

Postgraduate Medical Education in Sub-Saharan Africa: A Scoping Review Spanning 26 Years and Lessons Learned

Zohray Talib, MD

Lalit Narayan, MBBS, MA

Thomas Harrod, MLS, MS

ABSTRACT

Background Investments in training physician specialists through postgraduate medical education (PGME) are critical for Sub-Saharan Africa, given the increasing burden of non-communicable diseases.

Objectives The objectives of this scoping review were to (1) understand the breadth of publications on PGME from Sub-Saharan Africa, and (2) conduct a thematic analysis of lessons learned by specific training programs.

Methods We conducted a literature search of 7 databases for PGME literature published between January 1991 and December 2016. Two reviewers independently reviewed titles and abstracts for inclusion. Full-text articles were then reviewed, and bibliometric data were extracted to create a profile of PGME-related publications. Two authors coded the manuscripts to identify articles written about specific PGME programs. These were analyzed for lessons learned.

Results We identified 813 publications that reported on postgraduate medical education in Sub-Saharan Africa. Most articles were published between 2005 and 2016. Nations leading in publication were South Africa and Nigeria, followed by Ethiopia, Uganda, Kenya, Ghana, and Malawi. The largest number of articles related to general surgery training, followed by family medicine, emergency medicine, and anesthesiology. Thematic analysis revealed advantages of training programs for health facilities, challenges related to teaching, resourcing, and standardizing of training, and lessons learned related to international partnerships, faculty engagement, and research support for trainees.

Conclusions PGME in Sub-Saharan Africa has evolved over the past 26 years. Future growth will require strategic support to scale programs, support new specialties, trainees, and teachers, and leverage best practice models to sustain PGME programs.

Introduction

In the last decade, improving medical education in Sub-Saharan Africa has been a key component of strengthening health systems in the region. Investments in the health workforce are timely given the increasing burden of non-communicable diseases, the need for transformation of health systems to manage chronic illness, and the desire for improved access and coverage.¹⁻³ Africa's health workforce expansion strategies have relied on scaling up of frontline providers, which results in an increased need and demand for medical specialists to manage complex cases and to provide management and leadership in health systems.³⁻⁵

The Sub-Saharan African Medical School Study (SAMSS) published in 2011 estimated there were 168 medical schools in Sub-Saharan Africa.⁶ Most African medical schools admit directly from high school and training programs range from 5 to 7 years.⁶ Some

countries require compulsory service upon graduation, after which physicians can choose to directly enter the workforce or to embark on postgraduate medical education (PGME), the equivalent of graduate medical education in the United States.⁶ Reports suggest that 20% to 40% of physicians leave the country after graduating from an African medical school.^{6,7} The limited PGME capacity in Sub-Saharan Africa plays a significant role in this outmigration, and many who pursue specialty training abroad never return.⁷⁻¹⁰

PGME positions in the region are sponsored by governments, district hospitals or rural hospitals, or trainees may be self-sponsored.^{11,12} Most programs are affiliated with universities that confer a Master of Medicine degree. Some programs are affiliated to a regional body such as the West African College of Surgeons (WACS) or the College of East, Central, and Southern African Surgeons (COSECSA).^{13,14}

Over the past 15 years, a substantial scale-up of undergraduate medical education (UME) has occurred in Sub-Saharan Africa, with many governments substantially increasing medical school enrollment.¹⁵ In Kenya, the University of Nairobi saw a 3-fold increase in class sizes,¹⁶ while the

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Editor's Note: The online version of this article contains the final list of specialties and countries included in the search and the final search string used for PubMed.

number of medical schools in Ethiopia increased from 5 in 2003 to 23 in 2009, and enrollment at Addis Ababa University grew from 100 to more than 300 per year.¹⁷ Capacity was further expanded by the US-funded Medical Education Partnership Initiative (MEPI), which supported workforce investments in Africa with \$150 million granted to 12 countries to strengthen medical and health professions education.¹⁸

The expansion in UME has not been matched by increases in PGME capacity, and the specialist workforce in Africa is substantially inadequate, with shortages in many specialties.^{13,15,19,20} The SAMSS study identified only 436 PGME programs in the region.⁶ Strategic expansion of specialist training programs would benefit from understanding the lessons that can be learned from existing programs.

