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The Role of Community-Based Education and Service (COBES) in Undergraduate Medical Education in Reducing the Mal-Distribution of Medical Doctors in Rural Areas in Africa: A Systematic Review

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Abstract

Introduction: Community-Based Education and Service (COBES) and rural outreach programmes are increasingly being used in the delivery of undergraduate medical education in rural communities to address the disparity of health workers across the world, especially in the developing countries. This systematic review describes whether COBES as part of the undergraduate medical training, aids in addressing the maldistribution of doctors in Africa.

Methods: A critical literature search through key data sources identified studies that focused on COBES as an educational intervention which addressed recruitment and retention challenges in Africa. Data are presented as a narrative synthesis due to the varied methodological designs adopted by the various studies reviewed.

Results: This review reveals that relatively few medical schools are so far using innovative curricula incorporating COBES and rural outreach programmes to train medical students with the hope that they will opt for rural practice after graduating. Given the gaps in human resources for healthcare especially in the rural areas and lower levels of service delivery in Africa, students' contributions to health delivery at facilities and in communities are expected to bridge the gaps in services delivery at the primary health care level. Some medical schools from African countries, have consequently scaled up their rural components in the undergraduate curricula, thus responding to changes in health and making medical education more relevant to the needs of rural communities. There is now increasing evidence that COBES and rural outreach programmes are indeed making an impact on health services delivery in the rural areas. Graduates of institutions that incorporate COBES and rural outreach programmes have testified that their present practice location in the rural communities was influenced by the undergraduate rural exposure through COBES. There is growing evidence that exposure of health professions students, especially medical students, to the rural areas influences their eventual choice to work in the rural areas after graduation.

Abbreviations: PBL, Problem-Based learning; COBES, Community-Based Education and Service; SMHS, School of Medicine and Health Sciences; UDS, University for Development Studies; MU, Maastricht University; FHML, Faculty of Health, Medicine and Life Sciences; SHE, School of Health Professions Education; WHO, World Health Organisation; MEPI, Medical Education Partnership Initiative.

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Conclusion: Based on this review, it is strongly recommended that COBES/rural outreach programmes should be made part of the undergraduate medical curricula in all health training institutions in Ghana in particular, and the sub-Saharan African sub-region in general.

Keywords: Community-based education and service; Rural areas; Retention; Recruitment; Doctors; Undergraduate medical curriculum; Africa

Contents

Introduction

Medical education can roughly be distinguished into the pre-Flexner period of apprenticeship model of medical training, the Flexner era of biomedical approach to medical training and an approach integrating community-oriented medical education.[1] One of its key objectives of integrating community-oriented medical education was to train a team of health graduates with considerable knowledge and skills to work effectively in both rural and urban areas as well as to provide comprehensive health care to a defined geographical area, in partnership with members of the community. In the decades thereafter a number of other medical schools in developing countries came to the realization that the Pre-Flexner and the Flexner model of medical education were not sufficiently adequate to produce graduates able to address local community health needs.

The latter approach, the so-called Community-Based Education and Service (COBES) which has become widely accepted nowadays as an important innovation in undergraduate medical training was at the time considered as an educational intervention to address local community health needs. Community-Based Education and Service (COBES) is the "learning activity that uses the community as a learning environment, in which not only students but also teachers, members of the community, and representatives of other sectors are actively engaged throughout the students' educational experience".[2] COBES is increasingly being used in the delivery of undergraduate medical education in rural communities to address the disparity of health workers across the world, especially in the developing countries.

The first objective of COBES is to address the issues of training students in different contexts to seeing patients in the context of a secondary/tertiary hospital and those who present themselves at the healthcare facilities in the rural communities which emphasises primary health care. This will help students to appreciate those difference and help students to navigate different complexities.[3]

The second objective is for students to understand the efficiency of health services in the rural communities may benefit more from inclusion of health promotion and the prevention of diseases than from curative care'[4]and thirdly, COBES aims to reduce the inequity with respect to access to healthcare services by improving access to health facilities in the rural areas.

