HARMONIZING CORE COMPETENCIES FOR MASTER OF PUBLIC HEALTH TRAINING PROGRAMMES IN AFRICA

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OPRABR001

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DECLARATION

This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy (Ph.D.) in the Department of Public Health, Faculty of Health Sciences at the University of Cape Town. I, Abraham Opare, the PhD candidate and author of this thesis hereby declare that this thesis is my original work (except where acknowledgements indicate otherwise) and has not in whole or in part, been, submitted for examination for another degree in this or any other university.

17th February 2025

Signature: _____

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To my wonderful mother Mrs. Juliana Opare, my sister Rebecca Opare and my brothers Emmanuel, Isaac, and Edward, I say you have all been a blessing in my life. I would also like to say a big thank you to all the research participants from across Africa and beyond who completed questionnaires and participated in interviews, offering their time and providing valuable insight about the core competencies that are relevant to MPH programs in Africa. To the authors of the various studies, I cited in this thesis write-up, I say a big thank you.

DEDICATION

This thesis is dedicated to the memory of my beloved sister, Esther Opare and wonderful father, Mr. Edward Opare whose deaths occurred while I was still writing this thesis. Words cannot describe how difficult it was to lose you both within a short space of time. You will forever remain in my mind and heart.

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ABBREVIATIONS

ASPHA	Association of Schools of Public Health in Africa
ASPHER	Association of Schools of Public Health in the European Region
PHAC	Public Health Agency of Canada
CEPH	Council on Education for Public Health
APACPH	Asia-Pacific Academic Consortium for Public Health
CAPHIA	Council of Academic Public Health Institutions Australia
PHFI	Public Health Foundation of India
PAHO	Pan American Health Organization
HICs	High-income countries
LMIC	Low- and middle-income countries
EPHFs	Essential Public Health Functions
MPH	Master of Public Health
NGO	Non-Governmental Organization
PHC	Primary Health Care
SPH	Schools of Public Health
WHO	World Health Organization

UHC	Universal health coverage
MDGs	Millennium development goals
SDGs	Sustainable development goals
HSS	Health systems strengthening
CDC	Centre for Disease Control
PhD	Doctor of Philosophy
USA	United States of America
UK	United Kingdom
PH	Public Health
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
TB	Tuberculosis
Africa CDC	Africa Centre for Disease Control and Prevention
PRISMA	Preferred Reporting Items for Systematic Review
ANAPHI	Australian Network of Public Health institutions
FIOCRUZ	Fundação Oswaldo Cruz (Oswald Cruz Foundation)
AMREF	African Medical and Research Foundation
WHO-AFRO	World Health Organization Regional Office for Africa
AHO	African Health Organization
WAHF	West African Health Foundation
WFPHA	World Federation of Public Health Associations, (WFPHA),
ABChealth	African Business Coalition for Health
AHRI	Africa Health Research Institute
APHA	Africa Public Health Alliance
CEBHA+	Collaboration for Evidence-based Healthcare and Public Health in Africa
ANDEMIA	African Network for improved Diagnostics, Epidemiology and Management of Common Infectious Agents

MSF	Médecins Sans Frontières
COVID-19	Coronavirus Disease 2019
NICD	National Institute for Communicable Diseases
UCT	University of Cape Town
KNUST	Kwame Nkrumah University of Science and Technology
GLUK	Great Lakes University of Kisumu
IB	University of Ibadan
UG	University of Ghana
FETP	Field Epidemiology Training Programme
PDoH	Provincial Department of Health
NDoH	National Department of Health
AO	Abraham Opare
VZ	Virginia Zweigenthal
HEIs	Higher Education Institutions

DEFINITION OF OPERATIONAL TERMS

Core competencies: Core competencies in the context of this thesis refers to the set of knowledge, skills and attributes needed by MPH graduates for public health work in Africa.

Core competency framework: A core competency framework in the context of this research refers to a structured and organized representation of the set of knowledge, skills and attributes (grounded in theory and evidence), required by MPH graduates for public health work in Africa (1).

Competency-based education: An approach to teaching which emphasize the acquisition of competencies needed for performing specific task within a given context (2).

Curricula document: This refers to a formal documentation of a course, which contain stated outcomes for each of the course elements (3).

Syllabus: This refers to the content regarding knowledge, skills and attitudes or values contained in a curriculum (4).

Skills: These refer to the set of expertise that is needed to perform a particular job/task (5)

Master of Public Health: A post-graduates inter-disciplinary programme that prepares students for public health practice (6). Completion of the programme leads to the award of a Master of Public (MPH) degree.

Public Health: The science and art of preventing disease, prolonging life, and promoting health through the organized efforts of society (7)

Health System: This refers to all organisations, people and stakeholders in society who act with a primary goal of promoting, restoring and maintaining health (8).

Social determinants of health: Conditions in which people are born, grow, live, work, and age that affect health outcomes (9)

Structured literature review: This refers to a systematic and organized approach to reviewing existing research on a specific topic by following a clearly defined criteria, structure or process (10).

Health systems strengthening: Collective efforts by all organizations, people and key actors which is geared towards improving the performance of health systems with the ultimate goal of improving the health of populations (11).

Domain: A broad distinguishable area of content usually within a competency framework (12)

Harmonized core competencies: Harmonized core competencies in the context of this thesis refer to common set of essential knowledge, skills, and abilities that is needed my MPH graduates in Africa, for public health work in the region.

Discipline-specific domains: These are the traditional public health domains/disciplines like Epidemiology, Biostatistics, and Environmental Health Science which historically have been an integral part of MPH programs across the world (1)

Cross-cutting domain: These are the domains applicable across disciplines, such as leadership and communication. They do not necessarily fall under the traditional academic domains but are relevant to public health practice (1).

OVERVIEW OF THESIS

In light of the burden of disease and health systems challenges in Africa, this thesis explores the core competencies that are relevant to the public health work undertaken by Master of Public Health (MPH) graduates in Africa to tackle these challenges in the region. Furthermore, it explores the challenges of adopting harmonized or common sets of core competencies across MPH programs in Africa. The thesis comprised four interrelated studies as shown in Figure 1 and is presented in seven chapters.

Chapter One introduces the problem this thesis addresses – the absence of a core competency framework for MPH programs in Africa – which contributes to the lack of harmonization in the training received by MPH students across the continent. Chapter Two, the literature review, explores public health as a discipline and how it has evolved over the years. It discusses its role in health system's strengthening, the training of the public health workforce – including MPH graduates and the development of core competencies for public health workforce. It also provides an overview of the aim of the thesis and the specific objectives that will contribute to achieving the aim. Chapter Three, a structured literature review, analyzes studies, core competency frameworks and MPH curricula documents to identify a preliminary sets of core competencies for MPH programs in Africa. Chapter Four through applying methods, used by curricula reform processes in other settings, assess the applicability of the preliminary sets of core competencies identified in Chapter Three to public health work undertaken by MPH graduates in Africa. Additionally, it explores the contribution of MPH programs towards graduates' development of some of the identified competencies, and how these competencies are covered or taught in MPH programs in Africa. Using the sets of competencies identified in Chapter Three and assessed to determine their applicability to graduates' work in Chapter Four as a guide, employers of MPH graduates are interviewed in Chapter Five to determine the actual set of core competencies that are needed by MPH graduates for public health work in Africa. In Chapter Six, a mixed method study explores the acceptability and challenges of harmonizing common sets of core competencies such as those identified in this thesis, across MPH programs in Africa. The final chapter (Chapter Seven) summarizes the findings from the thesis and provides recommendations based on the findings. Table 1 summarizes the logic of this thesis, focusing on what was done, how it was done and why it was done.

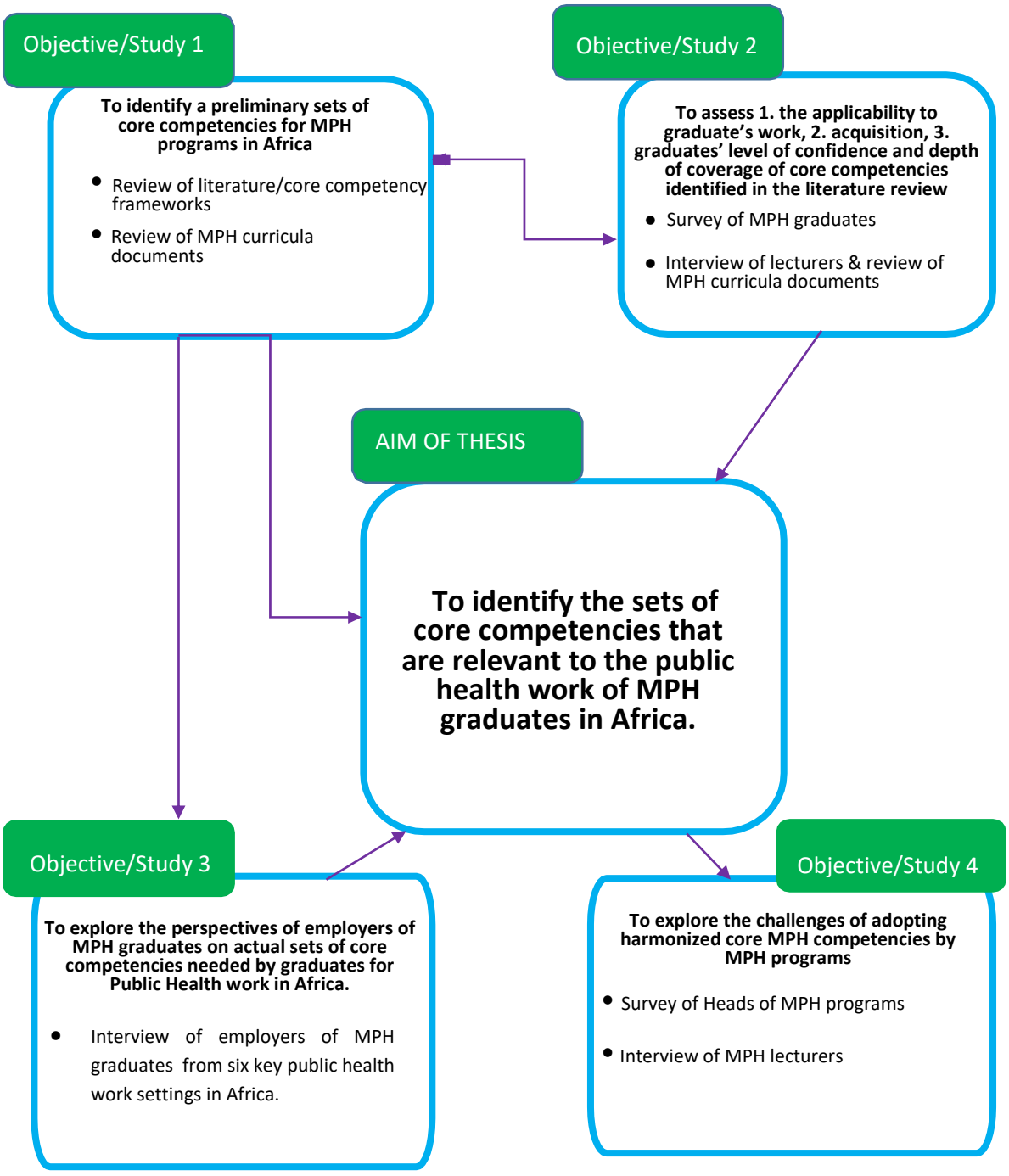

Figure 1: Mind map of research showing how the individual studies are interrelated

Table 1: Overview of the logic and rationale guiding the different components of the thesis

What was done?	How was this done?	Why was this done/logic
Identified a preliminary set of competencies.	Through review of literature and MPH curricula documents	To explore if there are any core competencies developed for other regions or covered in current MPH programs that might be relevant to the African public health context. Identifying a preliminary list of competencies was also intended to guide the conversations with employers of MPH graduates about the actual sets of competencies needed by graduates for public health work in Africa. (i.e. it assisted in the development of interview guides and streamlined the interviews with employers)
Assessed the applicability of the identified competencies to graduates' work, and MPH programs contribution to graduates' acquisition and development of competencies.	Through survey of MPH graduates	To determine which of the competencies identified from the literature review are important to the work of MPH graduates in Africa and should be considered for inclusion in any core competencies framework developed for MPH programs in the region.
Assessed how some of the identified competencies are covered in MPH programs	Through review of MPH curricula documents and interview with MPH Lecturers	To ascertain whether the competencies identified through the literature review, which were considered core by MPH programs, were taught in a manner that enables graduates to acquire both theoretical knowledge and practical skills essential for public health practice. The insights gained also aimed to inform the teaching of additional competencies recommended for inclusion in an MPH core competency framework in Africa.
Identified the actual sets of core competencies needed for public health work across a range of different work settings.	Through interviews with employers of MPH graduates	To explore which additional competencies not identified in the literature review were important to the work of MPH graduates in Africa. It was also done as a way of triangulating the data from the literature review, thereby providing some guidance to the users of the thesis findings on which competencies identified through the literature review were also highlighted by employers to be important to the work of MPH graduates.
Assessed the potential challenges institutions might face when adopting harmonized or common sets of core competencies across MPH programs	Through survey of Heads of MPH programs and interview with MPH lecturers	To inform institutions about some of the challenges they might encounter in adopting competencies and how to navigate them. This was important since the goal of this thesis is for its findings to inform the development of a core competency framework for MPH programs in Africa and ultimately contribute to improving MPH training in the region.

ABSTRACT

Background

Africa faces numerous health challenges, including high burdens of diseases and fragile health which hinder efforts to prevent, address, mitigate, and control these health challenges. The skills taught in MPH programs are recognized globally as being crucial to addressing these challenges and strengthening health systems. In recent years, the global community has experienced the emergence and re-emergence of disease outbreaks such as the Ebola and COVID-19 pandemics. These outbreaks have highlighted the need to strengthen programs like the MPH to equip graduates with the competencies necessary to address new and emerging health challenges. Additionally, they have highlighted the shared health systems challenges faced by different countries in Africa and the vulnerability of health systems to new challenges. The Association of Schools of Public Health in Africa (ASPHA) has acknowledged the lack of harmonization in the training received by MPH students from the different MPH programs on the continent. This lack of harmonization in MPH training within and across African countries has been attributed to the absence of a core competency framework, which outlines the competencies relevant to the public health work undertaken by MPH graduates in the region.

Aim: This thesis identified the set of core competencies that are relevant to the public health work undertaken by MPH graduates across different work settings in Africa, including the challenges that could be encountered in adopting harmonized or common sets of core competencies across MPH programs in Africa

Methods: A structured literature review was conducted to identify a preliminary set of core competencies for MPH programs in Africa. These competencies were subsequently refined through stakeholder engagement, resulting in a more focused and contextually relevant set of competencies that guided interviews with key informants. In order to elicit information from a broad range of country contexts, fieldwork was conducted in five African universities: one South African university (the University of Cape Town), in two Ghanaian universities (University of Ghana, Kwame Nkrumah University of Science and Technology); in one Nigerian university (University of Ibadan), and one Kenyan university (Great Lakes University of Kisumu). In each university, MPH graduates were surveyed to determine the applicability of competencies identified in the structured literature review to their work, the contribution of the MPH to competencies development, and graduates' level of confidence with each competence. Lecturers were interviewed and MPH curricula documents were reviewed to determine the depth of coverage of competency domains considered to be core in the five MPH

programs. In-depth interviews were used to explore the perspective of a range of employers of MPH graduates from fourteen African countries on the actual sets of core competencies graduates need for public health work in Africa. Finally, interviews and surveys with lecturers and heads of MPH programs were used to explore the challenges that MPH programs in Africa could face in adopting harmonized or common set of core competencies across programs.

Findings: A preliminary set of competencies – 187 competencies across nine discipline-specific and seven cross-cutting domains were identified for MPH programs in Africa through the literature review. Importantly, domains such as public health law and outbreak management which provides the foundation for creating equitable health systems and addressing emerging epidemics and pandemics, are missing from most MPH programs in Africa. Additionally, competencies in domains such as leadership, communication, monitoring and evaluation, community and intersectoral collaboration, outbreak management, and health promotion are the most applicable to graduates' work despite MPH programs contributing minimally to their development among graduates. Furthermore, the results show that while MPH programs in Africa generally equip graduates with foundational knowledge and skills in domains like Epidemiology, Biostatistics, Health Systems, Policy and Management, Health Promotion, Environmental Health Science, and Social and Behavioural Science, few programs provided graduates with the platform/opportunity to apply this knowledge and skills to real-life public health work during their MPH training.

Across different African country settings, employer interviews found that MPH graduates in Africa perform critical roles that contribute significantly to health systems strengthening and were instrumental in the public health response to the COVID-19 pandemic. Employers reported that competencies in technical domains such as data analysis and interpretation, research proposal development, research grant application, outbreak management, public health-related law, teaching & coordination of health training programs, health promotion & advocacy, health resource mobilization, monitoring and evaluation, environmental health, Health financing and budgeting, and project management are crucial to the work of MPH graduates in Africa. Additionally, they emphasized that soft skills, including leadership, good time management, teamwork, conflict management, and communication and dissemination of public health information using tools like PowerPoint are important to the work of MPH graduates in Africa.

Challenges to adopting harmonized or common sets of core competencies across Africa include institutional differences, chiefly regarding resources and culture, bureaucratic hurdles with integration into curriculums, resistance from faculty members, and resource limitations.

Conclusion: This thesis used mixed methods in five different country settings, to identify the set of core competencies that are relevant to the public health work undertaken by MPH graduates in Africa. Challenges of adopting harmonized or common sets of competencies across MPH programs in Africa are identified. While competencies in key domains such as epidemiology, biostatistics, and research are already emphasized in most MPH programs in Africa, competencies in other key domains such as outbreak management, leadership, public health-related law communication, monitoring and evaluation, health financing, and project management are less emphasized or missing in most MPH programs in the region and need attention. There is a need for curriculum reforms among MPH programs in Africa to ensure that crucial and practical competencies are included or emphasized in MPH programs to better prepare graduates to effectively tackle the continent's health system challenges. A key limitation of the study was the limited representation of Francophone countries. Future work could explore competency frameworks in non-ASPHA and Francophone contexts and focus on building consensus among MPH education stakeholders in Africa on which competencies identified in this thesis should be included in MPH curricula. Future work could also focus on creating a core competency framework for MPH programs in Africa using the findings from this thesis as a guide.

Keywords: Public Health, Education, Competency, Master of Public Health (MPH), domain.

CHAPTER 1

INTRODUCTION

1.1 Background

The global public health context is rapidly changing resulting in numerous public health challenges (13, 14). These challenges, which include inequity in health services and increased burden of communicable and non-communicable diseases demand corresponding changes in public health responses and competencies (13, 15-17). Effective and equity-oriented interventions developed and implemented by skilled personnel with the relevant competencies in public health are needed to build strong global health systems. Although LMICs share some common public health challenges, it is widely recognized that Africa faces a distinct set of health system challenges (16). These include; weak public health leadership and management (18), horizontal and vertical inequities in health systems (19), inefficiencies in resource allocation and use (20, 21), weak health information and research systems (22) and emergence and re-emergence of infectious diseases like Ebola (23). These challenges necessitate a tailored set of competencies to ensure that MPH graduates are equipped to respond effectively to the region's specific health needs. Furthermore, recent global developments, such as the WHO Global Competency and Outcomes Framework for Essential Public Health Functions, underscore the importance of adapting public health competencies to local contexts while maintaining alignment with essential public health functions (24).

Globally, MPH programs are recognized as providing skill sets for the delivery of equitable and appropriate health services (25). Many skills learnt through MPH programs facilitate tackling the current and emerging health systems challenges across the globe (6, 26, 27). The success of these programs, therefore, depends on their ability to equip graduates with the core skills needed to deliver effective interventions aimed at building resilient health systems (28).

Over the last few decades, competency-driven approaches towards MPH education have been recognized as being core to the design of programs (1). While this growing need to adopt a competency-driven approach to MPH programs worldwide has led to the development of core competency frameworks for Schools of Public Health (SPH) in developed regions such as Europe, North America, Australia, and South America (1, 29-32), the situation is different in Africa (33). Currently, no guidelines exist for MPH programs in Africa that outline the sets of competencies MPH graduates should have to effectively meet the population health and health system needs of the continent. The absence of a core competency framework for MPH programs in Africa has resulted in a lack of harmonization in the training received by students across the continent (34). For example, graduates receiving MPH training from one institution

in a country in Africa may have a very different set of competencies compared to graduates from other institutions in the same country. To address this lack of harmonization in MPH training and to position programs to equip graduates with the skills needed to address Africa's health challenges, the ASPHA is embarking on an initiative to develop a core competency framework for MPH programs across the continent (35). Studies have, however shown that identifying core competencies needed by MPH graduates for public health work is crucial to creating a core competency framework for programs (1, 31, 36). Despite this, no study has been conducted to identify the core competencies of MPH graduates in Africa to address the health system challenges of the continent. This is a major drawback to the ASPHA's initiative to develop a core competency framework for MPH programs in Africa. Furthermore, it has also been argued that although studies have been conducted in developed countries like the United State of America (USA) and United Kingdom (UK) to identify core competencies needed to address the health system challenges in those countries, these competencies may not necessarily be applicable to the African context (34). Consequently, studies that aim to identify competencies that are relevant to the public health work of MPH graduates for African health systems are needed. Additionally, while some competencies are already taught in MPH programs in Africa, their applicability to graduates' public health work in Africa and gaps in teaching have not been widely studied.

To fill these gaps, this thesis reviewed the literature, analysed documentation, and conducted in-depth interviews with employers of MPH graduates to identify core MPH competencies that are relevant to the range of public health work of MPH graduates in Africa. Additionally, this thesis assessed the depth of coverage of existing core competencies in MPH programs in Africa and the applicability of these competencies to graduates' public health work after the MPH. Furthermore, since no study has assessed the challenges of adopting harmonized core MPH competencies across programs in Africa, this study also explored the perspective of key stakeholders – heads of MPH programs and lecturers regarding the challenges of adopting harmonized core competencies across MPH programs in Africa.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter explores the discipline of public health (PH), its evolution over time, and its role in strengthening health systems. Since public health training programs play crucial roles in the development of PH competencies, this chapter also reviews the training of the public health workforce globally with a particular focus on the education and training of MPH graduates. Additionally, this chapter highlights the World Health Organization's (WHO) Essential Public Health Functions (EPHF) along with the efforts of educational institutions, public health organizations, associations of schools of public health in developing core competencies frameworks to support the performance of these essential functions.

2.2 Search Strategies

This literature review concentrated on four main sections and a combination of search strategies was used. Keywords relevant to the four main sections were identified and included as combined search terms. These key terms included *public health, evolution, Africa, health systems, core competencies, training programs, Master of Public Health, framework, public health personnel, public health workforce, associations, schools of public health, health challenges.* Electronic databases searched included PubMed, Web of Science, Academic Search Premier, and CINAHL through EBSCOhost. Additionally, Google Scholar and other relevant websites, such as the Association of Schools of Public Health, and the WHO, were searched for grey literature. Furthermore, relevant books and conference reports were searched. The search strategy for electronic databases incorporated MeSH terms. These MeSH terms included ("Public Health" [MeSH]) OR ("Health Education" [MeSH]) OR ("Teaching" [MeSH]) OR ("Public Health Professional" [MeSH]) OR ("Health Workforce" [MeSH) OR ("Public Health Practice" [MeSH] AND (Competency-based Education [MeSH]) AND ("Africa" [MeSH]). The literature search was conducted between October and December 2021 and then updated in July 2024. The search was restricted to articles and papers published in English Language.

2.3 Public Health as a field

PH as defined by Winslow in the early 20th century is the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society (7). As opposed to clinical medicine which focuses on diagnosing and treating specific diseases in the individual, PH through applying knowledge from a wide range of disciplines, focuses on

creating conditions under which whole populations can prevent deterioration of their health (37, 38). PH as a discipline is ever-changing, transitioning from the implementation of discrete interventions that addressed infectious diseases in the early days of the field to broad social, cultural and economic reforms that address the root causes of poor health in modern times (39). This evolution of the field towards its multi-disciplinary approach to improving population health is one that has taken place over centuries (40). Major health events over the years have largely influenced this evolution as shown in **Figure 2**.

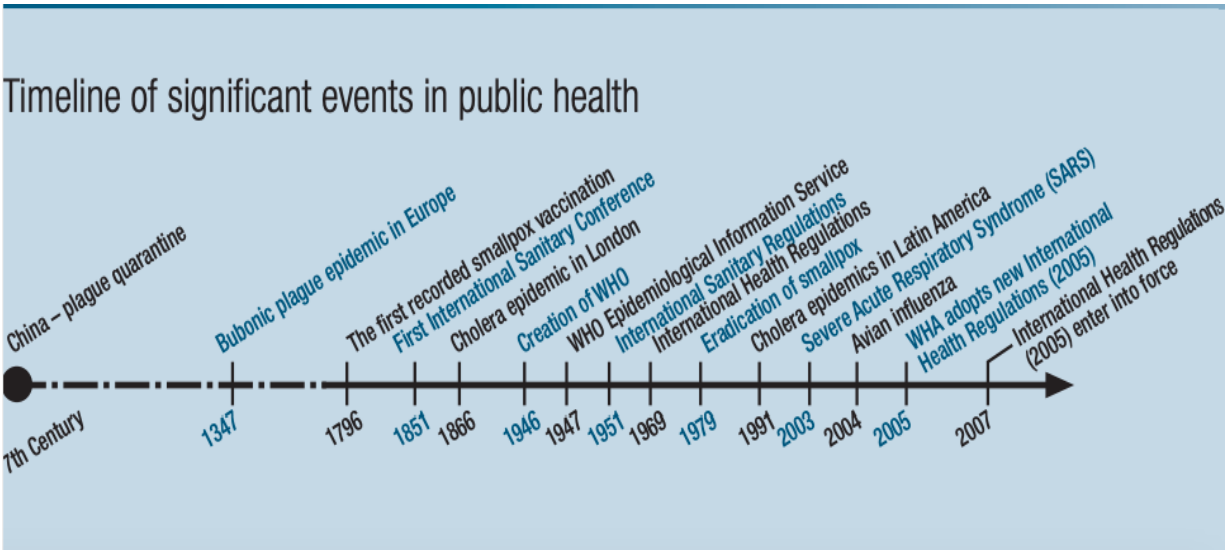

Figure 2: Timeline of significant health events that drove the evolution of the field of public health[1]

The period between the 13th and 18th centuries witnessed the outbreak of several infectious diseases across the globe including the bubonic plague, smallpox, and cholera, which required PH interventions that focused on the prevention of specific diseases. These interventions included isolation of infected individuals from the general population, immunization, and improvement in sanitary conditions (41).

This period also witnessed the earliest attempts at establishing multi-national cooperation in the field of PH through the enactment of international PH laws and policies (42). These policies mainly focused on preventing the spread of infectious diseases. Notable among these is the invocation of the unilateral quarantine regulations across European ports from 1377-1851 in response to the bubonic plague, and the international call for improvements in environmental conditions at the international sanitary conference held in 1851, in response to the cholera epidemic (41). These events implicitly demonstrated recognition for the importance of tackling

[1] *World Health Organization. The world health report 2007: A safer future: global public health security in the 21st century: World Health Organization: 2007. available at https://www.who.int/whr/2007/en/ , accessed 24 November 2021)*

communicable diseases from a global public health perspective—a marked departure from previous approaches (42).

Despite the relative success of PH during the period between the 13th and 18th centuries in dealing with the spread of communicable disease, it was yet to fulfil certain expectations fundamental to its mission. Factors such as industrialization, increase in population, urbanization, and poverty resulted in an increase in the burden of non-communicable diseases and health inequities in the late part of the 18th century. These new challenges required new public health interventions (40). Systematic development of local and international PH organizations such as the WHO and the engagement of multiple sectors and community partners to improve the health of individuals and populations became necessary (40). Inadvertently, this ushered in a new era of the field, which span the period between the 19th and 21st centuries. This new era of PH is characterized by enhanced and broadened practices that extend beyond health. Today, PH has become an interdisciplinary field encompassing several disciplines including epidemiology, biostatistics, economics, law, social and behavioural sciences, environmental health, nutrition, health promotion, health policy, and management and occupational health (43). Additionally, social, scientific, political and moral factors recognizing the interdependency and interrelationship of the health of the people, communities, and nations have become key dimensions of the field (44, 45).

The skills and technological advances that are presently applied to the prevention and control of communicable and non-communicable diseases like Human Immunodeficiency Virus (HIV), tuberculosis (TB), diabetes, hypertension, coronary heart disease among others have been developed over the past hundred years (45). While some of these advances have relied on medical breakthroughs and biomedical technologies (e.g. new vaccines, new drugs, etc.), many have relied on behavioural changes and regulations (45, 46).

The social determinants of health; an essential part of the modern PH paradigm which recognizes the role of everyday lifestyle and systems in keeping people healthy, has made this consideration for behavioural changes and regulations in addressing health challenges essential (40, 47). The importance of the social determinants of health in modern PH practice is widely acknowledged by local and international public health organizations (48-50). For example in the WHO's 2008 report, it affirmed that "the social conditions in which people are born, live and work are the single most important determinant of good health or ill health, of a long and productive life, or a short and miserable one"(49). Over the last century, the scope of public health has significantly expanded (51). While initial efforts were focused primarily on

controlling infectious diseases, modern public health now encompasses a wide range of complex health challenges (52). These include the rising burden NCDs, health system inefficiencies, environmental and climate change-related health threats, urbanisation, mental health, occupational and industrial health risks, and the social determinants of health (51).

Another important theme that has become central to modern PH practice is the concept of social justice. Social justice in the PH context refers to the view that every individual regardless of race, gender, and social status deserves equal access to good health (53). "It captures the twin moral impulses that animate PH: to advance human well-being by improving health and to do so particularly by focusing on the needs of the most disadvantaged" (53)

With equity and social justice as guiding principles in modern PH practice, various stakeholders in health have embarked on several initiatives to ensure the conditions in which everyone can enjoy good health. Most of these initiatives, instituted by stakeholders like the WHO, World Federation of Public Health Associations (WFPHA), Centre for Disease Control (CDC), educational institutions, local and national governments, and PH workforce have been key in improving access to health care services by the population irrespective of race, gender, geographical location, social status, ethnicity, and sexual orientation. While some of these initiatives have also faced several challenges like inadequate funding, cultural barriers and bad governance minimizing their impact on health systems strengthening, the overall role of PH as a field in strengthening past, present and future health systems cannot be overemphasized.

2.4 Role of PH in health systems strengthening

A health system, as defined by the WHO, refers to the organization of people, institutions and resources to promote, restore and/or maintain health (54). A well-functioning health system is generally recognized as one that responds to the needs and the expectations of the population in a balanced manner (55-57). Based on the WHO's health system framework (Figure 3), the key goals of a well-functioning health system include protecting the population against health threats, shielding individuals from the financial consequences of ill-health, and ensuring equitable access to people-centred care (56, 58).

Figure 3: The WHO's Health Systems Framework[2]

Strengthened health systems are essential for achieving the broad health objectives of the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), as well as for the success of programs addressing both communicable and non-communicable diseases (57, 59). Increasing the global efforts towards health systems strengthening has become important (60). Health systems strengthening involves implementing strategies that ensure the provision of effective and equitable Healthcare services, the development of skilled health workers, the mobilization and allocation of resources and the improvement of systems leadership and governance (59). It has been a major focus of the field of PH over the years. PH, through its role in building and shaping international systems and organizations that respond to health challenges, has helped to develop the global network for identifying and responding to outbreaks and emergencies (57). For example, PH agencies such as the Africa CDC, and the WHO have been instrumental in responding to recent outbreaks of transmissible infectious diseases like Ebola (West Africa), diphtheria (Bangladesh), Monkeypox (Nigeria), and Zika (South and Central America) (61-63). Additionally, PH measures such as isolating diseased individuals and altering unhealthy behaviours through community engagements have been vital in managing some of the worst outbreaks in history (63).

Another important role of PH in health systems strengthening is the provision of relevant and scientifically valid epidemiologic data to guide health policies. Scientific evidence that is generated through PH research helps drive decisions regarding how to formulate appropriate health policies, how to design and implement safe and effective interventions; and where to

[2] *World Health Organization. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: World Health Organization; 2010. available at (http://www.who.int/healthinfo/systems/WHO_MBHSS_2010_full_web.pdf, accessed 26 November 2021)*

invest in human and financial resources (59). For example, health policies like the WHO's 'Test and Treat' policy which has become key to tackling HIV/AIDS have been developed through PH research (64). Furthermore, data that is generated through PH research such as the global estimates of disease burden and monitoring and evaluation of health interventions have helped ensure that investments in health are cost-effective and international policies that support health efforts based on best available scientific evidence (59, 65).

It is important to acknowledge that despite efforts by most PH organizations to generate evidence to inform health policies and interventions, not all research translate into actionable policies, guidelines, and recommendations (59). Partnership between research organizations and institutions that are tasked with formulating and implementing PH policies have become very crucial in the 21st century.

One of the most important roles of PH as a field in strengthening global health systems over the years has been its continuous efforts to train and supply the health workforce capable of performing essential health functions. The success of any health system depends on the availability of properly trained and competent workforce. As emphasized in the US CDC's framework for health systems strengthening (as shown in figure 4), PH personnel are needed to perform critical health functions such as health promotion, disease surveillance, outbreak investigation, management of national and international PH institutions and implementation of key health programs (59). As the performers of these functions, the public health workforce is generally acknowledged as key actors in promoting the health of populations within and across countries (66). The growing global call to increase the number of trained PH workforce in the move toward achieving universal health coverage (UHC) (67) is proof of the recognition of this important role of the field in health systems strengthening.

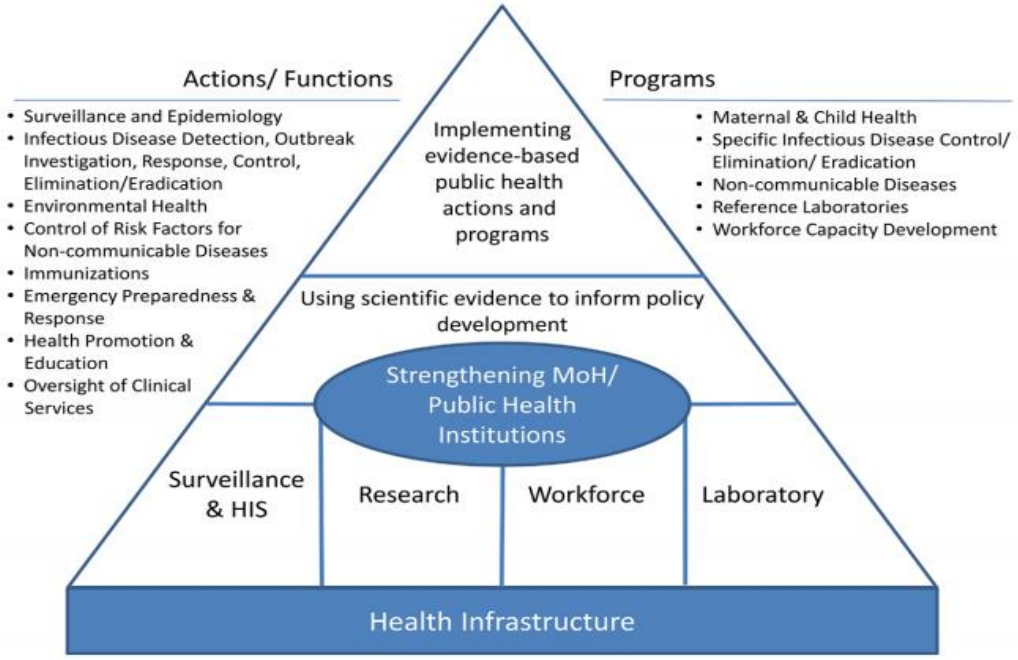

Figure 4: Public health framework for health systems strengthening[3]

2.5 Training of the public health workforce

Over the years, the education and training of the PH workforce have been the responsibility of different organizations and institutions. Training the PH workforce has often been complicated by the academic controversy as to whether public health is a distinct discipline or not (68). While some schools of thought consider "health professionals who perform PH functions" and "people educated specifically in the field of PH" as distinct, others view them to be the same (66).

In the US, the Welch-Rose committee, formed in 1915 under the auspices of the Rockefeller Foundation, examined whether PH meets the criteria to be considered a discipline, and to make recommendations on how to train experts in the field. In its report, the committee acknowledged that although many of the students who pursue PH come from diverse backgrounds such as medicine, nursing, sanitary engineering among others, PH meets the criteria for being a distinct "profession (69)".

In more recent times, other researchers have supported the notion that PH should be considered a "profession" and the mandate to train workforce should be given to educational institutions specially equipped to provide such training (68, 69). For example, Evashwick (2013) argued

[3] *Center for Global Health. Public Health Framework for Health Systems Strengthening [factsheet]. Available at http://www.cdc.gov/globalhealth/pdf/HHS_one_pager_factsheet_press_quality.pdf; accessed 2 December 2021)*

that “PH should be considered a distinct profession since it has a unique knowledge base, an educational credential offered by schools and graduates programs and a career path independent of other occupations or professions”(68)

Despite the debate over where the responsibility for training PH personnel lies, educational institutions and SPH that offer the undergraduate PH degree, and postgraduate MPH programs are globally recognized as key trainers of health personnel who contribute to health systems strengthening within and across countries (30). While the undergraduate PH degree is only offered in certain countries such as the US, UK, Australia, Nigeria, and Vietnam, educational institutions in almost every country globally offer the MPH. This makes the MPH a key supplier of the global PH workforce. The program which is usually offered either on part-time or full-time basis aims to equip individuals from a variety of disciplines with the key PH competencies to tackle health challenges (70). In Africa, MPH programs generally do not impose rigid pre-requisite undergraduate majors for admission, echoing the more flexible American model. While a significant number of students admitted into these programs come from clinical fields such as medicine, nursing, and pharmacy, many institutions also admit candidates with backgrounds in social sciences, biological sciences, and in some cases, engineering and education (71). This interdisciplinary intake reflects the multidisciplinary nature of public health and the need for diverse perspectives in addressing complex health challenges (6). However, some programs may give preference to candidates with health-related qualifications or relevant work experience in health systems (32). Since the MPH program is considered an essential contributor to the training of the global PH workforce, there has been several efforts in recent times to improve program structure, making it more competency-driven (72).

