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Journal of Interprofessional Care

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ijic20

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To cite this article: Gatera Fiston Kitema, Anita Laidlaw, Veronica O'Carroll, Jean Baptiste Sagahutu & Andrew Blaikie (2023): The status and outcomes of interprofessional health education in sub-Saharan Africa: A systematic review, Journal of Interprofessional Care, DOI: 10.1080/13561820.2023.2168631

To link to this article: https://doi.org/10.1080/13561820.2023.2168631

Published online: 05 Feb 2023.

JOURNAL OF INTERPROFESSIONAL CARE
https://doi.org/10.1080/13561820.2023.2168631

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ORIGINAL ARTICLE

The status and outcomes of interprofessional health education in sub-Saharan Africa: A systematic review

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ABSTRACT

The increasing burden of chronic diseases, and shortage of health care workers especially in Low and Middle Income countries (LMICs) requires greater collaborative working between health professions. There is a growing body of evidence that interprofessional education (IPE) and interprofessional continuous education (IPCE) can improve collaborative practice thus strengthening health care delivery in low resource settings. The World Health Organization (WHO) promotes this educational strategy in these regions as part of wider programs to improve health care. The purpose of this systematic review was to summarize IPE and IPCE activities in sub-Saharan Africa (SSA) and its outcomes; including practice, service and patient outcomes. Standard guidelines for conducting and reporting systematic reviews were followed. The online databases searched included MEDLINE, Embase, Education Resources Information Centre (ERIC), the Cumulative Index of Nursing and Allied Health Literature (CINAHL) and Science Direct. The Kirkpatrick model was used to classify IPE outcomes reported from literature. Following full text screening, 41 articles were selected for data extraction. It was found that IPE/IPCE is still a relatively new concept in SSA with 93% of studies published after 2012. Furthermore, IPE is concentrated predominantly in undergraduate institutions and mainly implemented to improve collaborative practice and address important public health concerns. Positive reaction and outcomes of IPE/IPCE were reported in terms of change of attitude and perception toward collaborative practice as well as knowledge and skills acquisition. Few studies in SSA sought to understand and measure the outcomes of IPE/IPCE relating to health care practice. More work in this important potential outcome of IPE/IPCE is recommended.

ARTICLE HISTORY
Received 23 May 2022
Revised 8 December 2022
Accepted 7 January 2023

KEYWORDS
Collaborative practice; health education; interdisciplinary practice; interprofessional education; sub-Saharan Africa

Introduction

The Centre for the Advancement of Interprofessional Education (CAIPE) defines interprofessional education (IPE) as "occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care" (CAIPE, 2002). There is a growing body of evidence showing that effectively delivered interprofessional collaboration can improve health outcomes (Reeves et al., 2017). Consequently, the World Health Organization (WHO) report (2010) recommends adoption of IPE to improve health care delivery through greater collaborative working. This is to maximize the capacity of stretched and under-resourced health systems to deal with the ever increasing burden of disease, especially with the rise of non-communicable diseases (NCDs) in many emerging economies (Bigna & Noubiap, 2019).

The Lancet Commission on health professionals for a new century (Frenk et al., 2010) highlighted that "poor teamwork . . . so-called tribalism of the professions where various professions act in isolation from or even in competition with each other" is hindering the delivery of care and that adoption of IPE is one part of the solution to deal with this "tribalism" (Frenk et al., 2010, p. 1). Reeves et al. (2010) added that health professionals who value input from colleagues of other professional groups and specialties demonstrate enhanced co-operation and collaboration.

There is consequently a growing body of evidence supporting the use of IPE to assist in improving the quality of health delivery and health services outcomes (Reeves et al., 2016). However, much of this evidence is based on studies conducted in high resource settings and according to the Africa Interprofessional Education Network (AfrIPEN) there is limited evidence on IPE and interprofessional collaboration (IPC) from lower-resource settings including sub-Saharan Africa (SSA). This is despite the greater need in such regions where higher prevalence of diseases, limited resources, poverty and scarce workforce are common challenges leading to weak health care collaboration and less effective service delivery (Botma & Snyman, 2019). Another increasingly popular approach to health and wellbeing in SSA is "One health." One health is an approach that brings together multiple professions and disciplines to address challenges related to human, animal and environmental health in a multisectoral approach (Human health, animal health and environmental health). This interprofessional approach aims to design and implement programs, policies, legislation and research for better broad public health outcomes (WHO, 2019).

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Xyrichis et al. (2018) found that different terms like "interprofessional collaboration", "multidisciplinary coordination", "trans-professional teamwork" and others have been used to describe collaboration in health care teams. Xyrichis et al. (2018) further suggested that detailed evaluation of the nature of collaborations is required in order to consider an intervention as an interprofessional one according to the WHO and CAIPE specifications. Interprofessional interventions can be delivered either during initial professional training (IPE) or to graduated professionals in practice (interprofessional continuous education or IPCE). IPCE focuses on practice based cadres in a form of lifelong learning (Gilbert et al., 2010). IPE was re-explored further in a scoping review (Reeves et al., 2011) with three main forms of interprofessional intervention noted, namely interprofessional education (IPE), interprofessional practice (IPP), and interprofessional organizational (IPO). IPP interventions are activities or procedures embedded and implemented in regular practice to develop collaboration thus the quality of care. IPO interventions are implemented at the organizational level to strengthen collaboration and the quality of care. Reeves et al. clarified that the IPE intervention focuses mainly on pre-qualification (through education systems) while both IPP and IPO are mainly post-qualification interventions that may be considered as a form of IPCE.

Outcomes of both IPE and IPCE can be evaluated using the Kirkpatrick (1959, 1996) model that was adapted and extended by Barr (2000). The extended model includes trainee reaction, learning (knowledge, attitude and skills), behavior in practice, as well as results at the organizational and personal level (patient outcomes). This adapted model has been evaluated by Hammick et al. (2009) and deemed more useful in evaluating outcomes of IPE.

The SSA region suffers significantly greater burden of diseases, both communicable and non-communicable (Gouda et al., 2019) and, at the same time, has a critical shortage of health care providers (Afriyie et al., 2019). As health professions education is reformed in these lower-resource regions and IPE and IPC adopted to address the growing health care challenges, there is a need to understand the current status of IPE and its outcomes in SSA. The aim of this review is to summarize the IPE and IPCE activities in SSA, and the outcomes on health practice, service and patient care. This is intended to enable teaching institutions and health care systems in the region to use IPE and IPCE strategies most effectively in the future to positively impact health care delivery.

