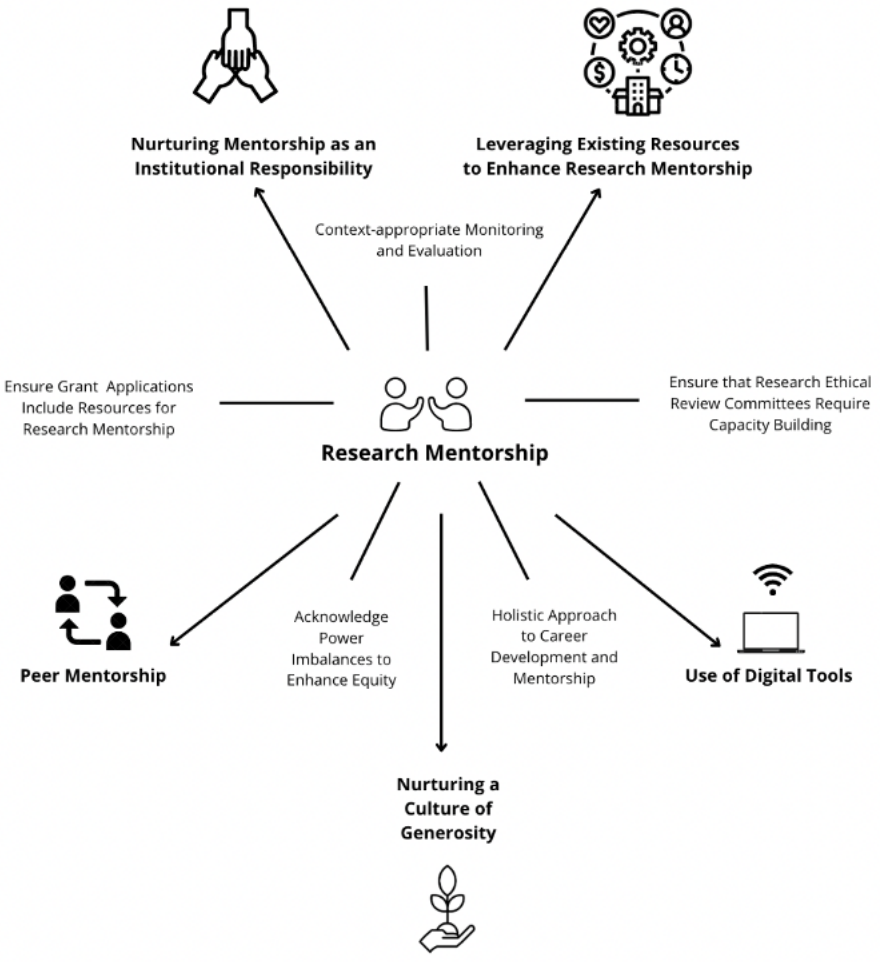

Figure 3 Overview of strategies to enhance research mentorship in low/middle-income countries (top five themes in bold).

of generosity and holistic approach in mentorship relationships. Mentors are to consider social life, be respectful of diversity and protect mentees from negative critics and racial/gender bias. This warm and inclusive culture of generosity is thought to facilitate and develop motivation in mentees to become future mentors. Mentorship should purposely cultivate a culture of cooperation rather than competition within mentor/mentee programmes (five submissions).

Peer and group mentoring

A total of 16 open call submissions and 12 studies[27 31 33–35 44 79 83 87–90] recognised the role of peer mentorship in enhancing research mentorship in LMIC settings. Peer mentorship is defined as informal and formal support from one researcher to another who is at a similar career stage. Introducing junior scientists and PhDs into mentoring early on to create a culture of mentorship that is sustainable over time (four submissions). Creation of a formal or organised mentorship club, group or other form of community to aid in creating lasting mentor/mentee relationships (14 submissions). However, two studies highlighted hesitancy and barriers in peer mentorship that include fear, embarrassment, lack of knowledge and awareness.[51 52]

A summary of these key findings, the contributions strategies and studies and assessment of the certainty of the evidence of the finding are presented in the GRADE CERQual table (table 3).