2.6 Core competencies for PH practice across the world

A key element of the global efforts towards achieving the SDGs is improving the training of PH personnel (73, 74). Tackling global health challenges such as health inequities require not only increasing the number of trained PH professionals, but also ensuring that training programs produce a skilled PH workforce capable of providing essential PH functions across systems (75). The need to produce a PH workforce with the proper set of knowledge, skills, and capabilities to deal with global health challenges has been recognized by several global health organizations (76). For example, to ensure a competent workforce, the WHO identifies strengthening of PH training programs as a key strategies for improving health outcomes, as outlined in its list of Essential Public Health Operations (Figure 5) (75).

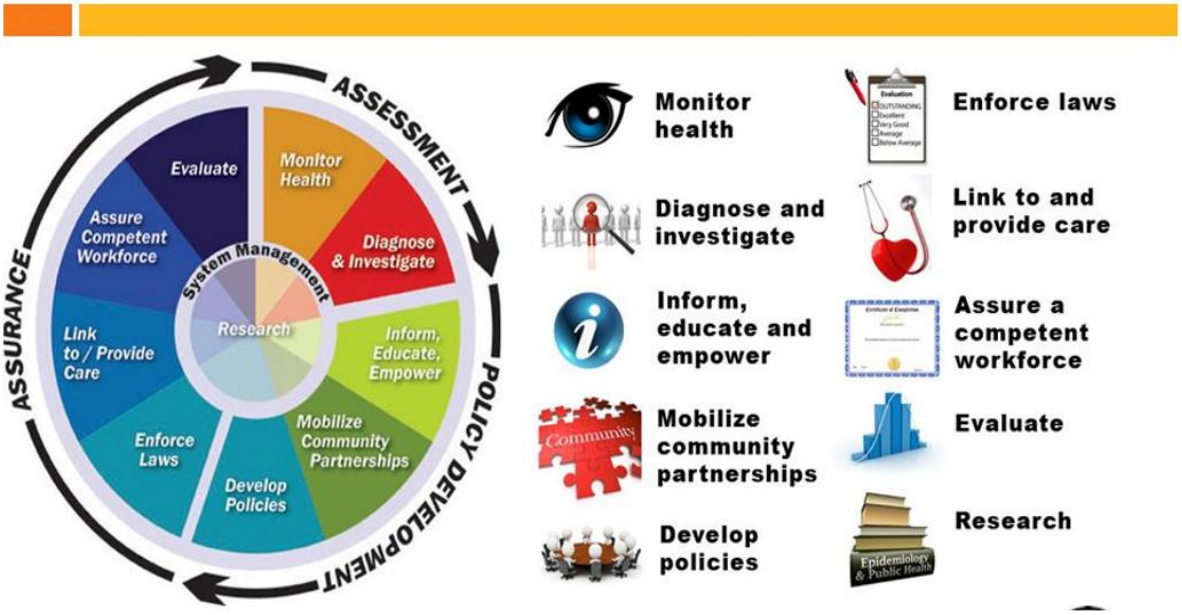

Figure 5: World Health Organization's list of essential public health operations (EPHOs)[4]

Educational institutions that are involved in the training of PH personnel have also made efforts to improve their training. In 2001, the US Council on Linkages Between Academia and Public Health Practice which focuses on improving PH education, training, practice, and research among member institutions identified eight foundational PH competency domains desirable for public health practice (29). These domains are policy development/program planning, analytical, PH sciences, communication skills, financial planning and management, cultural competency, community dimensions of practice, leadership and systems thinking as shown in Figure 6. Several membership organizations for PH training institutions worldwide have embarked on projects to identify core competencies essential for training their students (29-31). However, as shown in Figure 7, these projects have only been successfully completed in high-income countries (HICs).

[4] *Centre for Disease Control and Prevention. The public health system and the 10 essential public health services. 2017. Available at https://www.cdc.gov/publichealthgateway/publichealthservices/essentialhealthservices.html accessed 15 October 2021*

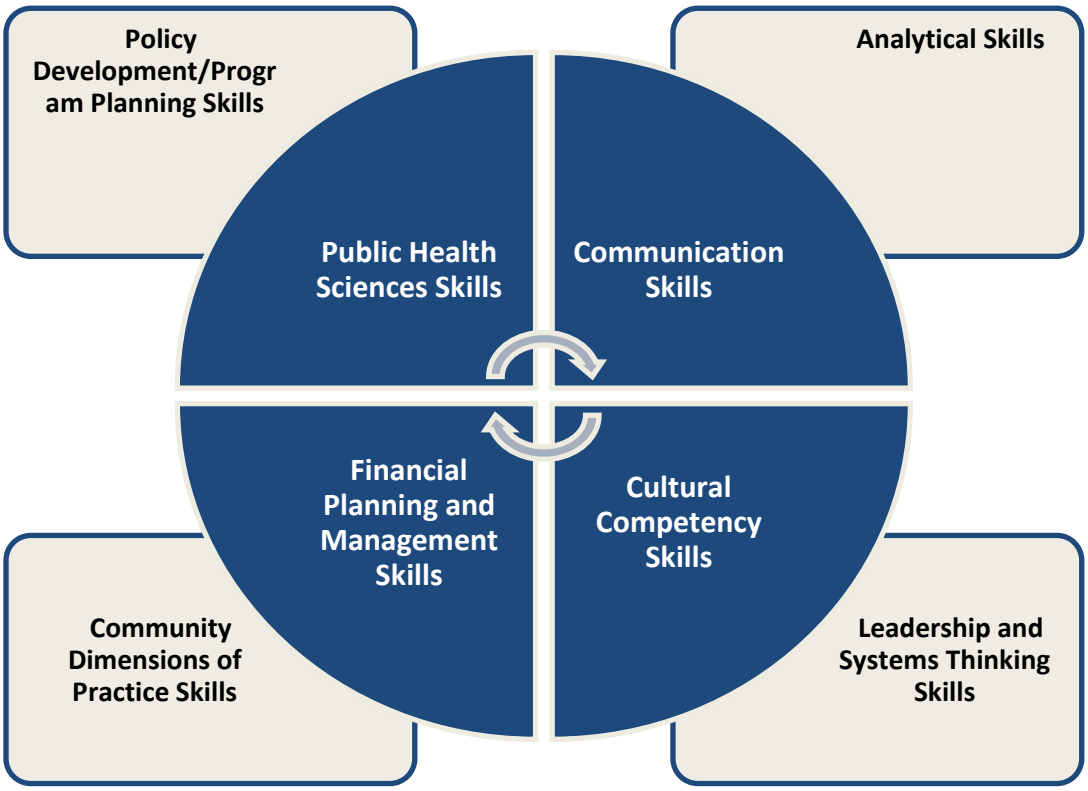

Figure 6: Council on Linkages between Academia and Public Health Practice's foundational public health competency domains

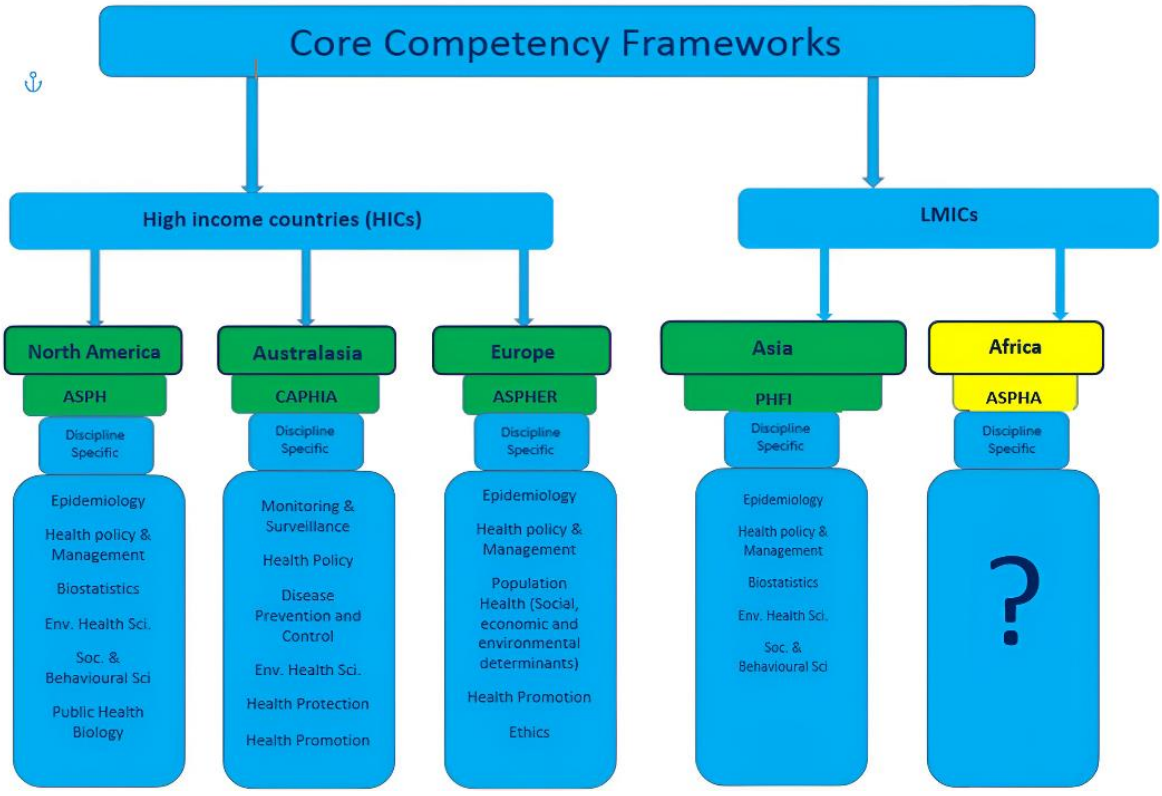

Figure 7: Core competency frameworks that exist for Master of Public Health training programs in developing versus developed countries

Legend:

	Work on core competency framework complete
	Work on core competency framework ongoing

In 2006, the Association of Schools and Programs of Public Health (ASPH) in the US, through a participatory research project, identified five discipline-specific and seven cross-cutting core competencies that every MPH graduate should have upon completing their degree to contribute effectively to health systems strengthening (77). These core competencies have been used to guide the accreditation of MPH programs in the region. The Council on Education of Public Health (CEPH), which coordinates the standardization and accreditation of MPH education in the US further identified 22 core competencies across eight main domains (Figure 8) which are fundamental to MPH training in the US (78).

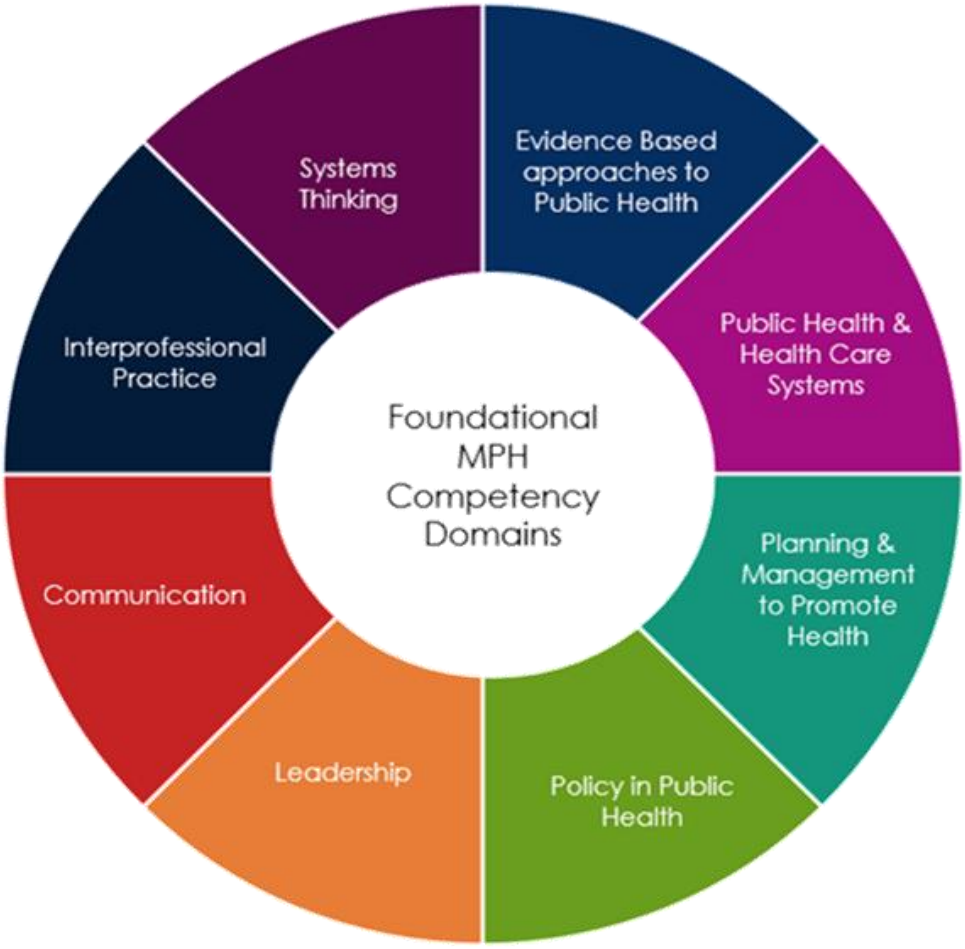

Figure 8: Council on Education of Public Health foundational MPH competency domains[5]

[5] *King LR. Academic Training in Public Health: Developing Competencies to Meet the Needs of a Changing Workforce. Association of Schools of Public Health in Africa (ASPHA) conference. 2018. Available at https://asphaafrica.net/aspha-2018-conference/ accessed on 20 December 2021.*

The Association of Schools of Public Health in the European Region (ASPHER) which serves as a membership organization for PH training institutions across Europe also embarked on an initiative in 2006 to identify core competencies that are key to the training of MPH students in the region (31). The initiative was in response to the need to improve the training of MPH students, making them well suited to deal with the health challenges in the region.

In 2007, the Australian Network of Public Health Institutions (ANAPHI), which oversees PH teaching and research in Australia, developed a list of core competencies to guide the training of MPH students (Figure 9). These core competencies were organized under the five core public health functions, relevant to the Australian context. It is expected that these competencies when acquired as part of MPH trainings will help improve graduates' contribution to the development of the Australian health system (33).

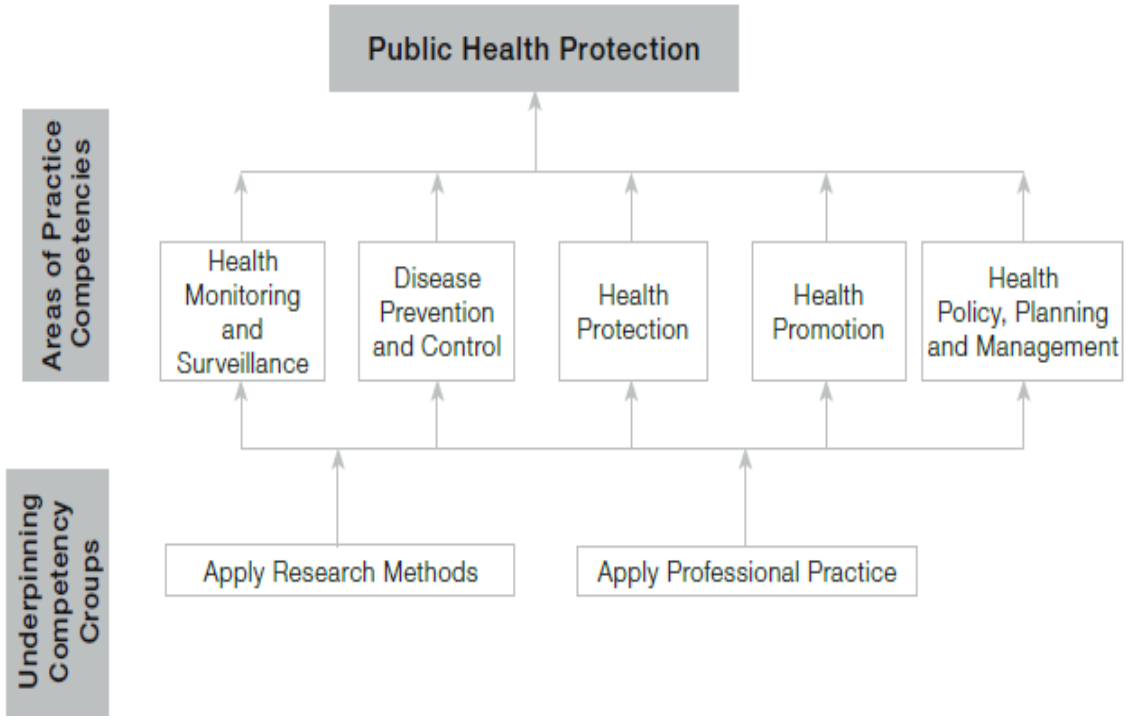

Figure 9: The Australian Network of Public Health Institutions (ANAPHI) competency standards for Public Health practice[6]

Although most SPH in developing countries acknowledge the key role of competency-driven PH education in health system strengthening, very few projects had been undertaken in these regions until recently to identify core competencies relevant to their health system context. Recent research conducted in countries like India (32, 36, 79, 80) has not ensured a high level of participatory involvement spanning a broad range of key stakeholder input.

[6] *Genat B, Robinson P, Parker EJ. Foundation competencies for Master of Public Health graduates in Australia. Australian Network of Public Health Institution (ANAPHI) 2009. Available at http://caphia.com.au/testsite/wp-content/uploads/2016/07/DRAFT-CAPHIA-Comp-Framework-2ndEd.pdf , accessed 22 December 2021*

In Africa, few research projects have been conducted to identify core competencies that are relevant to the local context. Moreover, it is unclear whether core competencies developed for MPH programs in developed countries will be relevant to the local context when adopted in regions like Africa. Inadvertently, this has highlighted the importance of conducting research to identify core competencies that are relevant to addressing the unique health challenges of regions like Africa.

To address this gap, the ASPHA, which serves as a membership organization for SPH in Africa, has been working on a project since 2019 to develop a core competency framework for MPH programs in Africa. ASPHA aims to harmonize the core competencies contained in the framework across MPH programs of member institutions. The ultimate goal of the project is to move towards an African-based MPH accreditation system based on harmonized core MPH competencies.

2.7 Conclusion

The discipline of PH plays a crucial role in strengthening health systems and improving the overall health of populations. The evolution of public health over time has been influenced by major health events and has led to a shift towards a more multidisciplinary approach to addressing the root causes of poor health. The PH workforce is diverse, but all members share a common goal of improving health. The training of the PH workforce, including MPH graduates, is important for the development of PH competencies. Educational institutions and PH organizations have worked to identify core competencies needed to support the performance of the WHO's essential PH functions. Associations of schools of public health in regions like North America and Europe have also developed core competency frameworks for programs like the MPH, and these have often been developed in consultations with key stakeholders. However, no study has been conducted in regions like Africa to identify core competencies for MPH graduates, and no core competency frameworks currently exist for MPH programs in the region. This makes research which engages stakeholders from diverse work and country settings to identify competencies relevant to the work undertaken by MPH graduates in Africa to strengthen the continent's health systems, particularly important.

2.8 Aim of Study

This thesis aimed to identify the set of core competencies that are relevant to the public health work undertaken by MPH graduates across different work settings in Africa. It also explored the challenges that could be encountered in adopting harmonized or common sets of core competencies across MPH programs in Africa

2.9 Objectives

1. To review the literature to identify core competencies that may be relevant to MPH programs in Africa.
2. To assess the applicability of identified competencies to graduates' work, the contribution of MPH programs to their acquisition, graduates' confidence in utilizing them and how they are covered in MPH programs across Africa.
3. To explore the perspectives of employers of MPH graduates on the core competencies needed by graduates for public health work in Africa.
4. To explore the perspectives of key stakeholders on the challenges in adopting harmonized or common sets of core competencies across MPH programs in Africa.

2.10 Purpose of Study

The findings of this thesis will inform the development of a core competency framework for MPH programs in Africa. They will also inform the ASPHA about the challenges in harmonizing core competencies across MPH programs and how to overcome them. Ultimately, these findings could contribute to improving MPH education in Africa and enhance graduates' contributions to health systems strengthening in the region.

CHAPTER 3

Core competencies for Master of Public Health (MPH) programs in Africa - Structured literature review

3.1 Background

Health systems in Africa face numerous challenges (13, 81). These challenges include high burden of communicable and non-communicable disease, limited health care infrastructure, inadequate health financing, inequities in health care access, fragmentation in health services, prioritization of curative instead of preventive health care, poor governance and leadership, weak health information systems and shortage and maldistribution of the PH workforce (16, 81-83). Equipping the PH workforce in Africa with the relevant knowledge and skills to address these challenges is key to health systems strengthening on the continent (84).

Across Africa, graduates from the MPH program work in different sectors of the health systems and often hold key health leadership positions (6, 16). This provides them with the platform and opportunity to contribute their skills and competencies toward addressing the health systems challenges of the continent. To effectively tackle the health systems challenges of Africa, there is a growing call for MPH programs on the continent to equip graduates with the competencies that are contextually relevant/core to the health systems (25, 85). Evidence from across the globe suggest that competency-based MPH education is key to equipping MPH graduates with the knowledge and skills, needed to address health systems challenges across different contexts (1). Adopting a competency-based MPH education however relies on the development of a core competency framework for MPH programs (26). The need for core competency frameworks as parts of efforts to move towards competency-based MPH education prompted Associations of Schools of Public Health in America and Europe to develop core competencies framework for their MPH programs (32, 33). The situation is however different in Africa. Currently, no Africa-wide core competency framework exists for MPH programs. Evidence suggests that the development of core competency frameworks for MPH programs optimally relies on the use of literature reviews, document analysis and stakeholder engagements to assure buy in (86). To develop a core competency framework for MPH programs in Africa, it is important to first review the literature and MPH curricula documents to identify a preliminary set of core competencies which can be refined or expanded using methods that ensures inputs from stakeholders across different sectors of health in Africa.

3.2 Aim

The aim of this study was to review studies, reports, core competency frameworks, and selected MPH curricula documents to identify core competencies that may be relevant to MPH programs in Africa.

3.3 Methods

3.3.1 Study Design

This study employed a structured literature review method. This methodology was chosen because of its ability to provide a comprehensive initial overview of complex research topics. (15, 16). This was complemented by an analysis of MPH curricula from ten purposively sampled ASPHA member institutions. Additionally, core competency framework documents developed by national and regional Associations of Schools of Public Health worldwide were reviewed. The review method focussed on five sequential stages shown in Figure 10

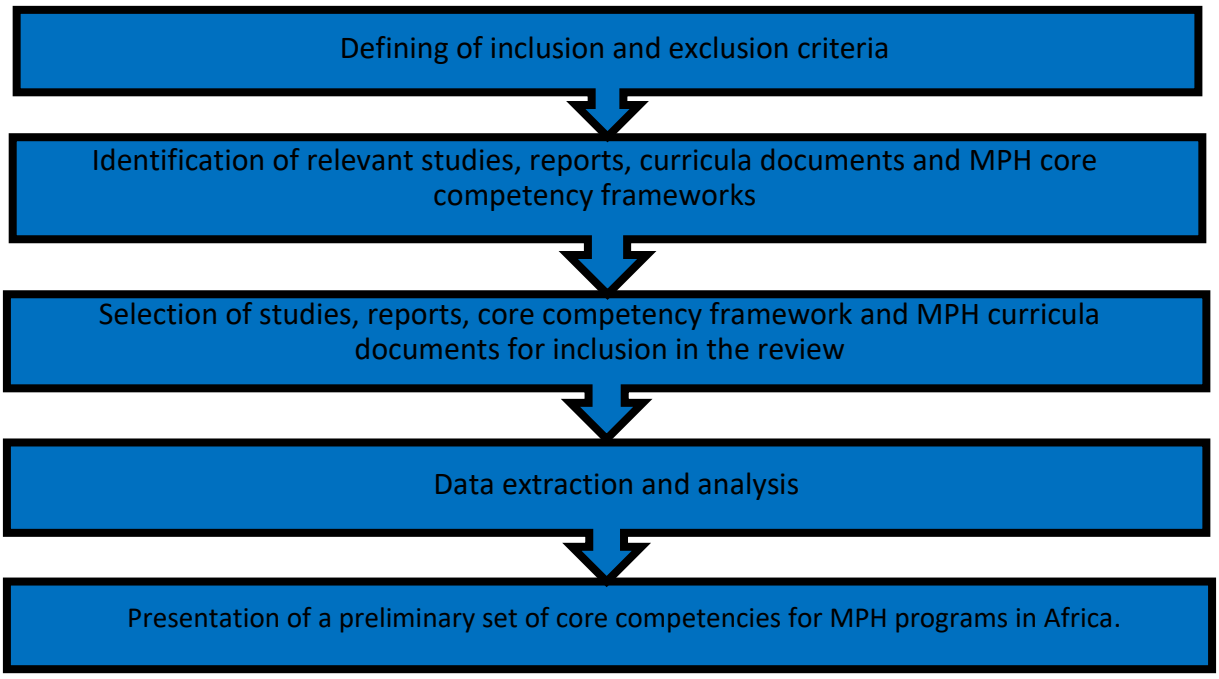

Figure 10: Sequential stages of the literature review process.

3.3.2 Inclusion criteria

Studies and reports from around the world that discussed MPH competencies were included in this review. Articles were restricted to those published in English between January 1982 and January 2022 (when the search was conducted). This period was selected to capture both the early global efforts in the 1980s to define public health training competencies and the more recent developments in competencies for MPH training programs. Additionally, this study included MPH curricula documents purposively sampled from ten MPH programs in Africa, as well as core competency frameworks developed by national and regional associations of

schools of public health worldwide (Table 1). Studies were included if they had any data on core competencies for MPH programs across the globe regardless of whether this was the main aim of the study or not.

3.3.3 Exclusion criteria

This review excluded studies published in other languages other than English and those published before January 1982.

3.3.4 Search Methods

3.3.4.1 Identification of studies

To identify articles discussing MPH competencies, the following databases: Google Scholar, PubMed and Scopus were searched. The search was limited by language of publication (i.e. English) and not limited by study design or geographical location of study. The key search terms used to identify studies are shown in Appendix 1. The search strategy for electronic databases incorporated both Medical Subject Headings (MESH terms) and free-text key terms which were adapted to suit each database using an applicable controlled vocabulary. The search results were triangulated with findings from an earlier work conducted by London and Mall (2012) to identify core competencies that exist for MPH programs across the globe (35). The websites of Associations of Schools of Public Health worldwide were also searched for reports and grey literature on MPH competencies. A hand-search of the reference lists of all eligible studies was conducted to identify additional studies that met the inclusion criteria.

To identify MPH curricula, a list of MPH institutions that are members of the ASPHA at the time of the study was obtained from the Association's secretariat. From the full list of forty-three MPH institutions obtained (Appendix 2)**,** ten SPH from the five sub-regions of Africa (i.e. at least one SPH from West Africa, Southern Africa, East Africa, North Africa, and Central Africa) were purposively sampled. Where there were several MPH programs in a sub-region, efforts were made to obtain and review the curricula of all the institutions in that sub-region before selecting curricula for inclusion. This was done by searching institutions websites or sending an email to contacts listed on websites to request for the curricula documents. Among institutions whose curricula were obtained, those with the most detailed information on core competencies were selected for inclusion in the review.

To identify core competency framework documents, a list of national and regional associations that have developed core competency frameworks for MPH programs was developed through an online search (Table 2). Using the list as a guide, core competency frameworks documents developed by these national and regional associations were obtained from associations'

websites. Where core competency framework documents were not available online, an email was sent to the contact details listed on the association's websites to request for the documents.

Table 2: List of National and Regional Association of Schools of Public Health (identified through online search)

Region	Association of Schools of Public Health	Website	Framework Available?
Africa	Association of Schools of Public Health in Africa (ASPHA)	asphaafrica.net	No
Asia	Public Health Foundation of India (PHFI)	phfi.org	Yes
	Asia-Pacific Academic Consortium for Public Health (APACPH)	apacph.org	Yes
Europe	Association of Schools of Public Health in the European Region (ASPHER)	aspher.org	Yes
North America	Council on Linkage between Academia and Public Health Practice	phf.org	Yes
	American Association of Schools of Public Health (ASPH)	aspph.org	Yes
	Pan American Health Organization (PAHO)	paho.org	Yes
	Council on Education of Public Health (CEPH)	ceph.org	Yes
	Public Health Agency of Canada (PHAC)	phac-aspc.gc.ca	Yes
Australasia	Public Health Association of New Zealand (PHANZ)	pha.org.nz	Yes
	Council of Academic Public Health Institutions, Australia (CAPHIA)	caphia.com.au	Yes

3.3.4.2 Selection of studies

The selection of articles and reports for inclusion in this review was conducted by two reviewers – Abraham Opare (AO) and Virginia Zweigenthal (VZ). AO initially checked the electronic search result and selected all titles and reports that referred to public health, MPH, competencies, skills, knowledge and attributes. Any identified articles or report that were found to be clearly irrelevant at first glance was excluded. Titles found to be relevant to this review were imported directly into Endnote © version 7 and duplicates were removed. AO then screened the abstract of the articles and identified those relevant to this review. Full text review was done for articles and reports whose abstracts were found to be relevant to this review. To verify whether articles and reports were accurately selected for inclusion, VZ independently

analyzed a selection of the search results and any disagreement on article or report eligibility were resolved through discussion.

All 10 core competency framework documents identified through the online search were selected for inclusion in this review.

3.3.5 Data extraction

Data from articles and core competency framework documents that met the inclusion criteria were extracted by two reviewers (AO and VZ) using the Joanna Briggs Institute QARI data extraction form, modified for this review (Appendix 3). Data was extracted by AO, while VZ independently analyzed a selection of the articles, curricula and core competency framework documents to verify whether the data was accurately extracted. A high level of agreement between AO and VZ on the data extracted was found. Data extracted included specific details about the context, methods used to identify competencies, study location, target group, detailed competencies statements under thirteen pre-defined domain/theme and any other results relevant to answering the review question. The criteria defined in the standards for reporting qualitative research (SRQR) (87) was used to critically evaluate the methodological coherence of each article included in this review. Data from the MPH curricula documents were extracted using a piloted data extraction form (Appendix 4)

From reviewing reports from plenary sessions at the 2019 ASPHA conference in Uganda, thirteen discipline-specific and cross-cutting domains (Table 3) were identified and used as predefined themes for the data collection. The conference, which brought together over 100 stakeholders including lecturers, heads of MPH programs and researchers, featured small group discussions where participants explored competency domains, they considered relevant to the PH context of Africa. Feedback from the groups was presented in plenary sessions, where areas of overlap were discussed, and consensus on the thirteen competencies was reached through open deliberation. Detailed competency statements from the selected articles, MPH curricula and core competency frameworks documents were extracted under these thirteen agreed domains/themes. To ensure that no relevant competencies for MPH programs in Africa were missed during the data extraction process, broad domains/themes and detailed competencies from articles, curricula, and core competency frameworks—different from the thirteen predefined domains/themes—were also extracted and reported. These were extracted under 'other' on the data extraction forms (Appendix 3 & 4). Themes that were deemed to be relevant to understanding the topic of competency-based education and the process of harmonizing core

competencies across MPH programs were also extracted and reported under 'Other key Findings'.

Table 3: Discipline-specific and cross-cutting domains agreed upon by delegates at the 2019 ASPHA conference as relevant to MPH programs in Africa and the region's PH context.

Discipline specific domains	Cross-cutting domains
Epidemiology	Leadership
Social and Behavioural Science	Systems thinking
Health Promotion	Communication
Biostatistics	Professionalism
Health Systems, Policy and Management	Personal/technical (soft skills)
Environmental Health Science	Awareness of Social, Political & Cultural context
Public Health Law	

To ensure uniformity in the extraction of competencies, a working definition of competencies and the distinction between learning objectives, curriculum and competencies was established (Figure 11). In listing the detailed competencies under each domain/theme, the Centre for Health Policy (Columbia University) 'curriculum to competency tool kit' was used as a guide (20). This tool kit indicates that any competency statement should consist of; an action verb (observable or measurable performance of a worker), a content (subject matter, type of performance, specific task) and a context (limitations or conditions of work environment). In instances where extracted competencies did not meet the criteria for a competency statement, efforts were made to reword them using the curriculum to competency tool kit' and the Blooms taxonomy guides (88). Since this review aims to identify competencies that should be emphasised in educational programs to ultimately improve graduates' workplace performance, the competency model proposed by Westera (2014) were considered in formulating competency statements. This model, based on a review of common competency definitions, emphasizes that "competencies comprise a mental component representing thought and a behavioural component representing performance" (89).

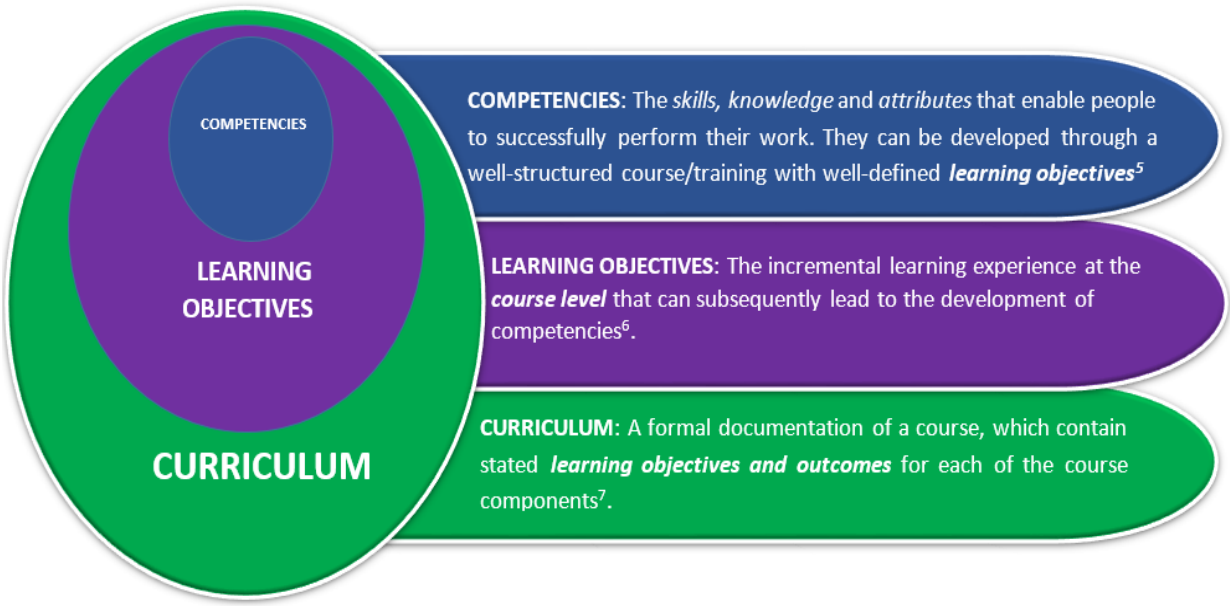

Figure 11: : Distinction between competencies, learning objectives and curriculum

3.3.6 Data Analysis

The procedure described by Thomas and Harden (90) was followed in the analysis of data in this review. This involved a concentrated reading and re-reading of the abstract (where applicable) and full text of each article, core competency framework and curricula document. Pre-defined themes and those identified within the data were entered into the Atlas.ti (version 7.0.92) software together with data/competencies that fell under these themes. Where applicable, first order data (study results) and second order data (author's discussion and interpretation of findings) were analyzed; exploring both the explicit and implicit meanings within the data to identify core competencies that may be relevant to MPH programs in Africa. Each included article or document was first analyzed individually before key themes capturing similar competencies or ideas were merged to produce overarching themes/domains and detailed/sub-competencies that addressed our review question.