Review objectives

The following objectives were set for this review:

- To understand the status (what, who, how, where, when) of IPE and IPCE in SSA.
- To identify reported outcomes of both pre-qualification and practice based interprofessional education (IPE and IPCE) in SSA on satisfaction, knowledge, attitude and behavior in practice as well as organizational or patient outcomes.

Methods

Search strategy

Standard systematic review procedures were followed and the protocol for the review was registered with the International Prospective Register of Systematic Reviews (University of York, 2021). The Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) (Moher et al., 2009) informed the search strategy development for this review.

The online databases searched included MEDLINE, Embase, Education Resources Information Centre (ERIC) the Cumulative Index of Nursing and Allied Health Literature (CINAHL) and Science Direct. Additionally, citation searching on included studies was performed. A gray literature search was conducted on platforms including the CAIPE, and the African Interprofessional Education Network (AfrIPEN) website as well as Google scholar. No publication timeline restrictions were applied. The literature search was conducted between January 2021 and March 2021, and the search strategy can be found in appendix A.

All identified references were uploaded on a systematic review management software (Rayyan, 2021) allowing duplicate removal and collaboration in the screening of literature. Two members of the research team screened each abstract against the inclusion and exclusion criteria to decide whether the full article should be read. A third member was consulted to address conflicts in the screening process. Similarly, every included full article was screened by at least two researchers before passing it to the final stage of exclusion or inclusion, with a third member in the case of conflicts and discrepancies.

Inclusion criteria

Inclusion criteria for studies were:

- Those conducted in the SSA region with full-text available in English language.
- Intervention studies (both RCTs and non-randomized).
- Systematic reviews.
- Quantitative, qualitative and mixed methods for data collection and analysis.
- Those that met the CAIPE definition of IPE (CAIPE, 2002) or those that describe an intervention that met the CAIPE definition in education or practice setting.
- Those that describe interprofessional engagement of different types of health professionals.
- Reports describing interprofessional initiatives in SSA with no outcome measures.

Participants

Only students or health care team and collaborators in public or private teaching institutions, hospitals and non-governmental organizations were included in this review.

Interventions

The intervention considered were interprofessional health education or training.

Outcomes

Learner satisfaction or reaction in general, learning (knowledge, attitudes, and skills), behavior in practice as well as results at the organizational and personal levels (patient outcomes).

Exclusion criteria

Exclusion criteria for studies were:

- Literature with no full text.
- Studies with described interventions that did not meet the CAIPE IPE definition.
- Studies where no IPE was conducted.
- Studies conducted outside the SSA region.

Quality assessment of the included studies were conducted by two reviewers (GFK, AB) and was guided by the Joanna Brigg Institute (JBI) tools (JBI, 2020) for quality assessment, and both quality of study (design and implementation) and quality of information (sampling, ethics, possible bias) were assessed by assigning a score on each component. However, the quality of information was given greater weighting as this review sought to understand and capture as much information as possible on the development and progress of IPE in SSA.

Data extraction forms were developed guided by the best practice medical education (BEME) review (Hammick et al., 2009) and the forms were piloted prior to data extraction. Information extracted from articles included author, title, study design, year of publication, countries of study, IPE details (Aim, professions involved, professional context, duration, setting, provider or funder). Some of the information extracted are presented in Table 1 and narratively. In addition, data on IPE intervention outcomes were also retrieved. Extracted data were pulled together and grouped for a narrative synthesis. Components of the narrative synthesis were the status of IPE and IPCE in SSA and the evaluation of IPE and IPCE in SSA.

Results

The conducted literature search generated 3225 articles, and after de-duplication, 2942 were considered for abstract screening. The screening resulted in 109 articles carried forward for full text screening. Following full text screening, 41 articles were selected for data extraction after meeting the inclusion criteria (Figure 1). The level of agreement among screeners was 87%.

The 41 studies included in the review were published between 1998 and 2021, with 93% (38) of the studies published after 2012. Most IPE interventions in SSA were conducted in South Africa (17,41%), Uganda (7,17%), Rwanda (6,15%), Nigeria (4,8%), Tanzania, Botswana and Malawi (3,7%) each, Mozambique, Zimbabwe, Zambia, Ghana and Kenya have (2,5%) each. Then finally, the Democratic Republic of Congo, Ethiopia and Lesotho combined accounting for 7% of the presented IPE work. Additionally, the analysis showed that 7% (3) of the reported IPE initiatives were the results of collaboration among institutions or professions based in SSA countries and another 7%(3) as extended international collaboration. Reflecting on the quality of included studies, 22% were case studies and did not report much on IPE outcomes. Only 73% quantitative, qualitative and mixed methods studies were considered for IPE outcomes. The average assigned quality score across the included studies was 68% (median 70%, range 37–100%).

The status of IPE in SSA

Most of the IPE work in SSA were concentrated in pre-qualification training (27, 66%) and those in practice as part of IPCE (14, 34%). Patient or case simulation learning and service learning as well as community-oriented learning accounted for 46% (19) of the IPE initiatives in SSA, and classroom-based IPE was found in 17% (7), with interactive workshops appearing in 41% (17) of the IPE initiatives in SSA with some studies reporting a mixture of the above learning environments. In addition, IPE initiatives in SSA were mostly driven by Institutions such as Universities (29, 71%) or Hospitals (8, 20%), whilst the rest (4, 10%) were driven by policies (government) or non-governmental organizations. The analysis clarified that 51% (21) of the studies reported to have received funding offered through universities (68%), NGOs (23%) or other sources.

The literature shows that a total of 3238 participants, including facilitators, took part in IPE and IPCE combined. The minimum number of participants in a session was 10 and the maximum was up to 762. The reviewed studies present that the average participants in an IPE and IPCE session was 108 (median = 46). IPE/IPCE facilitators were mainly provided by the organizing or funding institutions. The professions mostly involved in IPE and IPCE considering the number of articles reported on them in the SSA were Medicine (29, 71%), Nursing (29, 71%), Physiotherapy (17,41%), Occupational Therapy (13, 32%), Nutrition and dietetics (13, 32%), Pharmacy (13, 32%), Social workers (11, 27%), and others professions (allied eye health, allied health professions, gynecology, exercise and sports science, speech and language therapy, laboratory, medical archivists, community health workers, biokinetics, medical research, environmental health, education, dentistry and oral health, veterinary medicine, biological sciences, wildlife management, agricultural and forestry sciences, laws and the liberal arts, meteorology, commerce, accounting, computer engineering, chaplaincy and anthropology) were involved in at least one reported IPE/IPCE activities or article. Ninety-two percent of the IPE/IPCE initiatives brought together two to seven professions (mode = 4).