Despite the acknowledgement that many challenges of COBES such as lack of social amenities, poor road and transportation network and poor accommodation, both students and community members have expressed

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high satisfaction about its usefulness and benefits.[5,6] Furthermore, COBES has been identified to be an important approach to train doctors and other health professionals who are willing and able to work in underserved areas to bring equity in the distribution of health professionals, particularly to benefit the rural communities.[7–10] Nevertheless, a common understanding and overview of the evidence of the impact of COBES in influencing graduates' choice of speciality and willingness to accept rural postings in Africa is lacking. This systematic review will look at the strengths and weaknesses of COBES as an educational intervention in addressing the maldistribution of doctors to the rural areas in African countries.

Objective: To determine whether COBES, considered as part of the undergraduate medical training, aids in addressing the maldistribution of doctors in Africa.

Method

Search strategy and data sources

An initial search strategy was created using Medline (via Ovid) and Pubmed and applied to the rest of the databases. These databases were MEDLINE, CINAHL, ERIC, EMBASE, PsycINFO and Google scholar. Medical and subject headings (MESH) and free text words according to the objectives of the review were used (See appendi×1, Medline search strategy). The key words included community based medical education, medical students, undergraduate medical education, medical school curriculum, medical education, service learning, community-based education, community-based education and service (COBES), career choice, practice location, retention, rural areas, remote areas, recruitment, speciality, developing countries and Africa. Where appropriate, truncation and Boolean operators were used.

Inclusion criteria: Studies that included recruitment and retention outcomes of medical school programmes were selected regardless of design and methodology. This was done because of the relatively limited literature published in the field and only if the primary goal of the publications was about the role of community-based education in addressing the disparity of doctors in rural areas. The search date was from 1990 to 2018. This date range was chosen because preliminary search indicated that the integration of COBES into health professions curricula gained prominence in the 1990s. Only English language studies performed in African countries were selected and reviewed, since this review focuses on the effects of COBES in Africa.

Exclusion criteria: Studies that focused on admissions of students with rural background in addressing the disparity of rural doctors were excluded. Programmes that described a single rotation in the rural community not explicitly addressing attraction and retention were also excluded, as were publications that addressed rural, non-medical programmes.

Data extraction and analysis

Data extraction was initially done by AA on 10 studies. The findings were then discussed with other members of the team and used those discussion to guide further data extraction. If need be a third member of team was consulted for adjudication. The titles and abstracts of each paper were independently screened for inclusion by the first and last authors. Consensus was reached by all authors on which articles to be included in the review.

Data extracted included inclusion/exclusion criteria, study population, context of intervention (i.e., students, practicing health workers), specific intervention (i.e., Community-based education, rural outreach rotations), method of data collection, method of teaching and learning, key findings (outcomes). We used a narrative approach due to the different study designs, contexts and outcomes.

The overview of the selection process is provided in Fig. 1. The search of the electronic data yielded 309 publications. A further search using the so-called snow-balling approach to identifying further literature from the reference lists in relevant journal yielded 16 additional articles giving a total of 325 publications. The titles and abstracts of each publication were screened resulting in 155 duplications being removed. Another 144 studies were excluded after reading through the abstracts because of irrelevant programme context and others were rejected because they were done outside Africa. The end result was that 26 articles were retrieved and reviewed in full and the reference lists of these journal articles were reviewed again using the snow-balling approach. After applying the additional inclusion and exclusion criteria such as irrelevant materials and non-Africa studies to the abstracts and full-text articles, 18 were finally picked for inclusion in this systematic review (Fig. 1).