3.4 Results

3.4.1 Search Result

The electronic search identified 2310 articles and reports. After removal of duplicates, 1782 articles and reports remained for screening. 1719 articles and reports which were found to be irrelevant to this review were excluded, leaving 63 articles and reports for full text review. Using the pre-defined inclusion and exclusion criteria, twenty (20) articles which met the inclusion criteria were included in this review. Our web search also identified 10 core competency frameworks developed by national and regional association of Schools of Public Health, which were all included. Our search of the websites of MPH institutions also produced 31 MPH curricula documents. After an initial review of the 31 documents, 10 from MPH programs (across the five sub-regions of Africa) which contained the most detailed information relevant to this review were purposively selected for review. The processes involved in the search, screening and selection of articles, curricula and core competency framework documents is summarized using the modified PRISMA flow diagram (Figure 12)

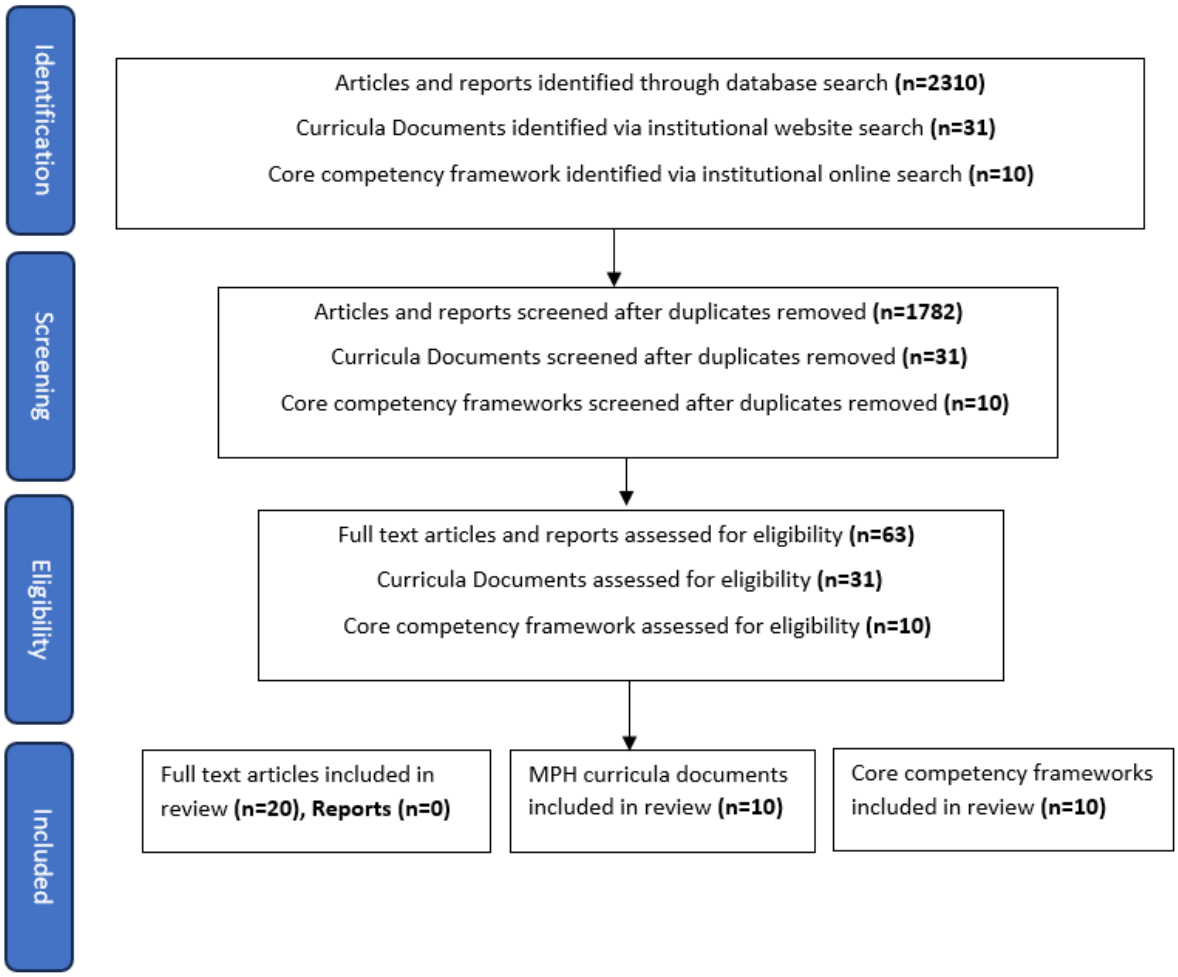

Figure 12: Modified Prisma Flow Diagram

3.4.2 Characteristics of the included studies, MPH documents and core competency frameworks

Twenty studies met our inclusion criteria. Of these, three were conducted in Africa (South Africa, Ghana and Ethiopia (91-93), four were conducted in North America (USA, Mexico and Costa Rica) (1, 94-96), seven were conducted in Asia (India, Maldives, Vietnam, Sri Lanka, China and United Arab Emirates) (97-103), three were conducted in Australia (104-106) and three were conducted in Europe (Austria, UK, The Netherlands) (106-108) as shown in Figure 13. As shown in Table 4, Stakeholder consultations were used by all 20 studies to identify competencies, and ten studies used modified Delphi methods to refine the initial list of competencies identified via review of literature, documents analysis or interviews with stakeholders (1, 92, 93, 96-98, 100, 104, 106, 109). The majority of the studies viewed the identified competencies as generic, representing the minimum knowledge and skills required of all MPH graduates regardless of their specialization during the MPH or intended career direction. One study (104) defined its competencies based on professional responsibility levels, categorizing them as basic, mid and advanced tiers of performance. A detailed description of the included studies is provided in Table 4.

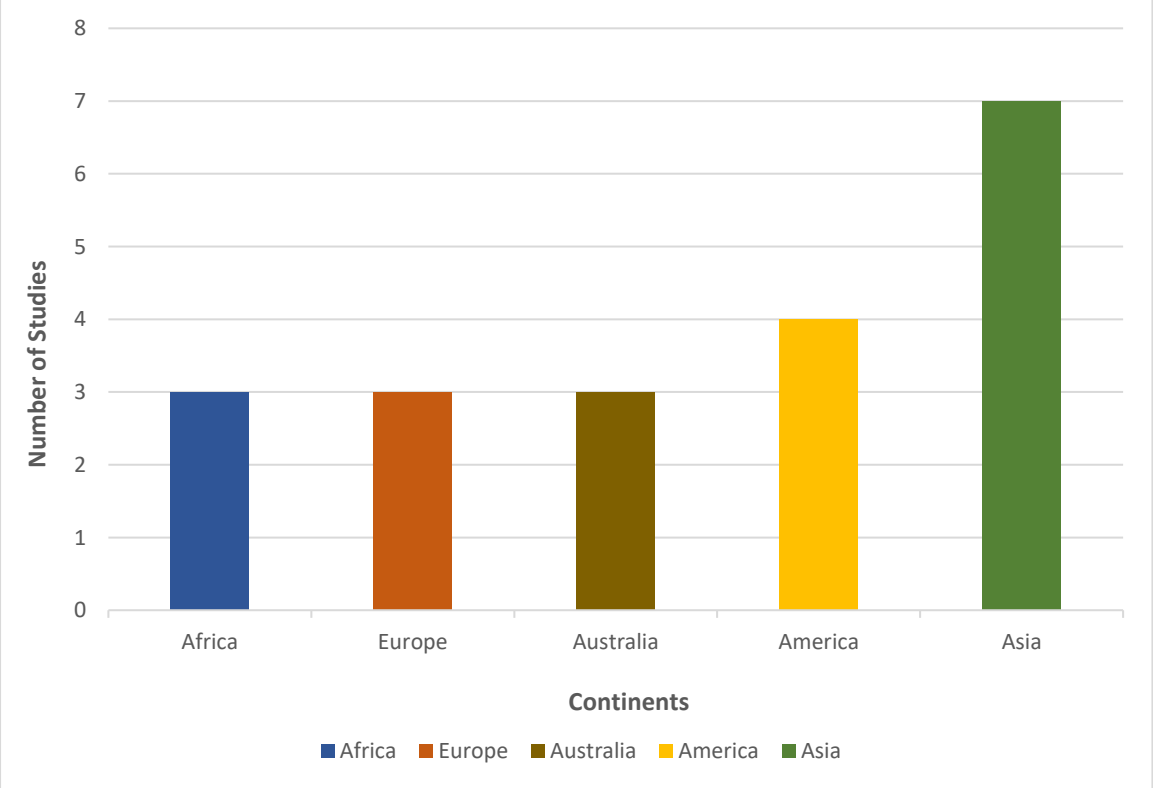

Figure 13: Distribution of the included studies across the globe (n=20)

Ten core competency frameworks developed by Associations of Schools of Public Health and other agencies involved in the training of MPH graduates were included. As shown in Figure 14, two frameworks were developed by Associations of Schools of Public Health and PH agencies in Asia (102, 110), five were developed in North America (1, 111-114). Two were developed in Australasia (115, 116) and one was developed in Europe (108)

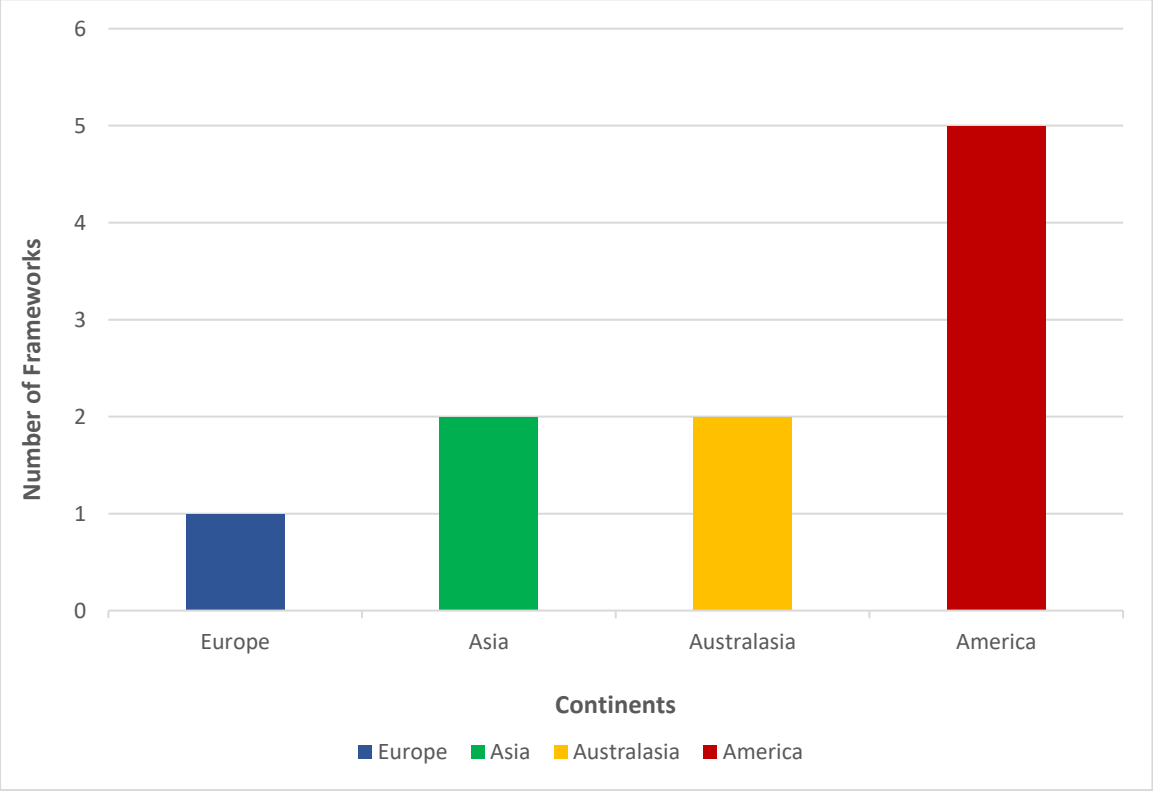

Figure 14: Distribution of the included core competency frameworks across the globe (n=10)

While we found some differences in the methods used by the various PH organizations/agencies to develop their core competencies frameworks, common elements in the development process were identified. In general, these frameworks were developed by reviewing the literature and core competency frameworks from other organizations to create an initial list of competencies (92, 102, 113, 114, 116). This was typically followed by stakeholder consultations, including interviews and survey of public health experts, employers of MPH graduates and MPH educators (111, 113-118). Most frameworks were developed using the Global list of Essential Public Health Functions (EPHF) (119) as a guide. Core knowledge and skills, identified from studies and reports which were considered key in performing the functions listed in the EPHF, were included in the final list of competencies in most frameworks (1, 108, 111, 113-117). As detailed in Table 5, six of the frameworks listed competencies for both discipline-specific and cross-cutting domain (1, 99, 102, 108, 111, 116) and four listed competencies for discipline-specific domains only (113-115, 117).

Out of the ten MPH curricula documents included in the review, one was from Southern Africa (South Africa), one was from North Africa (Egypt), three were from West Africa (Ghana and Nigeria), one was from Central Africa (Democratic Republic of Congo) and four were from East Africa (Tanzania, Uganda, Somalia and Kenya), Figure 15. All curricula reviewed indicated whether the domains (or courses) offered as part of the programs were considered as core. Domains or courses that were considered core across programs were expected to be taken by all students as part of their MPH training. On the other hand, courses that were not considered to be core were optional and it was possible for some students to graduate with their MPH degree without taking those courses. Although we found some differences in the domains or course considered to be core across the ten institutions, there were also some commonalities. For example, as Shown in figure 16, epidemiology and biostatistics were considered as core by all the MPH programs reviewed, and seven of the ten programs considered health systems, policy and management as being core. None of the programs considered public health law as core.

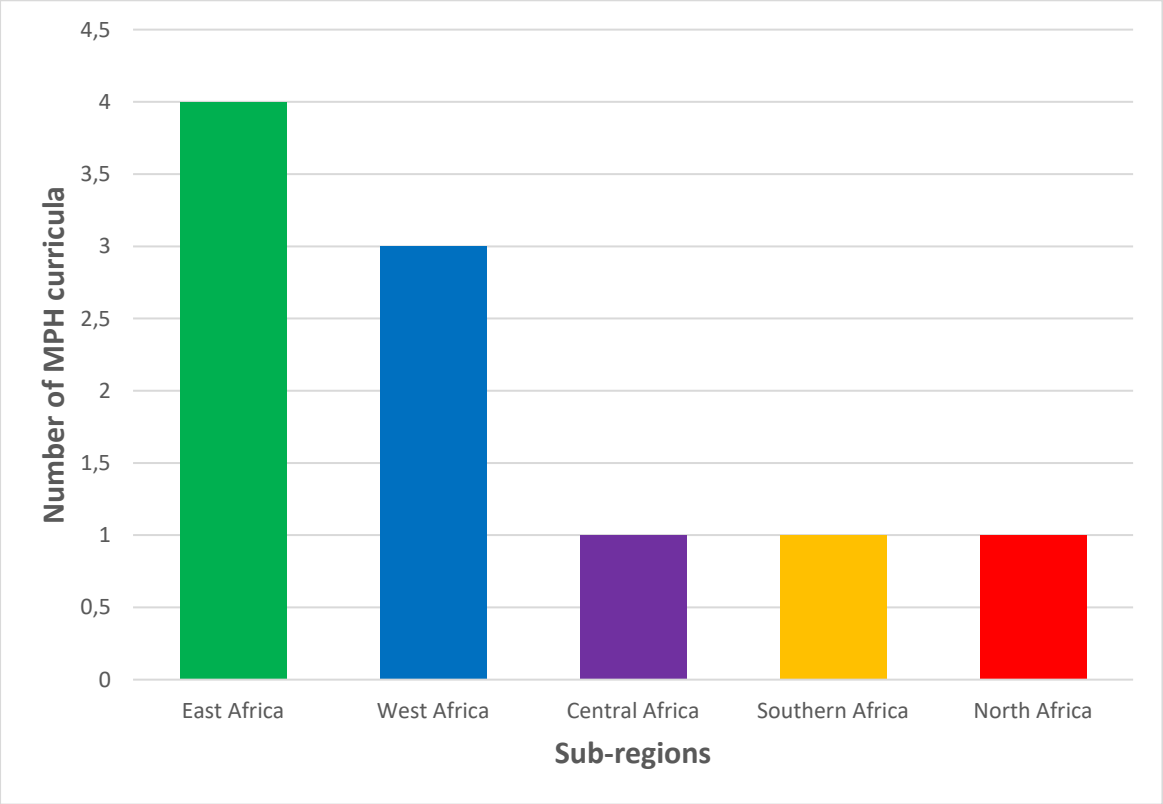

Figure 15: : Distribution of the included MPH curricula documents (n=10)

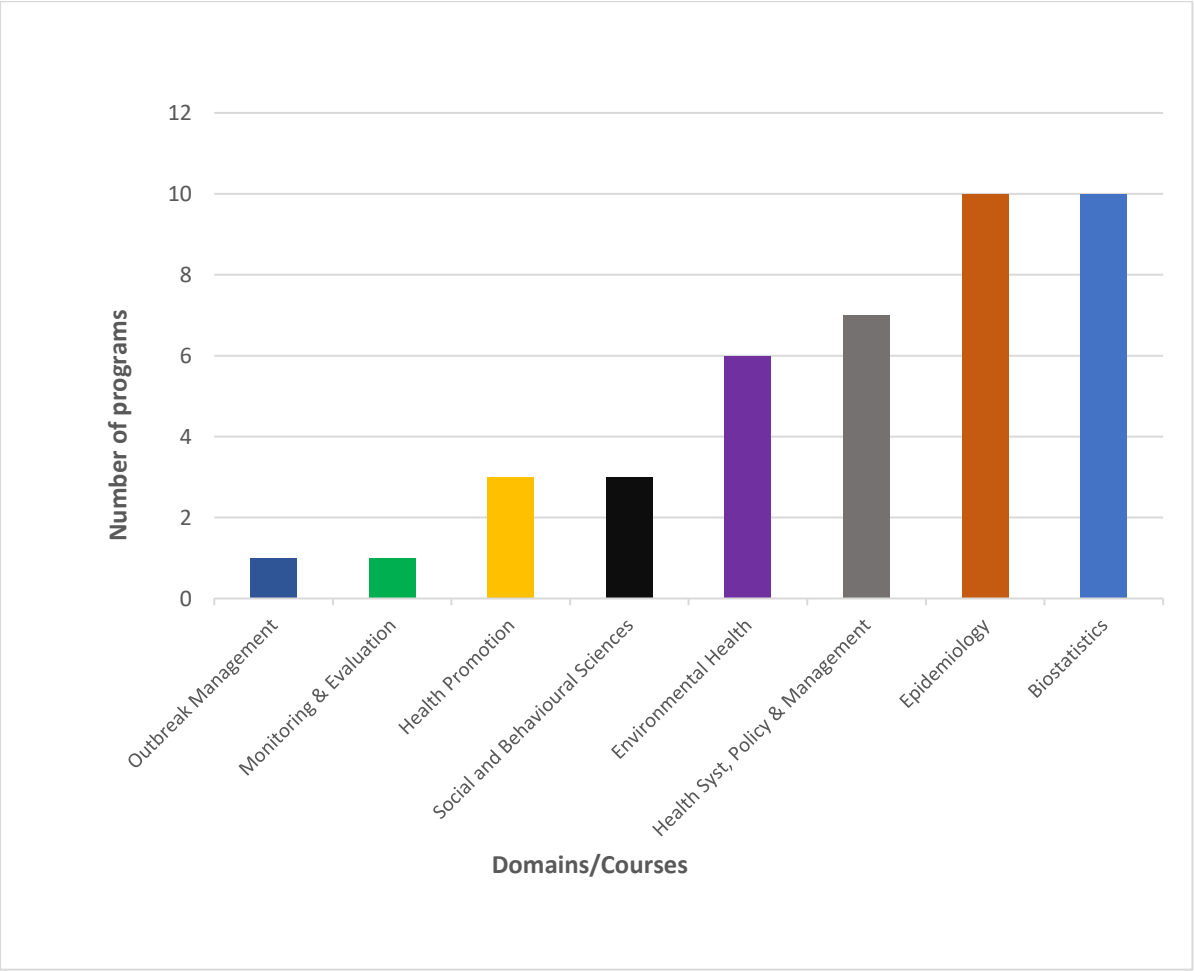

Figure 16: Public health domains considered to be core in the MPH programs

3.4.3 Core competencies that may be relevant to MPH programs in Africa

From the studies, core competency frameworks, and MPH curricula reviewed, 321 competencies were extracted under thirteen predefined discipline-specific and cross-cutting domains/themes. Additionally, 37 competencies that fell under three other domains identified in the data – Program Planning and Financing, Outbreak management, and Monitoring and Evaluation – were also extracted. As shown in Table 6, after analyzing these competencies, removing duplicates, merging similar competency domains or statements, and in some cases rephrasing competencies statements to make them adaptable to the African context, a preliminary list consisting of 187 detailed competencies across nine discipline-specific and seven cross-cutting domains was identified. Figures 17 and 18 show the list of discipline-specific and cross-cutting domains identified through this review as core for MPH programs and the PH context of Africa. The review of MPH curricula documents found that the public health law domain, which is crucial for tackling health inequity in Africa was missing from all ten MPH programs. Outbreak management which has become crucial for addressing pandemics like the COVID-19, was considered a core domain in only one MPH program.

Figure 17: Preliminary list of discipline- specific core competency domains for MPH programs in Africa

Figure 18: Preliminary list of cross-cutting core competency domains for MPH programs in Africa

3.4.4 Other key findings from the review.

3.4.4.1 Categorization of core competencies

This review found that most studies and core competency frameworks grouped competencies under two sets of domains/themes: discipline specific (i.e., competencies that graduates are expected to acquire through traditional academic domains like epidemiology etc., during their MPH training) and cross-cutting (i.e., competencies that do not necessarily fall under the traditional academic domains but are relevant to PH practice such as communication and leadership). Most papers categorized the two domains (i.e., discipline-specific and cross-cutting) as broad domains or themes and the specific competency statements that fell under these two broad domains or themes were referred to as detailed or sub-competencies. Compared with findings from other studies (1, 91, 97, 100, 108), this review found similarities in the broad domains and sub-competencies across the various core competency frameworks and MPH programs. For example, most frameworks and MPH curricula documents highlighted the importance of utilizing competencies in communication, health promotion, monitoring and surveillance, environmental health, biostatistics, epidemiology and health systems, policy and

management to improve health outcomes. Depending on the setting however, differences in which competencies were emphasized by the various MPH programs or core competency framework were also found. For example, in developed regions like Europe and North America, environmental and PH biology competencies were emphasized in core competency frameworks while in regions like Asia and Australia, competencies in health systems, policy and management, health monitoring and surveillance and health promotion were emphasized.

3.4.4.2 Cadre of public health workforce

This review also found that the PH workforce consists of two groups. The first group include "individuals for whom PH activities constitute the primary part of their functions and who are expected to consistently possess all the core competencies at the basic level, demonstrating increasing levels of competency as their careers progress" (108). MPH graduates who are recognized globally for their PH roles fall under this group (93, 108, 120). The other group constitute a broad healthcare workforce and other professionals like actuarial scientists and engineers whose work significantly affect the health of populations even though they do not always perceive themselves as being part of the PH workforce (104, 108, 121). Despite core competencies existing for individuals in these two groups (109, 114-116, 122) , the papers included in this review solely reported competencies for professionals in the first group.

3.4.4.3 Reasons for competency-driven education

Most of the studies included in this review argued that competency driven education can improve performance of MPH graduates in their work environment and improve their contribution to health systems strengthening (92, 97, 102, 106, 108, 113-116, 122-124). Some studies also reported that harmonizing core competencies across public health programs can provide an impetus for curricular reform and innovation, as well as enhance learning assessment and outcomes (1, 105, 106, 108, 111, 114, 116). For example, the Public Health Association of New Zealand's (PHANZ) core competency framework argued that harmonizing core competencies across programs like the MPH can help create a more unified PH workforce by providing a common language and shared understanding of key concepts and practices (116). Most studies highlighted the importance of identifying core competencies for MPH programs as part of efforts to make these programs more responsive to current and emerging health system challenges (1, 93, 101, 102, 104, 106, 109, 122).

3.5 Discussion

This study reviewed existing literature, core competency frameworks and selected MPH curricula documents to identify core competencies that may be relevant to MPH programs in Africa. This review is the first step in identifying a set of core competencies relevant to the range of public health work undertaken by MPH graduates in Africa. A central theme that emerged from the studies and frameworks reviewed is the need to adapt and contextualize MPH training to be responsive to current and emerging health challenges. This has become particularly important in an era of epidemics and pandemics, such as Ebola and COVID-19, as well as the rise of preventable non-communicable diseases, underscoring the critical role of MPH graduates in tackling global public health challenges.

Positioning MPH graduates to tackle emerging health challenges – which have devastating effects on the socio-economic development of Africa – requires equipping them with the appropriate combination of knowledge and skills. Based on the findings from this review, this can be achieved through a well-structured and harmonized competency-based MPH education. For example, competencies under domains such as outbreak management, identified through this review when harmonized across MPH programs in Africa will equip MPH graduates with skills to use indicator-based and surveillance-based systems or tools to detect potential health threats, develop plans for border screening of pathogens like Ebola and Sars-Cov-2, conduct capacity assessments to identify the resources needed to manage outbreaks, and design and implement effective crisis and risk communication strategies during pandemics. Furthermore, introducing competencies under domains such as Public Health Law identified through this review to be crucial for the African PH context but missing in current programs, will help equip graduates to address the inequities found in many of the health systems in Africa.

Like the findings from other studies (26, 72, 86), this review demonstrates that there are similarities in the broad domains and detailed competencies found in core competency frameworks for MPH programs in different parts of the world. Despite this, globally, different Associations of Schools of Public Health emphasize different competency domains. For example, Associations of School of Public Health in regions like North America and Europe place emphasis on domains like public health biology which reflect the nature of the public health challenges where issues of genetics and genomics are pertinent to disease prevention. On the other hand, Schools of Public Health in regions like Asia place emphasis on domains like health monitoring and surveillance which reflects their nature of PH practice where issues of outbreaks are prominent and requires graduates to possess skills to address them. In countries like Australia and New Zealand, emphasis is placed on cultural competencies because of health

disparities among diverse groups– with aboriginal groups having high levels of alcohol use and suicide rates related to social deprivation. These differences further emphasize the need to identify which core competencies, among those identified in this review, are relevant to the public health work undertaken by MPH graduates in Africa and should be emphasized in MPH programs across the continent

3.6 Conclusion

This study reviewed studies, core competency frameworks and MPH curricula documents to identify a preliminary set of core competencies for MPH programs in Africa. This is the first step in a process that aim to identify the core competencies needed by MPH graduates for public health work in Africa. The findings of the review shows that competencies in domains such as epidemiology, biostatistics, health promotion and health systems policy and management, which are crucial to public health work globally are core in most MPH programs in Africa. Domains such as public health law and outbreak management which provides the foundation for creating equitable health systems and managing emerging pandemic are however missing in most MPH programs in Africa.

3.7 Limitation

This study has some limitations. The review only included articles published in the English language. Thus, articles published in other languages such as French and Portuguese were excluded which may have limited the scope of relevant literature included in the review. The review also included curricula documents from only 10 MPH programs in Africa. While a purposive sampling technique was used to ensure that at least one of the 10 curricula documents included were from MPH programs in the five sub-regions of Africa (West, East, North, Central and Southern Africa), the competencies identified may not be representative of the competencies that exist in all MPH programs in Africa. Furthermore, while this review provides some insight into competencies that may be relevant to MPH programs and graduates work in Africa, it is acknowledged that identifying the actual sets of competencies needed by MPH graduates for their public health work in Africa is complex and requires engagements with several key stakeholders. This can only be achieved through using methods such as surveys, interviews and structured discussions complemented by a literature review. This identified gap is explored in Chapter five of this thesis. Furthermore, this review did not explore how the competencies considered core in MPH programs are taught in these programs (i.e., the depth of coverage), nor the extent to which MPH programs in Africa have contributed to

graduates' development of the identified competencies. This identified gap is explored in the next chapter of this thesis.

Table 4: Summary characteristics of the included studies

Study ID/	Study Location	Target group (e.g., MPH students/graduates, Field Epidemiologist etc)	Data Collection (Method used to identify or validate competencies)	Domains Reported by Author
Kitaw et. al, 2020	Ethiopia	MPH students/ graduates (Five sets of Public Health competencies were developed for the different levels and types of public health training. These included the MPH, Doctor of Public Health, Doctor of Philosophy in Public Health, undergraduate degree in Public Health and Master of Science in Public Health. *We extracted competencies for MPH graduates in this review)*	Literature Review (Review of core competency frameworks and empirical studies discussing core public health competencies) Stakeholder consultations (Workshop attended by over 50 participants from Schools of Public Health and the Ministry of Health in Ethiopia to discuss drafted core competencies and the challenges in adopting them) Qualitative interviews (Interview with Public Health leaders to gain deeper insight into the priorities and gaps in public health education and practice)	V (Health policy and program), XI, XII, IX and XIII (leadership and system's thinking), XIX (Other: Values and Ethics, Assessment and analysis, Cultural competencies, collaboration and partnership, community engagement and partnership, Education and Training)
Bhandari et. al, 2020	Uttar Pradesh, India	MPH students/graduates	Literature Review (Review of seven core competency frameworks to draft initial list of competencies) Qualitative interviews (Interview with Public Health experts in India) Use of a modified Delphi process, to refine the drafted competencies	I, II and IV, VI (grouped as Public Health Sciences), V, XI, XII, XIII, XIX (Other: Financial management and Budgeting, Partnerships and collaborations, Assessment and analysis, Awareness of Social and cultural determinants)
Huong et. al, 2020	Vietnam	MPH students/graduates (MPH graduates' students in the Environmental Science concentration)	Literature Review (Review of competencies frameworks for MPH and environmental health programs) Interviews (In-depth interviews and focused group discussion with academics and Public Health experts) Delphi (use of a Delphi technique involving 20 experts from universities offering Master of Public Health and Environmental Health Science programs and 17 practicing Public Health and environmental Health experts)	VI (Environmental Health Science, XI (Communication), XIX (Other: Environmental Health management)

			Survey (Survey of 361 personnel whose work were related to environmental health-298 completed survey)	
Schleiff et. al, 2020	Global with participants from Costa Rica, Ghana, USA, UK	MPH Students/graduates in the Health Policy and Systems Track)	Literature Review (Scoping Review of core competency frameworks for the Health Policy and System Research program and other related programs like the MPH) Stakeholder consultations (In depth interviews with key informants involved in the teaching of the Health Policy and Systems Research program. Modified e-Delphi technique to establish consensus on the domain areas and the list of competencies under each domain)	XI (Communication), XIX (Others: Leadership and Mentorship, Health Policy and System's Research)
Sathiakumar et. al, 2019	India, Sri Lanka	MPH students/graduates	Literature Review (Review of previously developed competencies for MPH programs) Document analysis (Review of curricula documents from several CEPH-accredited schools across the US and from public health schools in Pakistan and other international universities) Stakeholder consultations (Discussion of the of the competencies identified from literature among members of the Working group which comprised senior faculty members in three South Asian Universities, One Professor from the University of Southampton, and one faculty member from the University of Alabama Birmingham)	I, II, IV, VI (Fundamentals of Environmental and Occupational Health Science, XIX (Others: Program Monitoring and Evaluation
Foldspang et. al, 2018	European region	MPH students/graduates	Literature Review (Review of public health core competency frameworks to Identify competencies that were important to the European context) Stakeholder consultations (Consultation and discussion with public health stakeholders)	III, XI (Communication and Cultural advocacy, IX and XIII (Leadership and System's Thinking) XIX (Others: Science and practice, Governance and Resource Management, Law, Politics and Advocacy, One Health and Security, Collaboration and Partnership, Organizational Literacy and

				adaptability, Professional Development and Reflective Ethical Practice.
Corvin et. al, 2017	America	MPH students/graduates	Literature Review (Review Of core competency frameworks) Stakeholder consultations (Formation of committee of experts to brainstorm the core competencies identified via review of MPH core competency frameworks from the ASPHH and Council on Education for Public Health)	I, II, III, IV, VI, XIX (Others: Systems of Public Health, Health and Population Assessment)
Robotin et. al, 2016	Republic of Maldives	MPH students/graduates	Literature Review (Scoping review of literature and curricula documents of MPH programs in high-ranking universities) Consensus (consultation with various stakeholders to reach an agreement on the competencies required by graduates) Use of a Delphi process to refine the competencies.	I, III, IV, V and XIII (Public Health leadership and management), XIX (Other: Public Health Research, Foundations of Public Health, Public Health nutrition, Health economics).
Angus et. al, 2016	Australia	MPH students/graduates	Literature Review (Review of core competency frameworks) Stakeholder consultations (Discussion among stakeholders in Public Health Education in Australia)	I, IV, V and XII (Public Health Leadership and Management), XIX (Foundations of Public Health, Qualitative Research in Public Health)
Negandhi et. al, 2015	India	MPH students/graduates (MPH graduates in Monitoring and Evaluation concentration)	Document analysis (Analysis of MPH curricula documents) Qualitative interviews (Interview with Public Health experts in India) Use of a modified Delphi process, to refine the drafted competencies	XIX (Monitoring and Evaluation)
Zwanikken et. al, 2014	Multi-national with participants from China, Vietnam, South Africa, Sudan, Mexico and	MPH students/graduates	Document analysis (Review of core competencies and learning objectives of the six participating institutions and core competency frameworks) Stakeholder consultations (Workshop/ online meeting attended by MPH course convenors in the six participating institutions) Use of a modified Delphi process, to refine and validate the drafted competencies (Among Public Health experts and MPH alumni)	I, II and IV, VI (grouped as Public Health Sciences), V and XII (Planning and management competencies), IX and XIII (leadership and system's thinking), XVII (context sensitive competencies), XIX (Other:

	the Netherlands			Community and intersectoral competencies)
Czabanowska et. al, 2014	The Netherlands, Austria, United Kingdom, Lithuania, Australia	Public Health professionals including MPH graduates.	Literature review (To draft initial list of competencies) Stakeholder consultations (Formation of expert panel consisting of seven public health and seven leadership academics from four European Universities; Maastricht University, Medical University Graz, The Sheffield Hallam University, the Lithuanian University of Health Sciences and the University of Griffith to discuss the list of competencies) Use of a Delphi process, to validate the drafted competencies	IX (Systems thinking), XIII (Public Health leadership)
Wen et.al, 2013	China	MPH students/graduates	Stakeholder consultations (Formation of expert group to identify initial list of competencies) Survey (Survey of participants from Public Health units and universities)	XI, XII (Project planning and assessment) XIX (Other: Content knowledge, Practical skills, Data analysis and assessment, Teaching and Research, Overall Capacity)
Sharma et. al, 2013	India	MPH students/graduates	Document analysis (Analysis of curricula documents from 23 MPH institutions in India) Survey (Survey of 122 stakeholders from academia, civil societies, public health services, national and international organizations and non-governmental organizations) Stakeholder consultations (National consultation with public health experts and academics in India)	I (Principles of Epidemiology), II IV (Basic Statistics), VI (Environmental Health Science) XIX (Others: Health Care System, Policy and Planning, Health Financing)
Genat and Robinson, 2010	Australia	MPH students/graduates	Literature Review Stakeholder consultations (workshop with public health academics, employers from public sector organizations and policymakers. Delphi (To refine the competencies)	III, V, and XII (Health policy, planning and management, XIX (Other: Health Protection, Evidence-based Professional Population Health Practice,

				Disease Prevention and Control, Health Monitoring and Surveillance
Calhoun et.al, 2008	America	MPH students/graduates	Literature review (To draft initial list of competencies) Stakeholder consultations (Formation of expert groups to discuss competency areas/domains) Use of a modified Delphi process, to refine the drafted competencies	I, II, IV, V, VI, IX, XI, XII, XIII, XVI, XIX (Other: Public Health Biology, Diversity and Culture)
Moser et. al, 2008	America	MPH students/graduates (MPH graduates in epidemiology concentration)	Literature review (To draft initial list of competencies) Stakeholder consultations (Formation of expert groups to discuss competency areas/domains) Use of a modified Delphi process, to refine the drafted competencies	I (Epidemiology)
Varela, 2007	European Region	Field Epidemiology	Consensus Survey of public health experts	I, II and IV, VI (grouped as Public Health Sciences), XIX (Public Health Policy, Risk Assessment, Public Health Surveillance, Outbreak investigation, Public Health Ethics, Applied informatics), V(Management), XI
Petersen et. al, 2005	United Arab Emirates	MPH students/graduates	Literature Review (Review of core competency frameworks) Stakeholder consultations (discussion of drafted competencies by public health experts and academics)	I, II, IV, VI, XIX (Other: Health care organization and policy), Health behaviors)
Thomas, 2005	America	MPH students/graduates	Document analysis (Review of core competency frameworks) Stakeholder consultations (An expert group comprising several representatives of national public health agencies and experts in public health ethics was formed to discuss the drafted skills/competences during a two-day meeting. This was followed by discussion of the competencies by stakeholders and the general public)	XIX (Skills in Public Health Ethics)

(Domains Reported: I=Epidemiology, II= Social and Behavioural Science, III= Health Promotion, IV= Biostatistics, V= Health Policy and Management, VI= Environmental Health Sciences, VII= Health Systems, VIII= Public Health Law, IX= System's Thinking, X= Advocacy, XI=Communication, XII= Program Planning and Development, XIII= Leadership, XIV=Commitment to Equity, XV=Soft Skills, XVI= Professionalism, XVII= Bottom-up Approach to Policy Implementation, XVIII= Awareness of Social and Political Context, XIX=Other domains)

Table 5: Discipline-specific and cross-cutting domain from the core competency frameworks reviewed

Region	Europe	North America					Australasia		Asia	
Developed by	**Association of Schools Public Health in the European Region-ASPHER (108)**	**Public health agency of Canada, Government of Canada PHAC (114)**	**American Association of Schools of Public Health ASPH (1)**	**Council on linkage between Academia and Public Health practice (117)**	**Pan American Health Organization PAHO (113)**	**Council on Education for Public Health CEPH (111)**	**Council of Academic Public Health Institutions Australia CAPHIA (115)**	**Public Health Association of New Zealand PHANZ (116)**	**Asia-Pacific Academic Consortium for Public Health APACPH (110)**	**Public Health Foundation of India PHFI (102)**
Discipline specific Domain #1	Science and practice	Public health sciences	Epidemiology	Public Health Science	Health situation analysis	Public Health Science	Health Monitoring and Surveillance	Public Health Science	Epidemiology	Principles of Epidemiology
Discipline specific Domain #2	Governance and Resource Management	Assessment and analysis	Biostatistics	Financial Planning and Management	Surveillance and control of risks and threats	Planning and Management	Disease Prevention and Control	Policy, Legislation and Regulation	Biostatistics	Basic Biostatistics
Discipline specific Domain #3	Leadership and Systems Thinking	Policy and program planning, implementation and evaluation	Health Policy and Management	Community Dimensions of Practice	Health promotion and social participation	Policy in Public Health	Health Policy, Planning and Management	Research and evaluation	Health Policy, Planning and Management	Social and behavioural sciences
Discipline specific Domain #4	Law Politics and Ethics	Partnerships, collaboration, and advocacy	Social and behavioural sciences	Leadership and Systems Thinking Skills	Policy, planning, regulation and control	Evidence-Based Approach to Public Health	Evidence-based Professional Population Health Practice	Community Health development 4	Social and behavioural sciences	Health Care Systems, Policy and Planning, and Health Financing

Discipline specific Domain #5	Health promotion	Diversity and inclusiveness	Environmental Health Sciences	Communication skills	Equitable access and quality of individual and public health services	Public Health and Health Care Systems	Health Promotion	Health Systems	Environmental Health Sciences	Introduction to Environmental Health
Discipline specific Domain #6	One Health and health security	Communication	Public Health Biology	Cultural competencies	International/ global health	Leadership	Health Protection			
Discipline specific Domain #6		Leadership				Systems Thinking				
Cross-cutting Domain #1	Collaboration and partnerships	X	Communication and informatics	X	X	Leadership	X	Communication	Systems Thinking	X
Cross-cutting Domain #2	Organizational literacy and adaptability	X	Systems thinking	X	X	System's Thinking	X	Advocacy	Education and Research	X
Cross-cutting Domain #3	Communication, culture and advocacy	X	Diversity and Culture	X	X	Communication	X	Working Across and Understanding Cultures	Resource Development	X
Cross-cutting Domain #4	Professional development and reflective ethical practice	X	Program planning	X	X	Interpersonal Practice	X	Planning and Administration	Communication and informatics	X

Cross-cutting Domain #5		X	Leadership	X	X		X	Leadership, Teamwork, and Professional Liaison	Management	X
Cross-cutting Domain #6		X	Professionalism	X	X		X	Professional Development and Self-Management	Planning	X
									Public Health Biology	
									Leadership	
									Health equity/ethical practice	

Table 6: Preliminary sets of core competencies for MPH programs in Africa.