The aims of IPE/IPCE in SSA were concentrated on developing and advancing collaborative practice (11, 27%), primary health care development (7, 17%), maternal and child health development (6,15%), “One health” and global health development (3, 7%), HIV/AIDS care (3, 7%), cancer care (2, 5%), community health development (2, 5%) and others (malaria care, palliative care, cultural-clinical immersion, geriatrics care, physical trauma care, tuberculosis management, non-technical skills development, eye health care and infection control) covering 22% (9). IPE was mostly delivered through face-to-face interactions (32, 78%) and only one (3%) online session was reported. Eight (19%) of the included studies did not specify

Table 1. Summary of 41 included studies.

IPE aim	Health Professions involved	Professional context	Setting	IPE Duration (Range)	Mode of teaching/ learning	Provider/ Funder	Country	Author and year of publication
Collaborative practice enhancement	Natural Medicine Physiotherapy Nursing Occupational therapy Psychology Sports science Pharmacy Education specialists Nutrition and dietetics Dentistry and Oral Health Social Sciences General Medicine Biokinetics Optometry	Pre-qualification Post-qualification	Community University Hospital	2 hours – 27 days	**Face to face**: Community-based learning Classroom-based interactive learning Interactive workshops/ IPCE Practical case simulation	University/ Higher learning institution	South Africa Botswana Rwanda Mozambique	Mpofu et al. (2014) Karuguti et al. (2017) Davis et al. (2015) Julie et al. (2016) Snyman and Donald (2019) Sagahutu et al. (2020) Sagahutu et al. (2021) Botma and Labuschagne (2019) Reitsma et al. (2019) Scrooby et al. (2019) Ferrao et al. (2014)
Primary Health Care development	General medicine Occupational therapy Physiotherapy Speech and hearing therapy Social work Nutrition and dietetics Optometry Nursing Midwifery Pharmacy Health economics and management Natural medicine Sport science	Pre-qualification Post-qualification	Community University and Hospital University and community University	2 hours – constant twice weekly ward rotations.	**Face to face** Community-based learning Interactive workshops/ IPCE Practical case simulation	University/ Higher learning institution	South Africa Zambia and Malawi	Muller et al. (2019) Kools et al. (2015) Waggie et al. (2014) Muller et al. (2019) Van Wyk et al. (2020) Lazarus et al. (1998) Snyman and Donald (2019)

(*Continued*)

Table 1. (Continued).

IPE aim	Health Professions involved	Professional context	Setting	IPE Duration (Range)	Mode of teaching/ learning	Provider/ Funder	Country	Author and year of publication
One health and global health development	General medicine Nursing Veterinary medicine Environmental health sciences Wildlife and aquatic resources management Biomedical laboratory sciences Agricultural and forestry sciences Social sciences Education Law and the liberal arts Metrology Biological sciences Commerce and accounting Computer engineering Pharmacy Sociology Anthropology	Pre-qualification	University Community	44 days – 7 weeks	**Face to face** Community-based learning Interactive workshops/ IPCE **Online** Online interactive learning	University/ Higher learning institution Non-governmental organization (NGO)	Uganda Rwanda	Martini and Caceres (2012) Porta et al. (2020) Buregyeya et al. (2021)
HIV/AIDS care	General medicine Nursing Community health workers Biomedical laboratory Sciences Psychologist Pharmacy Clinical Research scientists	Pre-qualification Post-qualification	Hospital University	2–5 days	**Face to face** Interactive workshops/ IPCE Practical case simulation	Hospital University/Higher learning institution Non-governmental organization (NGO)	Nigeria South Africa Uganda	Alexander et al. (2015) Chetty et al. (2020) Kiguli-Malwadde et al. (2020)
Cancer management	Specialised medicine General medicine Pharmacists Nursing Midwives Health officers	Post-qualification	Hospital	1 hour – 5 days	**Face to face** Interactive workshops/ IPCE	Hospital	Zimbabwe Uganda	Ndarukwa et al. (2017) Levine et al. (2011)
Maternal and child health	Environmental health General medicine Nursing Pharmacy Business officers Marketing officers Education experts Health services managers Politicians Faith community leaders Midwifery Occupational therapy Physiotherapy Speech and language Therapy Project management Social worker Psychiatrists Psychologists Health volunteering Social care (children)	Pre-qualification Post-qualification	Community University Hospital	1 day – 2 years Masters degree course	**Face to face** Community-based learning Classroom-based interactive learning Interactive workshops/ IPCE Practical case simulation	Hospital University/Higher learning institution Non-governmental organization (NGO)	Tanzania Uganda Malawi Kenya Rwanda	Leshabari et al. (2012) Chamberlain and Watt (2012) Egenberg, Karlsen, et al. (2017) Data et al. (2020) Dressel et al. (2017) Vostanis et al. (2019)

(*Continued*)

Table 1. (Continued).

IPE aim	Health Professions involved	Professional context	Setting	IPE Duration (Range)	Mode of teaching/ learning	Provider/ Funder	Country	Author and year of publication
Other (Malaria care, Palliative care, Cultural-clinical immersion, Geriatrics care, Physical trauma care, Tuberculosis management, Non-technical skills development, Eye health care, Infection control)	Biomedical laboratory sciences Health management Nursing General medicine Pharmacy Social Worker Faith and chaplaincy Physiotherapy Occupational therapy social work Community health officer Specialised medicine Clinical Medical Officer Ophthalmic Clinical Officer	Pre-qualification Post-qualification	Hospital University Community	2 hours–4 weeks	**Face to face** Community based learning Classroom-based interactive learning Interactive workshops/ IPCE Practical case simulation	Hospital University/Higher learning institution Government	Uganda Botswana, Ghana Nigeria South Africa Rwanda	Namagembe et al. (2012) Ersek et al. (2010) Morton (2012) Akoria (2012) Pitout et al. (2016) Farley et al. (2021) Abahuje et al. (2021) O'Carroll et al. (2020) Zocher et al. (2019)