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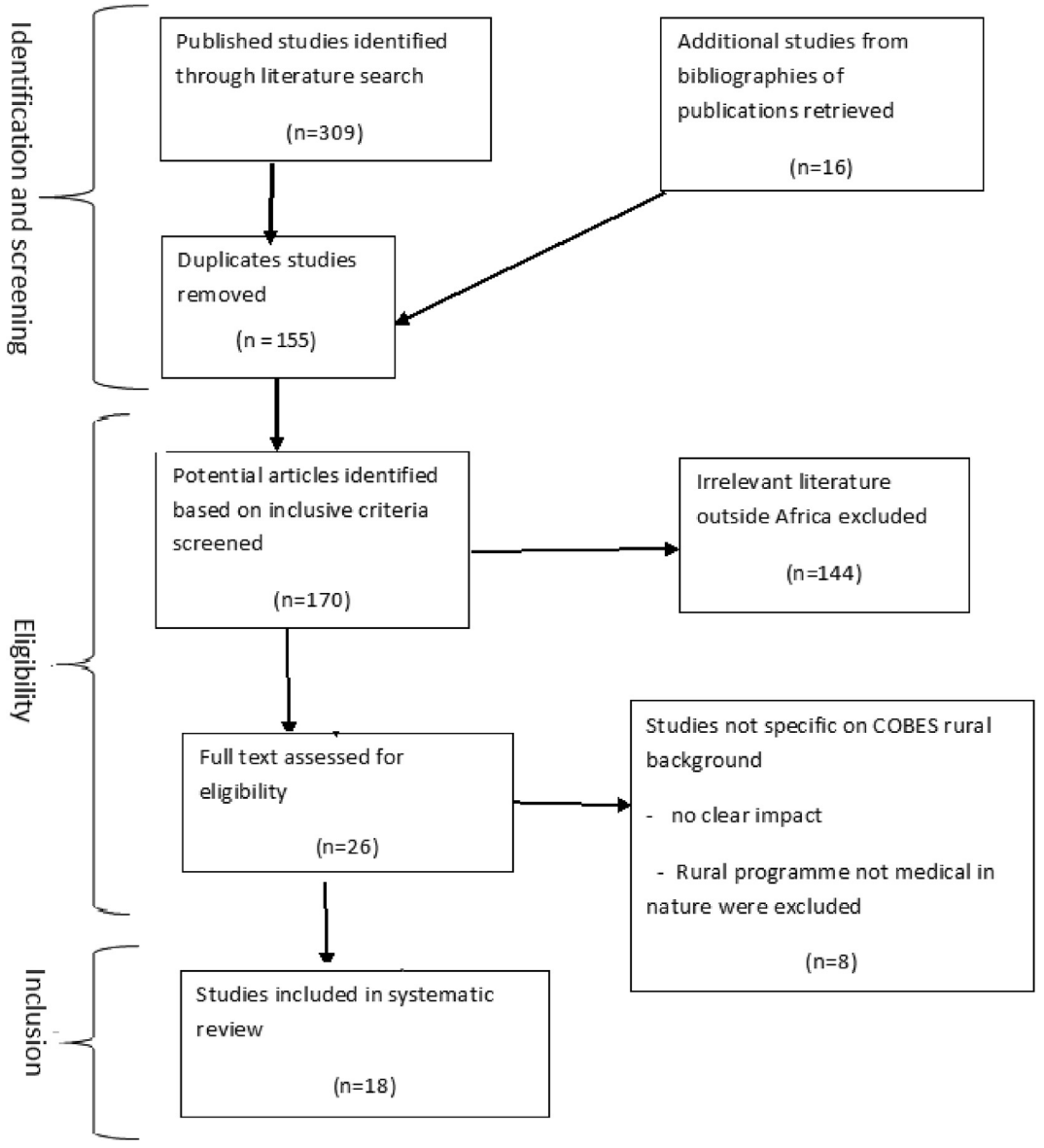

Fig. 1. Reporting studies for systematic review (PRISMA Diagram).

Results

General characteristics of the studies

Table 1 gives a summary of the 17 studies and one review, conducted in Ghana (4 studies), Uganda (6 studies), South Africa (3 studies and one review) and one study each from Nigeria, Tanzania, Democratic Republic of Congo and Botswana. All the studies were conducted in medical or health professions institutions among students, tutors/supervisors and graduates. The study methodologies were qualitative in nature employing cross-sectional descriptive studies using open-ended questions, individual interviews, focus group discussions, internet-based survey and a review.

All the studies were in the COBES curriculum context or incorporating rural outreach programmes or rural rotation.