DISCUSSION

Our data provide evidence-based strategies to improve health research mentorship at LMIC institutions. Institutions need to recognise that research mentorship is a collective responsibility that should be expected and provided to all members. Promoting a culture of generosity increases the sense of collective responsibility for research mentorship. Ongoing research and training resources can be leveraged to spur research mentorship at the institutional level. This manuscript extends the literature[2] by centring evidence and strategies from LMIC researchers, including data from a global crowdsourcing open call, and assessing the strength of the evidence using the CERQual approach.

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Table 3 Evidence profile and assessment of confidence in the review findings as per GRADE-CERQual methodology

Study finding	Studies/strategies contributing to the finding	Methodological limitations	Coherence	Adequacy	Relevance	CERQual assessment
Institutional responsibility: Recognise research mentorship as an institutional and collective responsibility to be provided by and expected from all team members	OC=8 strategies SR=15 studies	Minor concerns	Minor concerns	Serious concerns	Minor concerns	Moderate confidence
Digital tools: Digital tools can enhance institutionalisation of research mentorship in LMICs by establishing and sustaining mentorship relationship over time	OC=14 strategies SR=11 studies	Moderate concerns	Moderate concerns	Serious Concerns	Minor concerns	Low confidence
Leveraging existing research and training programmes: Existing research and training programmes facilitates institutional research mentorship	OC=15 strategies SR=49 studies	No or minor concerns	Minor concerns	Minor concerns	No or minor concerns	Moderate confidence
Culture of generosity: Mentors practicing warm and inclusive culture of generosity motivates mentees to become future mentors	OC=7 strategies SR=7 studies	Minor concerns	Moderate concerns	Moderate concerns	Minor concerns	Low confidence
Peer and group mentorship: Informal and formal support from one researcher to another who is at a similar career stage enhances mentorship cultures in LMIC institutions	OC=16 strategies SR=12 studies	Moderate concerns	Serious concerns	Serous concerns	Minor concerns	Low confidence

CERQual, Confidence in the Evidence from Reviews of Qualitative research; LMICs, low/middle-income countries; OC, open call; SR, scoping review.

Our data suggest that institutions should be responsible for ensuring that research mentorship is provided to and expected from all members. This contrasts the practice of many LMIC research mentorship programmes that are offered to a subset of researchers.[30 91] There are several strong reasons to consider research mentorship as a fundamental right of being in a university or research institute. Research mentorship can enhance recruitment and retention of promising research talents, build a sense of common purpose and enhance research outcomes. Greater institutional support for mentorship have been correlated with positive mentorship experiences.[92] Unfortunately, under-represented racial/ethnic minorities less often have research mentors compared with other researchers.[93 94] Policies that make research mentorship available to all members could decrease mentoring disparities.

Our work suggests that nurturing a culture of generosity within research institutions can increase the likelihood of current mentees becoming subsequent mentors. This is consistent with research showing that people who receive mentorship are more likely to serve as mentors for other people.[95] Mentorship within research institutions could create virtuous cycles that spur further kindness between researchers. Positive mentorship experiences provide examples of behaviours to emulate; negative mentorship experiences could be useful as a reminder of what not to do when one is a mentor.[95]

LMIC institutions have existing research and training resources that can be leveraged to enhance research mentorship. This finding aligns with previous mentoring toolkits[96] and mentorship guidance.[1] Having research in an institution allows opportunities to interact with external scientists and to embed mentorship activities into funded research or conferences. From a training perspective, using open access learning materials (eg, massive open online courses), developing peer mentorship groups and organising university elective credit for research can formalise research mentorship.