The objectives of this scoping review were 2-fold: (1) to understand the breadth of PGME publications from Sub-Saharan Africa, and (2) to conduct a thematic analysis of publications that reported on specific training programs and to aggregate lessons that can be learned from their experience.

Methods

We conducted a scoping review using methodological guidelines outlined by the Joanna Briggs Institute.²¹

Data Sources and Search

We searched 4 major international academic databases (PubMed, Global Health, ERIC, and Embase) and 3 Africa-specific databases for PGME literature published between January 1991 and December 2016. African Indicus Medicus is produced by the Association for Health Information and Libraries in Africa with technical support from the World Health Organization. African Journals OnLine is a non-profit initiated by the International Network for the Availability of Scientific Publications. Bioline is a nonprofit scholarly publishing cooperative committed to providing open access to quality research journals published in developing countries.

For the international academic databases, we used a search strategy built on the premise that relevant literature on PGME would contain title or keywords and be assigned categories that referenced education or training, a specific clinical specialty as well as a country in Sub-Saharan Africa. A list of clinical specialties was constructed by first including all those already identified by the Sub-Saharan African Medical School Survey conducted in 2010,⁶ and then adding all clinical specialties listed as MESH titles under medicine that were deemed relevant by a process of consensus by the study team. A list of

Box Lessons From Experience of PGME Programs in Sub-Saharan Africa

Advantages

- Retention: A sizable share of graduates from PGME programs remain in-country, especially at academic centers.
- Health outcomes: The presence of PGME programs increased local clinical capacity and resulted in reductions in mortality and morbidity.

Challenges

- Clinical training sites: Variable case volumes for specialized procedures, especially at clinical sites that also train medical students.
- Locally relevant curricula and standards: The dearth of local PGME standards and lack of relevant curricula in some specialties.
- Resource constraints: Inadequate resources and suboptimal learning conditions in settings, including limited access to key clinical and educational resources.
- Supervision: Inconsistent supervision and bedside teaching, and residents relying on each other for learning.
- Trainees: High rates of stress for many trainees, particularly in specialties with high work hours.

Lessons Learned

- Faculty engagement and training: Enhance faculty preparation and incentives for supervising and teaching trainees.
- Diversify clinical training sites: District hospital offer rich procedural skills training.
- Strategic partnerships: Leverage the contributions of international partners to develop curricula, enhance teaching, and ensure an initial cadre of trained educators in new specialties.
- Establish programs in complementary specialties, such as surgery and anesthesiology.
- Enhance trainee preparation, assistance, and mentoring for the dissertation and provide peer-reviewed venues for publishing resident research and dissertations.
- Provide data on the financial, clinical, and human burden of non-communicable diseases to regulators and policy makers to advocate specialist training.

Sub-Saharan African countries was retrieved from the US Library of Congress website.²² An experienced librarian (T.H.) created search strategies based on these lists, which were further refined through team discussion. The final list of specialties and countries included in the search and the final search string used for PubMed are provided as supplemental material.

The 3 Africa-specific databases were searched using word strings of 3 to 5 keywords. We conducted an initial electronic search using the terms “education” or “training” and manually sorted titles to include those that referenced education or training programs in clinical specialties in Sub-Saharan African nations.

Google Translate was used to machine translate titles and abstracts in non-English language journals. Duplicate entries present in more than 1 database were identified using RefWorks web-based bibliographic management software (RefWorks-COS, Bethesda, MD), and removed.

Inclusion Criteria and Screening

Articles eligible for our scoping review were published between 1991 and 2016 and focused on PGME programs in Sub-Saharan Africa that produced graduates eligible for an in-country license to practice. We included editorials and review articles as these may also contain useful information.