Among the included studies, COBES/Rural outreach programmes was associated with the following: useful exposure acquisition of clinical, communication and interpersonal skills, development

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of team work, building competence in primary healthcare, the willingness to want to choose rural practice and addressing human resource gaps in the rural areas.

Concerning useful of exposure, Amalba et al[11] in as study among medical students in Ghana, found that over 80% of the students perceived COBES to be useful, meaningful and enjoyable[12] as the exposure helped them acquire essential communication, interpersonal[6,13,14] and clinical skills[13,14] relevant for rural practice. Furthermore, most students indicated that the rural exposure may influence them to want to choose to work in the rural areas after graduation.[6,11,12,15–17] The Studies conducted by Reid et al,[12] and Mwanika et al,[6] concluded that alumni of institutions using the COBES and rural outreach curricula attached premium on COBES contributing to the development of their team work, building competence in primary healthcare and also, that their current practice location in the rural areas was greatly influenced by their COBES experience. This is significant as it adds to the potential impact of COBES in influencing the practice location of graduates. In addition, placement of students in the rural communities during COBES/Rural outreach programmes helps to address the human resource gaps at the community.[18] Given the gaps in human resources for health especially in the rural areas and lower levels of service delivery in Africa, students' contributions to health delivery at facilities and in communities are bridging the gaps in services at the primary health care level. The shortages of health workers, the limited opening hours of health facilities, the long waiting time, unfriendly staff attitude and poor relationships between the community and health staff hinder access to basic health services. Undergraduate medical students therefore, can contribute through COBES to overcoming these barriers and potentially make an impact in health services delivery in the rural communities.

Discussion

We undertook this review to address an important issue of the role of COBES in tackling the maldistribution of doctors in the rural areas in Africa. This systematic review tried to gather emerging evidence from published studies on the role of Community-based education and service and other rural outreach programmes in addressing the maldistribution of doctors in Africa. The evidence outlined in this review builds on a similar review conducted by Wilson et al[15] on the critical review of the interventions to redress the inequitable distribution of health professionals to rural and remote areas. One of the key strategies to solving the disparities of rural-urban workforce maldistribution is by providing the opportunities for students to have part of their medical education training in the underserved communities. The ultimate aim of health education is to improve health outcomes. One of the strategies to improve health outcome is to increase access to quality health care across different population groups. The disparity of the distribution of health professionals between the rural and urban populations can contribute to differences in health outcomes.[19]

There has always been a mismatch between health professions education and the needs of the local health system globally. There is also pressure on medical education to become socially accountable. In Africa, attention has, therefore, been focused on medical education and retention of medical doctors. The most commonly reported strategies to improve retention of both health and non-health professionals include increasing salaries for workers, strengthening post graduate education and launching or strengthening community-based education.[20] A study by Snow et al, 2011,[21] on the key factors leading to reduced recruitment and retention of health professionals in remote areas of Ghana indicated that strategies to increase recruitment and retention of health professionals in remote areas for medical schools would be to include compulsory students' rotation in the rural areas. This would help alleviate the fears such as of lack of social amenities, poor road and transportation network and poor accommodation among medical students (often from the urban areas), increase their rural exposure and their understanding of actual conditions in the rural areas.

Many medical schools globally, including medical schools from African countries, have scaled up their rural components in the undergraduate curricula, thus responding to changes in health and making medical education more relevant to the needs of rural communities.[22] Changes such as decreasing disease, increasing knowledge on health, improved health seeking behaviour, and increasing primary prevention and primary health care[5,23,24] are seen as the benefits accruing for rural communities as students interact with community members. This will empower the communities to handle their own health needs and serve as a platform for communities to advocate for better health services.[25] Structured community exposure and community-based education has provided health profession students such as medical students with experiences of working with underserved

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Table 1
Characteristics of studies included in the systematic review.