This study has limitations. First, although, we received some non-English submissions, our relatively English-focused promotion materials likely limited contributions from some LMICs. At the same

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time, we accepted submissions in each of the five official United Nations languages and translated the call for submissions. Second, anticipating the complexity of health research mentorship, we decided to accept text and non-text submissions. Third, published literature on research mentorship in LMICs is limited. However, our use of a global crowdsourcing open call allowed us to elevate the voices of LMIC researchers and learn from indigenous strategies that are not part of the published literature.

The data from this qualitative evidence synthesis have implications for health research mentorship programmes and policy. From a programme perspective, these data suggest that research mentorship programmes should be embedded within institutions and provided to all researchers. Expanding the scope of research mentorship could help decrease disparities in mentoring and build a sense of collective solidarity. From a policy perspective, the data from this qualitative evidence synthesis directly informed a WHO/TDR practical guide called HERMES (HEalth Research MEntorship in Low and Middle-Income CountrieS.

Research mentorship is a critical component of developing vibrant research institutions in LMICs. The evidence identified through this global open call and scoping review provide specific strategies and guiding principles for research mentorship. Research on implementation strategies to enhance mentorship at LMIC institutions is needed to advance this field. Monitoring and evaluation of research mentorship are critical for sustained success.

Author affiliations
[1]Clinical Research Department, London School of Hygiene and Tropical Medicine Faculty of Infectious and Tropical Diseases, London, UK
[2]Institute of Global Health and Infectious Diseases, The University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, North Carolina, USA
[3]Ethiopian Public Health Institute, Addis Ababa, Ethiopia
[4]School of Public Health, Universidad del Valle, Cali, Colombia
[5]Department of Parasitology, Chungbuk National University, Cheongju, Korea (the Republic of)
[6]Department of Parasitology, Sylhet Agricultural University, Sylhet, Bangladesh
[7]Grupo de Epidemiología, Facultad Nacional de Salud Pública, Universidad de Antioquia UdeA, Medellín, Colombia
[8]Clinical Sciences Department, Nigerian Institute of Medical Research, Lagos, Nigeria
[9]Johns Hopkins Medicine, Baltimore, Maryland, USA
[10]Infectious Diseases Institute, Makerere University College of Health Sciences, Kampala, Kampala, Uganda
[11]School of Public Health, Southern Medical University, Guangzhou, China
[12]The University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, North Carolina, USA
[13]Department of Internal Medicine, Jimma University, Jimma, Ethiopia
[14]TDR, The Special Programme for Research and Training in Tropical Diseases co-sponsored by UNICEF, UNDP, the World Bank and WHO, WHO, Geneva, Switzerland
[15]Nigerian Institute of Medical Research, Lagos, Nigeria
[16]Saint Louis University College for Public Health and Social Justice, Saint Louis, Missouri, USA
[17]School of Public Health, Addis Ababa University College of Health Sciences, Addis Ababa, Ethiopia
[18]Armauer Hansen Research Institute, Addis Ababa, Ethiopia, Addis Ababa, Ethiopia

Correction notice Published version has incorrect affiliation for author Victor A Talavera-Urdanivia. The correct affiliation for Dr. Talavera-Urdanivia is Grupo de Epidemiología, Facultad Nacional de Salud Pública, Universidad de Antioquia UdeA, Medellín, Colombia.

Twitter Eneyi E Kpokiri @ekpoks and Olaoluwa Pheabian Akinwale @OlaoluwaAkinwa3

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Contributors JDT and AA conceived the study idea. EEK and KM analysed data from the crowdsourcing open call, YGA, LO and MK conducted the scoping review and analysed the data. TCN, VAT-U, OPA, YCM and BC contributed to the open call data. EEK and KM drafted the first version of the manuscript. JDT, YGA, LO, VAT-U, OPA, WT, DY, TCN and MK were part of the working group and reviewed all sections of the manuscript with feedback. All authors read and approved the final version. EK is the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and the final compilation of data to inform a practical guide and qualitative evidence synthesis was approved by the AHRI (PO/23/22) and London School of Hygiene and Tropical Medicine institutional review boards. The scoping review was also registered on the Open Science Framework platform (10.17605/OSF.IO/JQA9Z). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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ORCID iDs
Eneyi E Kpokiri http://orcid.org/0000-0003-1180-1439
Victor A Talavera-Urdanivia http://orcid.org/0000-0001-9425-851X
Olaoluwa Pheabian Akinwale http://orcid.org/0000-0002-1054-9393
Weiming Tang http://orcid.org/0000-0002-9026-707X
Joseph D Tucker http://orcid.org/0000-0003-2804-1181