At the first level of screening, 2 reviewers independently reviewed titles and abstracts to check if they met inclusion criteria. To ensure interrater reliability, the authors collectively reviewed a smaller subset of articles prior to commencing screening on the full dataset. At the second level of screening, full-text articles were reviewed, and bibliometric data were extracted to create a profile of publications.

The second objective of this study was to understand the lessons learned from the perspective of training programs that were published during the time frame of our analysis. To accomplish this, 2 authors (Z.T. and L.N.) sorted the full dataset, reviewed the title, abstract, and text, and extracted publications referring to specific programs and lessons learned. We excluded publications that reflected broadly on the health system and did not specifically discuss a PGME program.

For the dataset of program-related publications, each full-text manuscript was reviewed by an author (Z.T.) who has experience with medical education in Sub-Saharan Africa, including visiting faculty appointments at 2 African institutions. Lessons learned were extracted and categorized in an Excel spreadsheet according to topics selected by the authors based on common attributes identified during the scoping review, relevance to scaling PGME, and alignment with US GME accreditation requirements.²³ These topics included faculty, residents, recruitment and retention, the educational program, financing and planning, resources, and program outcomes. Within each topic, themes were identified and summarized.

This review did not involve research with human subjects and was exempt from institutional review board approval.

Results

A search of the 4 international databases yielded 7129 citations. An additional 156 citations were found in

the African databases. Following removal of duplicates, 6267 citations remained. The titles and abstracts of each citation were independently screened by 2 authors (Z.T. and L.N.) for eligibility, resulting in the exclusion of 5367 citations. For 900 publications that met initial inclusion criteria, the full text was screened by the same authors, and 87 publications were excluded. The selection schema is shown in FIGURE 1. Overall, 813 publications met the inclusion criteria, and the final subset of publications relating to specific programs encompassed 140 publications.

Bibliometrics

Most articles identified through the scoping review were published in the latter years of the search window, between 2005 and 2016 (FIGURE 2). This included a surge in publication in 2005 and 2010, with a continuing trend through 2016. Leading in publication were South Africa (192 articles) and Nigeria (104 articles), followed by Ethiopia, Uganda, Kenya, Ghana, and Malawi (FIGURE 3). The largest number of PGME articles by specialty related to general surgery training programs, followed by family medicine, emergency medicine, and anesthesiology (FIGURE 4).

Most publications that related to a specific PGME program were published in 2005 or later, and the majority were from the fields of surgery, emergency medicine, and family medicine (provided as supplemental material). Countries represented in this sample included Ethiopia, South Africa, and Nigeria, in addition to articles from Ghana, Rwanda, Uganda, Tanzania, Malawi, and Zambia (provided as supplemental material).

Thematic Analysis of Lessons Learned From Specific PGME Programs

Educational Programs: Programs reported on efforts to develop locally relevant curricula by reviewing case data from local specialists.^{24–28} Programs also reflected on the lack of relevant standards to guide education, and the need to ensure locally relevant curricula especially when international partners were involved.^{26,28,29–38} Suggestions included having partners co-develop curricula to ensure local relevance.^{30,31,39–44}

District hospitals often were described as optimal training sites, especially for procedural skills and more hands-on training.^{45–50} Some programs reported inadequate case volumes for specialized procedures, and used case simulation and/or off-site rotations (both in and out-of-country) to augment

clinical training.^{51–58} In addition to clinical skills, a number of programs identified a need to improve training in administration and management, finance, and teaching and research.^{40,43,51,59–69}

Research requirements and access to procedures were cited as reasons for graduation delays for some trainees.⁷⁰ Programs reported residents found research requirements difficult to meet, due to inadequate research skills, lack of mentors, funding, and time.^{33,69,71–75} Several programs reported that international partnerships provided assistance for research activities.^{31,75–77} In Uganda, the national Orthopedic Association established a journal to facilitate peer-review dissemination of research findings.⁷¹ Another challenge leading to suboptimal training were medical students, who overwhelmed local clinical capacity, and thus limited PGME trainee access to procedures.^{11,78–80}