Domains	Detailed/Sub-Competencies	
	Knowledge	**Skills/Abilities**
Public Health Law	• Defines the basic constitutional concepts and legal principles which are relevant to the practice of Public Health in at least one African country • Outlines the broad International Laws and Regulations related to Public Health. • Outline the Local laws related to Public Health practice in at least one African country. • Outlines the specific confidentiality laws that should be adhered to in collection, maintenance and release of data in public health emergencies. • Describes the major ethical theories and concepts relevant for public health practice, including human rights. • Outlines the law-based tools and enforcement procedures available to address day-to-day (non-emergency) public health issues • Outlines the law-based tools and enforcement procedures available to address emergency public health issues (outbreaks) • Describes the effect of corruption on the attainment of the right to healthcare in at least one African country.	• Applies available law-based tools and enforcement procedures to address day-to-day (non-emergency) public health issues • Applies available law-based tools and enforcement procedures to address emergency public health issues (outbreaks) • Assess the effect of corruption on the attainment of the right to healthcare in at least one African country • Applies confidentiality laws in the collection, maintenance, and release of data in a public health emergency. • Access, effectively apply, and defend the use of legal information, tools and remedies (e.g., quarantine and isolation orders, injunctions, abatement orders) in public health emergencies (as seen in the COVID-19 pandemic
Outbreak Management	• Outlines the various methods of ensuring community health safety and preparedness towards outbreaks. • Describe the essence of effective crisis and risk communication (which are cognisance of already existing inequalities and socio-economic fragilities) during pandemics (like COVID-19) in reducing the panic levels and the number of infections significantly in at least one African country. • Describe the processes involved in Identifying as rapidly as possible the agents (possibly novel like COVID-19) responsible for disease outbreak and their epidemiological characteristics. • Describe an outbreak in terms of person, place and time.	• Apply event-based and indicator-based surveillance systems/tools to detect potential health threats • Develop a plan for border screening for known pathogens of international concern (like COVID-19) • Develop effective crisis and risk communication strategies (which are cognisance of already existing inequalities and socio-economic fragilities) during pandemics (like COVID-19) to help reduce panic levels and the number of infections. • Conduct outbreak investigations to characterize affected population groups, and sources of exposure.

	• Outline the process involved in conducting capacity assessment to identify the personnel and resources needed to deal with outbreaks (like COVID-19) • Describe the process involved in performing an outbreak risk assessment	• Critically appraise international public health alerts to assess the implications for local context. • Conduct capacity assessment to identify the personnel and resources needed to deal with outbreaks (like COVID-19) • Perform a risk assessment • Communicate the results and implications of risk assessments to policymakers with different backgrounds.
Health Promotion	• Be familiar with the different levels of disease prevention (primary, secondary and tertiary prevention) which are key in planning health promotion activities • Be familiar with the central concepts applied in health promotion, e.g., empowerment, holism, community development, participation, capacity building, social marketing and health advocacy. • Outline health related behaviours and social factors that influence them • Outline the role of the media in health promotion • Explain how effective human communication should acknowledge context. • Explain the role of partnership building in health promotion • Be familiar with major health promotion policies and strategies in at least one African country.	• Mobilize communities and facilitate collaborative actions with key stakeholders geared towards promoting health • Design educational materials using local resources in at least one African country to communicate and promote health • When needed, generates or promulgates factual information to counteract industry marketing in relation to nutrition, tobacco cessation, reducing alcohol consumption in at least one African country • Advocate for health on behalf of the population • Plan health promotion activities using needs-based research. • Perform community diagnosis to identify channels through which health promotion interventions can be implemented effectively in the community • Engage the media in planning health promotion activities
Monitoring and Evaluation	• Describe how M&E data can be used to support decision making, advocacy and other purposes related to Public Health in at least one African country. • Describe how the public health information infrastructure is used to collect, process, maintain, and disseminate data that is relevant to monitoring and evaluation • Outline how changes in public health systems (including input, processes, and output) can be measured.	• Make use of M & E data to support decision making, advocacy and other purposes related to Public Health. • Evaluate the costs and benefits of alternate strategies for public health problems using Monitoring and Evaluation data. • Design appropriate context sensitive tools and indicators for monitoring and evaluating public health programs and interventions in at least one African country

	• Outline the indicators used in the monitoring and evaluation of public health programs in at least one African country. • Be familiar with Monitoring and Evaluation tools and frameworks with special reference to National Health programs in at least one African country • Describe how the effect of Health programs can be quantified using a National Health program in at least one African country as a reference. • Describe how the public health information infrastructure is used to collect, process, maintain, and disseminate data that is relevant to monitoring and evaluation	• Monitor and evaluate Public Health policies, interventions and regulations using standard monitoring and evaluation indicators and tools • Monitor and evaluate health interventions using the domains of input, process, outcomes and impact. • Develop a feasibility evaluation plan for programs and interventions that tackle public health problems in at least one African country
Health Systems, Policy and Management	• Be familiar with the health system of at least one African country, the nature of health policy and the policy process • Be familiar with the theoretical frameworks and concepts used in the analysis of policy processes. • Outline the socio-political factors (e.g., power) that should be recognized in the formulation, implementation and analysis of public health policies in at least one African country. • Demonstrate understanding of the complexities of developing and implementing health policies intended to promote equity in at least one African country. • Be familiar with the process involved in the analysis of policy options to determine feasibility in diverse African community context • Describe how the principles of systems thinking can be applied to health policy and management • Describe how a bottom-up approach leads to more appropriate and sustainable health policies in Africa • Identify the main components and issues of the organization, financing and delivery of health services and public health systems in the at least one African country • Identify whether the principles of the primary health care model (as described in Alma Ata) are being adhered to within the health system.	• Critically evaluate evidence related to health systems and health care; and argue or advocate for specific policies or practices using this evidence. • Develop context-sensitive health policies and strategic plans for at least one African country • Conduct comprehensive analyses of policy development and implementation processes, including stakeholder analysis. • Apply theoretical frameworks and concepts in the analysis of policy processes • Analyse the effects of political, social and economic policies on public health systems at the local, regional, national and international levels • Analyse and evaluate policy options and determines feasibility for public health policies/programs in diverse community contexts, using appraisal of evidence.

Biostatistics	• Describe the basic concepts of probability, random variation and commonly used statistical probability distributions. • Be familiar with the descriptive and inferential methodologies (selected based on the type of study design), that are available for answering public health research questions. • Be familiar with methodological alternatives to commonly used statistical methods when assumptions are not met (e.g., when data is not normally distributed). • Distinguish between different types of variables and the implications for selection of statistical methods to be used based on these distinctions.	• Interpret results of statistical analyses found in public health studies. • Apply descriptive and inferential methodologies according to the type of study design to answer public health research questions. • Apply statistical reasoning to address, analyse, and solve problems in public health • Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences
Epidemiology	• Be familiar with basic epidemiological concepts (prevalence, incidence, bias, confounding, measures of association. • Be familiar with features of demographic structure in at least one African country and understands the process of demographic change and its implications for public health • Describe a public health problem in terms of magnitude, person, time and place. • Outline the principles and limitations of public health screening programs. • Outline the distribution and determinants of health in populations • Explain the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues.	• Calculate basic epidemiologic measures. • Apply epidemiological findings in planning public health programs. • Develop evidence-based guidelines for surveillance, prevention and control of communicable diseases and non-communicable diseases that are common in at least one African country • Communicate epidemiologic information to lay and professional audiences. • Evaluate the strengths and limitations of epidemiologic reports. • Develop an epidemiological study protocol using investigation techniques consistent with the public health problem.
Social and Behavioural Science	• Outline the basic theories, concepts and models from a range of social and behavioral disciplines that are used in public health research and practice. • Be familiar with the underlying causes of social and behavioral factors that affect health of individuals and populations • Identify critical stakeholders for the planning, implementation and evaluation of public health programs, policies and interventions.	• Apply evidence-based approaches in the development and evaluation of social and behavioral science interventions. • Design a map of multiple targets and levels of intervention for social and behavioral science programs and/or policies. • Apply basic theories, concepts and models from a range of social and behavioral disciplines to develop a public health research protocol or plan a public health intervention

	• Identify individual, organizational and community concerns, assets resources and deficits for social and behavioral science interventions. • Outline the role of social and community factors in both the onset and solution of public health problems. • Describe the strength and weakness of social and behavioral science interventions and policies. • Be familiar with gendered stratification of societies and its differential impact on the health of women, men, transgender and non- confirming people in Africa • Describe how social, behavioural, environmental, and biological factors contribute to specific individual and community health outcomes	• Engage stakeholders in planning, implementation and evaluation of public health programs, policies and interventions in at least one African country.
Environmental Health	• Outline the major environmental health issues which impact local (in at least one African country) and global burden of disease • Describe how climate change increases health risks due to pollution among vulnerable groups in at least one African country • Describe basic genetic, physiologic and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental exposures. • Outline the regulatory programs, guidelines and authorities in at least one African country that control environmental health issues. • Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.	• Develop a risk management and risk communication approaches in relation to issues of environmental justice and equity. • Conduct an environmental risk assessment • Recommend approaches to prevent and control environmental exposures that are risk to human health and safety • Communicate environmental and occupational health findings in writing to lay and professional audiences. •
Program Planning and Financing	• Be familiar with the process involved in the development and implementation of health programs • Be familiar with the process involved in the development of budgets for public health programs in at least one African country • Differentiate between the formative, process, outcome and impact evaluation • Describes the role of governmental and non-governmental organizations in the delivery of health services in at least one African country	• Perform community diagnoses to Identify key stakeholders that should be involved in the planning of health interventions to ensure smooth implementation. • Design a suitable public health intervention program (e.g., HIV prevention programs) using the planning cycle. • Develops strategies for determining budget priorities for public health programs in at least one African country • Prepare proposals for funding from external sources

		• Manage public health programs within current and forecasted budget constraints • Develop a budget for public health programs in at least one African country • Assist with the conduct of costing and cost-effectiveness studies • Utilize cost-effectiveness, cost-benefit, and cost-utility analyses in programmatic prioritization and decision making • Assess evaluation reports in relation to their quality, utility, and impact on public health
Awareness of Social, Political and Cultural Context	• Describe how history, power, privilege and structural inequality have produced inequality and health disparities in Africa • Be familiar with the context (the social, political and cultural conditions in which people grow, live and work) that influence the health of the population in at least one African country. • Be familiar with the dynamic forces that contribute to cultural diversity in at least one African country and how these forces affect the health of the population • Cite examples of situations where consideration of culture-specific needs resulted in a more effective modification or adaptation of a health intervention in at least one African country • Describe the role of cultural, social, and political factors in the accessibility, availability, accessibility and delivery of public health services • Be familiar with the process involved in the assessment of the public health organization for its cultural competence	• Develop strategies for interacting with persons from diverse backgrounds (e.g., cultural, socioeconomic, educational, racial, ethnic, sexual orientation, professional) to improve health • Develop public health programs and strategies responsive to the diverse cultural values and traditions in at least one African country • Assess the public health organization for its cultural competence • Make appropriate recommendation to policy makers on how the role of cultural, social, and political factors in health care should be recognized in planning and implementing public health programs and interventions. • Communicate the need for a diverse public health workforce to policy makers and other key stakeholders (academic institutions, government, employers of public health professionals, etc.)
Systems Thinking	• Outline the principles of systems thinking and identify characteristics of a system • Be familiar with the consequences (both intended and unintended) produced by changes made to one aspect of the public health system	• Apply the principles of system thinking within systematic inquiry to analyse, model and improve public health organizations and services at different strategic levels • Assess changes in public health systems (including input, processes, and output)

	• Demonstrate an understanding of the dynamic and complex nature of health systems by reflecting on and describing their value bases and functioning, their components and the central roles and behaviours of a range of agents. • Describe how systems, including individuals, social networks, organizations, and communities, may be viewed as systems within systems in the analysis of public health problems • Describe how systems models can be tested and validated • Describe how the contexts of gender, race, poverty, history, migration, and culture are important in the design of interventions within public health systems	• Make appropriate recommendation to policy makers on the need to recognize health systems as social constructions, influenced by and influencing the agents within them, as well as influenced by broader political and economic forces, generating public value and contributing to societal development • Analyse the effects of political, social and economic policies on public health systems in at least one African country • Analyse the impact of global trends and interdependencies on public health related problems and systems • Assess strengths and weaknesses of applying the systems thinking approach to public health problems
Leadership	• Be familiar with the importance of practicality, flexibility and adaptability in the process of working with others to achieve public health improvement goals as opposed to rigidly adhering to traditional and commonly used work methods • Describe the attributes of leadership in public health • Outline the key principles of management and change management • Outline how management skills are used to strengthen accountability and good governance.	• Demonstrate emotional intelligence with awareness of how one's own beliefs, values and behaviours affect one's own decision-making and the reactions of others • Lead, motivate and work with a multidisciplinary team using the skills and contributions of all stakeholders • Identify and supports the roles and responsibilities of all team members, including external stakeholders • Act as a role model, builds trust and demonstrates positive and engaging behaviour • Facilitates the development of others as public health leaders • Apply team building, negotiation and conflict resolution skills, including mediation • Apply human rights principles, equity and social justice in decision-making, recognising the difference between individual and societal needs • Demonstrate transparency, integrity and honesty, and be able to identify conflicts of interest in all processes
Communication	• Describe how the public health information infrastructure in at least one African country is used to collect, process, maintain, and disseminate data. • Describe how communicating and sharing information effectively at different organizational levels in at least one African country can help gain political	• Communicate in writing and orally with linguistic and cultural proficiency (e.g., using age-appropriate materials, incorporating images where necessary)

	commitment, policy support and social acceptance for a health goal or program. • Be familiar with cultural awareness and sensitivity in communicating with diverse populations • Outline the theory and strategy-based communication principles used across different settings and for different audiences • Be familiar with the various platform for disseminating public health data and information (e.g., social media, newspapers, newsletters, journals, town hall meetings, libraries, neighbourhood gatherings) • Describe how societal, organizational, and individual factors influence and are influenced by public health communications. • Be familiar with the effective ways and channels for communicating the results and implications of a risk assessments to policymakers with different backgrounds. • Develop written and oral presentations based on statistical analyses for both public health professionals and educated lay audiences	• Conveys data and information to professionals and the public using a variety of approaches (e.g., reports, presentations, email, letters) • Listen and respond in a way that fits the setting, the event, the subject matter and the audience • Appropriately references sources of public health data and information • Make effective use of the available communication platform (e.g., social media, newspapers, newsletters, journals, town hall meetings, libraries, neighbourhood gatherings) to disseminate public health data and information (including risks to health). • Solicits input from individuals and organizations (e.g, religious organizations, academic institutions, social service organizations, community-based organizations, various populations served) for improving the health of the population. • Apply communication methods to advocate for community public health programs and policies
Professionalism	• Describe how a commitment to lifelong learning and professional service is key to ensuring professionalism in the field of public health. • Appreciate a definition of public health that captures the unique characteristics of the field (e.g., population-focused, community-oriented, prevention-motivated and rooted in social justice) and how these contribute to professional practice.	• Value commitment to lifelong learning and professional service including active participation in professional organizations. • Promote high standards of personal and organizational integrity, compassion, honesty and respect for all people. • Recognize the importance of working collaboratively with diverse communities and constituencies (e.g., researchers, practitioners, agencies and organizations) in tackling public health challenges. • Apply the principles of a bottom-up approach to dealing with public health challenges
Personal/ Technical (Soft Skills)	• Be familiar with the various tools (PowerPoint, etc.) used to communicate academic findings/Reports to people from different background • Outline the importance of good time management in achieving good public health leadership.	• Apply various tools (PowerPoint, posters, reports etc) to communicate academic findings to people from different background • Demonstrate good time management as a public health personnel/ leader

CHAPTER 4

Work applicability, graduates' confidence, acquisition, and depth of coverages of identified competencies in selected MPH programs in Africa

4.1 Background

The MPH degree aims to equip graduates with the skills and knowledge necessary to pursue a range of careers in PH (125-127). These skills may include epidemiological competence, an understanding of health systems, and the ability to conduct research using various methodologies (86, 125). In Africa, the skills gained through MPH programs are crucial for improving health systems and addressing the health challenges of the continent (25, 26, 86). It is therefore important for schools of public health in Africa to strengthen their training of students to produce graduates capable of effectively responding to the continent's health challenges.

Over the years, most MPH programs in Africa have made efforts to improve the training of students through periodic review of curricula to ensure that they meet the health needs of the continent (26). Organizations such as the ASPHA have also made efforts to develop a core competency framework for MPH programs in Africa; with the aim of improving the training of MPH students in the region. As parts of these efforts, a preliminary set of competencies have been identified through this thesis – supported by the ASPHA and has been reported in the previous chapter. These competencies have been identified using methods which include literature review and analysis of MPH curricula documents. While some of these competency domains identified, such as epidemiology, biostatistics, health systems, policy and management, and social and behavioural sciences, are currently covered in most MPH programs in Africa, their applicability to graduates work in the region have not been studied. Additionally, graduates' level of confidence in utilizing these core competencies and the contribution of MPH programs to graduates' acquisition of these competencies have also not been studied. As a result, a study that assesses the applicability of the identified competencies to graduates' work and MPH programs' contributions to competency acquisition is important. This is because it will provide valuable insights into the competencies that should be emphasized in MPH programs. Additionally, it will offer insights into the effectiveness of MPH programs in equipping MPH graduates with the necessary knowledge, skills, and confidence to address Africa's health needs.

The depth to which the identified competencies are covered in MPH programs in Africa is also not known. Available evidence however suggests that most MPH programs in Africa are often faced with limited resources, which can potentially impact how core competency domains like epidemiology and biostatistics are covered in programs (16, 128). For example, some programs may have limited faculty expertise to teach certain concepts within specific domains, while others may lack the financial resources to offer a full range of courses that support students in developing key competencies. Other programs may not have the resources to offer practical training opportunities that would facilitate students' acquisition of practical skills in areas like environmental health and health promotion. Exploring how the competencies identified in the previous chapter are covered in MPH programs (. i.e. the depth of coverage) can help identify gaps in training. This, in turn, can inform efforts to improve MPH education in Africa. Consequently, this can contribute to the overall improvement of health systems in Africa.

4.2 Aim of Study

To assess the applicability of identified competencies to graduates' work, the contribution of MPH programs to their acquisition, graduates' confidence in utilizing these competencies, and their coverage in MPH programs across Africa.

4.3 Objectives

1. To explore the demographics, educational and work background of MPH graduates in Africa.
2. To assess the applicability of the identified public health competencies to graduates' work, the contribution of MPH programs to competency acquisition, and graduates' confidence in utilizing these competencies.
3. To assess the depth to which selected MPH programs in Africa cover core competency domains like epidemiology and biostatistics.

4.4 Methodology

This was a mixed method study. MPH graduates were surveyed to assess the applicability of identified competencies to their work, programs' contribution to competencies acquisition and their confidence in utilizing them. In-depth interviews with MPH lecturers were used to explore the depth of coverage of core competency domains in MPH programs.

4.4.1 Study population

The study population included lecturers who teach core competency domains like epidemiology and biostatistics in ASPHA member institutions. It also included MPH graduates who completed their MPH degrees between 2012 and 2016 from five ASPHA member institutions. Graduates who completed their MPH between 2012 and 2016 were selected to ensure they had sufficient post-graduation work experience, allowing for a more accurate assessment of the applicability and utility of the competencies acquired during the MPH program to their work.

4.4.2 Sampling of MPH programs and participants

A purposive sampling technique was used to select five MPH programs for inclusion in this study. This sampling technique was chosen because it allowed for the inclusion of MPH programs whose curricula documents provided detailed information on core competency domains, allowing for an in-depth evaluation of what was covered in the domain or course. This sampling technique was also chosen as it aligned with the aim to purposively include MPH programs and participants from at least three of the five sub-regions of Africa (i.e., West, East, North, Central, and Southern Africa) in the final sample. To select MPH programs for the study, a list of all MPH programs that are members of the ASPHA was obtained from the Association's secretariat (Appendix 2). An online search of institutions' websites was used to identify curricula documents. The online search identified 25 MPH curricula documents. For institutions whose curricula could not be obtained online, an email was sent to the contact details listed on the institution's website to request for them, resulting in an additional six MPH curricula documents being identified. The majority (61%) of the curricula documents obtained were from MPH programs in West Africa and only one curricula document was obtained from an MPH program in North Africa. After an initial review of all the curricula documents obtained, three from MPH programs in West Africa and one each from East, North, Central and Southern Africa (totalling seven programs in all) were judged to have the most detailed information on competency domains to permit assessment of the depth of coverage. These seven curricula documents were from MPH programs at the University of Ghana; University of Ibadan, Nigeria; Makerere University, Uganda; University of Cape Town, South Africa; Alexandria University, Egypt; University of Kinshasa, Congo; and University of Science and Technology, Ghana. Heads of the seven MPH programs selected were then contacted to ask for their programs' participation in the study. Heads of three MPH programs in West Africa (i.e. University of Ghana, University of Ibadan and University of Science and Technology) and

one from Southern Africa (University of Cape Town) granted permission for their programs to be included in the study. They also expressed their willingness to share the contact details of their MPH graduates and lecturers. Additionally, they agreed to waive the need to apply for ethics approval from their institutions, given that the study protocol had already been reviewed and approved by ethics committee of the University of Cape Town. Attempt to include the remaining four selected programs from East, Central and Northern Africa in the study was deemed unsuccessful after multiple emails to heads of programs or listed contact persons went unanswered. Following a discussion between the doctoral student and supervisors, it was agreed that a replacement MPH program from a francophone country – the University of Bamako in Mali – should be included. However, due to a coup-de-tat and subsequent unrest in Mali which affected the university's operation, this MPH program could not be included in the study and was replaced with another MPH program from East Africa, the Great Lake University of Kisumu, Kenya. This meant that five MPH programs from three sub-region of Africa (i.e. West, South and Eastern Africa) were finally included in the study.

4.4.3 Recruitment of participants

To recruit MPH graduates for the online survey, heads of MPH programs who agreed to their program's participation were asked to request a list with contacts (email addresses) of MPH graduates who completed their degree between 2012-2016 from the universities' records office. Once the list was obtained, graduates were contacted via email by the doctoral student. The email sent to graduates contained a link to an online questionnaire **(https://redcap.link/mph)**. Graduates whose emails were found to be wrong or inactive were contacted via other means (telephone, Alumni WhatsApp page, etc.) by the doctoral student to ask for their correct email. The procedure for the recruitment of graduates is shown in Figure 19. MPH lecturers were recruited through sending them an email, inviting them to participate in the study.

4.4.4 Data collection

4.4.4.1 Survey of MPH graduates: An online consent form and survey questionnaire **(**Consent Form (uct.ac.za)**)** was sent to MPH graduates to collect information on demographics, educational background, mode of study, specialization during the MPH, and their work experience, and roles before and after completing the MPH. This information was collected to characterize the respondents and their work, as their perceived competencies are influenced by their prior education and work experience. The survey questionnaire sent to graduates included the competencies identified in the previous chapter of this thesis. The recruitment of MPH graduates for the study followed a structured procedure, which is summarized in Figure 19.

This thesis was linked to another study in South Africa that explored the career paths of graduates from eight South African universities. While data from the survey of MPH graduates at the University of Cape Town on the acquisition and applicability of MPH core competencies were collected for both studies to avoid multiple requests to graduates for the same information, this thesis was independently conceptualized, with its own research objectives and methodology. However, co-investigators from these eight universities were involved in refining the identified core competencies for inclusion in the survey. The process of refining the competencies as outlined in Figure 20 resulted in 11 competencies domains and 58 detailed competencies being included in the questionnaire. Graduates were asked to self-grade the applicability of the competencies to their current or most recent work on a scale of 1-4 as follows: (1) Not applicable (2) Slightly applicable (3) Moderately applicable (4) Very applicable. Graduates were also asked to grade their level of confidence in using the competencies and the contribution of the MPH towards the acquisition of the competencies on scales of 1-4. The scale for level of confidence was (1) not confident, (2) a little confident, (3) moderately confident, (4) very confident. The scale for acquisition was (1) Acquisition is not attributable to the MPH, (2) The MPH slightly enabled acquisition of competency, (3) MPH moderately enabled acquisition of the competency, (4) MPH substantially enabled acquisition of competency. The survey questionnaire was structured so that participants had to complete a consent form before proceeding to the questionnaire. The survey was circulated in November 2022 and data were collected from November 2022 to January 2023.

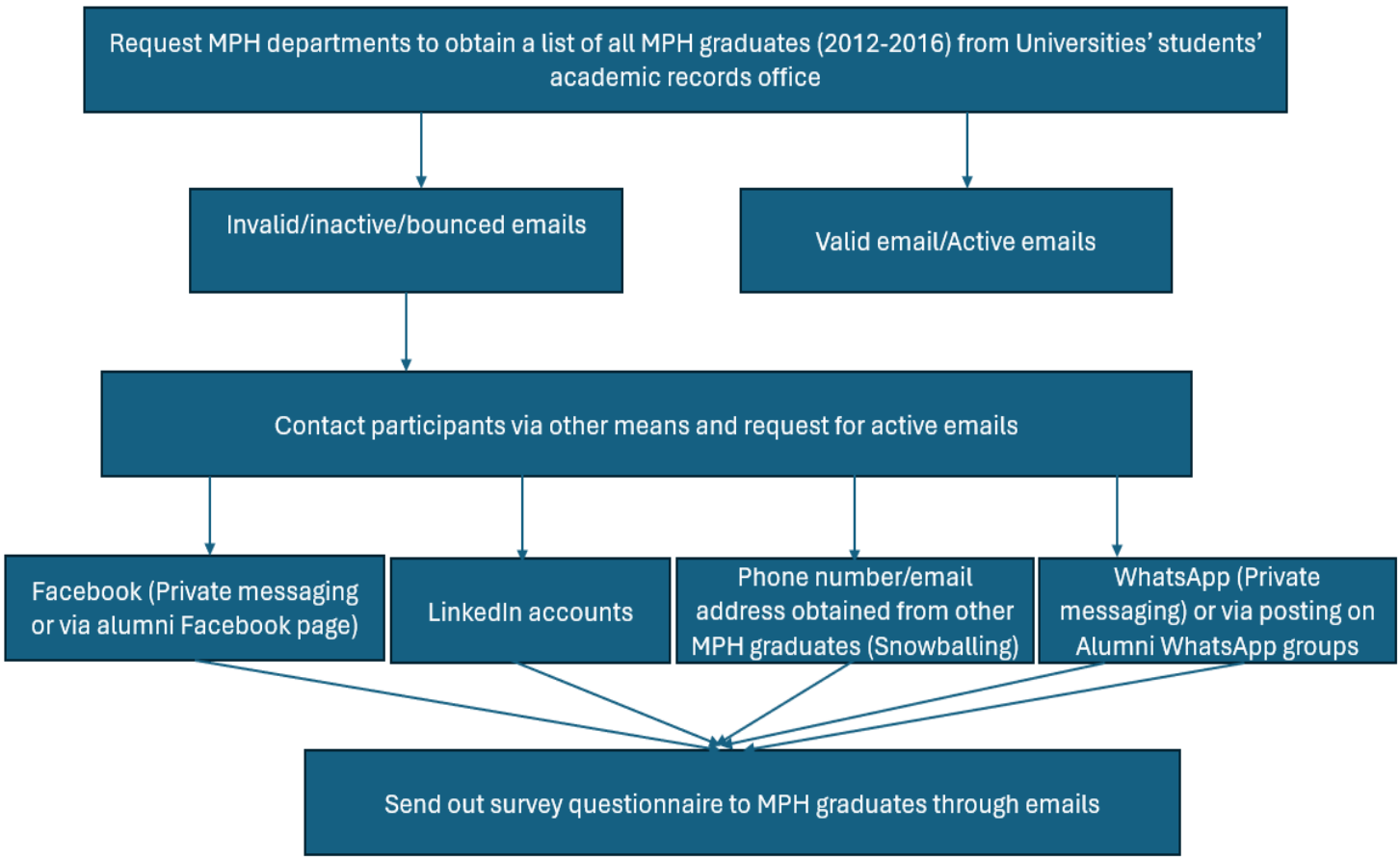

Figure 19: Procedure for recruitment of MPH graduates

Figure 20: Processes used to refine the competencies included in the survey

4.4.4.2 Review of MPH curricula documents to determine the depth of coverage: The doctoral student extracted detailed information on what was covered under the competency domains from the curricula documents using a data extraction form (Appendix 5). The data extraction form was piloted using two dummy MPH curriculum documents as a guide. To verify that the data was accurately extracted, the doctoral student's supervisor checked a

selection of the documents and the extracted data. A high level of agreement was found between the data extracted by the doctoral student and the supervisor.

4.4.4.3 In-depth interviews: Using a semi-structured questionnaire (Appendix 6), 14 MPH lecturers who teach courses related to the core competency domains identified in the previous chapter were interviewed. The interviews were conducted remotely by the doctoral student using Zoom and Microsoft Teams. These interviews lasted approximately 30 minutes and focused on gaining insights into the depth of coverage of the core MPH competency domains that were otherwise not explicit in some of the curricula documents. Specifically, these interviews explored what is currently covered in the classroom during the teaching of domains like epidemiology, biostatistics. Semi-structured interviews were deemed appropriate as they allowed for gaining insight into this complex issue from respondents and enabled probing for more information and clarification of answers where necessary (61). This ultimately facilitated appropriate judgement about the depth of coverage of core competency domains in the selected MPH programs.

4.4.5 Data analysis

4.4.5.1 Analysis of survey data: Data obtained from the survey of MPH graduates was entered into Microsoft Excel for cleaning and analysis. Data analysis was done using the STATA 14 statistical package. Descriptive analysis for variables derived from close-ended questions and summary statistics (with appropriate measure of central tendency) for normal and non-normally distributed variables was conducted. Differences in responses based on demographic and training variables were tested using t-tests, Mann-Whitney tests, chi-square tests, and Spearman's correlation to test the hypotheses. The level of significance for tests was $p<0.05$. For each competency domain, there were several items (competency statements) to assess, and respondents were required to score themselves on confidence, acquisition, and applicability. Each domain area could score a min to a max median score (Table 7). Each of applicability, confidence and acquisition were scored separately. The scores for each item (or competency statement) were added to compute one score per domain for each respondent. As the overall distribution of these scores was not normally distributed, median scores for each domain for confidence, acquisition and applicability to work were calculated. The percentage for each median score was then calculated. For example, a median score of 15 for the public health science domain under applicability was calculated as (15/20) x 100%, resulting in a 75% score. To ascertain if there was internal consistency in the metrics used under the 11 competency domains, Cronbach's alpha tests were conducted for each competency domain. A value of 0.7

or higher was considered to show a high level of consistency of the metrics under the 11 domains. Cronbach's alpha tests produced scores > 0.8 for each competency domain signifying consistency in the sets of questions asked under the domains.

Table 7: Scoring system for competencies

Competencies – scoring system				
Competency domain	**Items**	**Confidence (1-4)**	**Through MPH? (1-4)**	**Applicable to work (1-4)**
Score		1. Not.. 2. A little.. 3. moderate.. 4. very..		
Public Health Science skills	5	5-20		
Health Promotion competencies	7	7-28		
Monitoring & Evaluation	7	7-28		
Health Policy	5	5-20		
Communication for a range of audiences	7	7-28		
Context sensitive	4	4-16		
Community & intersectoral	2	2-8		
Planning & management	5	5-20		
Outbreak Management/ Emergency	4	4-16		
Academic/research	7	7-28		
Leadership	5	5-20		

4.4.5.2 Analysis of interviews and MPH curriculum document

Interviews with lecturers were audio-recorded and transcribed by the doctoral student using a voice transcription software – Otter ai. The transcripts were checked for errors by listening to the audio recording several times and comparing it with what was transcribed by the data transcription software. The data extracted from curricula documents, and from the error-checked transcripts were entered into Microsoft Excel for analysis. The doctoral student familiarized himself with the data through repeated review. Using a deductive data analysis method, information on the coverage of similar competency domains, such as epidemiology, across the five MPH programs was coded into common themes. To verify that the audio-recording were accurately transcribed and coded, the doctoral student's supervisor checked a selection of the recordings, transcripts and coded data. A high level of agreement was found between the doctoral student and supervisor regarding the coded data. To ensure confidentiality, each qualitative interview participant was assigned a unique alphanumeric code (e.g., Lecturer 1, Lecturer 2, etc.). These codes were used consistently throughout the analysis and reporting.

Using the data extracted, assessment on the depth of coverage of each core MPH competency domain or course was made using a modified version of Miller's competency triangle developed by Burns and Mehay in 2009 as a guide (Figure 21). This was done by applying the triangle to the data extracted under each competency domain or course, which included: 1. course content, learning outcomes, and assessment methods from the MPH curricula documents, and 2. what is covered in the classroom and how students are assessed, as shared by the MPH lecturers in the in-depth interviews

The Miller's triangle was considered for this analysis as it is widely accepted by researchers, easy to use and findings from its application are easily understood by academics and policymakers (62). The triangle was applied to the data extracted from the curricula documents and interviews to assess whether students or learners were assisted/enabled to: 1. Know (i.e., acquire the knowledge needed to fulfil future tasks), 2. Know how (i.e., use the knowledge acquired in the domain or course to fulfil future tasks), 3. Show how (i.e., perform in a simulated environment), and 4. Do (i.e., perform in complex real-life situations). In instances where lecturers could not be interviewed either because they did not respond to email and calls requesting their participation or declined to participate, an assessment of the depth of coverage was made by using only the data from the review of MPH curricula documents and the limitations of this was acknowledged. Diagrams and quotations from the interviews and curricula documents were used to illustrate the findings.