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REFERENCES

1 NASEM. "The science of effective Mentorship in STEMM," national academies. 2019. Available: https://www.nationalacademies.org/our-work/the-science-of-effective-mentoring-in-stemm#sectionPublications
2 Hamid M, Rasheed MA. A new path to mentorship for emerging global health leaders in low-income and middle-income countries. *Lancet Glob Health* 2022;10:e946–8.
3 Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. *Acad Med* 2013;88:1029–37.
4 Chi BH, Belizan JM, Blas MM, *et al*. Evaluating academic mentorship programs in low- and middle-income country institutions: proposed framework and metrics. *Am J Trop Med Hyg* 2019;100:36–41.
5 Prasad S, Sopdie E, Meya D, *et al*. Conceptual framework of mentoring in low- and middle-income countries to advance global health. *Am J Trop Med Hyg* 2019;100:9–14.
6 K. Gitonga L. Factors hindering formal and informal nursing mentorship programs in Kenyan public universities. *AJHR* 2016;4:23.
7 Nakanjako D, Katamba A, Kaye DK, *et al*. Doctoral training in Uganda: evaluation of mentoring best practices at Makerere University college of health sciences. *BMC Med Educ* 2014;14:9:1–8.:.
8 Tucker JD, Day S, Tang W, *et al*. Crowdsourcing in medical research: concepts and applications. *PeerJ* 2019;7:e6762.
9 W. H. Organization and UNICEF, ". Crowdsourcing in health and health research: a practical guide. World Health Organization; 2018.
10 Han L, Tang W, Ritchwood T, *et al*. Joint international consensus statement on crowdsourcing challenge contests in health and medicine: results of a modified delphi process. *BMJ Open* 2021;11:e048699.
11 Abraha KMEEKMKZBAAJTY. Research mentorship in Low and Middle-Income Countries: A Scoping Review, Available: https://osf.io/jqa9z/
12 Bank W. World Bank country and lending groups, 2021; 2022.
13 Creswell JW, Klassen AC, Clark VLP, *et al*. Best practices for mixed methods research in the health sciences. 2011;2013:541–5.
14 Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;3:77–101.
15 Ritchie J, Spencer L, Bryman A, *et al*. Analysing qualitative data; 1994.
16 Lewin S, Glenton C, Munthe-Kaas H, *et al*. Using qualitative evidence in decision making for health and social interventions: an approach to assess confidence in findings from qualitative evidence syntheses (GRADE-cerqual). *PLoS Med* 2015;12:e1001895.
17 Lewin S, Bohren M, Rashidian A, *et al*. Applying GRADE-cerqual to qualitative evidence synthesis findings-paper 2: how to make an overall cerqual assessment of confidence and create a summary of qualitative findings table. *Implement Sci* 2018;13:10.
18 Munthe-Kaas H, Bohren MA, Glenton C, *et al*. Applying GRADE-cerqual to qualitative evidence synthesis findings—paper 3: how to assess methodological limitations. *Implementation Sci* 2018;13:25–32.
19 Glenton C, Carlsen B, Lewin S, *et al*. Applying GRADE-cerqual to qualitative evidence synthesis findings-paper 5: how to assess adequacy of data. *Implement Sci* 2018;13:14.