Resident Recruitment, Support, and Well-Being: A number of programs reflected on factors that influenced recruitment to their specialty such as perceived workload, quality of life, unpredictability of training duration, and unclear path to licensure.^{71,81–84}

Several publications reported residents experienced high rates of stress and fatigue related to their considerable workload.^{85–88} One study indicated this occurred for nearly 90% of residents, and attributed it to the lack of facilities and an unstructured program.⁸⁷ Another study reported surgery trainees worked more than 105 hours per week.⁸⁸

Supervising Faculty: Supervision of trainees was provided either by in-country specialists (consultants) or visiting faculty. Challenges related to in-country specialists included inadequate incentives and inconsistent quality and frequency of teaching. Surgical programs, in particular, reported variable supervision of procedures, particularly emergency procedures by on-call residents.^{62,74,75,78,89–92} Programs described tension between learning and service, with residents reporting inadequate bedside teaching and relying on each other for learning.^{61,93–96} A challenge faced by some university-based programs was difficulty in influencing the quality of clinical teaching, especially with faculty employed by the ministry of health or the hospital.^{27,64,75,90,92}

A number of publications reflected on the contribution of visiting faculty and factors that influence their contribution, including experience in different practice settings and the time needed to become familiar with the environment.^{82,83,93,97} Several publications recommended that the optimal approach is to leverage visiting faculty to build local education capacity.^{19,42,44,98–100}

Newer Specialties Face Unique Challenges

Family medicine and emergency medicine services were evolving specialties in the PGME literature from Sub-Saharan Africa, and programs described efforts to garner support from the public, policy makers, regulators, and governments to understand the scope of practice in these specialties and ensure career paths for graduates.^{11,48,64,66,101–107} Programs discussed the need for international partners to help train an initial critical mass of specialists, including faculty, and ensure that curricula prepared graduates to serve as leaders, teachers, and supervisors in these disciplines.^{11,48,64–66,108,109}

Resources and Financing of PGME

Programs reported on suboptimal resources for training, including accommodations, transportation, electricity, safe drinking water, and access to good quality food.^{35,61} Programs also reported on suboptimal conditions in health facilities, including inadequately maintained equipment, unreliable drug supplies, and inconsistent availability of laboratory and radiology services.^{36,55,69,75,96,98,110,111} Programs leveraged private sector health facilities and international partners to bridge these gaps.^{7,55,63,75} Other publications described suboptimal educational resources, including textbooks and difficulty accessing online lectures and videos due to internet connectivity problems.^{32,35,82,90,95,112–114}

Reflections on financing PGME focused on the need to ensure that external funding was aligned with local capacity to sustain activities when funding ceased. Programs emphasized the need to adequately resource teaching hospitals to facilitate training and the importance of allocating funds to biomedical support as a component of equipment purchases and donations.^{8,36,76,96,101,103,104,111,115–119}

Health Care Workforce Priorities and Retention of Graduates in Region

Programs described the need for targeted research on the burden of non-communicable diseases to advocate for the training of specialists and to counter the previous predominant focus on infectious diseases.^{24,40,63,71,98,118,120,121} Publications also reported on the benefits of simultaneously establishing training programs in fields that are complementary such as surgery and anesthesia.^{29,71,98,110,122}

Programs reported that retention of graduates was influenced by location of training as well as career prospects and employment opportunities after graduation.^{8,10,66,74,79,92,98,122–127} In several instances, tracking graduates of PGME programs revealed high