Country	Reference	Study Population	Data collection methods	Key findings
Ghana	Amalba et al, 2016[5]	Medical graduates	Anonymous questionnaire	64% will choose to work in the rural area 82% found COBES to be very useful 61% and 68% of graduates from urban and cities respectively indicated that COBES will influence their practice location Adapted to rural lifestyle Identified community health needs
Ghana	Amalba et al, 2016[5]	Medical students Lecturers Community members	Anonymous questionnaire interview Focus group discussion	60% of students perceive COBES to influence their practice location Their presence in the community The awareness of community health needs Limited human resource in the community Benefit to the community Serves as role model to the youth
Ghana	Amalba et al, 2016[5]	Medical students	Questionnaire	More than 60% of students indicated role model during COBES could influence their practice location Over 51% of students indicated it could affect their choice of speciality.
Nigeria	Omotara et al, 2004[24]	Community leaders	Focus Group Discussion	Positive impact in community health, increased community awareness of preventive aspects of diseases
Uganda	Chang et al, 2011[16]	Medical students Faculty Site tutors	Internet based survey	More than 50% of students indicated a likelihood of working in the rural area after graduation Tutors and faculty also generally believed that the COBES program would encourage students to work in a rural setting in the future
Uganda	Kizito et al, 2017[17]	Medical, Pharmacy, Dental students Nursing	Questionnaire	A change in students' attitude towards working in the rural areas after COBES. COBES has the potential to increase the number graduates willing to work in the rural area Students are less influence by social amenities after COBES placement.
Uganda	Atuyambe et al, 2016[18]	Health workers Community members	Key informant interview Focus Group Discussion	Students contribute to health service delivery at the health facility Students contribute to health service delivery at the community level Addressing human resource gaps at community.
Uganda	Wakida et al, 2015[13]	Medical students	Questionnaire	Students with prior rural exposure expected to do community engagement Developed interpersonal skills, lifestyle practices and clinical skills
Uganda	Kaye et al, 2010[14]	Medical graduates Nursing graduates	Questionnaire	Acquired essential skills for rural practice Challenges (inequitable and poor remuneration), Inadequate equipment and supplies, limited opportunity for career progression, Limited access to continuous professional development,

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Uganda	Mwanika et al, 2011[6,35]	COBES Alumni Doctors	FGD, Telephone questionnaire	Alumni attaches premium on COBES contributing to the development team work, communication skills, competence in primary healthcare willingness to work in the rural area. 86% of Alumni were willing to work in the rural area and it was COBES that affected their willingness to do so. Study provides evidence which strongly points to the possibility that the positive impact of COBES endures with the alumni into the post-university years
South Africa	Iputo J. E, 2008[31]	Medical students Graduates	Intervention study	Increased numbers South African black doctors graduated, Attrition for black students dropped from 23% to <10% Preliminary research show that 36% of graduates practice in small towns and rural settings
South Africa	Reid et al, 2011[12,28]	Medical practitioners	structure questionnaire	Respondents reported that their experience at undergraduates of the community-based health care and rural situations influence their decision to practice where they do. The medical practitioners indicated that their rural experience was meaningful and enjoyable.
South Africa	Dambisya, 2003[37]	Medical students	Questionnaire	Rural preference is strongest among first year students and least among sixth year students.
South Africa	Wilson et al, 2009[15,29]	Review	Literature search	Moderate evidence that rural exposure as part of clinical rotation in the rural settings influence medical students to consider rural practice
D. R. Congo	Longombe, 2009[32]	Graduates	A review	The study provides evidence that rural-located medical schools can increase the distribution of practising Physicians to rural areas in DRC.
Tanzania	Kapanda et al, 2016[33]	Medical students	Self-Administered questionnaire	80% of the students were satisfied with the peripheral rural rotation Majority of the students had positive attitude towards peripheral Hospital placement.
Botswana	Arscott-Mills et al, 2016[34]	Medical students	Questionnaire, semi-structure interview	Most desire urban practice in a public institution or University Rural training did not influence preferred future practice location

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populations and has improved the graduates' preparation to deal with national health problems.[26]

In contrast to the above, there is no evidence that salary increment and other financial inducements have help with the recruitment and retention of health workers especially doctors in deciding the place of future practice.[27,28]