20 Noyes J, Booth A, Lewin S, *et al*. Applying GRADE-cerqual to qualitative evidence synthesis findings-paper 6: how to assess relevance of the data. *Implement Sci* 2018;13:4.
21 Colvin CJ, Garside R, Wainwright M, *et al*. Applying GRADE-cerqual to qualitative evidence synthesis findings—paper 4: how to assess coherence. *Implementation Sci* 2018;13:33–41.
22 S. Ethiopia and W. H. Organization, health research Mentorship in low-and middle-income countries (HERMES): a TDR global practical guide to spur Mentorship Institutionalization. *World Health Organization* 2022.
23 Barnoya J, Monzon JC, Colditz GA. Increasing chronic disease research capacity in Guatemala through a mentoring program. *Can J Public Health* 2013;104:e427–32.
24 Carothers CL, Heimburger DC, Schlachter S, *et al*. Training programs within global networks: lessons learned in the fogarty international clinical research scholars and fellows program. *Am J Trop Med Hyg* 2014;90:173–9.
25 Kwanashie H. A Mentorship Toolkit for teachers and researchers in pharmacology and other biomedical sciences in developing countries. *The FASEB Journal* 2015;29:LB464.
26 Zunt JR, Chi BH, Heimburger DC, *et al*. The National Institutes of health fogarty international center global health scholars and fellows program: collaborating across five consortia to strengthen research training. *Am J Trop Med Hyg* 2016;95:728:728–34.:.
27 Cole DC, Johnson N, Mejia R, *et al*. Mentoring health researchers globally: diverse experiences, programmes, challenges and responses. *Glob Public Health* 2016;11:1093–108.
28 Godoy-Ruiz P, Cole DC, Lenters L, *et al*. Developing collaborative approaches to international research: perspectives of new global health researchers. *Glob Public Health* 2016;11:253–75.
29 Hedt-Gauthier BL, Chilengi R, Jackson E, *et al*. Research capacity building integrated into PHIT projects: leveraging research and research funding to build national capacity. *BMC Health Serv Res* 2017;17:825.
30 Lescano AG, Cohen CR, Raj T, *et al*. Strengthening mentoring in low- and middle-income countries to advance global health research: an overview. *Am J Trop Med Hyg* 2019;100:3–8.
31 Noormahomed E, Williams P, Lescano AG, *et al*. The evolution of Mentorship capacity development in Low- and middle-income countries: case studies from Peru, Kenya, India, and Mozambique. *Am J Trop Med Hyg* 2019;100:29–35.
32 da Silva ATC, Hanlon C, Susser E, *et al*. Enhancing mental health research capacity: emerging voices from the national institute of mental health (NIMH) global hubs. *Int J Ment Health Syst* 2019;13:1–9.
33 Gandhi M, Raj T, Fernandez R, *et al*. Mentoring the mentors: implementation and evaluation of four fogarty-sponsored mentoring training workshops in low-and middle-income countries. *Am J Trop Med Hyg* 2019;100:20–8.
34 Hamer DH, Hansoti B, Prabhakaran D, *et al*. Global health research mentoring competencies for individuals and institutions in low- and middle-income countries. *Am J Trop Med Hyg* 2019;100:15–9.