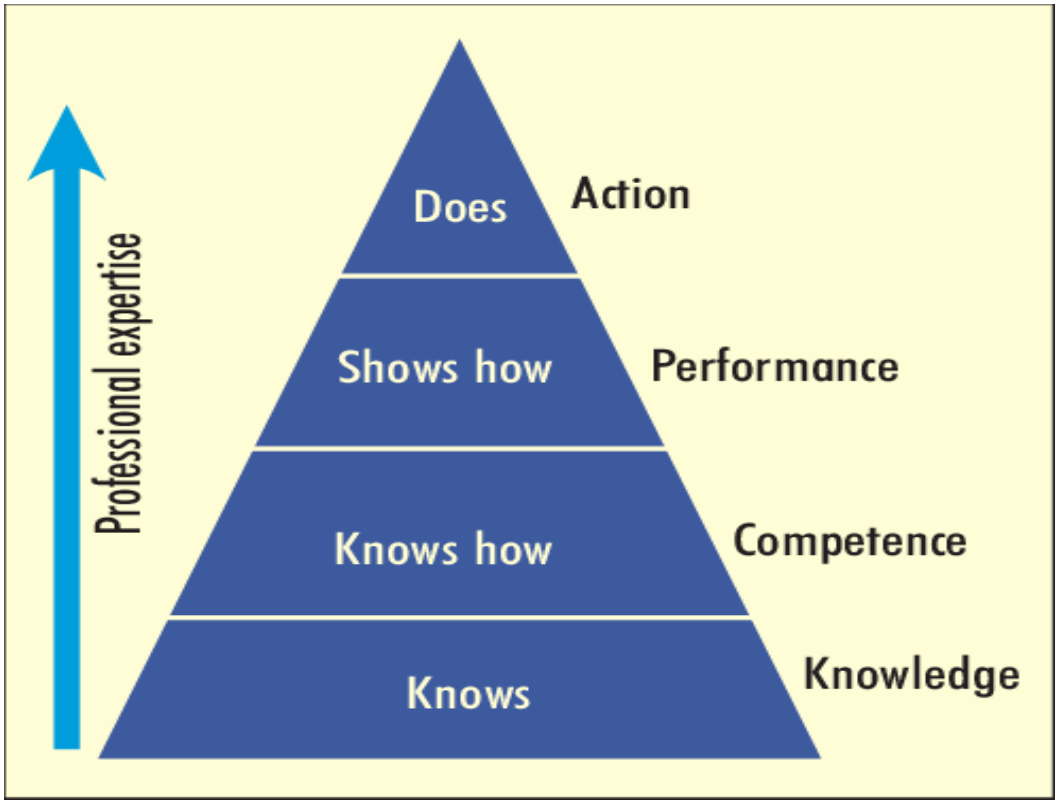

Figure 21: Modified version of the Miller's Triangle by Burns and Mehay (2009)

4.5 Ethical approval

Ethical approval for the study was obtained from the University of Cape Town Health Sciences Research Committee. The ethical approval with reference number 332/2020 was accepted by all the five universities which were included in the study.

4.6 Informed consent

Prior to completing the online survey, MPH graduates were asked to complete an informed consent form **(**Consent Form (uct.ac.za)**).** The form provided graduates with details about the study, including its purpose and that participation was voluntary. Lecturers were also asked to complete an electronic consent form (Appendix 7) once they accepted the invitation to participate in the study. On the day of the interviews, a verbal confirmation of consent was also obtained from the interviewees. Participants were also made aware of their alternatives to participation, which include their right to refuse or withdraw from the study at any point without penalty.

4.7 Privacy and confidentiality

Anonymity, privacy, and confidentiality of the information collected was emphasized and upheld throughout the interviews. The data collected were securely stored on two password-protected computers. In writing the findings of this study, no names or identifying

characteristics were mentioned except where consent to do so had been granted by the participant. Informants were also not identified in any documentation or report emanating from the study. Participants were also informed that the interview recording would be destroyed two years after the study had closed.

4.8 Reimbursement for participation

Lecturers who agreed to participate in this study received no remuneration or compensation. As an incentive to encourage more MPH graduates to participate, they were given the option to enter a raffle to win one of twenty $10 airtime vouchers. This option to enter a raffle to win an airtime voucher was advertised in the invitation email. To enter, a respondent had to complete a short survey at the end of the questionnaire (**https://redcap.link/mph**). Each respondent completing this survey was assigned a unique identifier**.** All the identifiers were collated and a researcher who was not involved in the project randomly selected 20 identifiers to receive the airtime voucher.

4.9 Quality Assurance

Prior to sending out the survey to the study population – MPH graduates who completed their degree between 2012 and 2016 – the survey was piloted among graduates who fell outside the target population. These were graduates who completed their degree before 2012 and after 2016. To prepare for the qualitative study, the doctoral student attended an international course on qualitative research methods and was trained on how to conduct qualitative interviews and data analysis. The interview guide was developed and piloted using the aims and objectives of the study as a guide.

4.10 Results

4.10.1 Survey of MPH graduates

4.10.1.1 Response Rate, Demographics and Career path of Respondents

A total of three hundred and twelve (312) MPH alumni who graduated between 2012 and 2016 from five the MPH (University of Ghana, University of Ibadan, University of Cape Town, Great Lake University of Kisumu and University of Science and Technology) were invited to participate in an online survey. Out of these, 168 (54%) participated in the survey. Thirty-six (21%) of those who participated graduated from the University of Cape Town, thirty-three (20%) graduated from the University of Ghana, thirty-two (19 %) graduated from the Kwame Nkrumah University of Science and Technology, thirty-eight (23%) graduated from the

University of Ibadan and twenty-nine (17%) graduated from the Great Lake University of Kisumu. Figure 22 shows the number of respondents from each of the five universities.

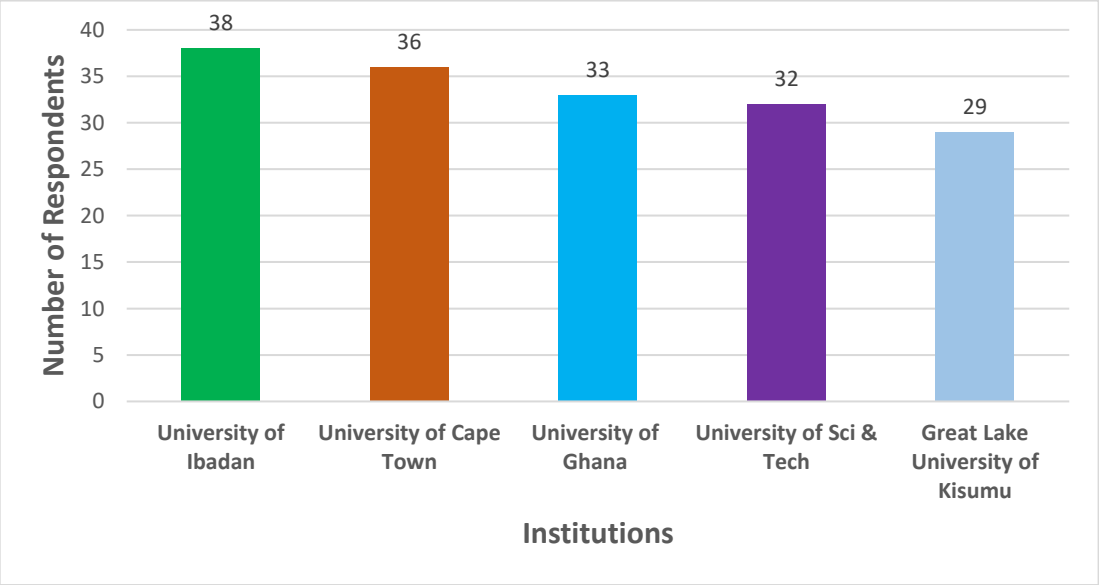

Figure 22: Number of alumni who responded to the survey from the five universities (n=168)

A majority (53%) of the participants were women and 47% were men. The median age of participants was 42 years (IQR: 38-51 years). The median age for men was 42 (IQR: 38-49 years) and that for women was 43 (IQR: 37-52 years), (p=0.9). Figure 23 shows the age and gender of respondents.

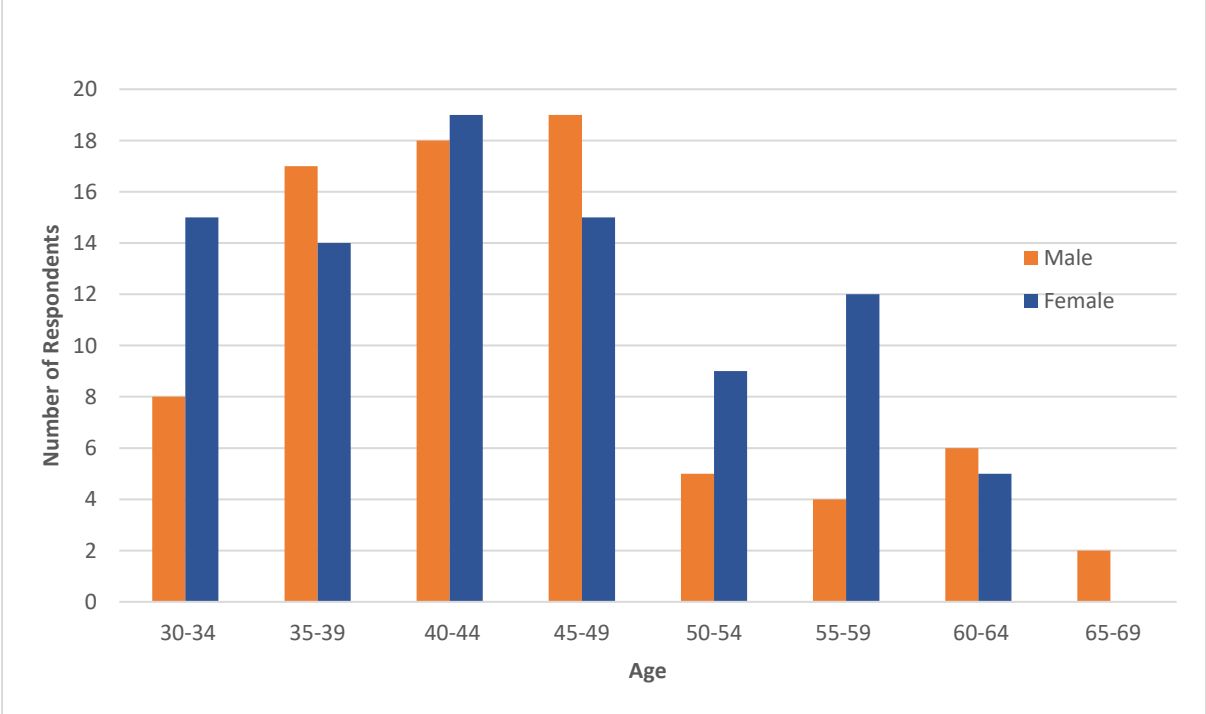

Figure 23: Age and gender of respondents (n=168)

Most of the participants (78%) came from Anglophone African countries, 17% came from Francophone African countries, 4% came from Lusophone African countries and 1% came from countries outside Africa (Figure 24). Figure 25 shows the countries where graduates came from (i.e. country of birth).

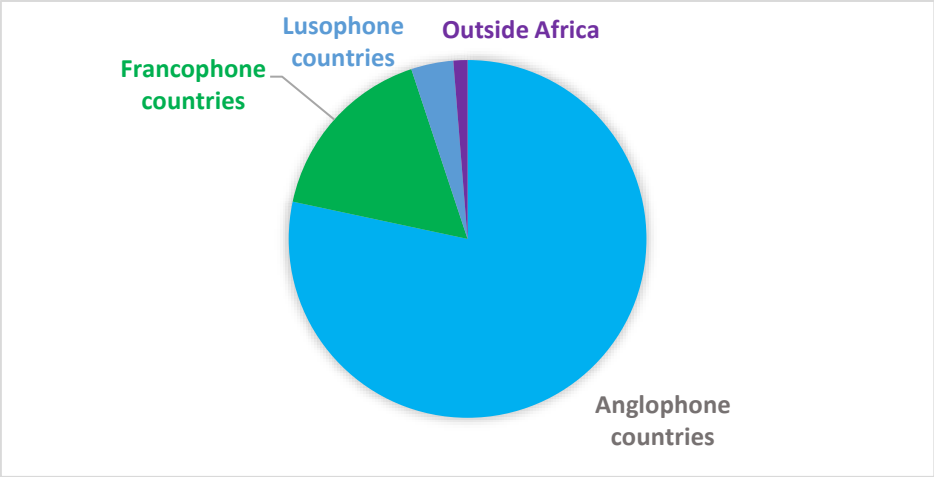

Figure 24: Distribution of graduates based on language of country they came from

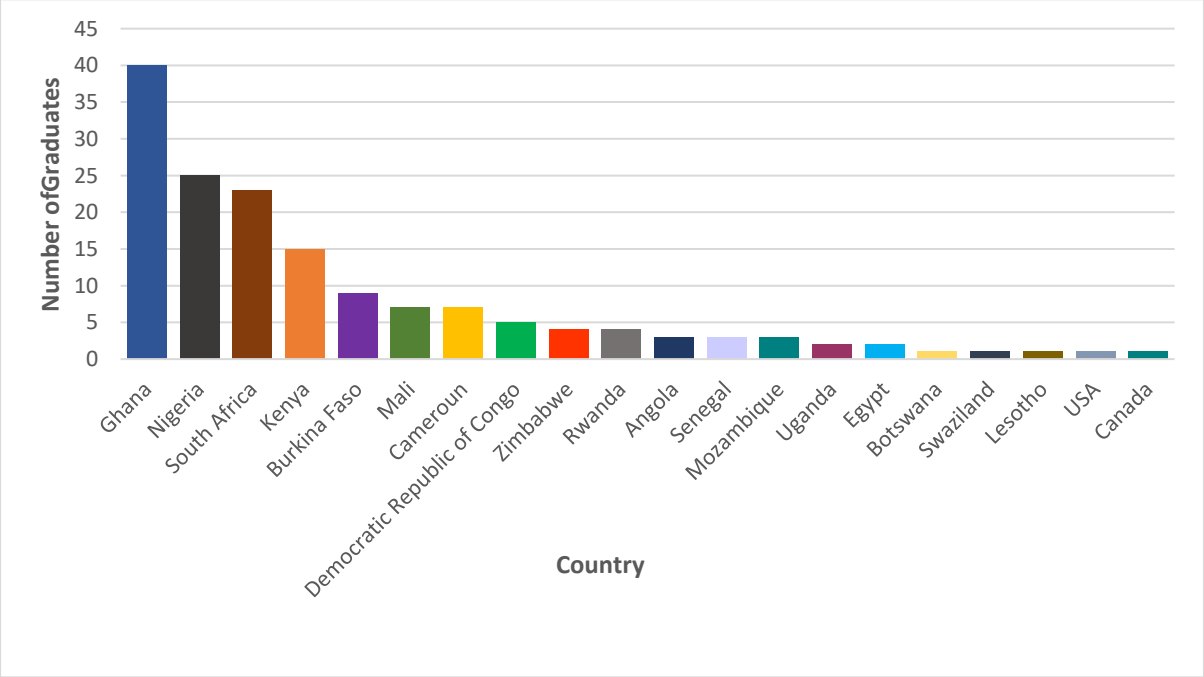

Figure 25: Countries where graduates come from (country of origin or birth, n=157)

Participants had professional educational background in medicine (37%), nursing/midwifery (17%), Social work (8%), pharmacy (6%), Social Science (5%), occupational therapy (4%), Bachelor of Public Health (2%), Optometry (2%), Dentistry (2%), Psychology (2%), Physiotherapy (1%), Business administration (1%), Health management (1%) and other professions (12%). (Figure 26)

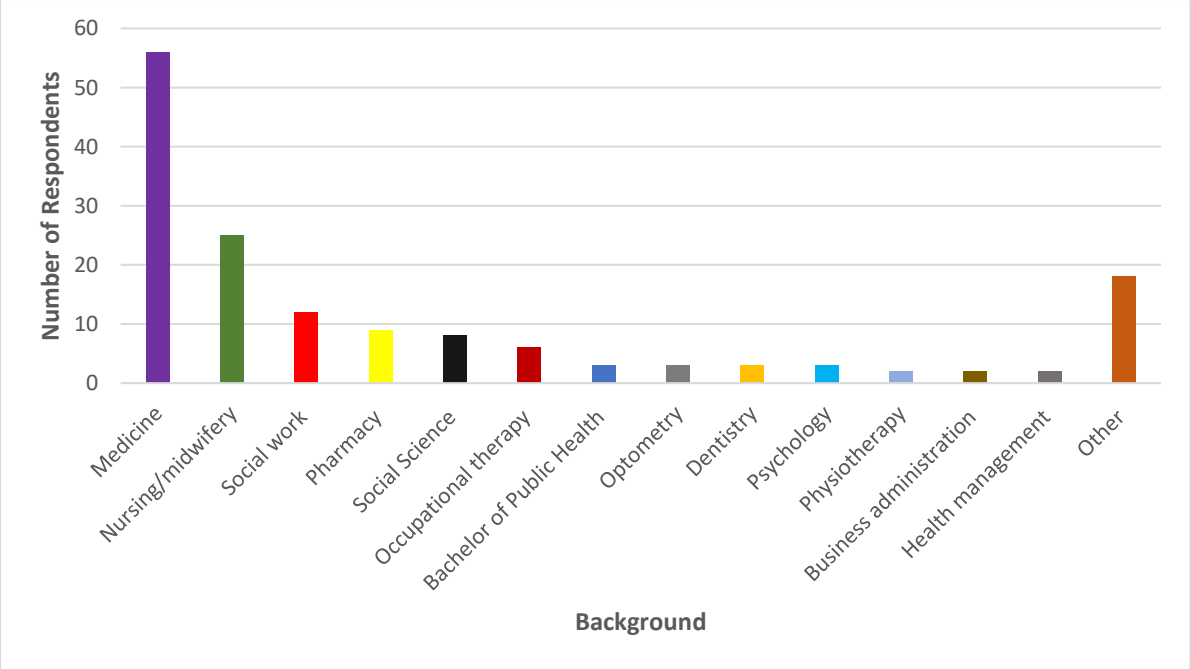

Figure 26: Professional background of graduates (n=152)

Graduates had a median work experience of 7 years (IQR: 4-10 years) prior to the MPH. As expected, older graduates had more work experience prior to starting the MPH compared to younger graduates (Figure 27). The correlation between age of graduates and years of work experience prior to starting the MPH is statistically significant. (Spearman's rho= 0.72, p<0.001).

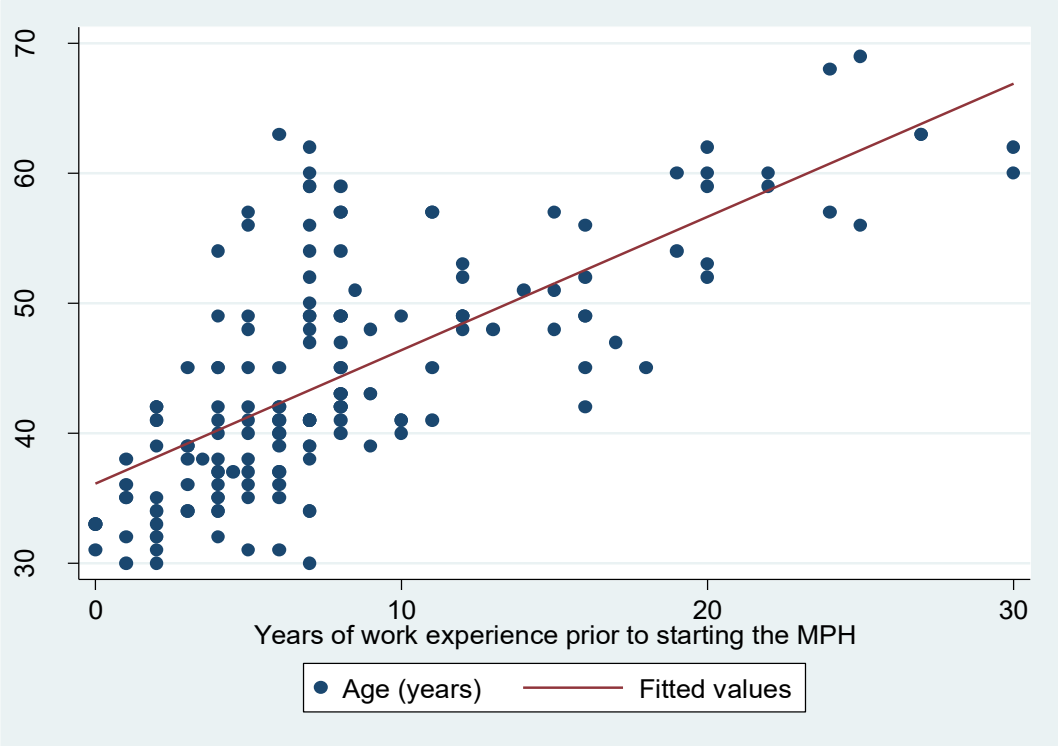

Figure 27: Correlation between age of graduates and years of work experience prior to starting the MPH.

Most of the graduates (53%) pursued the MPH degree on full-time basis and 47% pursued the degree on part-time basis. Graduates who pursued the MPH on part-time basis were significantly older (median age=46.9) compared to those who pursued the degree on full-time basis (median age=42.6), (p=0.001). Most of the graduates (30%) were in the Epidemiology and Biostatistics track during their MPH. The rest were in the health systems, policy and management track (19%), Health promotion and education track (17%), Social and behavioural science track (8%), Environmental health track (5%) and other tracks (21%) (Figure 28). Only 6% of the graduates reported that they got part-time work as research assistants in their institutions during their MPH.

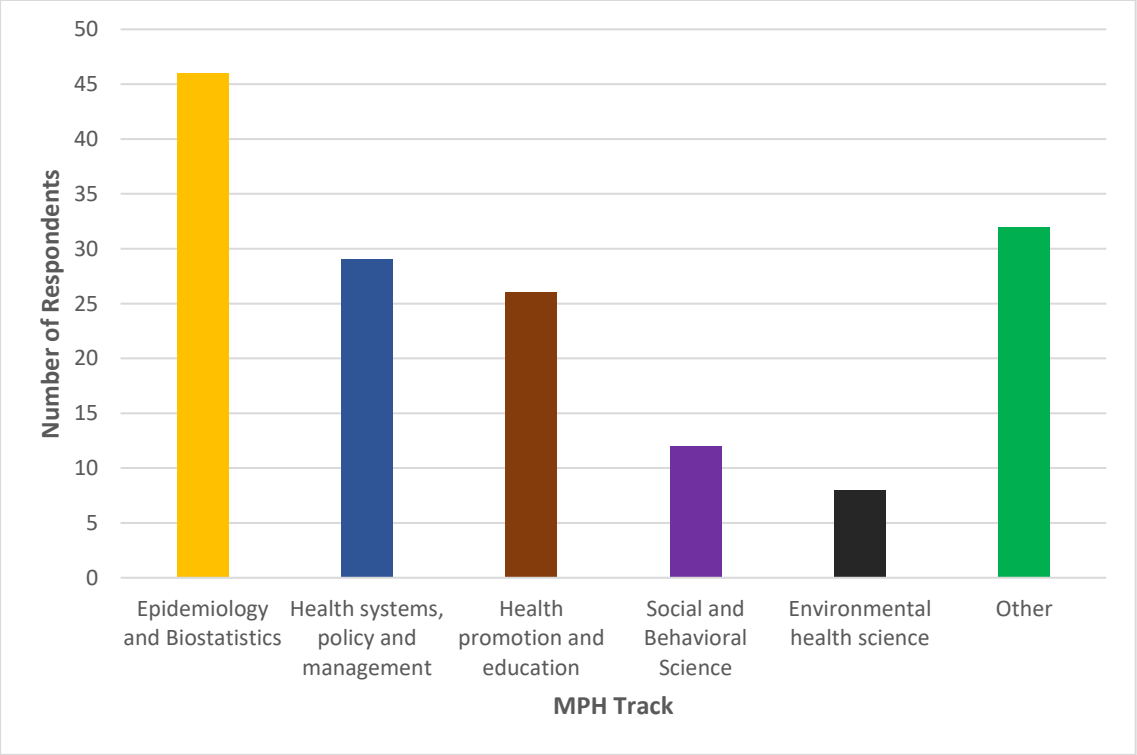

Figure 28: Self-reported Track of MPH graduates (n=153)

The vast majority of graduates (94%) reported that they were employed at the time of completing the questionnaire while 6% reported that they were unemployed. For the 6% who reported that they were unemployed at the time of completing the survey, 4% reported that they had had some form of employment since completing the MPH and 2% reported that they had never been employed since completing the MPH. The 2% of graduates who reported that they had never been employed since completing the MPH graduated recently, in 2016 compared

those employed, who completed their MPH between 2012 and 2015. Although the number of graduates who reported being unemployed after the MPH (6%) were lower than those that reported being unemployed prior to the MPH (11%), this difference was not statistically significant (p=0.166)

Many (39%) graduates also reported that they worked in public hospitals/clinic prior to starting their MPH degree. Other places where graduates worked prior to the MPH included private hospitals/clinics (8%), International non-governmental organizations-NGOs (7%), District Health departments (7%), local NGOs (5%), National Ministry of Health (5%), regional/provincial health departments (5%), universities/academic institutions (4%), research institutions (4%), other organizations (5%), unemployed (11%). After graduating with the MPH, most graduates shifted from working in public hospitals/clinics to working in district health departments (23%), international NGOs (15%) and research institutes (10%). Other places where graduates worked after the MPH included public hospitals/clinics (9%), local NGOs (8%), national ministries of health (7%), regional/provincial department of health (6%), universities/academic institutions (5%), private hospitals/clinics (4%) other institutions (7%), unemployed (6%) (Figure 29).

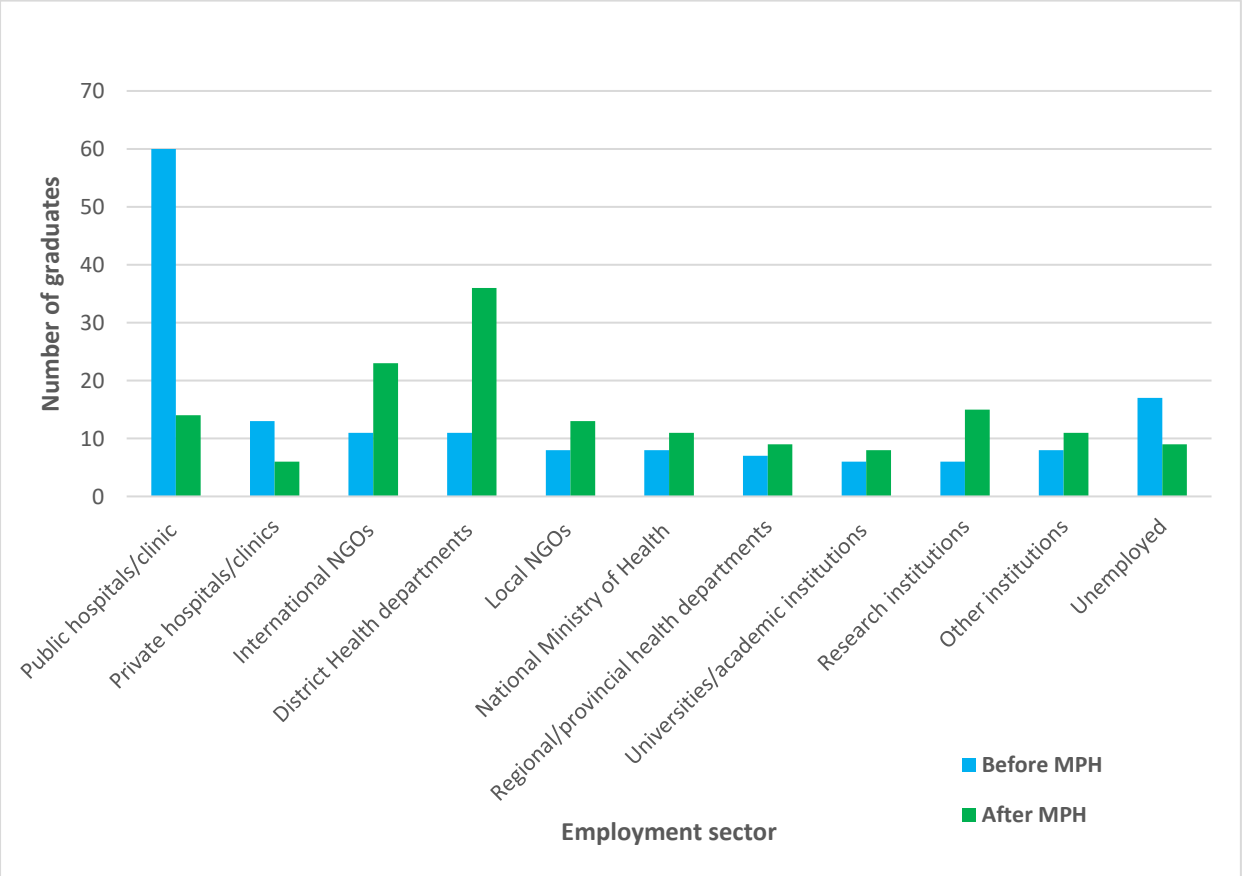

Figure 29: Sectors where graduates worked before and after the MPH (n=155).

Additionally, the vast majority of graduates (97%) reported that they currently or most recently worked for institutions/organizations within Africa. Only 3% reported working outside Africa. Most graduates (91%) reported that their work after the MPH was public health related. The median number of years graduates worked in public health related work after the MPH was 6 years (IQR: 5-8 years). A few graduates (9%), however, reported that they moved away from public health related work after completing the MPH. The median number of years' graduates reported working in jobs unrelated to public health was 4 years (IQR: 3-6 years). Even though graduates obtained their MPH from universities in Ghana, Nigeria, South Africa and Kenya, they reported working in institutions/organizations across different countries in Africa. Figure 30 shows the countries where graduates currently or most recently worked.

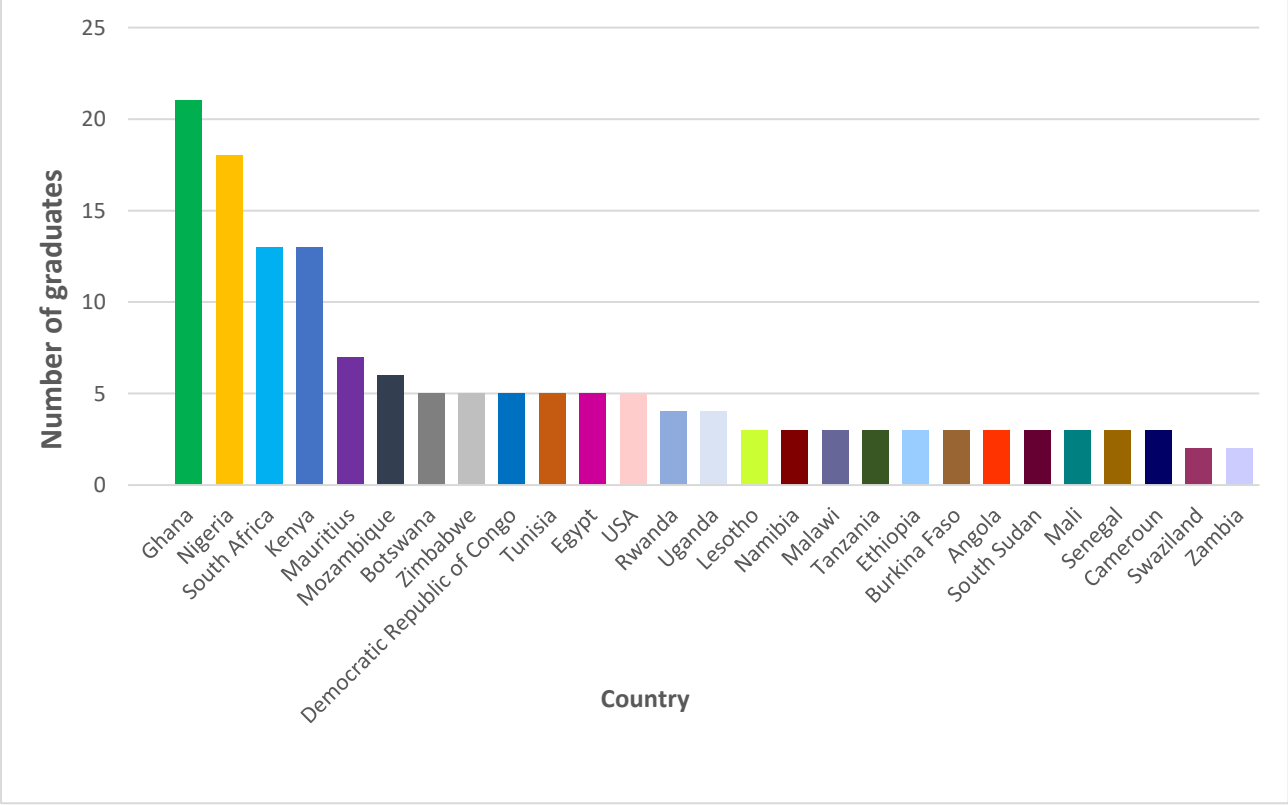

Figure 30: countries where graduates currently or most recently worked (n=154).

Prior to pursuing the MPH, most graduates reported having roles in clinical care/service for individual patients (46%). Other roles graduates reported performing prior to the MPH included being involved in policy development process at their workplace (14%), academic work in tertiary institutions (8%), programme/project management (7%), health promotion/education of patients (6%), pure research, (5%), line management (3%), studying (2%) and other roles

(9%) (figure 31). After completing the MPH, most graduates reported taking on roles in project/programme management (26%), health promotion/education (22%) being involved in policy development process (13%) and conducting research (14%). Other roles graduates performed after their MPH included clinical care of individual patients (9%), serving as line managers (6%), academic work in tertiary institutions (4%), studying (2%) and other roles (4%).

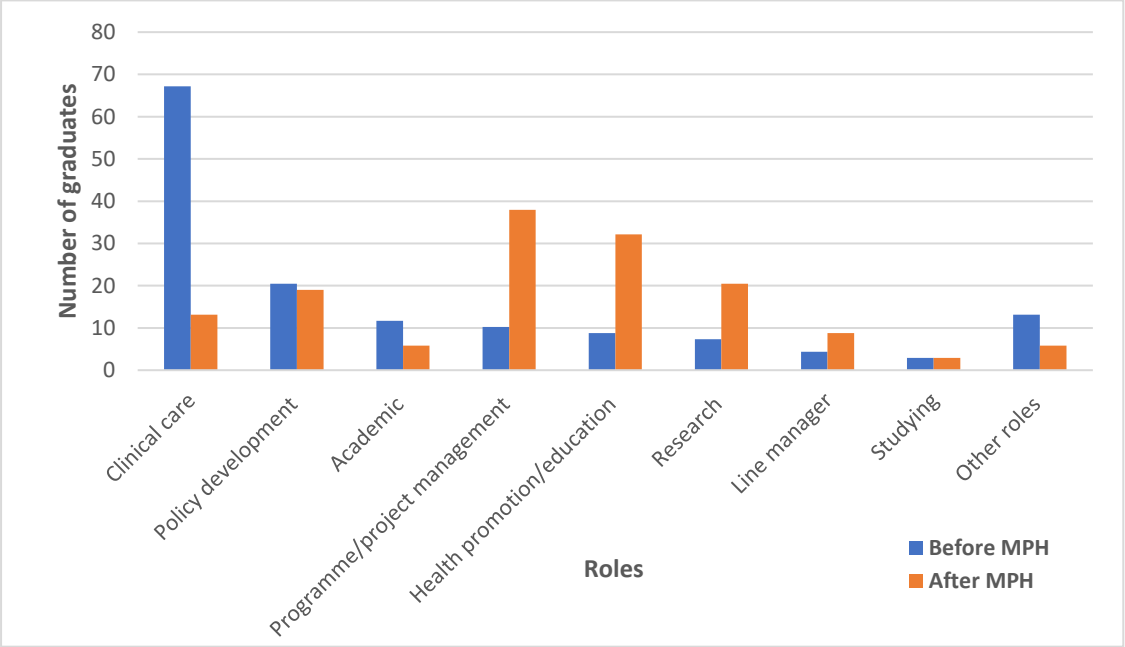

Figure 31: Self-reported roles of graduates before and after pursuing the MPH (n=146)

A majority of graduates (47%) attributed their taking on of managerial roles to the MPH and 35% reported that the MPH assisted them in taking on technical roles. Respectively, 6%, 4% and 8% of graduates indicated that the MPH assisted them in taking on research, teaching and other roles (Figure 32).

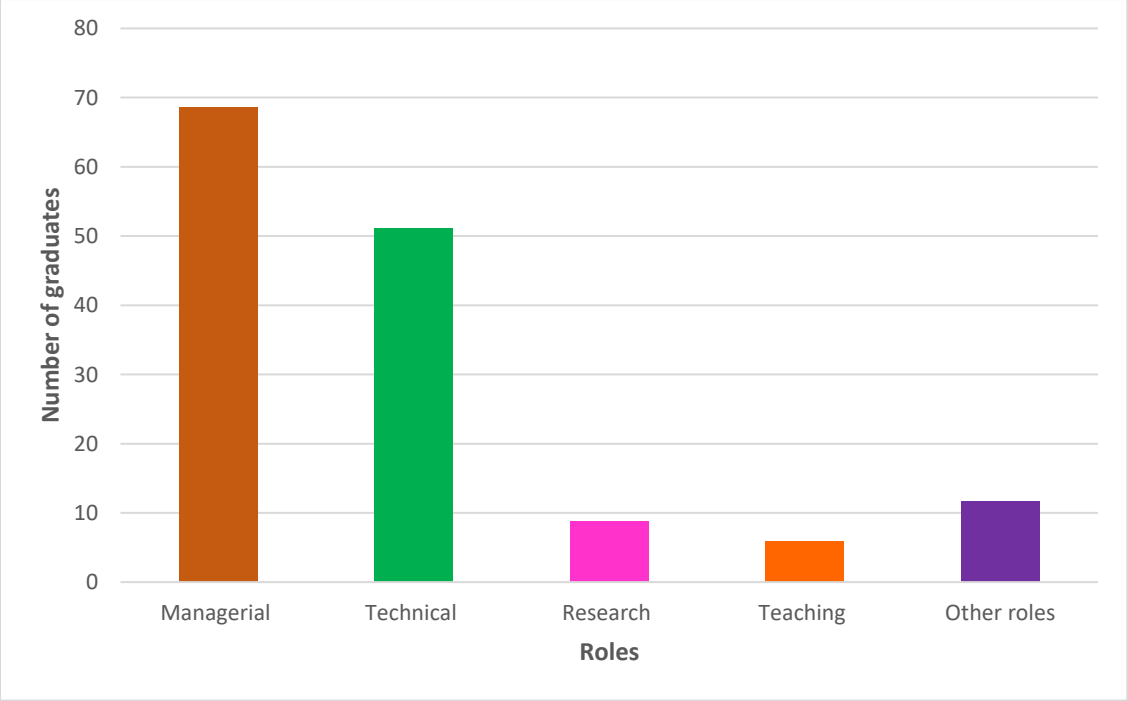

Figure 32: Roles facilitated by the MPH (n=146)

4.10.2.2 Applicability, acquisition and level of confidence in utilizing core competencies

As shown in Figure 33, overall, graduates graded themselves as having high confidence in their ability to utilize the public health science and research competencies to address public health issues in Africa, with median scores of 17 (85%) and 22 (79%) respectively.