The evaluation of COBES/rural outreach programmes from the perspective of the community and the perspectives of alumni, faculty and students suggest that improvement of poorly equipped health facilities, students' preparation, conduct and supervision of community exposure programmes by medical schools will make rural communities more attractive to health workers. There is emerging evidence to suggest that medical schools need to improve on COBES objectives, implement structural adjustments and encourage policy makers to invest in the development of COBES programmes to yield more productive, efficient and better community-based interventions in order to produce a healthcare workforce that is equipped with public health skills to want to choose to work in rural areas.[23]

Furthermore, evidence emerging across Africa to suggest that COBES not only has a perceived influence on students' willingness to work in the rural communities after graduating, but graduates have also indicated that the undergraduate COBES experience influenced their present practice location.[6,11,28–31] Training medical students within a traditional curriculum without including any rural outreach programmes with the expectation that they would nevertheless opt to work in the rural area is unrealistic and unlikely to happen under any circumstances.[32] There is emerging evidence from studies from countries in Africa, such as Tanzania,[33] Botswana,[34] Democratic Republic of Congo,[32] Uganda,[13,14,16,17,35] D. R. Congo,[36] South Africa[15,28,37] and Ghana[38,39](Amalba et al, unpublished) which indicates that an innovative curriculum involving PBL/COBES that incorporates rural outreach programmes, positively affects students' eventual practice location. It is based on this evidence that the Medical Education Partnership Initiative (MEPI), sponsored by the US government, is supporting 25 medical schools in 12 African countries to increase the quality, quantity and retention of physicians in underserved areas. The MEPI programme will identify strategies within community-based education that are reproducible, scalable and also can optimize outcomes that will be instructive for health professions training programmes across the continent.[40]

It important to acknowledge that although there is emerging evidence that COBES curriculum could make an impact in health through strengthening health workforce, the evidence is not substantial and conclusive. Therefore, further longitudinal studies should be conducted with larger cohorts of students who are exposed to COBES or rural outreach programme as part of their training. We will need to conduct a prospective longitudinal follow up study to ascertain where the students are located.

The search for solutions to this global problem has been central to the policies of many governments and stakeholders in health professions education. Policymakers and curricula planners could learn from the evidence emerging from COBES and acknowledge that the establishment of COBES and rural outreach programmes as part of health training institutions' curricula to provide rural exposure for students may positively influence doctors to choose rural practice. This will help to address the rural-urban disparity in the distribution of doctors. Policymakers should be discussing the possibility of committing extra incomes to exposing medical students to the rural areas during their period of training as doctors as an alternative strategy in addressing the inadequacy of doctors in the rural areas.

Limitations

Common to most systematic reviews, it is possible that some medical schools in Africa that use PBL/COBES or rural outreach programmes aimed at addressing the shortages of health workers in the rural communities in Africa have not been identified. However, we believe that a comprehensive search to include most schools with such curricula addressing rural-urban disparity of health workers was performed. Again, due to the paucity of published studies showing evidence of the impact of COBES/rural outreach programmes, we could not assess the structural strengths and weaknesses of such interventions in Africa, although the individual studies provided useful insight. The findings are also limited by the fact that most of the studies were cross-sectional descriptive studies which have limited validity. Therefore, further longitudinal studies should be conducted with larger cohorts of students who are exposed to COBES or rural outreach programme as part of their training.

Future studies should also focus on the design and methodology to ascertain the strengths and weaknesses of each study regarding the impact of COBES/rural

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outreach programmes on health workers willingness to work in the rural areas in Africa.

Conclusion

This review reveals that there is emerging evidence that COBES and rural outreach programmes are making an impact on health services delivery in the rural areas. Also, there is growing evidence that exposure of health professions students, especially medical students, to the rural areas may influence their eventual choice to work in the rural areas after graduation. Graduates of institutions that incorporate COBES and rural outreach programmes have testified that their present practice location in the rural communities was influenced by the undergraduate rural exposure through COBES. We, therefore, recommend that COBES/rural outreach programmes could be made part of the undergraduate medical curricula in all health training institutions in Ghana in particular, and the sub-Saharan African sub-region in general taken into consideration differences in curriculum type and regional differences in health workforce'.

Consent for publication

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Authors' contributions

A. A. and WvM jointly conceived the study. All authors were involved in the selection of articles for the review. All authors critically reviewed and revised the manuscript for useful expert content and agreed for it to be submitted for publication.