35 McGuire CM, Riffenburg K, Malope S, *et al*. Mixed-methods evaluation of family medicine research training and peer mentorship in Lesotho. *Afr J Prim Health Care Fam Med* 2020;12:e1–17.
36 Adefuye AO, Coetzee L, Janse van Vuuren C, *et al*. Medical educators' perceptions of research culture in a faculty of health sciences: a South African study. *Teach Learn Med* 2021;33:509–24.
37 Gupta A. Faculty mentoring in higher education: results from a pilot program at Jammu, India. *Mentoring & Tutoring: Partn Learn* 2021;29:261–83.
38 Singh G. An online abstract mentoring programme for Junior researchers and healthcare professionals. *Distance Edu* 2011;32:229–42.
39 Bloomfield GS, Xavier D, Belis D, *et al*. Training and capacity building in LMIC for research in heart and lung diseases: the NHLBI–Unitedhealth global health centers of excellence program. *Glob Heart* 2016;11:17–25.
40 Sharma M, Razzaque B. Research capacity strengthening in South Asia: based on the experience of South Asian Hub for advocacy, research and education on mental health (SHARE). *Glob Ment Health (Camb)* 2017;4:e9.
41 Byrnes A, Haregu TN, Pasricha N, *et al*. Strengthening noncommunicable disease research capacity and chronic disease outcomes in low-and middle-income countries in South Asia: implementation and evaluation of the ASCEND program. *Asia Pac J Public Health* 2019;31:536–47.
42 Bao H, Salisbury K, Chi BH, *et al*. Research mentorship crowdsourcing contest: toward global health good. *Am J Trop Med Hyg* 2020;103:1270–3.
43 Davtyan H, Davtyan K, Harries AD, *et al*. Going virtual for research training during the COVID-19 pandemic and beyond: E-SORT IT. *J Infect Dev Ctries* 2021;15:3S–6S.
44 Rodríguez DC, Jessani NS, Zunt J, *et al*. Experiential learning and mentorship in global health leadership programs: capturing lessons from across the globe. *Ann Glob Health* 2021;87:61.
45 Ukrani RD, Shaikh AN, Martins RS, *et al*. Low-cost peer-taught virtual research workshops for medical students in Pakistan: a creative, scalable, and sustainable solution for student research. *BMC Med Educ* 2021;21:557.
46 Kingiri A, Andersen MH, Hanlin R, *et al*. Mentoring as a pathway to building research capacity in the field of innovation and development in low income and low middle-income countries; 2020.
47 Bertman V, Petracca F, Makunike-Chikwinya B, *et al*. Health worker text messaging for blended learning, peer support, and mentoring in pediatric and adolescent HIV/AIDS care: a case study in Zimbabwe. *Hum Resour Health* 2019;17:41.
48 Pimmer C, Mhango S, Mzumara A, *et al*. Mobile instant messaging for rural community health workers: a case from Malawi. *Glob Health Action* 2017;10:1368236.
49 Woods J, Moorhouse M, Knight L. A descriptive analysis of the role of a whatsapp clinical discussion group as a forum for continuing medical education in the management of complicated HIV and TB clinical cases in a group of doctors in the Eastern cape, South Africa. *South Afr J HIV Med* 2019;20:982.