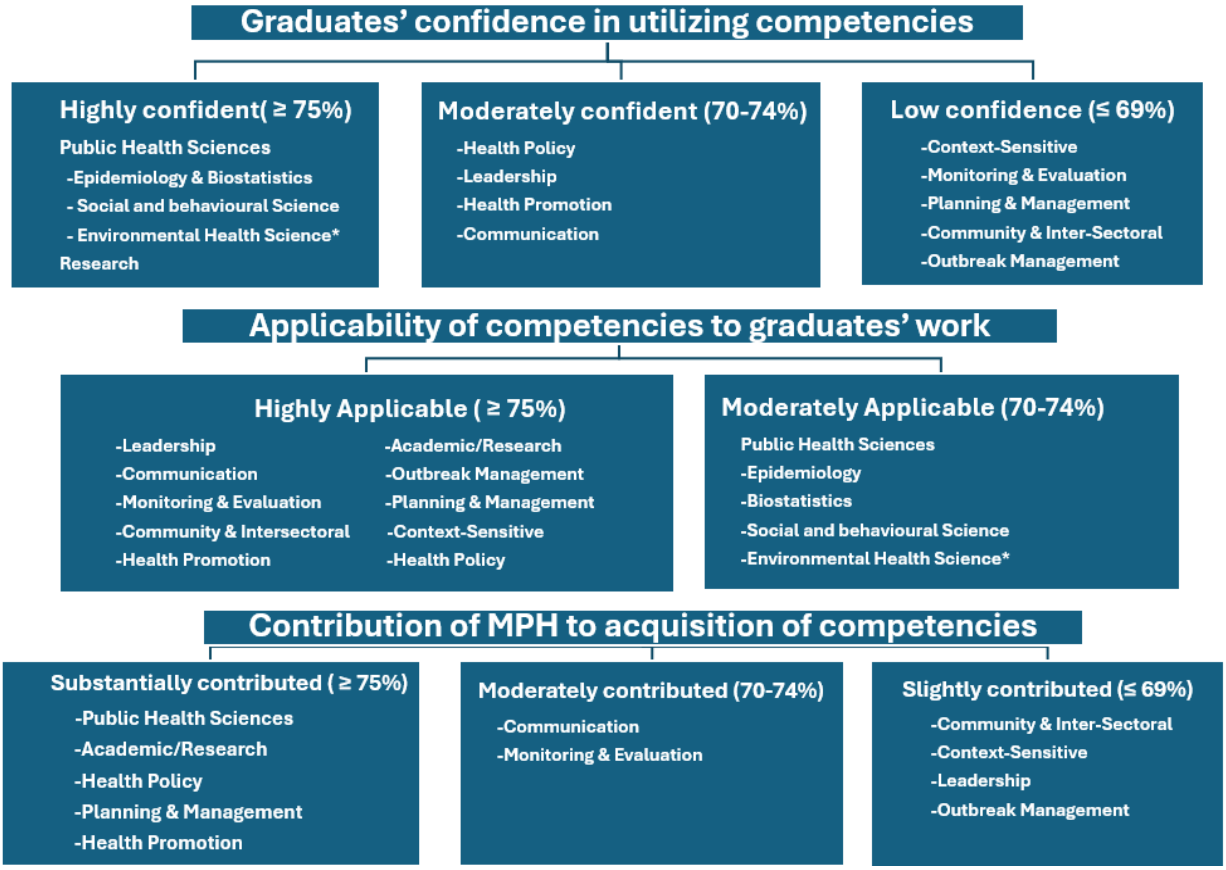

Figure 33: Applicability, acquisition and level of confidence in utilizing core competencies

In contrast, graduates graded themselves as having low confidence in their ability to utilize outbreak management, community and intersectoral collaboration, monitoring and evaluation, planning and management and context-sensitive competencies to address public health challenges with median scores of 7 (44%), 5 (63%), (68%), 13.5 (68%) and 11 (69%) respectively. Graduates further graded themselves as being moderately confident in their ability to apply communication, health promotion, leadership and health policy competencies to addressing public health issues with median scores of 19.5 (70%), 20 (71%), 14.5 (73%), 14.5 (73%). Despite having high confidence in their ability to utilize the public health science competencies, these were not the most applicable graduates' work. Competencies in leadership, communication, monitoring and evaluation, community and intersectoral collaboration, health promotion, outbreak management, planning and management, context-sensitivity and health policy which graduates reported having low to moderate confidence in were found to be the most applicable to graduates' work with median scores of 17.5 (88%), 24 (86%), 6.5 (81%), 23 (82%) and 22.5 (80%), 12.5 (78%), 15.5 (78%) 12.5 (78%), 15 (75%) respectively. The results also show that the MPH program contributed minimally to graduates acquisitions of competencies in outbreak management, context-sensitivity and community and intersectoral

collaboration competencies which were reported to be the most applicable to graduates' public health work in Africa. The program, on the other hand, contributed substantially to the acquisition of public health science competencies, despite these being only moderately applicable to graduates' public health work. This highlights a significant mismatch between the competencies provided by MPH programs and those required by graduates for their public health work in Africa.

Across the five MPH programs, no significant difference was found in graduate's response on competencies applicability to their work and their confidence in utilizing the 11 competency domains. A significant difference across programs was however found in graduates' scoring of the contribution of the MPH to their acquisition of the health promotion competencies (Kruskal -Wallis test, H= 15.8, p=0.0032). Post-hoc analysis showed that the University of Cape Town had significantly different (lower) median score (3.2) compared to the other universities.

4.10.3 Depth of coverage of competencies/domain in MPH programs.

Fourteen Lecturer who teach core competency domains or courses (i.e. epidemiology, biostatistics, environmental health science, health systems, policy and management, health promotion and education and social and behavioural sciences in five MPH programs – University of Ibadan, University of Ghana, University of Cape Town, University of Science and Technology and Great Lake University of Kisumu participated in the study.

4.10.3.1 Demographics of lecturers

The average age of participants was 52 years. A majority (64%) of the participants were males and 36% were female. The mean age of male participants was higher than that of female participants (53 versus 50 years), but this difference was not statistically significant (p=0.8). Participants had between 5 to 30 years of experience in public health education and had spent between 3 to 20 years teaching MPH courses in their respective programs.

4.10.3.2 Depth of coverage: health systems, policy and management domain

All the five MPH programs included in the study offer the health systems, policy and management domain or course, although the courses are named differently. As shown in figure 34, a review of what is covered under this domain showed that in all five programs, key topics included or taught as part of the domain expose students to detailed information on health systems and policies. Thus, the teaching of these domains in all five MPH programs are structured in such a way that the content assists students to acquire the foundational knowledge needed to perform future health policy and health systems related tasks. All five programs

therefore assist students to 'know" and meet the requirement of level 1 of the Miller's triangle. For example, in all five programs students are introduced to frameworks for understanding and conceptualizing health systems, as well as the health systems structure of at least one African country. Additionally, students are exposed to some of the key health policies that have shaped African health systems over the years and the common theoretical frameworks that are used in the analysis of these policies.

> *"In our first lecture, we introduce the students to frameworks that are key to understanding and conceptualizing health systems such as the WHO's six health systems building blocks. A lot of emphasis is placed on the need to have these building blocks in mind when planning interventions or policies aimed at strengthening the health system"* ***Lecturer 1***

> *"……. The lectures give them [referring to students] exposure to a particular health systems context. And most of the health systems contexts that we draw on is from African countries. So there'll be multiple African health systems, and depending on what we're talking about in that lecture, that country's health system will be what is discussed"* ***Lecturer 3***

> *"At the end of the lesson, student should be familiar with theoretical frameworks used in health policy analysis"* ***Curriculum 1***

> *"In this course, students will learn thoroughly how the system is structured, how care organized, delivered, and financed, and how the National Health Policy will influence the future of the system"* ***Curriculum 2***

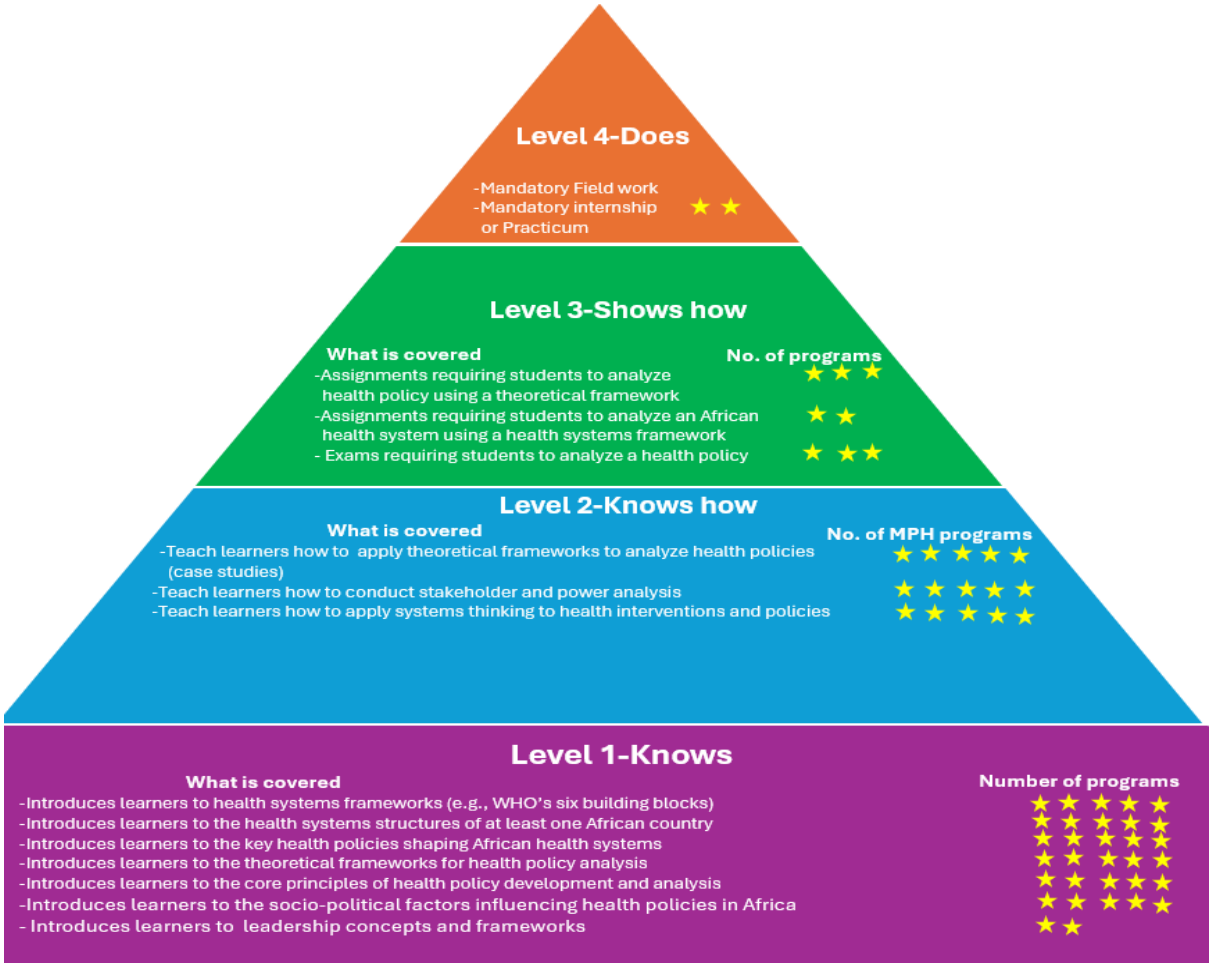

Figure 34: Assessment of the depth of coverage of the health systems, policy and management domain using the Miller's triangle

Furthermore, students in all five programs are also introduced to the fundamental concepts and issues in health policy development and analysis and the socio-political factors that influence policy developments.

> *"In the second lecture, we introduce students to the core principles of health policy development and analysis and we go into details on how to analyze health policies in the subsequent lectures"* ***lecturer 1***

> *"At the end of the lesson, students should be able to recognize the socio-political factors – and especially power - acting on and through health policy"* ***Curriculum 2***

In two of the programs, students are also exposed to the basic concepts of leadership and leadership frameworks across the world.

> *"...so that particular lecture covers the leadership components of the health system and draws from many other leadership frameworks around the world. Then, students are taken through team management types of leadership styles and so forth, which are applicable at the health sector level...."* ***Lecturer 1***

The analysis further showed that in all five programs, students are taught how to utilize the foundational information and/or knowledge acquired in the course to conduct future health systems and health policy related tasks. All five programs therefore assist students to **'know how'** when it comes to this domain and meet the requirement of level 2 of the Miller's triangle. For instance, in all five programs, students are taught how to apply the theoretical frameworks and core concept on health policy analysis learnt earlier in the course to analyse health policies. this is done in the form of case studies. Additionally, students are also taught how to utilize the information on actors/stakeholder mapping in the course to conduct stakeholder analysis.

> *"……and because we expose them to some of the theoretical frameworks and core concepts that are used in health policy analysis, we spend the next two lectures teaching them how to apply these frameworks and concepts in analyzing policies and policy processes in the form of case studies…"* ***Lecturer 2***

> *"…. So after introducing them to the fundamental roles of actors and stakeholder in shaping health policies, we teach them how to conduct power and stakeholder analysis in the subsequent lecture… So this is to make sure that apart from the* theoretical, they get to understand how to these apply these ones concepts to policies*…"* ***Lecturer 1***

Key informant from one of the MPH programs shared how emphasis is placed on the importance of systems thinking during the teaching of the health systems and policy course/domain and how students are taught how to apply systems thinking in designing public health interventions and policies in some of the lectures.

> *"Systems thinking is something we emphasize in all our lectures and as part of the course, we teach students how to apply systems thinking to health interventions and programs"* ***Lecturer 3***

In all five programs, student's assessments (assignments and examinations) are structured in such a way that it mimics what they will be required to do in the real-life setting. All five programs once again assist students to **"show how"** and meet the requirements for level 3 of the Miller's triangle. For example, in three of the programs, students are given assignments which require them to apply theoretical frameworks and fundamental concepts to analyse health policies (provided to them as part of the assignments). This is similar to what they will do in real life.

> *"…. Oh for their midterm assignment, we give them two policies from two African countries and the students are required to select one of these policies and analyse it through the lens of a theoretical framework …. You know like the Walt and Gilson's health policy analysis framework…."* ***Lecturer 3***

"So usually, we look at the health sector policies that have been implemented. And then we ask them to choose one particular policy. When they select that specific policy, they are encouraged to use the policy triangle to examine contextual issues surrounding the policy, as well as the process issues, the actors involved, and the content. Then, they attempt to critique whether research evidence is truly essential in policy analysis." ***Lecturer 1***

"As part of assignment, students are required to apply some of the theoretical frameworks we discussed in class to analyzing a health policy…Usually they have the option of selecting a policy themselves, but it should be from the region (referring to Africa). ***Lecturer 2***

In two programs, students are given "in class" exercises and "take home exam" which require them to apply health systems frameworks covered in the course to analyse the health systems of African countries.

"In the exams, we ask them to apply the WHO's health systems framework to analyse the health system of one African country" ***Lecturer 2***

"So usually, they have what we call class exercises. This means that case studies are worked on during class, then, they receive take-home exams." ***Lecturer 1***

With regards to MPH programs facilitating/assisting students to **"do"** (i.e. perform in the real-life environment in the area of health systems, policy and management), analysis of the interviews and curricula document showed that only two out of the five MPH programs provide students with the platform/opportunity to get real-life field experience where they could apply what they have learnt in the course/domain to real life work. This is achieved in the two programs through compulsory public health practice, field works and/or internship. For example, in one of the programs, students taking the health systems, policy and management course are required to obtained practical field experience or training through attachment/internship with institutions (including government institutions, health care facilities, NGOs, private organizations involved in public health practice. In the other program, students are required to undergo compulsory internship with an organization involved specifically in health systems research.

"And then in addition to that, in the second semester, they are supposed to go and do public health practice. So for public health practice, when they are in the field, for our department, they're supposed to identify health systems challenges, health system topics, gaps that are in the health, so when they come back, they're supposed to present and propose topics for the next group of students who will be coming" ***Lecturer 4***

For two of the programs, though students taking the health systems, policy and management course are not required to undergo compulsory field training or internship and so did not offer

the platform to specifically obtain real life field experience in the area of health systems, policy and management. The MPH program however offers the option of taking a practicum course. Student who opt to take this course get practical field experience in different aspect of public health including in health policy and management through engaging in a variety of activities. This includes assisting with programmatic activities, participating in community outreach initiatives, or contributing to policy development projects.

4.10.3.3 Depth of coverage: Epidemiology and Biostatistics domains

All five MPH programs included in this study offer both the Epidemiology and Biostatistics domains/courses. As shown in figure 35, analyses of what is covered under these domains/courses showed that in all five programs, course contents are designed in such a way that they expose students to the relevant information on Epidemiology and Biostatistics and thus assist them to acquire the foundational knowledge needed to perform future related tasks. This implies that all five programs assist students to **'know"** and meet the requirement of level 1 of the Miller's triangle under this domain. For example, in all five programs, students offering the epidemiology course or domain are exposed to the basic principles and methods of epidemiology. Additionally, students in all five programs also are introduced to epidemiological concepts such as measures of disease occurrence and associations, types and limitations of study designs, random error, bias, confounding and the basic principles of screening.

> *"So okay, the first lecture is more of orientation, then in the second lecture, we introduce them to the measures of disease occurrence, you know incidence, prevalence, attack rate, odds ratio, yeah"* ***Lecturer 5***
>
> *"The course aims to introduce students to the basic principles and methods of epidemiology.* ***Curriculum 3***
>
> *"…. with the principles of epidemiology course, we first look at the measure of disease frequency, so those are your prevalence, incidence, risk ratio etc. and we build on this knowledge in the subsequent lectures…"* ***Lecturer 6***
>
> *"At the end of the course, candidates should be able to demonstrate knowledge of: the nature and uses of epidemiology; the epidemiological approach to defining and measuring the occurrence of health related states in populations; the strengths and limitations of epidemiological study designs; the epidemiological approach to disease causation".* ***Curriculum 4***

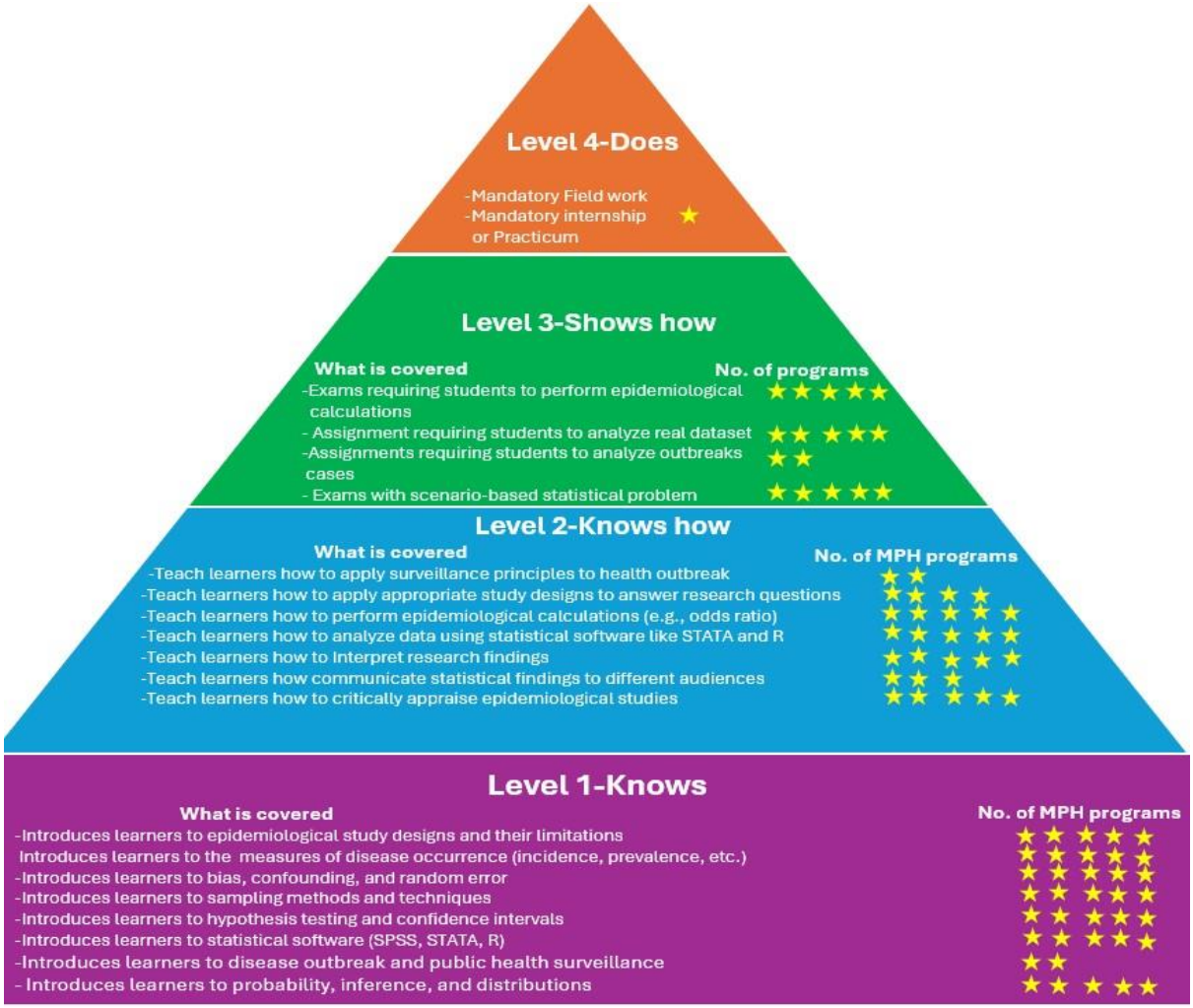

Figure 35: Assessment of the depth of coverage of Epidemiology and Biostatistics using the Miller's triangle

In two of the MPH programs, students taking the epidemiology course or domain are introduced to the concept of disease outbreak and public health surveillance.

> *"The course introduces students to the concept of disease and public health surveillance and explains the relationship between surveillance and disease outbreaks"* ***Curriculum 3***

> *"We cover the principles of outbreak investigations, including case definitions, line listing, the role of laboratory in outbreak investigation and the concept of person, place and time in the last lecture"* ***Lecturer 6***

Students taking the Biostatistics course/domains in all five programs are also exposed to the basic concepts of biostatistics, including, probability, inference, distribution, sampling methods/techniques and the principles of hypothesis testing.

> *'…. oh in the biostatistics course, they are exposed to fundamental concepts like sampling, I mean the different sampling techniques, we also introduce them to the concept of probability, distribution, hypothesis testing and confidence intervals in the second and third lectures…"* ***Lecturer 7***

"…as part of that lecture, we introduce students to the different ways of summarizing and describing statistical data, we also expose them to some of the statistical software packages which they will use later on in the course for their assignments…" ***Lecturer 8***

"At the end of the course, students should demonstrate a strong understanding of the basic statistical concepts (probability, sampling, inference, confidence intervals, type 1&2 errors and hypothesis testing)" ***Curriculum 6***

The analysis of the depth of coverage of the epidemiology and the biostatistics courses in the five MPH programs further showed that in all five programs, the teaching of the courses focussed on guiding students on how to utilize the foundational knowledge acquired earlier in the course for specific epidemiology and biostatistics related task. This means that all five programs assist students to **'know how'** when it comes to the epidemiology and biostatistics domain/course and meet the requirement of level 2 of the Miller's triangle. For example, students in the epidemiology tracks in all five programs are taught how to utilize the information on study designs, measures of disease occurrence, hypothesis testing and associations to design or evaluate epidemiological studies.

"…so because we would have already introduced them (referring to students) to the different study designs in the previous lectures, we now go through some published studies with them… I mean a couple of studies with different study designs, and this give them an idea of how the study designs they were exposed to are used in different studies depending on the study aim...". ***Lecturer 6***

"…. the course also focuses on helping students to build the skills in critically appraising epidemiological studies, you know to see if appropriate study designs and methods were used, if things like bias were avoided and that is why that lecture is very important. ***Lecturer 5***

"The session also aims to guide students on how to identify bias, confounders and methodological issues in published studies" ***Curriculum 7***

Students taking the epidemiology course or domain in two MPH programs are also taught how to conduct outbreak investigations and apply the principles of disease surveillance learnt in the course to outbreak cases.

"The course also aims to guide students on how to conduct outbreak investigation and how to write outbreak reports" ***Curriculum 5***

"So we go through some outbreak cases with them during that lecture and the aim is to show them how to apply the principles of outbreak and surveillance learnt in the course to these cases. I mean things like how to analyse and use data from the cases determine geographic

spread and identify clusters and how to implement control measures like quarantine". ***Lecturer 6***

Furthermore, in three of the programs, students taking the epidemiology course are also taught how to find the right research question and how to select and apply the appropriate research methods to answer these research question

"This session provides students with an overview of the domain of health sciences and public health research, the importance of finding the right research questions and guides students on how to find the right research question". ***Curriculum 4***

"…after that lecture you know; we now take them through how to select the appropriate study design for their research questions…" ***Lecturer 5***

In the Biostatistics course or domain, students in all the five MPH programs are taught how to use statistical packages such as STATA, R, SPSS (introduced to them earlier in the course) to analyse public health data.

"…For our general MPH students who are all required to take the biostatistics course, we have sessions where they are taken through how they can analyse data using SPSS…you know we guide them on how to draw on the data analysis concepts covered previously and how to apply that to their data analysis…". ***Lecturer 8***

"So building on their knowledge in methods in biostatistics, we train them on how to apply different statistical techniques to different public health dataset…and all students are taught how to use STATA which is the official statistical package in our MPH program to perform analysis of public health dataset. We call this the STATA training session" ***Lecturer 7***

Additionally, students in all five programs who take the biostatistics course are taught how to draw on the foundational knowledge acquired in the course in interpreting research findings and in three of the programs, students are guided on how to communicate research findings to different audiences.

"In as much as we are teaching them how to analyse the data, so like how to make meaning of out of the data, we also go to the extent of showing them how to present the result". ***Lecturer 7***

"…and you could see that in that particular session, we take them through ways of communicating the results of their analysis with different audiences. So you know those with biostatistics background and those with no background in MPH or biostatistics. Yeah so sort of lay audiences I should say...". ***Lecturer 8***

Aside from all five programs assisting students to apply foundational knowledge acquired in the epidemiology and biostatistics courses to public health related tasks, students' assessments

in all five programs are also structured in such a way that it mimics what they will be required to do in the real-life setting. This further indicates that all five programs once again assist students to **"show how"** and meet the requirements for level 3 of the Miller's triangle. For example, the assignments and end of course examination given to students in the epidemiology course in all five programs have aspects that require students to undertake tasks like calculating and interpreting the measures of disease occurrences, the relative and absolute measures of associations.

> *So like I mentioned, the exam is structured in such a way that the students are given essays, usually about five essay questions that require them among others to calculate things like the prevalence, incidence, odd ratio etc.* ***Lecturer 6***

> *"The assignment aims to assess students' ability to calculate and interpret the measures of disease occurrence (incidence, prevalence and odds) of a particular health outcome and how to construct 2x2 tables using information provided to them"* ***Curriculum 4***

In all programs, student's assignment and exams in the epidemiology course also involved student analyzing cases that are similar to what they will encounter in real life.

> *"The exams are not so theoretical per say, so we make it very practical and usually involves giving them cases which they have to analyse. For example, an outbreak occurred in a particular place, 20 people fell ill, they were at a particular gathering, and things like that, so they are not always just calculate this, calculate that, there is always a story depicting what happens in real life where they will now extract information from there to actually form their 2x2 tables and things like that"* ***Lecturer 5***

When it comes to the biostatistics course or domain, assignments and end of course examinations in all five programs have aspects which require students to analyse actual public health datasets provided to them and prepare reports from these analyses.

> *So what we usually do, for the main exams, we take them to the computing systems department, and there we have the data installed on the machines, so students sit down and they have to open the dataset and analyse the data and write the results in the answer booklet just to make sure that they get that skills in context of data analysis and result presentation.* ***Lecturer 7***

Similar to what is done in the epidemiology courses, students assignments and end of course examination under the biostatistics course also have aspects which require students analyse real life cases/scenarios and interpreting the outputs/results from data analysis.

> *"...okay yeah, usually for the continuous assessment, it involves MCQs, then the exams, there are some written, but the written is mostly applied questions, you give them scenarios, provide specimen data and then ask them how they will deal with it, or you give*

them the result of analysis and you ask them to interpret, just things like that…" ***Lecturer 8***

With regards to MPH programs facilitating/assisting students to **"do"** (i.e. perform in the real-life environment in the area of epidemiology and biostatistics), analysis of the interviews and curricula documents showed that only one of the MPH programs made it mandatory for students taking the biostatistics course to undertake internships/attachment in real life work settings/ environment where they could apply what they learn in the two courses /domain to real life work. None of the programs made it mandatory for students in the epidemiology course to undertake internships/attachments. However, in two programs, the MPH program in general had internship/practicum components where students could take advantage to gain real life experience, including in the area of epidemiology and biostatistics.

For methods in biostatistics, no, they don't go for any internship, you know the course is a four-hour credit course, very very intensive so they don't go for any internship outside but the MPH course in general has an internship component where every student can do some form of attachment, so if you have students coming from the biostatistics department for instances, usually they go to institutions that are heavily data driven you know, and if you have students coming from the population and reproductive health department, then they are attached to different organizations that are more tailored towards population and reproductive health. ***Lecturer 7***

"So for our MPH student, they have a course called internship where students can be attached to different organizations including those involved in epidemiology work and get some real life or field work experience but the course is not graded. So the main issue is since it not graded, not all of them end up going for it" ***Lecturer 5***

"As part of the MPH program in general, students have the option to undertake 4-6 weeks' internship with organizations involved in different aspect of public health work" ***Curriculum 5***

4.4.10.3.4 Depth of coverage of the Health Promotion and Education domain

The Health Promotion and Education course/domain is offered by four out of the five MPH programs included in the study (i.e. University of Ibadan, Great Lake University of Kisumu, Kwame Nkrumah University of Science and Technology and University of Ghana). As shown in figure 36, analyses of what is covered under this domain/course show that in the four programs, key topics included/taught as part of the domain/course expose students to in-depth information on health promotion and education. Thus, the course contents assist students to acquire the foundational knowledge needed to perform future health promotion and health education related tasks and meet the requirement of level 1 of the Miller's triangle. For

example, in all four programs, students taking the health promotion and education course are exposed to the basic concepts, principles, models, theories and strategies of health promotion and education. Specifically, students in the four programs are exposed to the concept of community-directed interventions, behavioural change theories, the different levels of disease prevention/interventions (i.e. primary, secondary, tertiary and quaternary level of prevention/interventions), the principles and practice of producing health promotion and advocacy materials and the role of partnerships in health promotion and education.

> *"The course is designed to enhance the student's knowledge of the basic concepts, principles and strategies of health promotion…. Emphasis will also be placed on behaviour change theories, strategies and methods for responding to emerging and pertinent public health issues".* ***Curriculum 8***

> *"By the end of the session, student should be able to: 1. describe the levels of disease prevention/interventions, 2. explain the concept of* community-directed interventions*, 3. describe the role of partnerships in health promotion and education.* ***Curriculum 10***

> *"We start the lecture with a discussion around primary health care, you know and we also discuss the Alma Ata declaration with them. Then we continue to the key concepts and theories that are important in health promotion"* ***Lecturer 10***

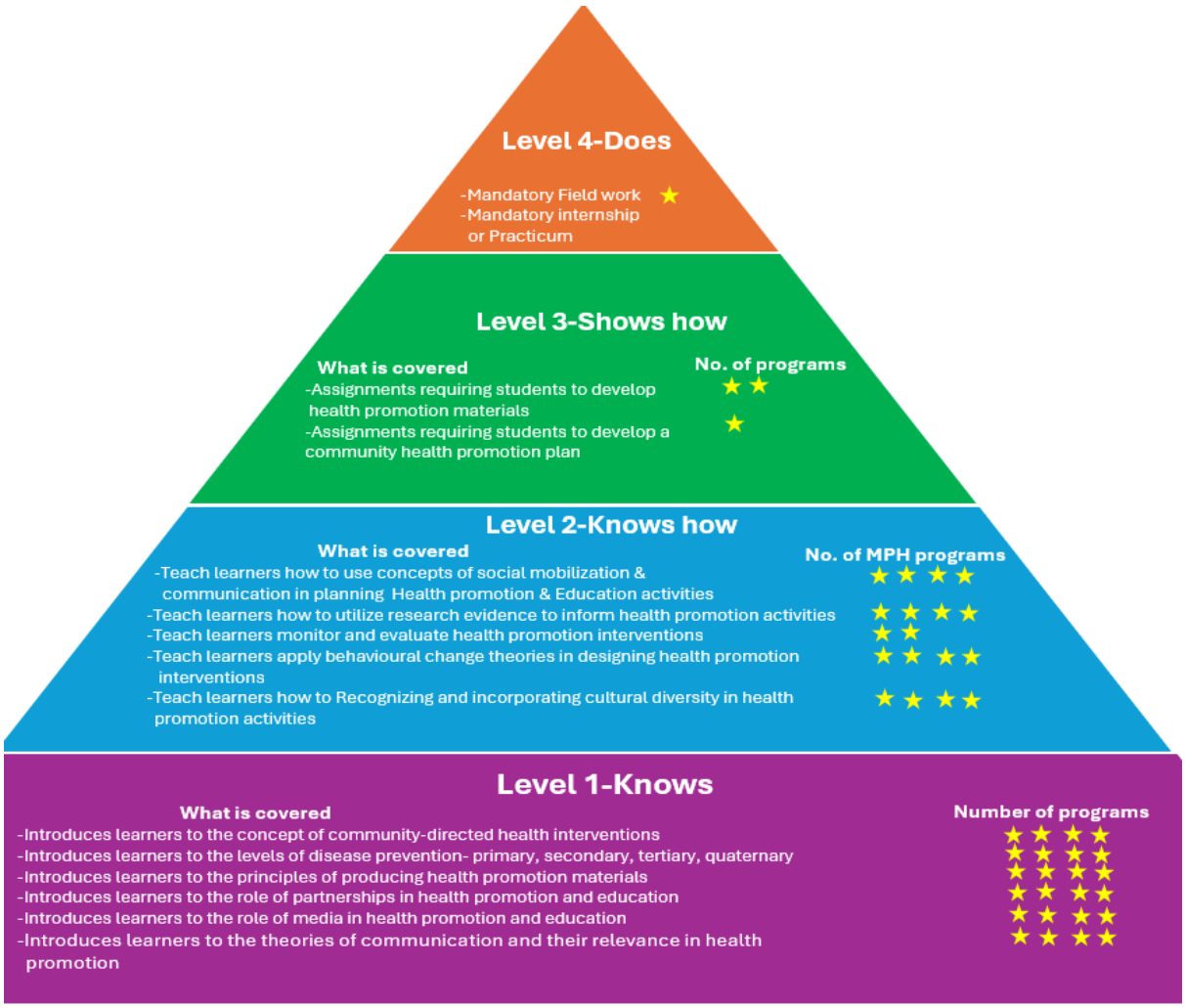

Figure 36: Assessment of the depth of coverage of the Health Promotion and Education domain using the Miller's triangle

Additionally, students in the four programs are exposed to the role of the media in health promotion and education and great emphasis is placed on the importance of effective communication which is sensitive to the socio-cultural context of the audience. Students are therefore introduced to the different concepts and theories of communication as part of the teaching of the domain.

> *"…for each session of health education, one should have a core message that they want to communicate and the message should be appropriate to the context. So we introduce them to the different theories of communication. We also emphasized the need for them to be aware of the overarching objectives of communication, you know, like why they are communicating the core message to the audience".* ***Lecturer 10***

> *"At the end of the session, students should be able to;1. list the different media technologies used in health promotion and education, 2. describe the role of the media in health promotion and education……"* ***Curriculum 9***

"The course also aims to introduce students to the theories of communication, the common channels of communication and their merits and demerits of the different channels of communication" ***Curriculum 8***

The analysis further showed that in the four programs that offer the health promotion and education course, students are also taught how to utilize the foundational information and/or knowledge acquired in the course to conduct future health promotion and education related task. For this domain, programs assist students to **'know how'** and meet the requirement of level 2 of the Miller's triangle. For example, in all the four programs which offer the health promotion and education course or domain, students are taught how to utilize information on social mobilization, media, community engagement/partnership, behavioural change strategies and health advocacy learnt in the course to plan and implement health promotion and education activities.