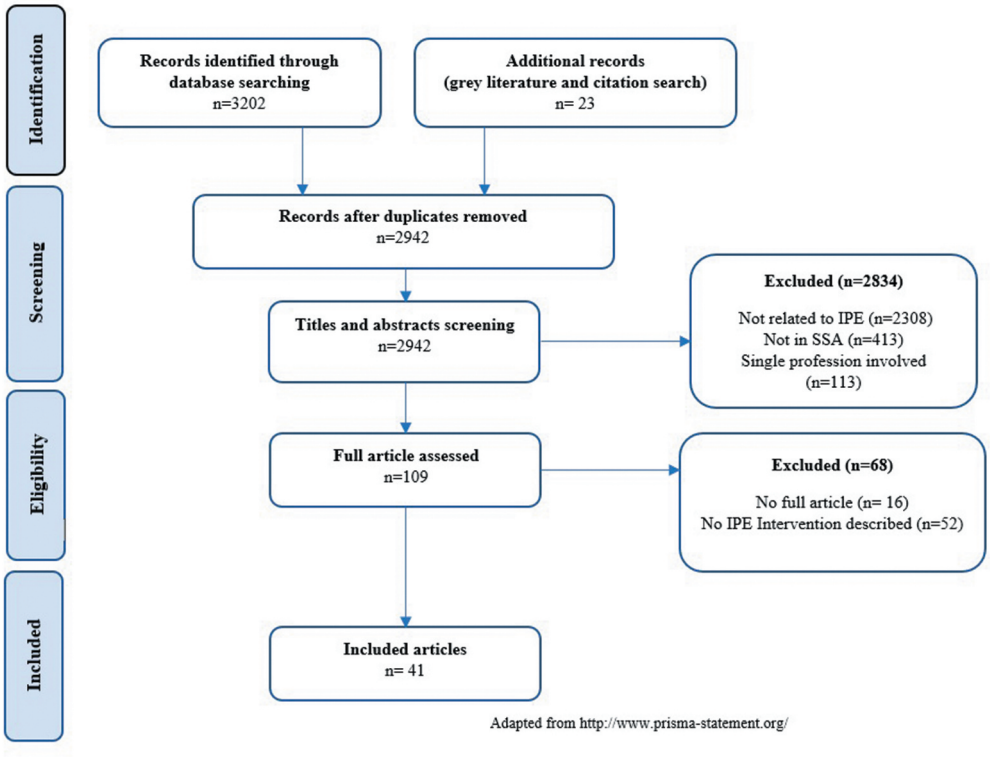

Figure 1. The PRISMA flow diagram from the systematic review on IPE in the SSA region.

the mode of teaching to be either face to face, online or blended with both. The duration of training dominantly ranged between 2 hours and 1 week in length (17,39%).

Evaluation of IPE in SSA

The evaluation of IPE initiatives in SSA in this review focused on synthetizing the outcomes of IPE/IPCE initiatives based on the adapted Kirkpatrick model (Barr, 2000; Hammick et al., 2009) of evaluating the outcomes of education and training programs. Data on IPE/IPCE outcomes were extracted from quantitative, qualitative or mixed methods evaluations and details on the outcome measures have been attached with the supplementary document (Appendix B). Most studies touched on the reaction of learners and facilitators, change in perception and attitudes toward learning, knowledge and skills acquisition after an IPE/IPCE session. However, little attention was given to assessing the behavioral change of participants after IPE/IPCE, the outcomes on wider changes in the organization and delivery of care or improvements in health or wellbeing of patients. (Table 2)

Learners' reaction

Learners' reactions were captured in 13 of the included studies and the overall reaction reflected was positive (Buregyeya et al., 2021; O'Carroll et al., 2020; Scrooby et al., 2019). Learners expressed that the learning environment was conducive for them and the interactions with colleagues from other professions enhanced their learning. In addition, learners appreciated each other's role in health care delivery, experience sharing and interactions after IPE sessions (Leshabari et al., 2012; Mpofu et al., 2014; Reitsma et al., 2019; Vostanis et al., 2019). Learners appreciated the process of interprofessional learning using simulation methods and community interactions (Chetty et al., 2020; Davis et al., 2015; Van Wyk et al., 2020).

Modification of perceptions and attitudes

There was a positive change in attitude toward, and perceptions of, IPE in SSA with 18 studies in this review focusing on this component in their outcomes. Some studies (Botma & Labuschagne, 2019; Julie et al., 2016; O'Carroll et al., 2020; Pitout et al., 2016) detailed that learners' perceptions and attitudes to collaborative learning and practice improved. There was also more appreciation of collaboration and each profession's role in effective team performance (Martini & Caceres, 2012; Mpofu et al., 2014; Reitsma et al., 2019; Snyman & Donald, 2019).

Acquisition of knowledge and skills

The literature reported acquisition of knowledge and skills through IPE in SSA. The authors (Dressel et al., 2017; Leshabari et al., 2012; Levine et al., 2011) noted that learners both in pre-qualification and those in practice found IPE to be ideal for knowledge and skills improvement in communication, teamwork and quality care enhancement. Some authors expressed that learning through interactive simulations, practical and service learning could contribute to more skills and knowledge retention (Data et al., 2020; Egenberg, Masenga, et al., 2017; Levine et al., 2011; Sagahutu et al., 2021), but this would need further investigation. In addition, IPE facilitated acquisition of knowledge in the new area of "One Health" approach as revealed by Porta (Porta et al., 2020).

Table 2. IPE outcomes in SSA ($n = 30$) classified according to the adapted Kirkpatrick's model (Barr, 2000; Hammick et al., 2009).

Adapted Kirkpatrick's model		Number of studies n(%)	Summarized outcomes	Author and year of publication
1	Reaction	13(40)	The reactions to the interprofessional education session included: • Opportunity for developing self-growth, collaboration and learning • Appreciation of diversity, traditions, and health needs • Appreciation of each discipline's role in achieving health at the community level • Unity of people and ideas through collaboration to create better solutions for the community • Motivation to better learn and teach about challenging diseases like HIV • Positive problem-based learning, team strengthening and collaborative work • Recommended educational and training approach for practical learning of subjects like anatomy and others	Mpofu et al. (2014) Davis et al. (2015) Reitsma et al. (2019) Scrooby et al. (2019) Van Wyk et al. (2020) Buregyeya et al. (2021) Martini and Caceres (2012) Chetty et al. (2020) Kiguli-Malwadde et al. (2020) Leshabari et al. (2012) Vostanis et al. (2019) Ersek et al. (2010) O'Carroll et al. (2020)
2a	Modification of perceptions and attitudes	17(57)	The synthesized evidence reported that through IPE: • Learning with other professions was beneficial and more thought-provoking • Soft and professional skills could be developed and health care needs could be met with limited resources • Common client-centered outcomes could be achieved • Professional and territorial hierarchies would collapse • Could improve teamwork and good communication • Could promote the understanding of other health care professionals' roles and clinical skills • Positive learning experience and collaboration can be achieved • Positive change in perception of other disciplines could be achieved • Significant educational value and broadened perspectives could be promoted • Could lead to improved work relationships and company culture • Enhanced respect toward colleagues' and other health professional' knowledge and skills • Enhanced self-efficacy and reduced stress • Increased confidence in delivering care to patients	Mpofu et al. (2014) Davis et al. (2015) Julie et al. (2016) Snyman and Donald (2019) Sagahutu et al. (2021) Botma and Labuschagne (2019) Reitsma et al. (2019) Scrooby et al. (2019) Van Wyk et al. (2020) Buregyeya et al. (2021) Martini and Caceres (2012) Alexander et al. (2015) Chetty et al. (2020) Kiguli-Malwadde et al. (2020) Leshabari et al. (2012) Dressel et al. (2017) Pitout et al. (2016)

(*Continued*)

Table 2. (Continued).