Declaration of Competing Interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of this article.

References

1. Magzoub ME, Schmidt HG. A taxonomy of community-based medical education. *Acad Med*. 2000;75(7):699–707.
2. Organization WH. *Health guidelines for the use of wastewater in agriculture and aquaculture: report of a WHO scientific group [meeting held in Geneva from 18 to 23 November 1987]*. 1989.
3. Kristina TN, Majoor GD, van der Vleuten CPM. Does CBE come close to what it should be? A case study from the developing world. Evaluating a programme in action against objectives on paper. *Educ Health*. 2005;18(2):194–208.
4. Bligh J. Tomorrow's Doctors: extending the role of public health medicine in medical education. *Med Educ*. 2002;36(3):206–207.
5. Amalba A, van Mook W, Mogre V, Scherpbier A. The perceived usefulness of community based education and service (COBES) regarding students' rural workplace choices. *BMC Med Educ*. 2016;16(1):130.
6. Mwanika A, Okullo I, Kaye DK, et al. Perception and valuations of community-based education and service by alumni at makerere university College of health Sciences. *BMC Int Health Hum Right*. 2011;11(Suppl 1). S5.
7. Hamad B. Community-oriented medical education: what is it? *Med Educ*. 1991;25(1):16–22.
8. McAllister L, McEwen E, Williams V, Frost N. Rural attachments for students in the health professions: are they worthwhile? *Aust J Rural Health*. 1998;6(4):194–201.
9. Harris M, Gavel PH. Factors influencing decisions about the state in which doctors plan to practise: additional results from the 2002 Australian Medical Workforce Advisory Committee national survey. *Aust Health Rev*. 2005;29(3):278–284.
10. Magnus J, Tollan A. Rural doctor recruitment: does medical education in rural districts recruit doctors to rural areas? *J Med Educ*. 1993;27:250–253.
11. Amalba A, van Mook WN, Mogre V, Scherpbier AJ. The effect of Community Based Education and Service (COBES) on medical graduates' choice of specialty and willingness to work in rural communities in Ghana. *BMC Med Educ*. 2016;16(1):79.
12. Reid SJ, Couper ID, Volmink J. Educational factors that influence the urban-rural distribution of health professionals in South Africa: a case-control study. *S Afr Med J*. 2011;101(1):29–33.
13. Wakida EK, Ruzaaza G, Muggaga K, Akera P, Oria H, Kiguli S. health-profession students' teaching and learning expectations in Ugandan medical schools: pre-and post community placement comparison. *Adv Med Educ Pract*. 2015;6:641.
14. Kaye D, Mwanika A, Sekimpi P, Tugumisirize J, Sewankambo N. Perceptions of newly admitted undergraduate medical students on experiential training on community placements and working in rural areas of Uganda. *BMC Med Educ*. 2010;10(1):47.
15. Wilson N, Couper I, De Vries E, Reid S, Fish T, Marais B. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health*. 2009;9(2):1060.
16. Chang LW, Kaye D, Muhwezi WW, et al. Perceptions and valuation of a community-based education and service (COBES) program in Uganda. *Med Teach*. 2011;33(1):e9–e15.
17. Kizito S, Baingana R, Mugagga K, Akera P, Sewankambo NK. Influence of community-based education on undergraduate health professions students' decision to work in underserved areas in Uganda. *BMC Res Notes*. 2017;10(1):726.
18. Atuyambe LM, Baingana RK, Kibira SP, et al. Undergraduate students' contributions to health service delivery through community-based education: a qualitative study by the MESAU Consortium in Uganda. *BMC Med Educ*. 2016;16(1):123.
19. Dussault G, Franceschini M. Not enough there, too many here: understanding geographical imbalances in the distribution of the health workforce. *Hum Resour Health*. 2006;4:12.
20. Chen C, Buch E, Wassermann T, et al. A survey of Sub-Saharan African medical schools. *Hum Resour Health*. 2012;10(4).