"…so because we also introduce them to the concept of social marketing, community participation, advocacy and social mobilization in the previous lectures, we use this lecture to teach them the strategies to engage with social groups and media outlets such as radio and television in their health promotion and education campaigns or efforts. ***Lecturer 9***

"…then we consider the area of behaviour change where we teach the students the need to hear from the client in developing health promotion activities and messages aimed at behavioural change. You know the inputs from the individual or audience is very important because communication is not a one-way approach but a two-way approach. ***Lecturer 10***

Additionally, students in all four programs are taught how to produce health promotion and education materials such as posters and infographics, brochures and pamphlets, and educational videos by drawing on theories and concepts about media production and communication learnt in the course.

"At the end of the session, students should be able to: 1. understand the principles and practice of producing health promotion and advocacy materials, 2. produce health promotion and advocacy materials (posters, brochures, educational videos etc.) …." ***Curriculum 9***

"After introducing them to the different channels of communications and the different types of audio-visual media technologies used in health promotion and advocacy, we take them through how to develop some of these materials like posters, brochures, educational videos among others in the subsequent lectures" ***Lecturer 10***

"I mentioned a session on behavioural change communication. Embedded in that session is the media aspect where we go through the different aspect of the media with them. You know especially now with the current trend of social media influence on health and we

teach them how to [develop] materials that can be used to promote health on these platforms". ***Lecturer 9***

Students in all programs are also taught how to utilize research evidence to inform their health promotion and education activities/projects, and in two of the programs, students are taught how to monitor and evaluate implemented health promotion and education interventions/project.

> *"As part of the course, students are encouraged to appreciate the role of health promotion in public health practice and are taught how to utilize research evidence in developing health promotion and education programs/interventions"* ***Curriculum 8***

> *"...and then, because health promotion activities are usually planned, we guide them on some of the study designs and tools they can use to do this planning, and how they can monitor and evaluate..."* ***Lecturer 9***

One key informant interviewed shared how emphasis is placed on teaching students how to apply the behavioural change theories learnt in the course towards designing health promotion interventions/programs aimed at behavioural change at the individual level. This uses negotiations and a 'behaviour-consequence' approach.

> *"We build on the lecture where we introduced students to behavioural change theories and we teach them how to facilitate negotiation. In other words, allowing the individual or audience who are targets of the health promotion and education effort to examine their alternatives and the consequences of those alternative in order to make informed choices on whether they want to continue the behaviour. And these choices depend on what the consequence or outcome of that behaviour will be, whether beneficial or not".* ***Lecturer 10***

Another key informant shared how students in her program are taught how to recognize the diversity in culture that exist among different audience and the need to take this into account in planning health promotion and education activities.

> *"That is something we emphasize throughout the lectures, the concept of cultural diversity in health promotion and education. So there is a session on cross-cultural consultation. In that session, we teach them how to recognize cross-cultural relationships, what to do in different cultures, how to build skills for cultural competency, and how they are to be aware of diversities when planning health promotion and education activities"* ***Lecturer 9***

Student's assessments (i.e. assignments and examinations) in the four programs were also structured in such a way that it mimics what they will be required to do in the real-life setting. Consequently, all four programs once again assisted students to **"show how"** and therefore

meets the requirements for level 3 of the Miller's triangle. In particular, in two of the programs, students are given group assignment which require them to develop health promotion materials.

> *"Oh the students are assessed at various levels. They have group projects and group assignment where they can be asked to develop health promotion materials as a group, and then there are exams where they are required to apply everything we have taught them in the course"* ***Lecturer 9***

> *"The assignment is primarily intended to address the following learning outcomes;1. Recognize the role of media in health promotion and education, 2. Apply the principles of audio-visual media production to creating health promotion materials".* ***Curriculum 9***

Students in one other program are given assignment which require them to develop a plan for a community health promotion activity which draws on the various concepts that are taught earlier on in the course.

> *"Assessment is mainly in two parts, there is continuous assessment which consist of take home exercises. For this, students are given group projects that require them to develop a plan for a community health promotion activity and they submit this plan as part of continuous assessment" And then they have the main exam, which also consists of short answer questions and long answer questions. Where short answer questions focus on mainly recall and [the] long answer questions, focus on problem solving.* ***Lecturer 10***

With regards to MPH programs facilitating/assisting students to "do" (i.e. perform in the real-life environment in the area of health promotion and education), the analysis showed that only two out of the four programs that offer the health promotion and education course require students to undertake mandatory field activities where they could apply what they learn in the course to real life health promotion and education work (i.e. work outside the teaching and learning environment). In these two programs, the mandatory field activity is part of the general community engagement component/requirement of the course.

> *"A core component of the course where they put in all they have learnt where they have the opportunity of planning a health promotion and education programme, implementing needs, sourcing for funds is the field activity component. once they come in, they are assigned to communities, when they get into those community, they do community diagnosis to identify what the issues are, then together with the community members, they prioritize the needs, and then after the prioritization of the needs, they come together, to see how do we solve this problem or how is this need going to be met, they look at resources within the community, they look resources outside the community that they have to source for and together with the community, they source for resources, leverage on the ones in the community and then implement that programme and then evaluate the impact"* ***Lecturer 9***

"In our program, practical exposure is part of the teaching. Throughout the program, the students are assigned to a community where you know they spend a certain amount of time every week throughout the program…So yeah they go through steps and off course the health promotion steps come at a particular time in the process… The whole program requires practice yeah so when they are doing planning, they have to carry out things like appraisal and so on and later on during implementation of programs they have designs, they apply these directly in the community" ***Lecturer 10***

In the two programs where fieldwork/activities are not mandatory (specifically for the health promotion and education course), the MPH program, in general, has internship/practicum components where students can take advantage to gain real-life experience, including in the area of health promotion and education.

4.4.10.3.5 Depth of coverage: Environmental health science

All five MPH programs included in this study offer the Environmental Health Science course/domain. As shown in Figure 37, the assessment shows that in all five programs, key topics included/taught as part of the domain/course assist students to acquire the foundational knowledge needed to perform a range of future environmental health related tasks. All five programs therefore assist students to **'know**" and meet the requirement of level 1 of the Miller's triangle. For example, in all five programs, students are exposed to the basic principles and concepts of environmental health, and additionally, in two programs, students are also introduced to the concept of environmental ethics and environmental justice.

"We start those lectures by introducing them to the principles and concepts of environmental health, we also cover what we call environmental ethics and code of conducts as well as environmental economics and management" ***Lecturer 11***

"The course includes topics on basic principles of environmental health, identifying the environmental hazards to which humans are exposed, modes of transmission of the hazards to men and the corresponding measures for protection against or prevention of transmission" ***Curriculum 11***

"We also teach them things around ethics and human rights and approaches to protecting vulnerable groups…." ***Lecturer 12***

All five programs also introduce students to common environmental exposures with a special focus on those found in LMICs, compared to those found in HICs. According to one key informant, focussing on environmental exposure in LMICs, forms part of efforts to make the course in their MPH program more relevant to the LMIC context.

"Yeah so the environmental exposures in low and middle income countries are what we teach because you know environmental health as a discipline has a very much of an American background…When the field started around the 60s, the focus was on the effects of things like nuclear power and pesticides. But now in low and middle-income countries, there are emerging issues like air pollution, water pollution, cholera. So we focus on these issues to make the course more relevant to the sub-Saharan Africa context". ***Lecturer 12***

"The course introduces students to common environmental exposures with a focus on pathways of exposure from the work area to non-working populations; measurements of exposure and, observation of effects" ***Curriculum 12***

"We introduce the students to sources of exposure to environmental health hazards as part of the course…especially the environmental exposure that you find in low- and middle-income countries" ***Lecturer 11***

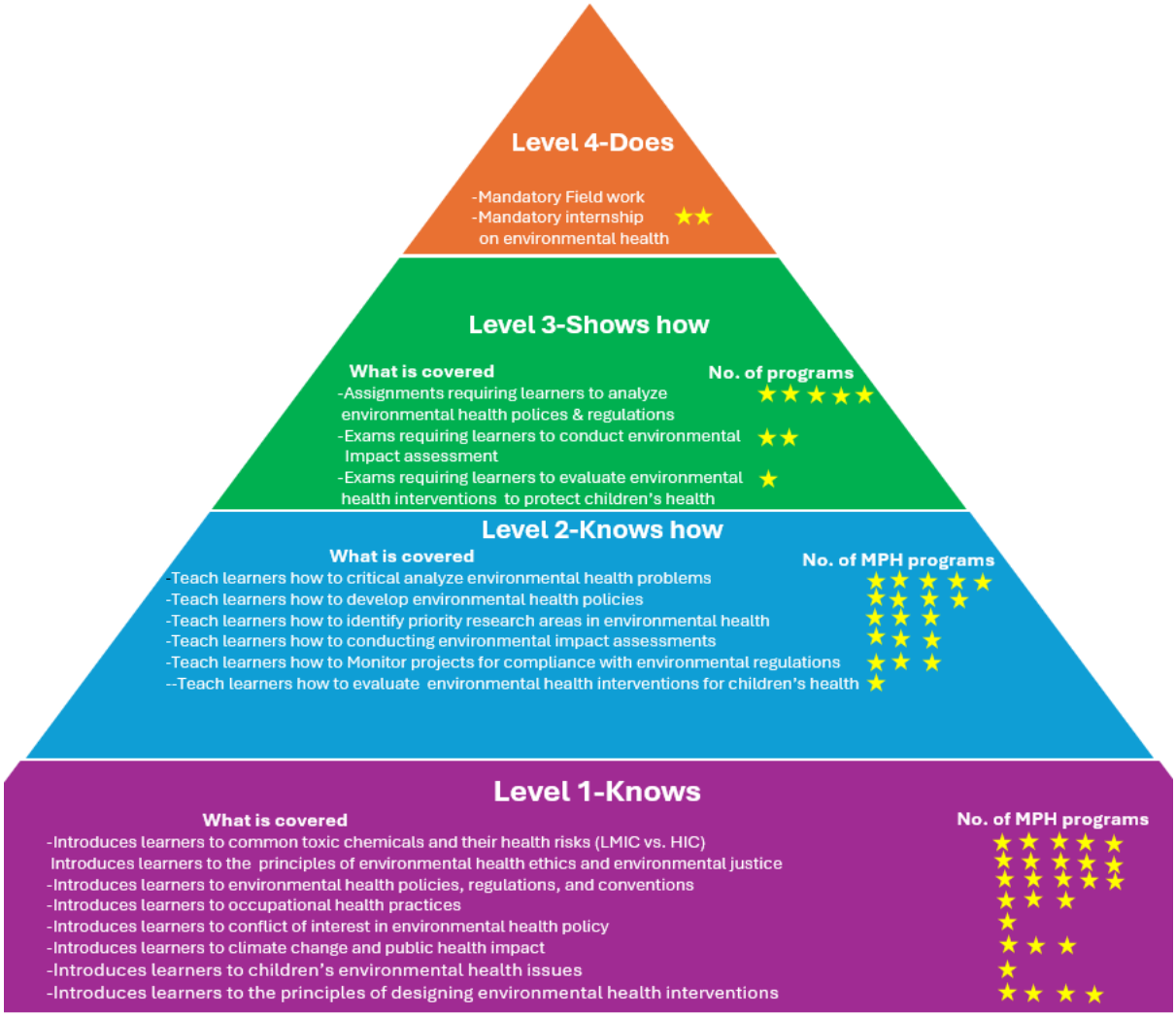

Figure 37: Assessment of the depth of coverage of the Environmental Health domain using the Miller's triangle

Furthermore, in all five programs, students are introduced to common policies, regulations and conventions that guide environmental health both at the local level – within African countries where the course is offered, and at a global level.

> *"...so we go through, and quite in detail, the environmental regulations, like the National Environmental Management Act in [mentions country], basically... A main focus of the of the course is going through the regulations and also more of the kind of principles behind some of the regulations as well".* ***Lecturer 12***

Environmental epidemiology, principles of environmental health impact assessment, instrumental analysis, laboratory methods and occupational health practices were further identified to be key area of focus in four MPH program while conflict of interest in environmental health policy and children's environmental health issues is a key area of focus in one MPH program. Climate change and its direct and indirect impacts on public health were further identified as key areas of focus within the environmental health science course or domain in three MPH programs.

> *As part of the second semester lectures, we introduce them [referring to students] to environmental epidemiology, environmental impact assessment, appropriate technology, environmental toxicology and instrumental analysis and laboratory methods.* ***Lecturer 11***

> *"By the end of the end of the session, students should be able to; understand the principles of environmental impact assessment"* ***Curriculum 13***

> *By the end of this course students should be able to recognize children's environmental health issues from a regulatory, preventative and community action perspective particularly in Africa and low- and middle-income countries (LMICs)-* ***Curriculum 14***

Exposure of students to common toxic chemicals that affect health of populations, with special emphasis on pesticides and their risk to health also emerged as a key area of focus of the environmental health science course in all five MPH programs. In four programs, students are introduced to the basic principles of designing environmental health programs

> *It also touches on the basic principles in designing of environmental health programs including water supply and disposal, vector/pest control, housing environment as well as food hygiene and hygiene education.* ***Curriculum 11***

Furthermore, the analysis showed that in all five programs, students are taught how to utilize the foundational information and/or knowledge acquired in the course to conduct future environmental health science related tasks. So, in all five programs students are assisted to **'know how'** and consequently meet the requirement of level 2 of the Miller's triangle. For instance, in all five programs, students taking the environmental health science course are

taught how to draw on the concepts and principles of environmental health covered earlier in the course in the analysis of environmental health policies and regulations. Students in four programs are also taught how to develop environmental health policies.

> ***"****Yes so we do teach them how to analyse the different policies that apply to the field you know. We go through the Environmental Management Act, the Water Act, the Pesticides Act which is also known as the Fertilizer Act with them in class. And we teach them how to analyse and critique those policies"* ***Lecturer 12***
>
> *"…. the course also focuses on assisting students to build the skills in critically analyzing environmental health policies"* ***Curriculum 13***
>
> *This course prepares the student to participate in the planning and administration of environmental health programs and to develop policies and regulations relevant to the protection and improvement of the physical environment****. Curriculum 11***

Additionally, in all five programs, students taking the environmental health science course are taught how to critically analyse the environmental health problems introduced to them earlier in the course. In three programs, students are further taught how to identify priorities areas in research that address some of these environmental health problems, such as in climate change.

> *That lecture forms part of the session on climate change. After introducing them to environmental the issue of climate change, we guide them on how to identify the priorities in policy and research for addressing this issue."* ***Lecturer 12***
>
> *At the end of the lecture, students should be able to critically analyse environmental health issues"* ***Curriculum 12***

In three programs, students are further taught how to conduct environmental impact assessment, including how to monitor programs and projects to ensure that they are implemented in line with environmental health laws, regulations and recommendations.

> *"…as I mentioned earlier, we introduce them to the concept of environmental impact assessment and then we use the next lecture guide them through the processes of actually conducting an environmental impact assessment. So yeah we do this to make sure that the develop the skills to do this on their own"* ***Lecturer 11***
>
> *At the end of the lecture, students should be able to; conduct an environmental impact assessment"* ***Curriculum 11***

In one MPH program, students taking the environmental health course/domain are taught how to critically evaluate health promotion interventions designed to address environmental health issues related to children.

So because we introduce the students to environmental health issues that affect children, we also teach them how to critically evaluate health promotion interventions designed to address some of these issues. ***Lecturer 12***

Aside from teaching students to apply foundational knowledge acquired in environmental health sciences to public health related tasks, lectures and assessments in all five programs were structured to simulate what they will be required to do in a real-life setting. So, all five programs assisted students to **"show how"** and therefore all meet the requirements for level 3 of the Miller's triangle. For example, in all five programs, assignments and end of course examination in the environmental health course have aspects that require students to undertake tasks like analysing environmental health issues, policies or regulations.

"So in terms of assessment, we give them a take home exam where they have to critique or analyse a local environmental health policy" ***Lecturer 11***

In two programs, students are given assignments which require them to conduct environmental impact assessment.

"The assignment aims to assess students' ability to conduct [an] environmental impact assessment and prepare a report based on their assessment". ***Curriculum 13***

In three programs with seminar components, students are also taught how to apply skills like academic poster development, slides (Power Point), and oral presentations to communicate their reports and findings

So we have the seminar component where we prepare them for presenting at conference and seminars so that eventually when they finish their projects and they go for conferences, you will know how to do this. ***Lecturer 11***

In one program, students are given a take home examination which require them to draw on topics related to children environmental health covered in the course to answer the examination questions.

"... so they get a take home exam and it's an essay question where they would have to tie in basically everything that they've studied under children environmental health to answer the question". ***Lecturer 12***

With regards to MPH programs facilitating/assisting students to "do" – perform in a real-life situation in the area of environmental health, the analysis showed that only two MPH programs makes it mandatory for students taking the environmental health course/domain to undertake compulsory field work or internship in the area of environmental health where they could apply

what they have learnt in the courses /domain to real life work. Consequently, only two programs assist students to **"do"** and meet the requirements for level 5 of the Miller's triangle.

> *Then there is the environmental practice component of the course in which case they [referring to students] visit laboratories, they visit industries, they visit other places of interest and they write reports and they also come back and do a presentation.* ***Lecturer 11***

In two programs where field or real-life practical exposure in environmental health is not mandatory, the overall MPH programs have practicum components. Here students can select to participate and have the opportunity to apply what they have learnt in the course to real life work in a community or organization or other service context.

> *I would say that we kind of overlap with the practicum. There is the practicum course that is offered in the program. And some of the topics do have a kind of environmental focus, depending on the convener as well. For example, like, the practicum, that one of the students did about last year, it was looking at mine dust exposure in [inaudible]. So, it very much depends on the topic of the practicum. But they will get attached to … an institution or NGO for the practicum. But, yeah, it obviously depends on the practicum. But there have been quite a few students from environmental health who do take the public health practicum.* ***Lecturer 12***

4.4.10.3.6 Depth of coverage: Social and behavioural science domain/course

The social and behavioural science course /domain is offered in three out of the five MPH programs included in the study (i.e. University of Cape Town, University of Ghana and Great Lake University of Kisumu). As shown in Figure 38, analyses of what is covered under this domain/course show that in the three programs, key topics included/taught as part of the domain/course expose students to in-depth information on social and behavioural science. The course contents therefore assist students to acquire the foundational knowledge needed to perform future social and behavioural science related tasks. For the three programs, students are exposed to a full range of issues to **'know"** and meet the requirement of level 1 of the Miller's triangle. For instance, in all three, students taking the social and behavioural science course are exposed to health behaviour theories and the social determinants of health.

> *"....so in the course we have a session around theory and conceptual frameworks where we cover the different social and behavioural science theories…".* ***Lecturer 13***

> *"At the end of the lesson, student should be familiar with the social and behavioural science theories that provide framework for understanding human behaviour"* ***Curriculum 14***

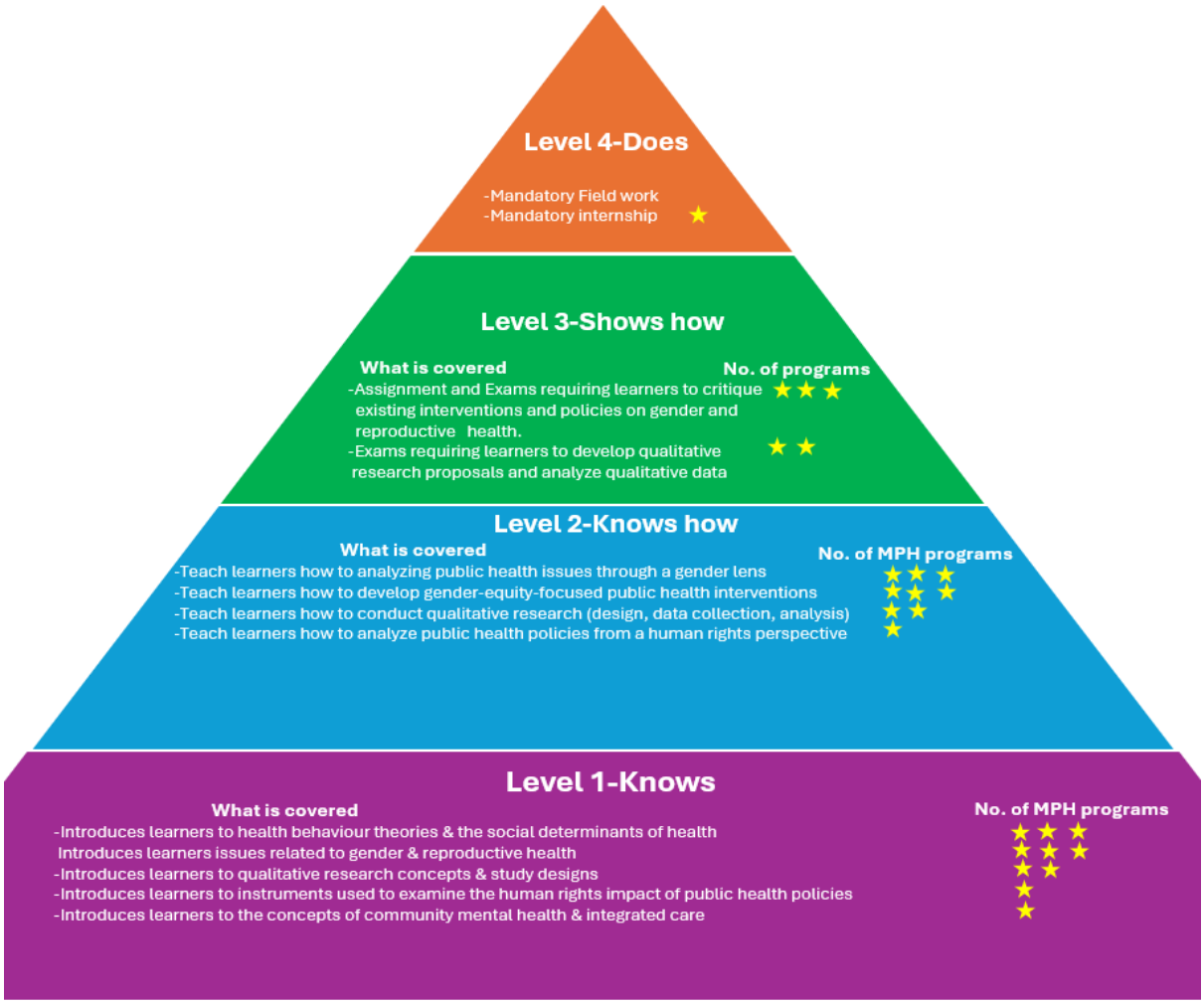

Figure 38: Assessment of the depth of coverage of the Social and Behavioural domain using the Miller's triangle

Additionally, in three MPH programs, students taking the social and behavioural science course are introduced to public health issues that relate to gender and reproductive health. They have a focus on the impact of gender, sex and sexuality on health, health care, and health systems.

> *"And so the way that we do it is that we cover a range of different kind of content related issues around sexual and reproductive health, that include[s]… sexual and reproductive health across the life course and sexual and reproductive health … related to sex and sex of the person or individual"* ***Lecturer 13***

> *"At the end of the session, students should be familiar with: 1. The impact of gender, sexuality and sex on health; 2. Strategies for providing comprehensive sexual and reproductive health education to individuals and communities, including education on sexual health, consent, and healthy relationships".* ***Curriculum 15***

Furthermore, students in two of the three MPH programs are introduced to the concepts and theories of qualitative research. This includes an introduction to qualitative study designs in

health systems research, data collection methods, principles of qualitative data analysis and interpretation

> *"...so the course is designed to give students who attend an introduction to qualitative research methods. And the idea is that they understand the value and contribution of qualitative research in comparison to other forms of research, and that they get the basic skills and theory associated with the key components of it"* ***Lecturer 13***

> *"The course introduces students to concepts and theories of qualitative research and the principles of qualitative data analysis and interpretation"* ***Lecturer 14***

In one MPH program, students taking the social and behavioural science course are further introduced to the concept of public health as it relates broadly to the society. This includes the origin of public health as a field, the tools and theories used to understand the causes and distribution of health and illnesses as well as the ways public health professionals intervene to improve population health. Additionally, students are exposed to human rights and its relevance to public health. This includes various instruments used to examine the human rights impact of public health policies, and how to incorporate human rights in public health planning and practice. Moreover, students in this program are further introduced to concepts in health promotion.

> *"And the idea of it is that the course provides an introduction in terms of an understanding of public health and how it fits more broadly within the ideas of health and medicine. So we spend quite a bit of time thinking about what public health is, its origin, how it's defined and how it compares to other aspects of health and thinking about health at a population level".* ***Lecturer 13***

> *"The module will take students through an introduction to human rights and its relevance to public health. The module will also introduce students to the instruments used to examine the human rights impact of public health policies, and to incorporate human rights in public health planning and practice.* ***Curriculum 16***

> *"And there's a component around health promotion. So here we don't have a standalone health promotion module. So that's an important component of what is covered by student in the social and behavioural science track"* ***Lecturer 13***

In another program, students taking the social and behavioural science course/domain are introduced to the concept of community mental health. To address the holistic needs of populations with mental health concerns, principles of integrated care and collaboration between mental health providers, primary care providers, social services, schools, and community organizations are emphasised.

The analysis further showed that in the three programs that offer the social and behavioural science course, students are taught how to utilize the foundational information and/or knowledge acquired in the course to conduct social and behavioural science related course work. In all three programs, students are assisted to **'know how'** and consequently meet the requirement of level 2 of the Miller's triangle for this domain. For example, in the three programs offering the social and behavioural science course, students are taught how to analyse public health issues through a gender lens and how to critique polices on gender and sexual and reproductive health.

> *"....and because we would have already introduced them to gender and reproductive health related issues in public health, we teach them how to analyse these issues through a gender lens and how to critique public health policies related to gender and reproductive health"* ***Lecturer 13***

> *".... the course focuses on assisting students to build the skills in critically analyzing gender and reproductive health related policies"* ***Curriculum 14***

Additionally, students taking the social and behaviour science course in the three MPH programs are taught how to draw on the learning around the impact of the impact of gender, sex and sexuality on health disparities, and the development of health interventions that promote gender equity and sexual and reproductive health within the broad arena of public health.

> *"The course also aims to equip learners with the skills to develop public health interventions that promote gender equity and sexual and reproductive health with special focus on vulnerable groups"* ***Curriculum 15***

> *"So through these sessions, we provide students how to promote equity goals pertaining to health, gender and sexuality in the domain of public health"* ***Lecturer 13***

Furthermore, students taking the social and behavioural science course in two programs are taught how to conduct qualitative research. This includes how to use social and behavioural theories learnt in the course to inform the formulation of appropriate research questions, how to collect qualitative data using methods such as in-depth interviews and focus group discussions (FGDs). Students in these two MPH programs are also taught how to interpret and critique published qualitative research and how to communicate research findings to both public experts in public health as well as lay audience.

> *Like I mentioned, we have a session around theory and conceptual frameworks where we cover the different social and behavioural science theories, so in the subsequent sessions, we*

teach them how they can use these theories to inform their research questions and study designs" ***Lecturer 13***

The course is to enable candidates to develop basic qualitative research designs. The course also focuses on equipping candidates with skills to interpret and evaluate qualitative research reports and articles in the public health literature. ***Curriculum 14***

In one program, MPH students taking the social and behavioural science course are taught how to analyse public health policies from a human right perspective.

"As part of the course, students will be given opportunities to develop critical skills to analyse public health policies from a human rights perspective, and understand how trade-offs should be made between public health and individual entitlements within a human rights framework" ***Curriculum 16***

Aside from assisting students to apply foundational knowledge acquired in the social and behavioural science course to public health related tasks, lectures and assessments in all three programs were structured to simulate what they will be required to do in real-life settings. These three programs once again assist students to **"show how"** and meet the requirements for level 3 of the Miller's triangle in this domain. For example, assignments and end of course examinations in the social and behavioural science course in the three MPH programs have aspects that require students to undertake tasks like identifying public health issues, developing intervention using the social determinant of health as a guide and critiquing existing interventions and policies on gender and reproductive health.

"For their first assignment, we ask them to critique a policy. So that's the policy one around gender. So, they use the gender lens to critique policy and think about how they would do things differently. We then also ask them to look at sexual and reproductive health problems, and they write a letter to the editor arguing for or against a stance on a specific problem. And that addresses both their kind of critical thinking and developing skills around writing and argumentation." ***Lecturer 13***

"The assignment aims to assess students' ability to identify gender and reproductive health related public health issues and ability to design interventions to address these issues". ***Curriculum 15***

In two MPH programs, students taking the social and behavioural science course are given assignments which require them to develop a qualitative research proposal. Additionally, students in these two programs are required to analyse qualitative datasets and critique published qualitative studies as part of their end of course examinations.

"So we make the course quite practical. We assess students based on their ability to apply their knowledge. And so in that sense, for their formative assignments, they are essentially

required to prepare a draft proposal for qualitative research, which means that they have to understand and apply learnings around all of the key methodological components previously covered in the course…and then the other part, the exams, we test their ability to critically read qualitative research, so we ask them to critique a published qualitative research" ***Lecturer 13***

With regards to MPH programs facilitating/assisting students to "do" – perform in the real-life environment in the area of social and behavioural science, the analysis showed that only one out of the three programs requires students to undertake mandatory field activities where they could apply what they learn in the course to real life social and behavioural science related work. In this program, students are mandatorily required to undertake a 3-month field residency visit to public and private sector institutions, research organizations and NGOs where they work as part of the health team and undertake social and behavioural science and other public health related task.

"The course comprises a 3-month field residency during the second semester. During the field visits, students work as part of the health team to acquire competencies needed for managing systems and programs. The competencies include community assessment and design of health survey; investigation and control of disease outbreaks; community mobilisation for health action education, and effective communication" ***Curriculum 15***

In one program where field or practical exposure in the area of social and behavioural science was not mandatory, the overall MPH program had a practicum/field internship component where students who elect to take part have the opportunity to apply course learning to real life work in a community or organization or other service context

4.11 Discussion

This study explored the applicability of competencies identified in the previous chapter to graduates work, the contribution of MPH program to graduates' acquisition of these competencies and their confidence in utilizing them. It also explored the depth of coverage of the identified competencies in MPH programs in Africa. Given that graduates' competencies are influenced by their work context, prior education, and career trajectories, the study also explored the demographic characteristics, educational background, and career paths of MPH graduates.

4.11.1 Demographics and career paths of MPH graduates

The study found that despite MPH graduates coming from diverse professional background, the majority were clinicians who worked as doctors, nurses, pharmacists, physiotherapists, occupational therapists and dentists.

This finding is consistent with other studies conducted in LMICs (6, 127), and highlights the growing recognition among clinicians of the value of an MPH in enhancing their skills and ability to respond to public health challenges. The study also found that most graduates pursued the MPH under the epidemiology and biostatistics track. Sullivan (2014) argues that the epidemiology and biostatistics tracks usually attract high numbers of students in MPH programs because it is often considered to be fundamental to understanding disease patterns, and other domains like outbreaks and public health research. These domains according to Sullivan are of interest to most professionals who pursue the MPH degree (129). The results also show that most MPH graduates had over 5 years of work experience prior to starting the MPH with median years of work experience prior to MPH being 7 years. This work experience correlated with graduate's age at the start of MPH where older graduates had more work experience than younger graduates. Similar findings have been reported elsewhere (25, 130, 131).

Fewer graduates (6%) reported being unemployed after completing the MPH degree compared to the proportions before the MPH (11%). The MPH is well known to provide graduates with specialized skills and knowledge that makes them more competitive on the job market (85, 130). This could therefore explain the difference in unemployment numbers before and after the MPH degree as found in this study. Contrary to the reported brain-drain of higher educated professionals, most MPH graduates lived and worked in public health related positions for organizations and institutions operating within Africa after completing their MPH. Only 3% lived and worked for organizations operating outside Africa. While job availability and other personal factors could have influenced graduates' decision to stay and work in Africa after completing their degree, it could also indicate a high commitment by graduates to contribute the skills and knowledge acquired from the MPH towards strengthening the health system in Africa.

The study further highlights a shift in graduates' roles from clinical care in hospitals and clinics to management and research roles within provincial and district health departments, non-governmental organizations, and research institutions. This finding is similar to that of a study by Zwanikken et al., 2014 which found that most MPH graduates from six MPH programs worked less in clinics after completing their degree and moved to international NGOs and research institutions (85). The shift in work or roles from clinical to more managerial and research after completing the MPH has been linked to graduates' motivation for completing

the MPH (130, 131). Studies have shown that most clinicians perceive the MPH as a stepping stone to change from clinical to research and management work or roles (25, 85, 130). For example, a study by Zwanikken et al., 2014, which explored the motivation and intentions of physicians undertaking MPH training at a university in South Africa, found that majority of physicians used the MPH training to advance careers in management, health policy development and research.

4.11.2 Graduates' confidence, work applicability, and MPH programs' contribution to the acquisition of core competencies.

Most MPH graduates were confident in their ability to utilize the public health science competencies to address public health issues. Notably, 91% of graduates expressed high confidence in their ability to apply epidemiology and biostatistics competencies to public health issues. Epidemiology and biostatistics are often central in most MPH programs, receiving substantial focus in curricula compared to other domains or courses (129). The epidemiology and biostatistics domains or tracks also attract most students in MPH programs (129). The high confidence in epidemiology and biostatistics competencies reported by MPH graduates could be a consequence of the substantial focus on these areas in most MPH programs and the large number of graduates who specialized in this track during their MPH. Most graduates also reported being highly confident in research. Research is known to be a major focus of MPH programs with most programs requiring students to undertake research projects/dissertations as part of the requirement to qualify for their MPH degree. This could explain the findings made in this study.

Despite graduates reporting high confidence in the public health science and research competencies, these were not the most applicable to their work. Competencies in domains like leadership, communication, monitoring and evaluation, health promotion and community and intersectoral collaboration were the most applicable to graduates' work. Competencies in leadership, communications, health promotion and monitoring and evaluation have been reported in several studies to be important to the work undertaken by public health professionals, including MPH graduates (1, 85, 132, 133). Most respondents reported taking on program/project management, health promotion and health policy development roles after their MPH. These roles are known to rely on the ability to lead teams, evaluate public health interventions/projects and communicate effectively with diverse stakeholders which might explain why most graduate felt competencies in domains like leadership, communication and health promotion were the most applicable to their works.

The study further found that while most graduates reported having low confidence in possessing outbreak management competencies, they acknowledged that it was one of the most applicable to their work. Our study was conducted during the COVID-19 pandemic when high expectations were placed on graduates to respond to the pandemic at their workplaces. It is possible that, while graduates had some skills in managing outbreaks, the high expectations to respond to the COVID-19 pandemic in their workplaces led to feelings of inadequacy or lack of preparedness, explaining the low confidence reported. Compared to the public health sciences and research competencies, graduates reported that the MPH contributed minimally to their acquisition of leadership, communication, monitoring and evaluation, community and intersectoral, and outbreak management competencies despite these being the most applicable to their work.

As was found in this study, a mismatch between competencies emphasized in public health training programs and those needed to perform in the workplace or in real world settings have been reported in other studies (134, 135). For instance, a study by Bashkin et al., (2022) which analyzed the gaps between public health training and practice found that while competencies in domains like communication, leadership, advocacy and community mobilization are key to the work of the public health workforce, they received limited focus in public health training programs (135). Significant differences were also found in graduates' assessment of their programs' contributions to the acquisition of health promotion competency. The MPH program at the University of Cape Town contributed the least to graduates' acquisition of this competency. This finding is likely due to the absence of a health promotion track in the MPH program at the University of Cape Town, which led these graduates to feel that the MPH did not contribute much to their acquisition of this competence.