Adapted Kirkpatrick's model		Number of studies n(%)	Summarized outcomes	Author and year of publication
2b	Acquisition of knowledge and skills	18(60)	• Participants had a significant improvement in knowledge and skills in interprofessional practice and health care. • The opportunity to practice interprofessionally in a rural area exposed students to conditions and situations not often experienced in other placements. • Interprofessional collaborative learning improved technical capacity. • The scenario-based training and simulation-base curriculum can be implemented in low-resource settings and may contribute to gains in knowledge, clinical skills and teamwork skills. • IPE enhanced contextualization of the determinants of health, link theory to practice and successful peer learning.	Mpofu et al. (2014) Sagahutu et al. (2021) Buregyeya et al. (2021) Chetty et al. (2020) Levine et al. (2011) Leshabari et al. (2012) Egenberg, Karlsen, et al. (2017) Data et al. (2020) Snyman and Donald (2019) Dressel et al. (2017) Vostanis et al. (2019) Namagembe et al. (2012) Ersek et al. (2010) Pitout et al. (2016) Farley et al. (2021) Abahuje et al. (2021) O'Carroll et al. (2020) Akoria (2012)
3	Behavioral change	6(20)	• There was reported dynamic and interactive experience beyond classroom activities. • Increased ability to place the interests of patients and populations at the center of interprofessional health care delivery. • Enhanced cultural proficiency of students and faculty promoted interprofessional communication and collaboration. • Reported IP non-technical skills training improved team dynamics, safer patient care practices, and empowerment.	Leshabari et al. (2012) Sagahutu et al. (2020) Dressel et al. (2017) Morton (2012) Akoria (2012) Abahuje et al(2021)
4a	Change in organizational practice	3(10)	• The development of innovative and accessible service-learning initiatives to help meet the needs of a community or provide easier access to health care services in collaboration with existing services. • The educational program provided health care workers with the tools potentially to decrease the morbidity and mortality of cervical cancer in low-resource countries. • The program led to provision of primary care and related services to patients and the community.	Levine et al. (2011) Morton (2012) Akoria (2012)
4b	Benefits to patients	0(0)	No findings	

Change in collaborative behavior

Behavior change consists of transfer of Interprofessional learning to practice for improvements (Barr, 2000). Behavior change is one of the impacts assessed to determine the outcomes of an IPE initiative. The reviewed literature showed a gap in assessment of behavior change in practice after an IPE experience. Some literature (Akoria, 2012; Morton, 2012) revealed that IPE enhances the understanding of cultural differences which improved interactions among team members and the provision of care to patients. In addition, authors (Dressel et al., 2017; Leshabari et al., 2012; Sagahutu et al., 2020) showed that IPE improves the ability to place the patient at the center of care and improves professional and social communication among the team of health care providers and students both on and off duty.

Change in organizational practice

IPE could impact the wider service delivery within an organization, and the adapted Kirkpatrick model (Barr, 2000; Hammick et al., 2009) assesses the outcomes at the organizational level. Some studies (Akoria, 2012; Levine et al., 2011; Morton, 2012) reported that IPE did lead to equipping health care workers with tools for early detection of cervical cancer and innovative strategies to deliver quality health care close to the community.

Benefits to patients

No studies conducted in SSA which examined the outcomes of IPE on patient outcomes were found in the current review.

Discussion

IPE delivery and growth in SSA

This review demonstrates that academic evaluation of IPE activity has been on-going in SSA since the 1990s with an increase in activity from 2012 onwards. The quality of published studies on IPE in SSA is still low, and this was reflected by the fact that 22% of included studies were case studies or reports and were excluded among studies considered for data on reported IPE outcomes. Most published work is being delivered in the Republic of South Africa (RSA), with an additional significant, but smaller, degree of activity in the East African regions. This concurs with Barr's (Barr, 2015) work on the mapping of IPE globally who noted that delivery of IPE started to become established more generally in SSA after the release of the WHO framework for action on interprofessional education and collaborative practice in 2010 (Gilbert et al., 2010). In RSA however it is clear that IPE has been more consistently implemented since the early nineties (Lazarus et al., 1998)..

In SSA, IPE is being delivered mainly as part of pre-qualification undergraduate training and predominantly by universities and hospitals. This is similar to delivery of IPE in other parts of the world such as the Arabic-speaking Middle East countries (El-Awaisi et al., 2016), Europe and the USA where it is being increasingly adopted as a teaching strategy for undergraduates (Gilbert, 2010; Greer et al., 2014). The literature (Barr & Coyle, 2013; Dornan et al., 2011) does, however, point to IPE being equally important for post-graduate education as part of IPCE, although there was very little literature published in this area.

Although IPE is key to enhancing competencies related to collaborative practice (Gilbert et al., 2010) across all health care workers, some professional groups are more exposed to IPE in SSA than others. The professions most engaged include Medicine and Nursing. This makes sense as these cadres are numerically the most common and considered to be at the center of health care provision and therefore collaborative practice (Barr & Coyle, 2013; Loversidge & Demb, 2015). Health professionals other than Medicine and Nursing should, however, ideally also be involved in the future to ensure that education encompasses the whole health care team. Within eye care, this is especially pertinent where inclusive eye health (Mörchen et al., 2018) and primary eye care (WHO, 2018) are currently being promoted in LMICs among community health care workers such as health surveillance assistants. The interprofessional team for eye care is consequently expanding, and IPE will be an important strategy to maximize these new initiatives.

Our review found that the content of IPE in SSA focuses mainly on strengthening non-technical skills such as the improvement of primary health care delivery. In particular existing efforts are predominantly directed toward effective interprofessional team communication and patient or family-centered care. This is an example of the important and focused benefits of IPE as, according to the Canadian National Competencies framework (Canadian Interprofessional Health Collaborative, 2010), these are some of the key competencies that health care providers should have.

IPE in SSA has also been commonly focused on improving service learning and community involvement to address pertinent health problems at the community level. Service learning is defined as a teaching strategy that blends academic instruction with relevant community service (Cashman & Seifer, 2008). Based on our review service learning and community-focused teaching are popular in RSA compared to other African countries, with the literature highlighting the positive outcomes when conducted interprofessionally (Barr, 2015).