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50 Willemse JJ, Jooste K, Bozalek V. Experiences of undergraduate nursing students on an authentic mobile learning enactment at a higher education institution in South Africa. *Nurse Educ Today* 2019;74:69–75.
51 Peponis C, Khaliq M, Ismail Ali A, *et al*. An international instant-messaging journal club: a modern, fun and global approach to a traditional teaching tool. *Trop Doct* 2020;50:49–53.
52 Asgary R, Cole H, Adongo P, *et al*. Acceptability and implementation challenges of smartphone-based training of community health nurses for visual inspection with acetic acid in Ghana: mHealth and cervical cancer screening. *BMJ Open* 2019;9:e030528.
53 Feldacker C, Jacob S, Chung MH, *et al*. Experiences and perceptions of online continuing professional development among clinicians in sub-Saharan Africa. *Hum Resour Health* 2017;15:89.
54 Shah S, Knoble S, Ross O, *et al*. A distance blended learning program to upgrade the clinical competence of district non-doctor anesthesia providers in Nepal. *World J Surg* 2017;41:3006–11.
55 Guillaume D, Troncoso E, Duroseau B, *et al*. Mobile-social learning for continuing professional development in low-and middle-income countries: integrative review. *JMIR Med Educ* 2022;8:e32614.
56 Schulze S. Mentoring to develop research self-efficacy, with particular reference to previously disadvantaged individuals. *Koers* 2010;75:429–51.
57 Magesa SM, Mwape B, Mboera LEG. Challenges and opportunities in building health research capacity in Tanzania: a case of the national institute for medical research. *Tanzan J Health Res* 2011;13:427–43.
58 Mda T. Growing researchers from the historically disadvantaged groups through Internships. *Perspectives in Educ* 2013;31:92–101.
59 Bennett S, Paina L, Ssengooba F, *et al*. Mentorship in African health research training programs: an exploratory study of fogarty international center programs in Kenya and Uganda. *Educ Health (Abingdon)* 2013;26:183–7.
60 Atkins S, Marsden S, Diwan V, *et al*. North–South collaboration and capacity development in global health research in low-and middle-income countries–the ARCADE projects. *Glob Health Action* 2016;9:30524.
61 Sam-Agudu NA, Paintsil E, Aliyu MH, *et al*. Building sustainable local capacity for global health research in West Africa. *Ann Glob Health* 2016;82:1010–25.
62 Zachariah R, Rust S, Berger SD, *et al*. Building global capacity for conducting operational research using the SORT IT model: where and who? *PLoS One* 2016;11:e0160837.
63 Kumwenda S, Niang EHA, Orondo PW, *et al*. Challenges facing young African scientists in their research careers: a qualitative exploratory study. *Malawi Med J* 2017;29:1–4.
64 Odhiambo J, Amoroso CL, Barebwanuwe P, *et al*. Adapting operational research training to the Rwandan context: the intermediate operational research training programme. *Glob Health Action* 2017;10:1386930.
65 Odhiambo J, Miller AC, Nyirahabimana N, *et al*. Implementation, outputs, and cost of a national operational research training in Rwanda. *Ann Glob Health* 2020;86:93.
66 Ssemata AS, Gladding S, John CC, *et al*. Developing mentorship in a resource-limited context: a qualitative research study of the experiences and perceptions of the makerere university student and faculty mentorship programme. *BMC Med Educ* 2017;17:123.
67 Wakida E, Maling S, Obua C. Mbarara university research training initiative: a spin-off of the medical education partnership initiative in Uganda. *Adv Med Educ Pract* 2017;8:527–33.
68 Yang L, Pratt C, Valencia E, *et al*. Redeamericas: building research capacity in young leaders for sustainable growth in community mental health services in Latin America. *Glob Ment Health (Camb)* 2017;4:e3.
69 Mbuagbaw L, Slogrove AL, Sas J, *et al*. Output from the CIHR Canadian HIV trials network International Postdoctoral fellowship for capacity building in HIV clinical trials. *HIV AIDS (Auckl)* 2018;10:151–5.
70 Potempa K, Furspan PB, Rajataramya B, *et al*. Strengthening non-communicable disease research capacity in Thailand: leveraging Phd nurses and other health professionals. *Pac Rim Int J Nurs Res Thail* 2018;22:178–86.
71 Reddy P, Desai R, Sifunda S, *et al*. You travel faster alone, but further together": learning from a cross country research collaboration from a british council newton fund grant. *Int J Health Policy Manag* 2018;7:977–81.
72 Gureje O, Seedat S, Kola L, *et al*. Partnership for mental health development in sub-Saharan Africa (PaM-D): a collaborative initiative for research and capacity building. *Epidemiol Psychiatr Sci* 2019;28:389–96.