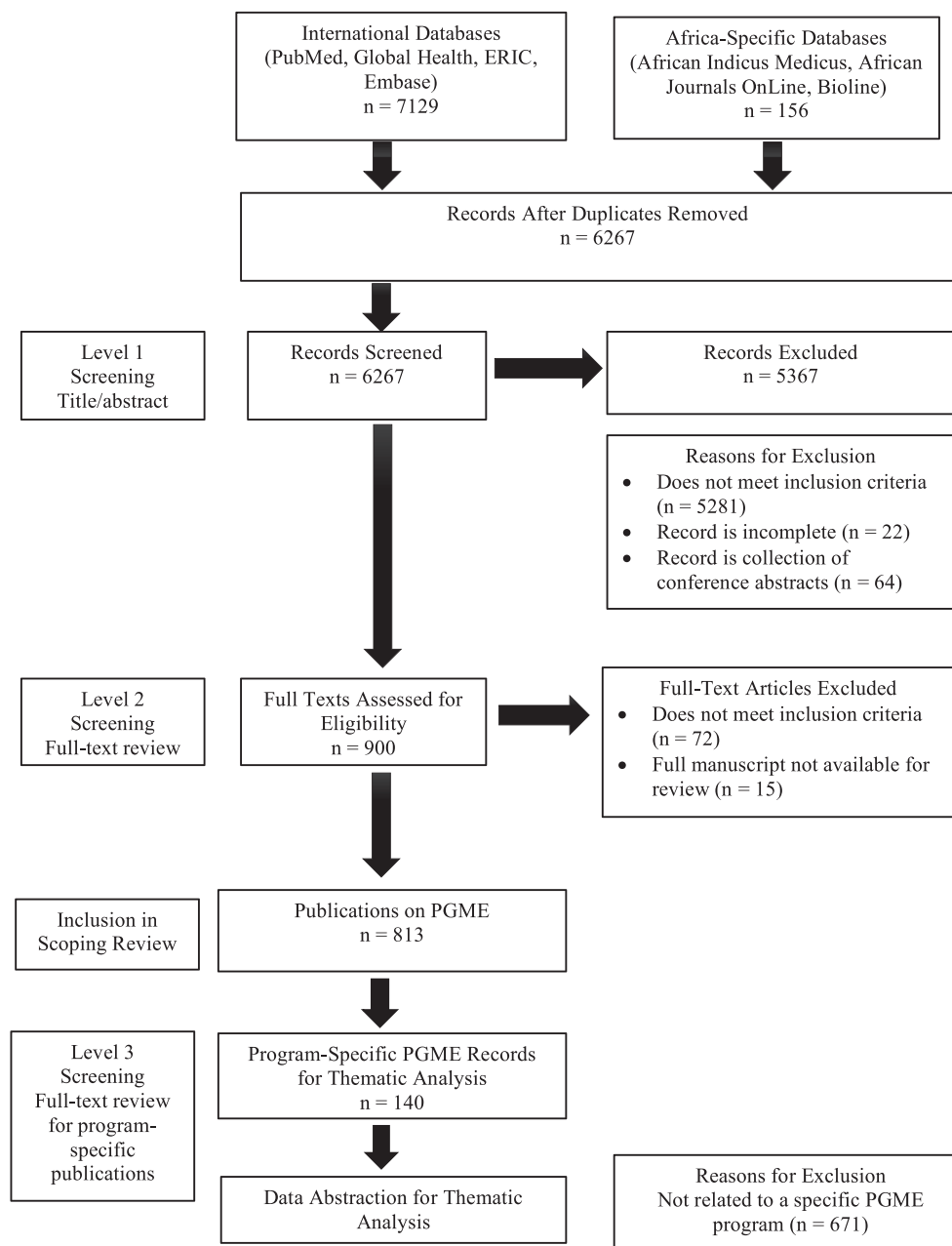


FIGURE 1
Scoping Review Schematic

rates of in-country retention, especially at academic centers. A study of academic faculty at a large hospital in Kenya reported the majority of surgeons on staff were trained locally.⁷⁹ In Ethiopia, 95% of 30 psychiatrists trained in-country were retained after graduation.³² Similarly, a network of rural hospital-based training programs in 4 African countries reported that all graduates who completed 1 year of compulsory rural service went on to practice in local underserved areas.¹²⁸

Impact of PGME on Health Care Provision

A number of articles reflected on the positive impact training programs have had on health facilities.^{8,129,130} One surgery program reported a 20% increase in surgical cases after starting the training program, another saw a 42% increase in gynecologic cases, and a third reported more efficient and evidence-based care especially with the start of daily morning rounds.^{129,131} Three programs reported a