This study suggests that IPE in SSA has been expanding in an appropriate way to address the health needs of the SSA population although at this stage still most published work originating from RSA. This literature review demonstrated that the SSA region is not only focused on dealing with the traditional challenges of infectious diseases such as HIV, Malaria and Tuberculosis but is also increasingly having to manage the growing burden of non-communicable disease (NCDs) too. For instance this review highlighted "One health" which again is an area where IPE is playing an important role in the broader health agenda in SSA improving the wellbeing of people, animals and the environment.

Interestingly, 51% of the studies reported in our review described financial support to implement IPE activities and its evaluation. The sources of funding were mainly scientific grants delivered by universities as well as funding from NGOs. This finding points to the importance of funding in the growth of IPE in SSA with governments as yet not found to be a major funding source to support IPE for IPC development.

Outcomes evaluation of IPE

The metrics used to evaluate the outcomes of IPE focused mainly on change in attitudes, as well acquisition of knowledge and skills among learners but not on changes in patient outcomes, ultimately the end point objective for delivering medical education. Reviewed studies consistently revealed that IPE enabled health sciences learners in SSA to better understand collaboration, role clarification and community involvement in addressing the relevant health problems that they are facing but without reporting on changes to patient health. This finding re-emphasizes that IPE should be central in developing patient and community-centered care in SSA but that future studies should focus on additionally measuring changes to longer term health outcomes.

In regard to the reported positive changes in perception and attitudes toward IPE found in this review there could be several different factors influencing this. In addition to the education approach being more interactive, the change in learning environment and community engagement could encourage a positive perception among participants. A systematic review by Hammick et al. (2009) recommended using principles of adult learning in IPE to maximize positive outcomes from teaching initiatives. In addition, the results of the current review show that there was significant knowledge and skills acquisition post IPE interventions, and learners noted preferences for simulation learning and community interactions. The available evidence for IPE in SSA highlights what works and therefore what should be adopted for future delivery of multidisciplinary training in this region. Even though IPE in SSA is still picking up pace and increasingly contributing to solving problems faced by communities, this review showed generally positive outcomes across the four levels of the adapted Freeth/Kirkpatrick framework. Additionally, the findings in this review complement those of the recent review (Reeves et al., 2016) that looked at presage, process and product factors of IPE especially on the product or outcomes of IPE factor.

Although there is generally very little evidence on the impact of IPE on actual practice (Fung et al., 2015; Reeves et al., 2017), our review found that the understanding of cultural differences in SSA could contribute to improvement in communication and collaboration among teams of care providers with the strong potential for improving health outcomes for individual patients. As positive changes in behavior of practice after exposure to IPE are possible, there is the opportunity to improve quality of health care in SSA by integrating this approach to education more widely in both under and post-graduate health sciences curricula. However, as previously stated more work is needed to understand the outcomes and impact of IPE in delivery of health care, especially in relation to changes in organizational practice and patient outcomes where there is little evidence at present.

Conclusion

This review describes a comprehensive academic evaluation of published work on IPE delivery in SSA. In doing so, the progress and potential for this form of collaborative education to support the development of health care delivery in SSA has been laid out. The review covers the context and drivers of IPE in SSA, as well as the evidence for the range of outcomes it has generated so far. It is vital for future IPE initiatives to be guided by the existing evidence aligned to the SSA context, so as to build on progress and focus on addressing African health care challenges. Universities and hospitals in SSA have driven the expansion of IPE. However, government-level policy makers as well as NGOs now also need to support this work to establish and promote it more widely to improve health care provision. Specifically, simulation-based and patient- or community-centered IPE has been shown to be preferred way of delivering IPE in the SSA context. However further evaluations are recommended to explore this further as well as its specific impact on health outcomes. Overall IPE is really still in its infancy in SSA, with more initiatives and evaluations needed to understand and measure its benefits on health care practice and patient outcomes.

Acknowledgement

Special acknowledgements to Vicki Cormie the senior academic liaison librarian, University of St. Andrews for offering support in literature search for this review.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Review conducted under the Global Challenges Research Fund (GCRF) PhD scholarship at the University of St-Andrews

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Appendices

Appendix A. The status and impact of the interprofessional health education in Sub-Saharan Africa: a systematic review protocol

Search strategy

	KEY TERM(S)	Mesh	Search
1.	interprofession* or inter-profession* or interdisciplin* or inter-disciplin* or interoccupation* or inter-occupation* or multiprofession* or multi-profession* or multidisciplin* or multi-disciplin* or multioccupation* or multi-occupation*	"Interprofessional Education/ methods"[Mesh]	"Interprofessional Education/methods"[Mesh] OR interprofession* or inter-profession* or interdisciplin* or inter-disciplin* or interoccupation* or inter-occupation* or multiprofession* or multi-profession* or multidisciplin* or multi-disciplin* or multioccupation* or multi-occupation* OR exp Interprofessional Relations/
2.	health* or medic* or nurs* or doct* or pharm* or therapist* or "patient Care Team" or "care team"	"Health/education"[Mesh]	"Health/education"[Mesh] or health* or medic* or nurs* or doct* or pharm* or therapist* or "patient Care Team" or "care team"
3.	Educat* or Teach* or Learn* or Train* or Tutor* or Instruct* or simulat*	"Education"[Mesh]	"Education"[Mesh] or Educat* or Teach* or Learn* or Train* or Tutor* or Instruct* or simulat*
4.	"Africa South of the Sahara" or "Sub Saharan Africa" or "Sub-Saharan Africa" or (Angola or Benin or Botswana or "Burkina Faso" or Burundi or Cameroon or "Cape Verde" or "Central African Republic" or Chad or Comoros or "Congo Brazzaville" or "Congo Democratic Republic" or "Cote d'Ivoire" or "Ivory coast" or Djibouti or "Equatorial Guinea" or Eritrea or Ethiopia or Gabon or "The Gambia" or Ghana or Guinea or "Guinea-Bissau" or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Reunion or Rwanda or "Sao Tome and Principe" or Senegal or Seychelles or "Sierra Leone" or Somalia or "South Africa" or Sudan or Swaziland or Tanzania or Togo or Uganda or "Western Sahara" or Zambia or Zimbabwe)	"Africa South of the Sahara"[Mesh]	"Africa South of the Sahara"[Mesh] or "Africa South of the Sahara" or "Sub Saharan Africa" or "Sub-Saharan Africa" or Angola or Benin or Botswana or "Burkina Faso" or Burundi or Cameroon or "Cape Verde" or "Central African Republic" or Chad or Comoros or "Congo Brazzaville" or "Congo Democratic Republic" or "Cote d'Ivoire" or "Ivory coast" or Djibouti or "Equatorial Guinea" or Eritrea or Ethiopia or Gabon or "The Gambia" or Ghana or Guinea or "Guinea-Bissau" or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Reunion or Rwanda or "Sao Tome and Principe" or Senegal or Seychelles or "Sierra Leone" or Somalia or "South Africa" or Sudan or Swaziland or Tanzania or Togo or Uganda or "Western Sahara" or Zambia or Zimbabwe

Appendix B.

Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Mpofu et al. (2014)	Investigation of the perceptions of students in an interprofessional education program	Quantitative self-administered questionnaire (SAQ) (ADDAPTED FROM = Tasmania questionnaire for evaluating the experiences of health sciences students in an IPE program (Whelan J, Spencer J, Rooney KA. "RIPPER" project: advancing rural inter-professional health education at the University of Tasmania. Rural and Remote Health 8: 1–9. (Online) 2008)	Participants highly commended the IPE program for its approach to developing self-growth, collaboration and learning, opportunities.	The IPE experience enabled participants to assess needs and prioritize activities, creating an opportunity to learn about other disciplines and compare alternative	The opportunity to practise interprofessionally in a rural area exposed students to conditions and situations not often experienced in other placements.	NA	NA	NA
Davis et al. (2015)	Interprofessional education impact on perceptions related to medication safety and patients outcomes	Focus group discussions	Student reflections also included the cross-cultural experiences encountered in health care delivery (appreciation for differing values, traditions, and health needs).	Students considered personal and professional skills developed in meeting health care needs with limited resources	NA	NA	NA	NA
Julie et al. (2016)	To explore academics' knowledge and experiences of interprofessional education and collaborative practice	Focus group discussions	NA	IPE develop common client-centered outcomes. IPE to lead into collapsing of professional and territorial hierarchies. IPE to be sucessful competencies, IPE continuous professional development and common practice frameworks like the international classification of function disability and health (ICF) or primary health care (PHC) need to be adopted.	NA	NA	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Snyman and Donald (2019)	To determine how an inter-professional service-learning experience changed students' inter-professional person-centered practice	Online questionnaire and report	NA	Participants reported increased awareness about their own roles, a deeper understanding of the roles of other professions and a realization of the importance of interprofessional collaborative practice (IPCP). The findings suggest that students' attitudes toward IPCP were influenced by their profession, with some professions showing less enthusiasm for IPCP than others.	NA	NA	NA	NA
Sagahutu et al. (2020)	To explore whether the presentation of a day's workshop on inter-professional practice would have impact on behavior related to inter-professional practice.	Validated Auditing Patient Record checklist	NA	NA	Behavior change as evidenced by more comprehensive recording of patient management can result from a well-structured interprofessional training programme.	NA	NA	NA
Sagahutu et al. (2021)	To explore whether the presentation of a day's workshop on inter-professional practice would result in improved knowledge of inter-professional practice.	Attitudes Towards Health Care Teams (ATHCT) scale modified by Leipzig et al. (https://agsjournals.onlinelibrary.wiley.com/doi/epdf/10.1046/j.1532–5415.2002.50274.x) AND A VALIDATED SELF-DESIGNED KNOWLEDGE QUESTIONNAIRE	NA	Significant improvement in attitudes toward interprofessional practice (IP).	Participants had a significant improvement in knowledge related to interprofessional practice.	NA	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Botma and Snyman (2019)	Students perception about interprofessional education and interprofessional practice	Drawing interpretation	NA	Participants expressed that IPC is about teamwork and good communication for better health care delivery. The invironment for IPE would better be pre-school or during training and less in practice. IPECP should be aligned to cultural context (tribal or organizational)	NA	NA	NA	NA
Reitsma et al. (2019)	Exploring and describing the students'experiences of the interprofessional education process	Validated questionnaire & qualitative – narrative reflections	Students felt positive about the project and agreed that it provided them with valuable educational experiences.	IPE helped students understand the roles and clinical skills of other health care professional.	NA	NA	NA	NA
Scrooby et al. (2019)	To build on the presented (interprofessional education anatomy teaching) model and determine its appropriateness for implementation with first year students in a health professions faculty	Self-designed likert-type experiences questionnaire and focus group discussion	The practice model for anatomy teaching was found to be suitable for IPE.	Student collaboration contributed to their positive IP experience and case studies were percieved to be suitable for IPE.	NA	NA	NA	NA
Van Wyk et al. (2020)	To determine the opinions of the module leaders in the undergraduate programmes on using simulation as a learning strategy in interprofessional education.	Self-designed likert-type questionnaire and free texts	NA	Simulation IPE improve role clarification among different professions students and standardized role-play scenario is the preferred simulation type.	The module leaders had a positive attitude toward simulation and its potential use for IPE.	NA	NA	NA
Buregyeya et al. (2021)	To explore the students' gained experiences on Onehealth initiative and students' contribution to solving community challenges	Indepth interviews and focus group discussions	Participants appreciated that each discipline had a role to play in achieving health in the community.	Participants reported a feeling of gratitude and accomplishment because they felt they made a positive change to the community	Participants appreciated the training skills gained in communication, team work and collaboration.	NA	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Martini et al. 2012	To reflects on challenges and pitfalls of running a voluntary multidisciplinary project	Online survey and focus group discussions	Participants agreed that it was valuable to work with people from different countries and that the multidisciplinary nature of the project was a precious opportunity. Participants saw the importance of bringing unity of people and ideas through collaboration to create better solutions for the community.	Participants felt that the project was of educational value and had broadened their perspectives	NA	NA	NA	NA
Alexander et al. (2015)	To describe an interprofessional education for Pain Management program	Focus group discussions	NA	Introducing concepts that require complex communication requires more time than anticipated.	NA	NA	NA	NA
Chetty et al. (2020)	To describe the perceptions of healthcare professionals attending a HIV interprofessional continuous medical education and collaborative learning initiative and to provide suggestions regarding the improvement of this educational program	Focus group discussions	Participants felt they learnt something new and had positive reaction about learning from each other.	Participants felt that the training shall lead to improved work relationships and company culture	Interprofessional collaborative learning improved technical capacity	NA	NA	NA
Kiguli-Malwadde et al. (2020)	To describe an interprofessioanl education on HIV-specific curriculum -(Strengthening InterProfessional Education to Improve HIV Care Across Africa (STRIPE HIV)	Online survey and qualitative-free text feedback	Facilitators felt confident in facilitating workshops as part of a team of interprofessional educators and training different types of health profession students together on HIV interproffessional collaboration was fulfilling.	Increased motivation to engage in more multidisciplinary approaches and to integrate HIV education into teaching practice in the future.	NA	NA	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Levine et al. (2011)	To assess the effectiveness of an educational program in visual inspection with acetic acid (VIA)for cervical cancer screening among healthcare providers	Validated multiple choice questions to assess knowledge	NA	NA	The self-reported comfort levels for identifying abnormalities increased significantly from before to after the educational program.	NA	The educational program provided healthcare workers with the tools potentially to decrease the morbidity and mortality of cervical cancer in low-resource countries	NA
Leshabari et al. (2012)	To describe an interprofessioanl education program and its outcomes	Focus group discussions	Interprofessional development provided a comprehensive learning experience.	Participants reported increased respect toward their colleagues' knowledge	The students gain knowledge and skills to enhance patient care.	There was reported dynamic and interactive experience beyond classroom activities.	NA	NA
Egenberg, Karlsen, et al. (2017)	This study investigated the effects of multi-professional, scenario-based training on the prevention and management of post-partum haemorrhage	Survey, medical birth registry	NA	NA	The scenario-based training was associated with a significant reduction of blood transfusion rates in this high-risk maternity setting.	NA	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Data et al. (2020)	To evaluated the possible impact of an interprofessional curriculum on teamwork, clinical skills(CSs), and knowledge among undergraduate medical and nursing students	The Clinical Teamwork Scale (Guise JM,Deering SH, Kanki BG, et al. Validation of a tool to measure and promote clinical teamwork. Simul Healthc 2008;3:217–223), a scenario-specific skills checklist (See SDC 2A – D http://links.lww.com/SIH/A600 for details of all scenario-specific checklists), Multiple choice questions (Bose C, Singhal N, Berkelhermer S, et al. Essential Care for Every Baby Facilitator Flip Chart. 1st ed. Itasca, IL: American Academy of Pediatrics; 2014:31b.) AND (Singhal N, Berkelharmer S, Barber G, et al. Essential Care for Small Babies Flip Chart. 1st ed. Itasca, IL: American Academy of Pediatrics; 2015:24.34.)	NA	NA	An IP, simulation-based undergraduate curriculum is feasible to implementing in low-resource settings and may contribute to gains in knowledge,clinical skills and teamwork skills.	NA	NA	NA
Snyman and Donald (2019)	To describe the role of interprofessional education in the acquisition of knowledge of the determinants of health	Focus group discussions	NA	NA	IPE enhanced contextualization of the determinants of health, link theory to practice and successful peer learning.	NA	NA	NA
Dressel et al. (2017)	To assessing interprofessional education (IPE) learning experiences for students	Survey	NA	Reported increased ability to explain the roles and responsibilities of other care providers and how the team works together to provide care	Proficiency in integrating the knowledge and experience of other professions.	Increased ability to place the interests of patients and populations at the center of interprofessional healthcare delivery.	NA	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Vostanis et al. (2019)	To work with practitioners who deliver care to vulnerable children and to understand their perspectives on the content of the interprofessional education	Semi-structured interview	Learning context and experience sharing were important.	NA	The interprofessional training promoted the delivery of knowledge and practice.	NA	NA	NA
Namagembe et al. (2012)	Impact assessment of the interprofessional training on Malaria management	Clinical skills assessment: The piloted tools were based on the Integrated Management of Childhood Illness tools, with adaptations for laboratory diagnosis of malaria. Laboratory skills: observation checklists/ perfomance indicator based on evidence based malaria blood smear preparation	NA	NA	Reported significant improvements in clinical and laboratory skills	NA	NA	NA
Ersek et al. (2010)	To reports the development and evaluation of an interdisciplinary, international palliative care workshop	The self-evaluation of palliative care knowledge and skills was adapted from an early too developed by the first author (Ersek et al., 2005))	Evaluation indicated high satisfaction with the workshop.	NA	Palliative Care Knowledge increased modestly but significantly. The evaluation indicated significant gains in self-evaluation of palliative care skills.	NA	NA	NA
Morton (2012)	To describe a model for interprofessional and transcultural learning	Focus group discussions and Indepth interviews	NA	NA	NA	Enhanced cultural proficiency of students and faculty promoted interprofessional communication and collaboration.	The program led to provision of primary care and related services to patients and the Ghanaian community.	NA