73 Mayor A, Martínez-Pérez G, Tarr-Attia CK, *et al*. Training through malaria research: building capacity in good clinical and laboratory practice in Liberia. *Malar J* 2019;18:1–15.
74 Nazer L, Kleinpell R, Olsen K, *et al*. A capacity-building pilot program to increase critical care research productivity in the middle east region. *In Review* [Preprint] 2020.
75 Chege MP. Building consensus on identifying research mentoring gaps and finding ways of addressing the gap in a Kenyan college of health sciences. *Afr J Prim Health Care Fam Med* 2019;11:e1–7.
76 Ahmed A, Daily JP, Lescano AG, *et al*. Challenges and strategies for biomedical researchers returning to low- and middle-income countries after training. *Am J Trop Med Hyg* 2020;102:494–6.
77 Angel MO, Colombo Bonadio R, Harada G, *et al*. Mentoring as an opportunity to improve research and cancer care in Latin America (AAZPIRE project). *ESMO Open* 2020;5:e000988.
78 Malavia TA, Nimgaonkar V, Bhatia T, *et al*. Outcomes from Indo-United States-Egypt tri-national psychiatric research training programmes. *Health Res Policy Syst* 2020;18:82.
79 Newberry JA, Patel S, Kayden S, *et al*. Fostering a diverse pool of global health academic leaders through mentorship and career path planning. *AEM Educ Train* 2020;4:S98–105.
80 Okewole H, Merritt C, Mangezi W, *et al*. Building career development skills for researchers: a qualitative study across four African countries. *Ann Glob Health* 2020;86:1.
81 Ponka D, Coffman M, Fraser-Barclay KE, *et al*. Fostering global primary care research: a capacity-building approach. *BMJ Glob Health* 2020;5:e002470.
82 Feng N, Edwards JK, Owiti PO, *et al*. Operational research capacity building through the structured operational research training initiative (SORT-IT) in China: implementation, outcomes and challenges. *Infect Dis Poverty* 2021;10:1–4.
83 Msami K, Mbwana M, Mwaiselage J, *et al*. Developing research education groups in African cancer centers: the experience in Tanzania. *J Canc Educ* 2021;36:101–8.
84 Muula AS, Hosseinipour MC, Makwero M, *et al*. Mentoring upcoming researchers for non-communicable diseases' research and practice in Malawi. *Trials* 2021;22:65.
85 Soliman AS, Chamberlain RM, Michalek A, *et al*. Mentoring in global cancer research training. *J Canc Educ* 2021;36:50–4.
86 Sisay MM, Yigeremu M, Woldeamanuel Y, *et al*. Women's health research working group: a Mentorship model to increase women's participation in research. *Ethiopian J Health Develop* 2021;35:2.
87 Balandya E, Sunguya B, Gunda DW, *et al*. Building sustainable research capacity at higher learning institutions in Tanzania through mentoring of the young research peers. *BMC Med Educ* 2021;21:166:166.:.
88 Phipps W, Kansiime R, Stevenson P, *et al*. Peer mentoring at the Uganda cancer institute: a novel model for career development of clinician-scientists in resource-limited settings. *JGO* 2018;4:1–11.
89 Cross R, Lowcock D, Fiave J, *et al*. Feeling part of a network of learning in health promotion': an evaluation of a postgraduate peer-mentoring scheme in Ghana. *Innov in Education and Teaching Intern* 2020;57:175–85.
90 McGuire CM, Yakubu K, Ayisi-Boateng NK, *et al*. Exploring gaps, strategies and solutions for primary care research mentorship in the African context: a workshop report. *Afr J Prim Health Care Fam Med* 2020;12:e1–4.
91 Nakanjako D, Akena D, Kaye DK, *et al*. A need to accelerate health research productivity in an african university: the case of makerere university college of health sciences. *Health Res Policy Syst* 2017;15:33.
92 Pololi LH, Evans AT, Civian JT, *et al*. Mentoring faculty: a US national survey of its adequacy and linkage to culture in academic health centers. *J Contin Educ Health Prof* 2015;35:176–84.
93 Beech BM, Calles-Escandon J, Hairston KG, *et al*. Mentoring programs for underrepresented minority faculty in academic medical centers: a systematic review of the literature. *Acad Med* 2013;88:541–9.
94 Helm EG, Prieto DO, Parker JE, *et al*. Minority medical school faculty. *J Natl Med Assoc* 2000;92:411–4.
95 McBride AB, Campbell J, Deming K. Does having been mentored affect subsequent mentoring? *J Prof Nurs* 2019;35:156–61.
96 Hansoti B, Kalbarczyk A, Hosseinipour MC, *et al*. Global health mentoring toolkits: a scoping review relevant for low- and middle-income country institutions. *Am J Trop Med Hyg* 2019;100:48–53.

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