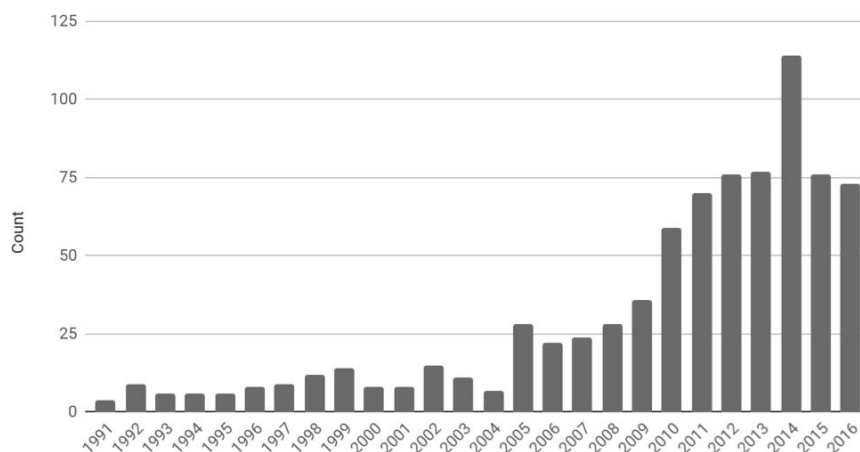


FIGURE 2
Publications Related to Postgraduate Medical Education in Sub-Saharan Africa (by Year of Publication)^a
^a N = 813.

reduction in morbidity and mortality as a result of training programs.^{68,102,132}

A summary of advantages and challenges faced by PGME programs in the region, and of the lessons learned from their experience is shown in the BOX.

Discussion

This is the first study that aggregated the PGME literature from Sub-Saharan Africa over a 26-year period (1991–2016) and examined the lessons learned from programs that published on their experience. The vast majority of articles were published after 2010, coinciding with the MEPI program. Poignantly, more than 90% of the articles published after 2014 are from countries that received MEPI funding.

Surgical training programs contributed the greatest number of articles to the literature. This likely reflects the relative maturity of the specialty, and the efforts of WACS and COSECSA and the South African College of Surgeons spanning more than 5 decades.^{8,14,128} Regulatory bodies and professional associations can be catalysts and resources for new and established programs. Along with internal medicine, the relatively new specialties of emergency medicine and family medicine were commonly mentioned. Publications in these specialties are largely recent and also reflect the efforts and benefits of international partners in medical education research.

The thematic analysis reveals much of what would be expected of physician training in resource-constrained settings, often with little formal organization of PGME programs. A number of expected

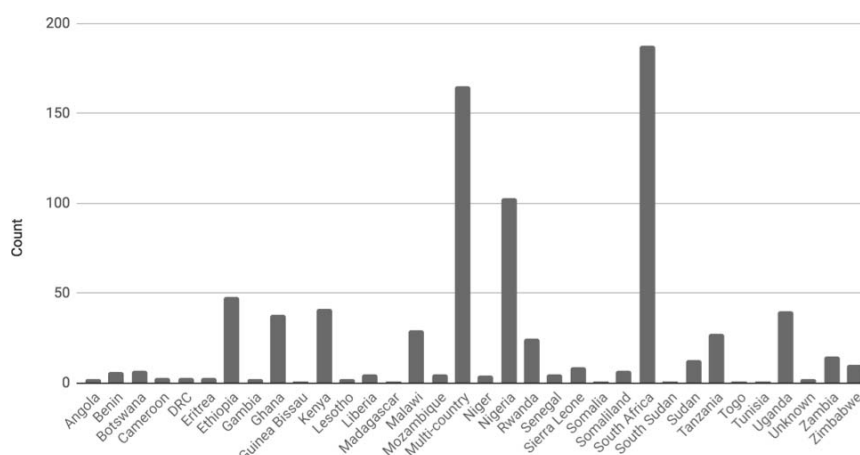


FIGURE 3
Publications Related to Postgraduate Education in Sub-Saharan Africa (by Country)^a
^a N = 813.