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Data extraction sheet-Reported outcomes of IPE in SSA								
			OUTCOMES					
Author	Objective of the Evaluation/ study	Outcome measures	Level 1:Reaction	Level 2a:Modification of perceptions & attitudes	Level 2b:Acquisition of knowledge & skills	Level 3:Behavioral change	Level 4a:Change in organizational practice	Level 4b: Benefits to patients/ clients
Akoria, (2016)	To develop and describe the of acute care for the elderly model	Observations, reports, patient files/medical notes	NA	NA	Participants acquired skills and knowledge related to health care delivery for the elderly	Improvement in quality of care for the elderly was noted.	In the face of limited resources, it was possible to establish a functional geriatrics unit with a trained interdisciplinary team. Family participation is central in our practice.	NA
Pitout et al. (2016)	To explore the perceptions of healthcare students and their facilitators of a simulated interprofessional consultation	Focus group discussions	NA	Better understanding of Role clarification could improve working collaboratively, communication skills enhancement and proper patient assessment without causing harm.	Knowledge and experience of teamwork gained	NA	NA	NA
Farley et al. (2021)	To evaluate an inter-professional training program using pretest and posttest performance	Validated multiple choice questions to assess knowledge, qualitative-open ended questionnaire	NA	NA	The inter-professional training program in short-course RR-TB treatment improved knowledge for participants.	NA	NA	NA
Abahuje et al. (2021)	To understand the barriers and acilitators faced by surgical providers who had participated in the not-technical skills training course in Rwanda when applying nontechnical skills to the delivery of surgical care in the operating room.	Self-designed likert-type questionnaires, qualitative-indepth interviews	NA	NA	The interprofessional training resulted in the acquisition of non technical skills.	Participants reported that non-technical skills implementation resulted in improved team dynamics, safer patient care practices, and empowerment.	NA	NA
O'Carroll et al. (2020)	To promote collaborative practice for eye health amongt an interprofessional mix of students and to evaluate students' experience of these workshops	Self-designed online feedback	Students reported that the workshop content was relevant to all professional groups. They valued the opportunity to learn interprofessionally, share their knowledge and perspectives.	NA	Students acquired new knowledge and skills in fundamental eye care delivery	NA	NA	NA