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21. Snow RC, Asabir K, Mutumba M, et al. Key factors leading to reduced recruitment and retention of health professionals in remote areas of Ghana: a qualitative study and proposed policy solutions. *Hum Resour Health*. 2011;9(13), 10.1186.
22. Crampton PE, McLachlan JC, Illing JC. A systematic literature review of undergraduate clinical placements in underserved areas. *Med Educ*. 2013;47(10):969−978.
23. Mbalinda SN, Plover CM, Burnham G, et al. Assessing community perspectives of the community based education and service model at Makerere University, Uganda: a qualitative evaluation. *BMC Int Health Hum Right*. 2011;11(Suppl 1). S6.
24. Omotara B, Padonu M, Yahya S. Assessment of the impact of community-based medical education of the University of Maiduguri on communities in three local government areas of Borno State, Nigeria: community leaders' perspectives. *Educ Health*. 2004;17(1):6−16.
25. Mubuuke AG, Kiguli-Malwadde E, Byanyima R, Businge F. Evaluation of community based education and service courses for undergraduate radiography students at Makeree University, Uganda. *Rural Remote Health*. 2008;8(4):976.
26. Mullan F, Frehywot S, Omaswa F, et al. Boelen C: medical schools in sub-Saharan Africa. *The Lancet*. 2011;377(9771): 1113−1121.
27. Johnson JC, Nakua E, Dzodzomenyo M, et al. For money or service? A cross-sectional survey of preference for financial versus non-financial rural practice characteristics among Ghanaian medical students. *BMC Health Serv Res*. 2011;11(1):300.
28. Reid S, Couper I, Volmink J. Educational factors that influence the urban-rural distribution of health professionals in South Africa: a case-control study. *SAMJ (S Afr Med J): S Afr Med J*. 2011;101(1):29−33.
29. Wilson N, Couper I, De Vries E, Reid S, Fish T, Marais B. Inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health*. 2009;9(1060).
30. Kotha S, Johnson J, Galea S, Agyei-Baffour P, Nakua E, Asabir K, et al. Lifecourse factors and likelihood of rural practice and emigration: a survey of Ghanaian medical students. *Rural Remote Health*. 2012;12(1898):1−13.
31. Iputo JE: Faculty of Health Sciences, Walter Sisulu University. Training doctors from and for rural South African communities. *Medicc Review*. 2008;10(4):25−29.
32. Longombe AO. Medical schools in rural areas−necessity or aberration. *Rural Remote Health*. 2009;9(3):1131.
33. Kapanda GE, Muiruri C, Kulanga AT, et al. Enhancing future acceptance of rural placement in Tanzania through peripheral hospital rotations for medical students. *BMC Med Educ*. 2016;16(1):51.
34. Arscott-Mills T, Kebaabetswe P, Tawana G, et al. Rural exposure during medical education and student preference for future practice location-a case of Botswana. *African J Prim Health Care Fam Med*. 2016;8(1):1−6.
35. Mwanika A, Okullo I, Kaye DK, et al. Perception and valuations of community-based education and service by alumni at makerere university College of health Sciences. *BMC Int Health Hum Right*. 2011;11(SUPPL. 1) (no pagination)(S5).
36. Ahuka L. Medical schools in rural areas-necessity or aberration. *Rural Remote Health*. 2009;9:1131.
37. Dambisya YM. Career intentions of UNITRA medical students and their perceptions about the future. *Educ Health Abingdon-Carfax Publ Ltd*. 2003;16(3):286−297.
38. Amalba A, Abantanga FA, Scherpbier AJ, van Mook W. Working among the rural communities in Ghana-why doctors choose to engage in rural practice. *BMC Med Educ*. 2018;18(1):133.
39. Amalba A, Abantanga F, Scherpbier A, van Mook W. Community-based education: the influence of role modeling on career choice and practice location. *Med Teach*. 2017;39(2):174−180.
40. Talib ZM, Baingana RK, Sagay AS, Van Schalkwyk SC, Mehtsun S, Kiguli-Malwadde E. Investing in community-based education to improve the quality, quantity, and retention of physicians in three African countries. *Educ Health*. 2013;26(2):109.

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