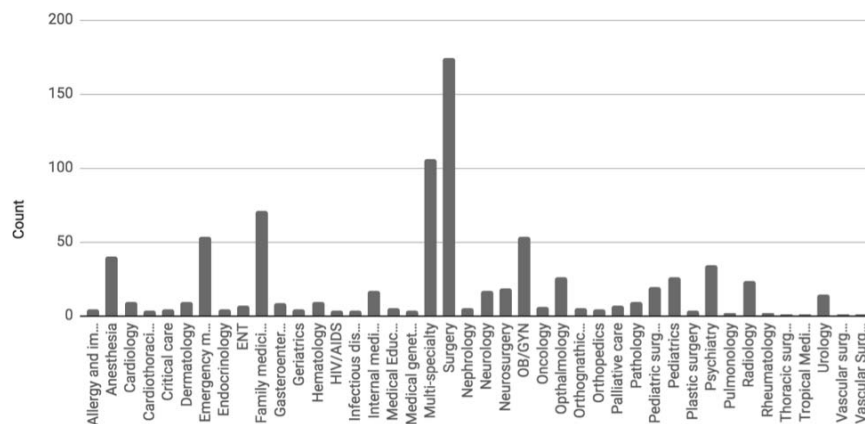


FIGURE 4

Publications Related to Postgraduate Education in Sub-Saharan Africa (by Specialty)^a^a N = 813.

challenges were reported, but there also are critical gaps in the literature. Little is written about funding models for PGME, particularly approaches that can be scaled up and are sustainable over time. There is a dearth of literature on program oversight, the role of sponsoring institutions, the functions of program directors, and the role of residents in improving and shaping the programs in which they train. In addition, few publications to date have addressed resident well-being and burnout, despite increasing global attention to this topic. Finally, while improvements in health outcomes appear to be correlated to the establishment of physician training, there are no reports in the literature on efforts to track, monitor, or assess the impact of PGME programs, and to date little has been written about educational outcomes, both with respect to graduates' learning attainments and on the impact of their added competencies on health care in the region. More robust research is needed to examine the link between investments in health workforce and improved outcomes for patients and populations.

The review has limitations. Despite the breadth of programs and nations represented, it does not encompass all PGME programs in Sub-Saharan Africa. We also suspect publication bias, with a greater likelihood of publication for programs with international partners, which may have influenced the thematic analysis. The high rate of publication of MEPI-funded projects may reflect the role of external partners in requiring publications as a grant-related activity. Programs and initiatives without international partners and those with limited resources may not have sought publication because of limited capacity and experience with medical education research.

Conclusion

Similar to the United States, the scale-up of graduate medical education is lagging behind medical school expansion. In Sub-Saharan Africa investments will be needed to expand programs, support training in additional specialties, and improve the regulatory environment for specialist training in the region. Regulation, either at the national, regional, or even transnational level, will be critical to ensure trainee well-being, the commitment of teachers, and the use of best practice models in establishing and sustaining PGME programs. Finally, it is important to document current PGME capacity in Sub-Saharan Africa to establish a baseline for strategic investments to meet the demands of evolving health systems, disease patterns, and population health needs.

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Zohray Talib, MD, is Associate Dean for Medical Education and Global Health, California University of Science and Medicine, San Bernardino, California, USA; **Lalit Narayan, MBBS, MA**, is Assistant Professor of Medicine, George Washington University School of Medicine & Health Sciences, Washington, DC, USA; and **Thomas Harrod, MLS, MS**, is Reference & Instruction Librarian, Himmelfarb Health Sciences Library, Washington, DC, USA.

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Corresponding author: Zohray Talib, MD, California University of Science and Medicine, 217 E Club Center Drive, Suite A, San Bernardino, CA 92408, USA, talibz@calmedu.org

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