4.11.3 Depth of coverage of identified core competencies in selected MPH programs

Using Miller's triangle, an assessment of the extent to which six core competency domains, identified in the previous chapter of this thesis were covered in five MPH program in Africa was conducted. Miller's triangle provides a framework for assessing the depth of coverage of competencies/domains in educational curricula (136, 137). Four ascending levels are used to assess the progressive application of basic knowledge to real-life performance: 'knows,' 'knows how,' 'shows how,' and 'does'. The analysis involved reviewing curricula documents as well as lecturers' interviews. The use of Miller's triangle to assess the depth of coverage in educational programs is widely reported (137, 138). For example, Negandhi et al. (2015) used a modified version of the triangle to assess the depth of coverage of the monitoring and

evaluation (M&E) domain in MPH programs (139). The finding of our assessment shows that in all five programs, key concepts and theories are taught during the teaching of competency domains/tracks which enable students to acquire the foundational knowledge needed to perform domain-related tasks. For example, in the health systems, policy and management domain/track, students in all five MPH programs are introduced to frameworks for understanding and conceptualizing health systems such as the WHO's health systems building blocks and fundamental concepts and issues in health policy development. In the health promotion and education domain, students in the four programs that offer the domain/track are introduced to the concept of community-directed interventions and behavioural change theories. This finding from our study is similar to that of other studies which found that curricula in most health education programs like medicine and nursing, are structured in such a way that they equip learners with the foundational knowledge needed to perform future health related tasks (139, 140). Despite all five programs equipping graduates with foundational knowledge needed to perform future task, our study found that within specific domains like Environmental health science, some programs focussed more on exposing learners to certain key concepts compared to others. For example, only two out of the five programs introduced students to the concept of environmental health ethics and justice. In the social and behavioural science domain, students in only one program were introduced to the concept of community mental health. Differences in program focus and the concepts students are exposed to may reflect efforts to align content with the program's country context. This factor is probable as MPH programs in countries with history of social injustice like South Africa, focused more on exposing students to concepts related to human rights and social justice. In such contexts, social inequity remains an important determinant of health (141, 142). Across all the five programs, the study found that although some concepts which were covered under the different domains were similar to those covered in MPH programs globally, these concepts were adapted to the health systems context of Africa. For example, learners in the health systems, policy and management domain are exposed to the health system structures of African countries. Likewise, those in the environmental health science domain are introduced to environmental exposures that are common in African countries. These finding highlights efforts made by African MPH programs to adapt their programs to the health systems needs of the continent. This study also found that lectures and student assessments in all five MPH programs equip learners with foundational knowledge and assisted them to perform in simulated classroom environments. However, significant gaps were found in MPH programs offering students the opportunity or platform to apply what they learn in different domains/courses to real-life work

environments. Very few programs incorporate compulsory field-based experiences or internship in the programs where students are required as part of their training to perform domain related task in the real-life environment. While some programs offer optional practicums or internships that allow students to gain real-world experience voluntarily, the fact that these are not compulsory means students can complete their degree without this crucial experience. Similar to findings of this study, several studies have also reported the absence of compulsory, well-structured internships programs in educational curriculums to be a key contributor to gaps in graduates' practical skills development (139, 143-146). For example, a study by Gerding et al., (2020) found that having well-structured compulsory internship programs in public health educational curricula contributed to producing graduates with well-rounded professional and practice-based experience They concluded that compulsory internship programs not only contribute to graduates' practical skills development but also enhance their employability within health organizations and departments, ultimately helping them strengthen health systems (144).

4.12 Limitations

While this study provides valuable insights into the work applicability, programs' contribution, graduates' confidence and depth of coverage of core competencies in MPH programs in Africa, it has some limitations. The study included MPH graduates from five purposively sampled MPH programs in Africa instead of MPH graduates from all programs in Africa, which while desirable was impossible considering the logistical and timeline restrictions of doctoral research. Although an effort was made to mitigate this limitation by including MPH programs and participants from at least three of Africa's five sub-regions (i.e., West, East, North, Central, and Southern Africa), the study's findings may not be representative of all MPH programs in Africa. Notably, a high proportion of respondents indicated they were still working in Africa. While the study achieved a good response rate, it is possible that non-respondents were graduates who relocated abroad potentially introducing selection bias toward individuals who are more engaged with or committed to public health in Africa.

The assessment of MPH graduates' confidence, work applicability and programs contribution to competencies acquisition relied on self-reported information which may have been subjected to information bias. It is possible that graduates either overestimated or underestimated their confidence in the core public health competencies, programs' contribution to their acquisition of the core competencies, and competencies applicability to their work. Given the dynamic nature of MPH programs across institutions in Africa, with periodic

curriculum revisions and updates, a key limitation of this study is its cross-sectional design, which captures only a snapshot of graduates' experiences with MPH programs at a specific point in time. This is because it does not account for changes in these programs over time. While this study design was appropriate and feasible within the logistical and timeline constraints of doctoral research, future studies could employ the use of longitudinal study designs to track changes in programs' contribution to competencies acquisition over time. The assessment of the depth of coverage of core competency domains in the selected MPH programs also relied on review of MPH curriculum documents (for domains and programs where repeated attempts to obtain interviews with course convenors or lecturers were unsuccessful). This may have limited information needed to make accurate judgement on the depth of coverage of core competency domains in those programs. However, in domains or programs where data from interviews with convenors/lecturers were triangulated with data from review of curricula documents, we found no significant difference between what was reported to be covered in the curricula documents and that shared by the lecturers. This suggests that the use of curricula documents alone to make judgement on the depth of coverage of core competency domains in some programs may not have significantly affected the study findings.

4.13 Conclusion

This study provides insights into the applicability of core public health competencies to graduates' work and how MPH programs contribute to their acquisition of these competencies. The study also provides some insight into the depth to which core competency domains are covered in the teaching and learning environment in MPH programs in Africa. The findings of the study show that most MPH graduates sought broader public health roles beyond clinical care of patients after completing the MPH. One possible explanation for this shift is that a large proportion of respondents were clinicians prior to their MPH training and used the degree to transition into more diverse public health roles. Nonetheless, this underscores the crucial role the MPH degree can play in strengthening broader health systems. This study also found an improvement in employability among graduates' (post-MPH) and a high retention of graduates who largely worked within Africa. This further highlights the key contribution of the degree in both personal development and health systems strengthening. The study shows that despite MPH programs in Africa equipping graduates with skills in domains such as epidemiology, biostatistics and research, domains that are crucial for on-the-ground public health work are either missing or underemphasized in African MPH curricula. These include leadership, communication, health promotion, monitoring and evaluation and outbreak management. This

highlights the need for curriculum reform among MPH programs in Africa to ensure that crucial and practical competencies are either included or emphasized in MPH programs to help prepare graduates to effectively tackle the health systems challenges of the continent. The findings of this study further show that while most MPH programs in Africa enabled students to acquire foundational knowledge needed for public health related tasks, there is a notable gap in programs providing students with opportunities to apply this knowledge in real-life settings. There are few compulsory internships and field-based experiences in most MPH programs in Africa. Addressing this gap is crucial to enhancing the practical preparedness of MPH graduates towards addressing the health systems challenges in Africa.

CHAPTER 5

Perspective of Employers of MPH graduates on core competencies needed for Public Health work in Africa

5.1 Background

It is recognized globally that there are differences between health system challenges faced by LMICs and developed countries (147, 148). Consequently, the competencies needed by the PH workforce to facilitate tackling these challenges may also be different (149, 150). Specifically, for Africa, many of these challenges related to health disparities, resource limitations and weak state are unique (151, 152). This means that though studies have been conducted in developed countries like the USA and UK to identify core competencies needed for PH work in those countries, these competencies may not necessarily be applicable to the unique health systems challenges in Africa (86). Available evidence also suggests that the training of the PH workforce, including MPH graduates, in Africa has not kept pace with the skill needs required to address the multiple disease burdens, including HIV/AIDS and TB, in the region (153). Studies have attributed this shortfall in training to the absence of a standardized guidelines which outline what core competencies MPH graduate should have when they qualify with an MPH degree (154, 155). This means that a graduate receiving an MPH from one institution in Africa may have a very different set of competencies to another graduate from another institution (12). This lack of harmonization in training according to London and Mall, 2012 has affected graduates' contribution to health system's strengthening (154). Over the last five years, the topic of harmonizing and benchmarking MPH programs in Africa broadly has been discussed and multiple stakeholders, including employers of MPH graduates, concur are relevant to health systems strengthening (153-156). However, studies have shown that identifying the core competencies needed by MPH graduates for their public health work—particularly to address Africa's unique health system challenges—is key to the process of harmonizing and benchmarking MPH programs (156-158). As part of efforts by the ASPHA to harmonize core competencies across MPH programs, a preliminary set of competencies have been identified for MPH programs in Africa through a structured literature review and reported in Chapter three of this thesis.

To inform MPH programs about which of these identified competencies are indeed relevant to the African context, a study which explores the perspective of employers of MPH graduates on competencies that are needed by graduates for public health work in Africa has become necessary. This is because such a study will allow MPH programs to measure the competencies

identified from the literature review against the actual competency needs of MPH graduates. Additionally, it will inform MPH programs about additional competencies—beyond those identified in the literature review—that are crucial for MPH graduates' PH roles across various work settings in the region, guiding targeted emphasis in MPH curricula.

5.2 Aim of Study

This study aimed to explore the perspectives of employers of MPH graduates across different work settings regarding the core competencies needed by graduates for PH work in the region.

5.3 Objectives

1. To explore the roles of MPH graduates in key sectors of health in Africa.
2. To explore the perspectives of employers of MPH graduates on the core competencies needed by graduates for public health work in the region.

5.4 Methodology

An exploratory qualitative study design was used to explore the views of employers of MPH graduates on the core competencies needed by graduates for public health work in Africa.

5.4.1 Study population

Participants from six sectors of health in Africa that employ MPH graduates were included in this study. The six sectors were: research organizations and networks; government/state institutions; non-governmental organizations focused on service delivery; social movements organizations; public health training institutions; and private for-profit organizations involved in health. Participants were selected from multiple sectors to provide a diverse range of perspectives and experiences, ensuring information-rich responses on the core competencies needed by MPH graduates for public health work in Africa.

5.4.2 Sampling and recruitment of study participants

A purposive sampling technique was used to select thirty (30) key informants across the full range of country settings and health sectors. Informants were identified through help from senior members of the research team. The thesis supervisors, for example, assisted in identifying information-rich potential informants working in national and provincial departments of health, as well as in research institutions. In instances where identified key informants did not respond to the invitation after repeated email reminders, attempts were made to contact them via other means such as phone calls where possible. If all attempts to contact an identified key informant was unsuccessful, another, replacement key informant in the same sector was identified and invited to participate in the study.

5.4.3 Data collection

Key informants from the six sectors who consented to participate in the study were interviewed by the doctoral student using semi-structured questionnaires (Appendix 8). The interviews were conducted remotely via Zoom and Microsoft Teams, in English, and lasted approximately 30 minutes. All interviews were audio-recorded and transcribed by the doctoral student using Otter.ai voice transcription software

5.4.4 Data analysis

The interview transcripts were checked for errors by listening to the audio recording several times and comparing it with what was transcribed by the data transcription software. Any errors identified were corrected. Using a deductive data analysis method, the doctoral student reviewed the transcribed data and categorized them under two broad themes. To assure rigour, the themes identified from five randomly selected transcripts were cross-checked by a senior member of the research team (PhD supervisor) and disagreements on emerging themes were resolved through discussion. Quotations that best illustrate themes were then selected for inclusion in the final presentation of the results.

5.5 Ethical approval

Ethical approval with reference number 332/2020 was obtained from the University of Cape Town Health Sciences Research Committee.

5.6 Informed consent

Key informants were asked to complete an electronic consent form (Appendix 9) once they accepted the invitation to participate in the study. On the day of the interviews, a verbal confirmation of consent was also obtained from informants. Participants were also made aware of their alternatives to participation, which included their right to refuse or withdraw from the study at any point without penalty.

5.7 Privacy and confidentiality

Anonymity, privacy, and confidentiality of the information collected was emphasized and upheld throughout the interviews. The data collected were securely stored on two password-protected computers. Except where consent to identify informants or their institutions had been granted by the participant, no names or identifying characteristics are used. Interview recordings will be destroyed 2 years after the close of the study.

5.8 Quality Assurance

The doctoral student attended an international course on qualitative research methods and was trained on how to conduct qualitative interviews and data analysis. Under supervision, the interview guide was developed and piloted using the aims and objectives of the study as a guide.

5.9 Results

5.9.1 Demographics

Out of the 30 key informants who were invited to participate in the study, 22 responded and consented to be interviewed, yielding a response rate of 73%. As shown in Figure 39, respondents worked in organizations or institutions operating in countries across four of the five sub-regions of Africa (i.e., West, South, East, and Central Africa). None of the stakeholders invited from organizations and institutions operating in North African countries responded to the invitation. The median age of respondents was 63 (IQR: 59.5-68 years). A majority of respondents were males (54.5%) and 45.5% were females. The median age of males was 55.5 (IQR: 53-59 years) and that of females was 65.5 (IQR: 62-69.5 years) and this difference was statistically significant (p=0.03). Five (23%) of the respondents worked in research organizations/networks, four (18%) worked in government or state institutions, four (18%) worked in non-governmental organizations focussed on PH work, four (18%) worked in PH training institutions, three (14%) worked in social movement organizations and two (9%) worked in private for-profit organizations involved in PH (Figure 40). The mean number of years that participants reported having worked with MPH graduates was 11.5 years.

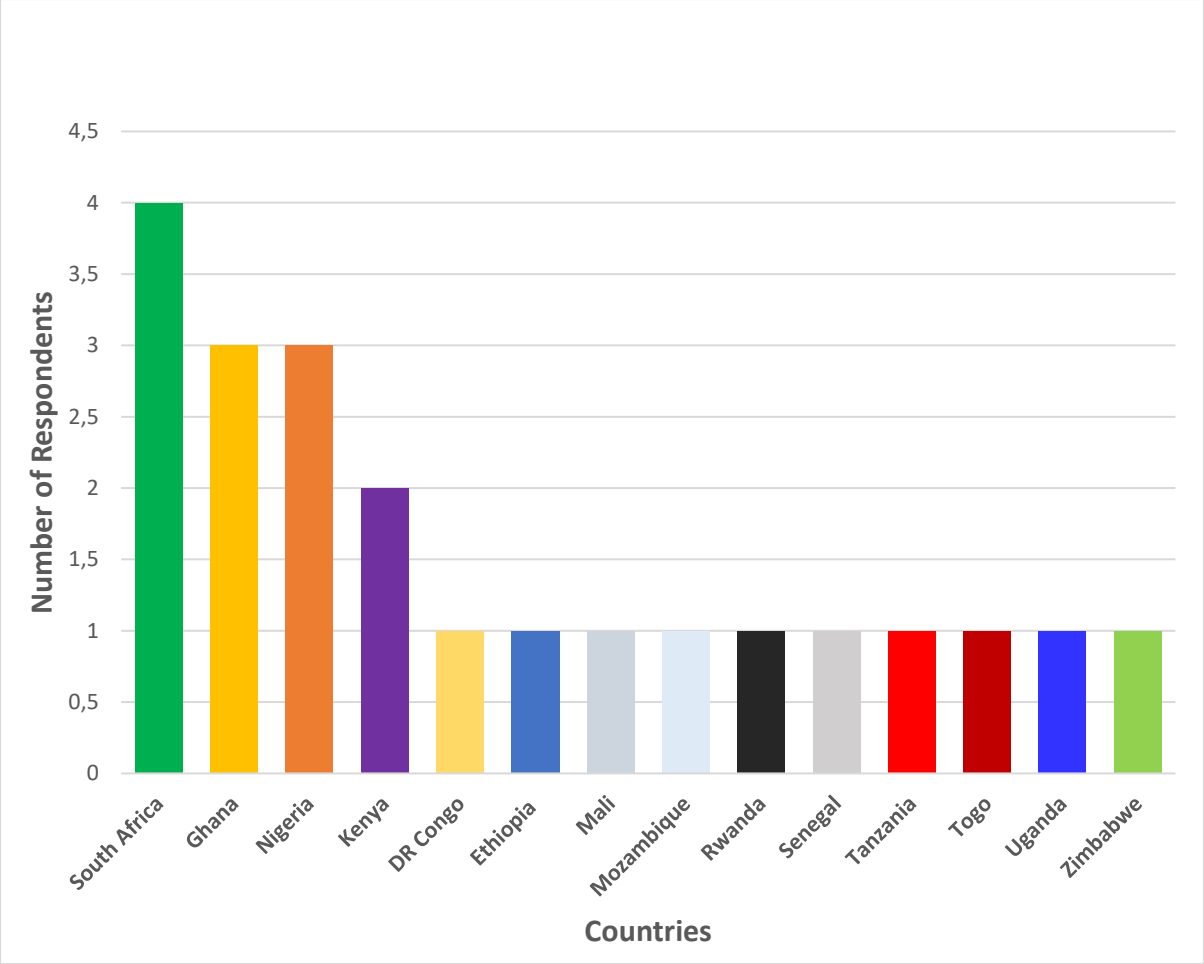

Figure 39:Countries where respondents' organization/institutions operated (n=22)

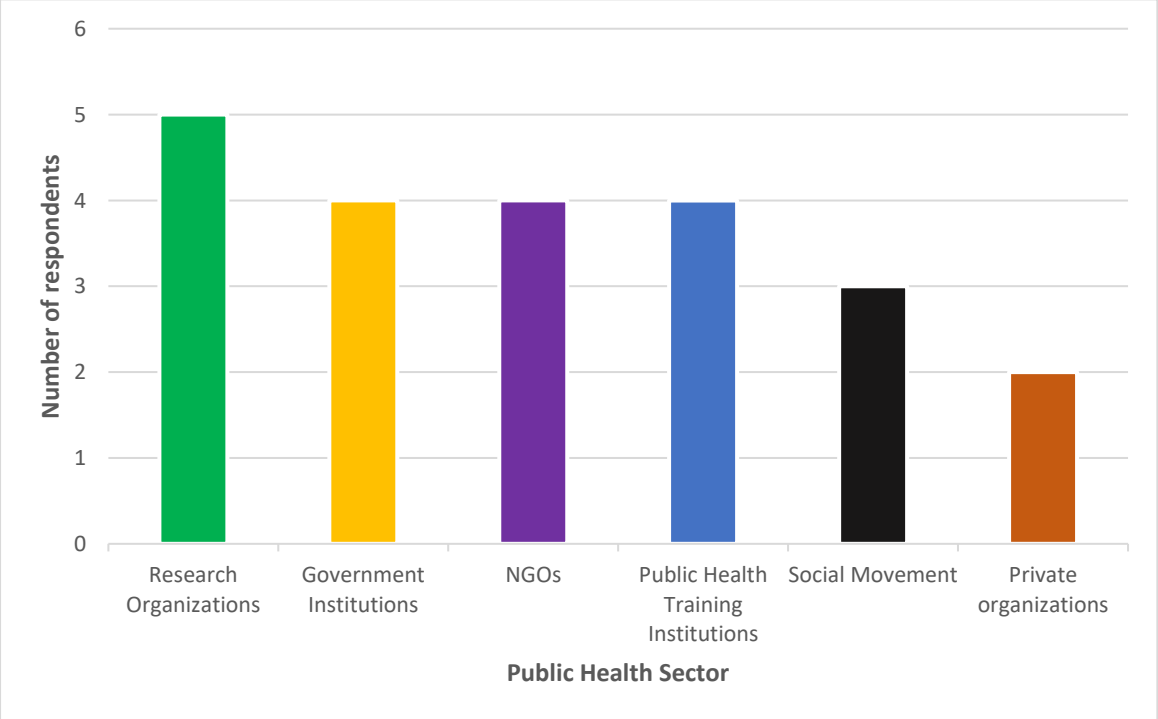

Figure 40: Organization/Institutions where stakeholders work (n=22)

5.9.2 Role of MPH graduates in key sectors of health in Africa

Key informants interviewed provided insight into the positions held by MPH graduates in their organizations or institutions, the roles performed by graduates in these positions, and the core competencies needed by graduates for public health work in their organization or sector. Figure 41 summarizes the roles of MPH graduates in the six key sectors highlighted by informants.

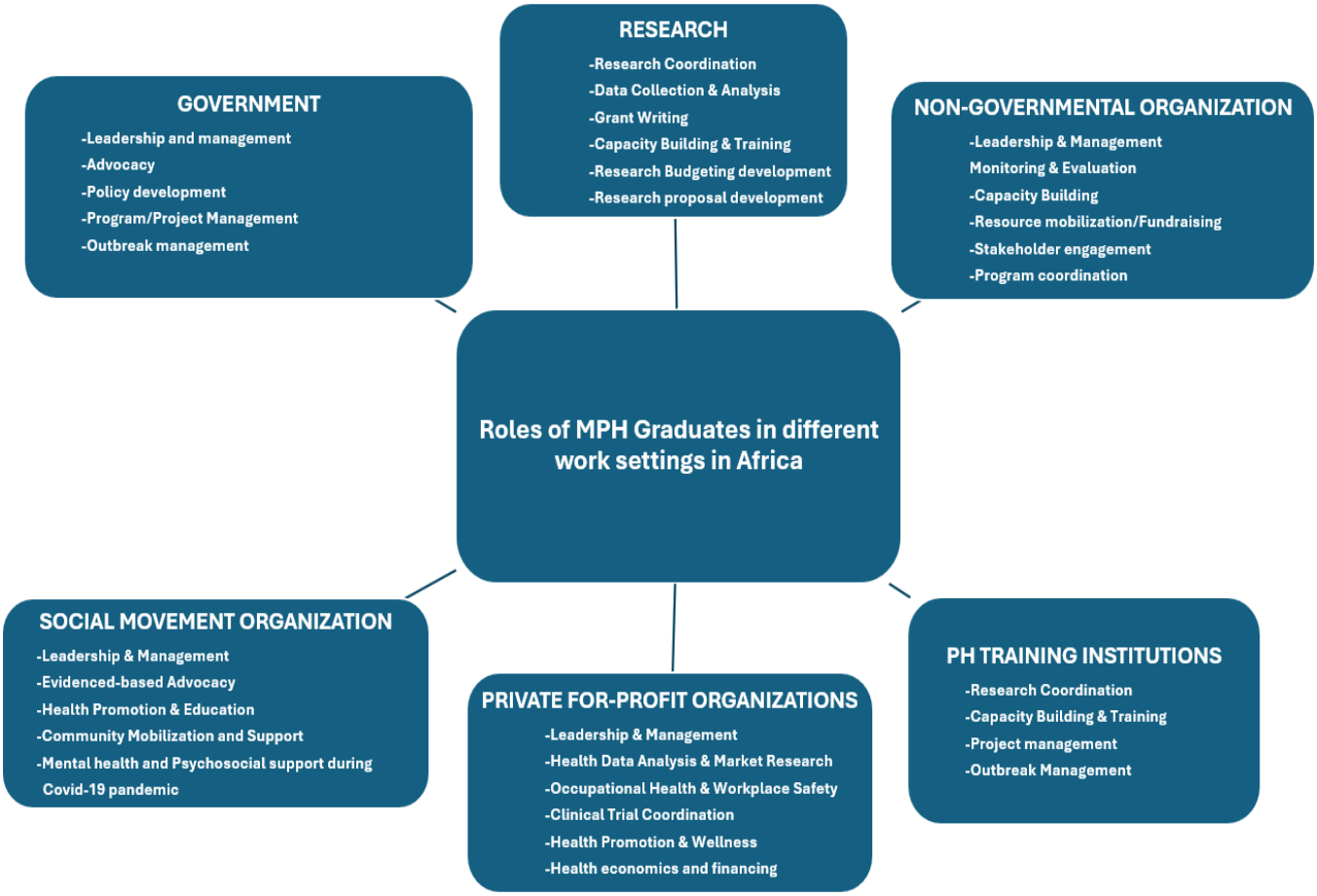

Figure 41:Roles of MPH graduates in six key health sectors in Africa

5.9.2.1 Research Sector

It emerged from the interviews that MPH graduates in the research sector hold different positions which include; serving as research/study coordinators, field epidemiologist, research data analyst and research project managers with a variety of cross-cutting roles. All key informants from this sector acknowledged that MPH graduates in their organizations/institutions contribute significantly to the analysis of both qualitative and quantitative research data.

> *"I've come across a lot of MPH people... they really are very impressive when it comes to analysis of research data"* ***Informant 2***

We 've three people working here who I know have MPH degrees because I was part of their interview…. They are very key to our work here you know,…they assist us with analysis of our research data. ***Informant 4***

The majority of key informants indicated that MPH graduates in their organizations assist in the development of research proposals and in the planning of data collections. One key informant acknowledged that even though MPH graduates in her organization do not usually perform the role of collecting data directly from the field, they play a key role in the training of fieldworkers who are involved in the data collection.

"…. The person who is in charge of training and supervising the data collectors here is an MPH graduate. So even if he doesn't collect data directly from the field, he contributes a lot to the data collection" ***Informant 3***

Some key informants also reflected on the roles of MPH graduates during the COVID-19 pandemic. These included conducting studies that informed the response to the pandemic and developing educational materials for health care professionals and the public using research findings on COVID-19 from across the globe.

"Since the start of the pandemic, the focus of our research has shifted. One of the MPH graduates here just completed a study on the impact of the pandemic on the mental health of primary healthcare providers and another is currently assessing the resilience of the health systems to handle the COVID-19 pandemic" ***Informant 5***

Other roles of MPH graduates in the research sector that emerged from the interviews included assisting in research grant applications and facilitating collaboration between research teams and institutions. One key informant reported that two MPH graduates had worked with in the past were involved in preparing policy briefs using findings from the research conducted in the institution but their performance in this area was not so impressive. Interestingly, another informant mentioned that most of the MPH graduates he works with struggled with preparation of research budgets, but this was something they learnt to do after some training and guidance.

"I don't think these graduates are taught how to prepare research budget in school because all those I work with here struggled with this when they joined the organization at first" ***Informant 1***

5.9.2.2 Government health sector

Key informants from the government sector worked at various levels, including national, district, and hospital management. All key informants in this sector agreed that MPH graduates contribute significantly to the work undertaken in the sector to improve health. Informants reported on the range of positions held by graduates in the sector and the roles/functions they

perform in these positions. These include serving as Hospital Administrators, Program/Project Managers, Health Data Managers, Health Researchers, Occupational Health and Safety Officers, Primary Health Care (PHC) Directors, Health Promotion Officers, Environmental Health Officers, Health Economics, Health Policy Analyst, Maternal and Child Health Officers and Biostatisticians in hospitals. One key informant working in the national ministry of health explained that the qualification, work experience and skills were the key consideration in assigning graduates to either technical or managerial roles.

> *"We work with about 7 MPH graduates here and they hold technical and managerial positions depending on their qualifications, experience, and skills.* ***Informant 7***

Another informant working in a Provincial Department of Health remarked that MPH graduates play significant roles in the hospital system.

> *"They (referring to MPH graduates) have a very big role in analyzing and addressing problems within the hospital system."* ***Informant 8***

All informants acknowledged that MPH graduates they work with take on multiple roles that cut across different aspects of health irrespective of what their main role in the workplace is. One key informant working in a federal ministry of health remarked;

> *"The hospital administrator here holds a Master of Public Health degree, and his work requires him to perform a number of duties. Honestly, I think he is doing a good job... he demonstrates leadership, tries his best to make sure that our resources are appropriately allocated and recently introduced a monthly meeting where we discuss current research evidence that is key to patient care"* ***Informant 6***

Another informant working in a local government health department mentioned that MPH graduates usually take on responsibilities related to program management at the district level.

> *"I know about the MPH program even though I do not have an MPH myself because our child and maternal health program coordinator is an MPH graduate. Her work involves implementing our program activities which include monitoring and evaluating the impact of the different interventions"* ***Informant 9***

Interestingly, one informant felt that though MPH graduates can understand and interpret research findings, they struggle when it comes to using this knowledge to design health interventions.

> *"They (referring to MPH graduates) can understand knowledge, interpret research findings, you know, they can often read a paper and tell you what was found, but when you ask them to design their own study to look at something, they are not always able to do that or able to apply this knowledge to programs and designing intervention."* ***Informant 8***

Another informant mentioned that though he has always perceived MPH graduates to be at the forefront of advocacy for policy changes, this is something graduates in his workplace have not performed to his expectation.

> *I was expecting the MPH graduates working here to be more involved in our advocacy campaign to get the district health department to make some changes to our child and maternal health program, but they don't seem to be interested in that.* ***Informant 7***

Informants discussed the roles of MPH graduates during the COVID-19 pandemic. One reported that MPH graduates were involved in designing and implementing COVID-19 vaccination campaigns in his hospital, which were very successful because the hospital then witnessed an increase in vaccination uptake. Another volunteered that MPH graduates drafted evidence-based recommendations on how to reduce COVID-19 infections among patients visiting health facilities which was then highlighted and reported to policy makers at the district department of health. These recommendations eventually helped in guiding the district's measures and interventions to deal with the pandemic.

> *"Once the COVID-19 vaccines became available, we initially saw a reluctance among our people to come for the vaccines. We however witnessed a very significant improvement in uptake once the vaccination campaigns were implemented. The lead in designing and implementing these campaigns was an MPH graduate".* ***Informant 6***

> *"I know the MPH graduate we work with here was contacted by the district department of health to assist in the development of policies related to social distancing and other measure that were implemented in the district to help deal with the pandemic"* ***Informant 7***

Other roles of MPH graduates in the state sector reported by informants include; promoting health through advocacy, managing the day-to-day operations of public sector health institutions, implementing new clinical processes that improve population health and maintaining a high standard of care in health institutions through engagement with stakeholders.

5.9.2.3 Non-governmental organizations (NGOs)

Informants working for non-governmental organizations discussed the positions and accompanying roles of MPH graduates in their organizations. These include serving as health promoters, program/project managers, advocacy officers, research coordinators, program/project coordinators, communication officers, research and development officers, capacity building coordinators, and health policy developers. Interestingly, Program/Project coordinator emerged as the predominant position held by most MPH graduates in the NGO

sector with all the key informants reporting that at least one MPH graduate from their organization served in this position.

> *"We have two MPH graduates working for us at the moment and one of them serves as our program coordinator…He has been very awesome and has improved a lot since joining the organization. The other works as our M&E specialist".* ***Informant 12***

> *"Over the years…., I mean the past 15 years, we have hired about nine MPH graduates to assist us with the work we do across Africa and most of them have served as coordinators for our many health projects on the continent".* ***Informant 11***

The majority of informants noted that MPH graduates in their organization worked in monitoring and evaluation (M&E) positions. One was, however, unsure if the MPH graduate working in his organization had additional M&E training before taking on that role.

> *"Graduates we employ here are usually involved in monitoring projects, tracking progress, collecting data, and assessing the impact of interventions related to sexual and reproductive health"* ***Informant 13***

> *"The MPH graduate who works here is responsible for the monitoring and evaluation of our programs, but I think he has additional training in M&E aside from his MPH. I don't quite remember"* ***Informant 10***

Advocacy emerged as a key responsibility that MPH graduates working in NGOs are assigned and many informants pointed out that they expected graduates to be at the forefront of advocating for health through engagement with decision makers both locally and internationally.

> *"Our MPH graduate employees are involved in engaging with decision-makers at various levels, including the United Nations (UN), the African Union, and both national and county levels in Kenya"* ***Informant 13***

Furthermore, many informants volunteered that a key role of MPH graduates in their organizations is communicating with different stakeholders to promote and invite support for their work.

> *"Communication is a key responsibility of those employed as MPH graduates in the organization ...They communicate with internal stakeholders, colleagues, and external stakeholders, including government officials, to inform them about developments, seek support for our work"* ***Informant 13***

Dissemination of accurate information to counter misinformation about the COVID-19 pandemic and vaccines emerged as an important role played by MPH graduates employed by NGOs over the pandemic.

You know there were lots of misinformation going on during the COVID-19 pandemic and it even became worse when the vaccinations started. Because of the nature of our work, we felt it was our duty to ensure that the public was well informed or educated and help debunk this false information. The MPH graduates we work with here were very instrumental in this. ***Informant 11***

5.9.2.4 Public health training institutions

It emerged from interviews with participants from public health training institutions that despite MPH graduates in this sector taking on diverse roles, the majority were involved in teaching and research.

"I have an MPH myself and currently teach health policy and management in the department. Most of my colleagues in the department are also MPH graduates…The assistants who help us in our teaching and research work here are also mostly MPH graduates or students" ***Informant 15***

"There are several positions and roles performed by MPH graduates here at the university, but I will say most graduates here are either lecturers or serve as research assistants" ***Informant 16***

One informant highlighted the key role MPH graduates play in advancing the research and development goals of her institution.

"This division plays an important role in advancing our university's vision of becoming a leading research institution in Africa and honestly speaking, the MPH graduates we work with here have been very instrumental in our work…We are on track to achieve our goals thanks to their immense contributions!" ***Informant 15***

In addition, informants reported that some MPH graduates working in public health training institutions serve as coordinators of health programs/projects.

We currently have five HIV projects across the country and three of our coordinators for these projects are MPH graduates. ***Informant 14***

One informant emphasized the contributions made by MPH graduates towards the successful implementation of health projects undertaken by his institution.

"Our institution works with the Kenyan ministry of health on many health projects especially in the area of HIV and maternal and child health care. The MPH graduates we have employed to work on these projects have really contributed to the successful implementation of the projects. We have seen [a] significant increase in the utilization of these services over the years". ***Informant 17***

Interestingly, another informant argued that MPH graduates in his institution performed better when they served as coordinators of health projects rather than research projects. He acknowledged that differences in performance may not be due to lack of skills to coordinate research projects but due to graduates having an interest in disease prevention

and control projects compared to research projects. Consequently, they were focused on their successful implementation.

Informants highlighted some important roles MPH graduates in their institutions played during the COVID-19 pandemic. This included reviewing research evidence to inform a local public health response. Some graduates produced materials used to educate the public about COVID-19. Others trained both health care and non-health care professionals in contact tracing and other emergency responses to the pandemic; some developed standard operating procedures (SOPs) and guidelines on prevention, testing, contact tracing, quarantine and isolation and others disseminated accurate and up-to date information to the public during the pandemic.

> *".....You know, then COVID-19 came and they (referring to MPH graduates) became very much involved in training the health care professional and other volunteers in contact tracing...."* ***Informant 16***

> *"I must say that the MPH graduates here were very instrumental in developing the SOPs on prevention, contact tracing and testing used by the department of health to help deal with the COVID-19 pandemic"* ***Informant 15***

5.9.2.5 Social Movement Organizations

Social movement organizations are formal or informal groups with members that share common ideas/goals. They drive or prevent change in societies through sustained campaigns and national and international level actions. From interviews with key informants in this sector, it was reported that although most MPH graduates worked in social movement organizations on a volunteer basis, their roles are critical to improving health across the continent. One such role is advocacy for equitable access to health care services through engaging with policy makers from different sectors like the state.

> *"Most of the MPH graduates working with us have their full or part-time jobs but choose to help us in the work we do on volunteer basis".* ***Informant 19***

> *"The kind of work we do involves a lot of engagement with policy makers in different sectors of health. Most of the MPH graduates who volunteer with us have experience working with these policy makers and so have been very active in our health equity advocacy campaigns".* ***Informant 18***

Furthermore, MPH graduates working in social movement organizations are involved in the development of materials (reports, policy briefs and research) used by their organizations in

their advocacy work. One informant recalled how MPH graduates in his organization helped improve their use of research evidence in their advocacy work.

> *".....Some policy makers want to know if the change you are pushing for is backed by evidence and this is an area that used to be a challenge for us…Since joining our movement, those two [referring to MPH graduates] have really help[ed] us produce policy briefs and recommendations for our advocacy campaigns using research evidence....."* ***Informant 19***

Another informant discussed how primary research studies conducted by MPH graduates in her organization helped inform their advocacy campaigns.

> *".... there have also been instances where some of the MPH graduates we work with here have conducted primary studies that have guided our advocacy work"* ***Informant 20***

When asked to reflect on the role played by MPH graduates during the COVID-19 pandemic, informants from social movements highlighted that graduates were actively involved in raising awareness about the pandemic and educating the public on measures such as mask wearing and social distancing. Some informants discussed how MPH graduates in their organizations were instrumental in mobilizing resources and support for marginalized communities to help them deal with the COVID-19 pandemic.

> *"……especially in the early stages of the pandemic, we carried out a number of campaigns to raise awareness about the virus and the lead on this was an MPH graduate....."* ***Informant 19***

> *"We realized that there were communities that needed help in order to adhere to some of the COVID-19 measures like handwashing, wearing of masks and isolation when they become infected. Others also struggled with basic things like food and toiletries because of the lockdown so we worked with the MPH graduates here to launch a campaign that helped mobilize resources to help these communities".* ***Informant 18***

Another informant reflected on how an MPH graduate working in her organization tackled the mental health toll of the COVID-19 pandemic on families who had lost members during the pandemic. The graduate started a mental health support group in one of the communities in the district.

> *"It was sad to see people lose their family members to the pandemic, and you know how these things can affect you mentally…So I was very happy when one of our MPH graduates started a mental health initiative to help some of these families' deal with their loss".* ***Informant 20***

5.9.2.6 Private Sector organizations (involved in public health work)

All key informants from private sector organizations interviewed acknowledged that MPH graduates demonstrate diverse skills which enable them to hold various positions and perform different functions/roles in the sector. Some of these positions shared by informants include; serving as Market Research Analysts for their health products, Health Data Analysts, Wellness Coordinators, Research/Clinical Trial Coordinators, Health Program/Project Managers and Health Policy Analysts.

Interestingly, two informants noted that their organizations considered the employment of MPH graduates strategically, as ways to drive organizational success – including financial success – while at the same time improving health status of their clients. Informants acknowledged that MPH graduates over the years had contributed significantly to achieving their organizations' goals. One informant reflected on how an MPH graduate with a health economics specialty who was hired by his company to take on the role of analyzing health care trends to identify business opportunities contributed significantly to the growth of the company.

> *"…. When we made the decision in 2017 to get an MPH graduate on board in our work here in the company, I remember how skeptical one of our directors was on the impact that will have on our growth, but I will say that was one of the best decisions. She (referring to the MPH graduate) has really contributed to the growth of the company and now we have two other graduates working here…."*. ***Informant 22***

Another key role of MPH graduates in the private sector reported by informants is helping companies stay complaint with local health policies and regulations. Graduates analyze health policies and make recommendations on compliance to companies based on their analysis.

> *"Our company prides itself in maintaining a high level of standard and this means strictly adhering to local health policies and regulations. We have two MPH graduates working here who assist us in this regard. They are responsible for analyzing local health policies and advising us based on their analysis"*. ***Informant 21***

An informant working in a company that provides a health and wellness service highlighted the key role an employed MPH graduate played. Over the years, she has designed and implemented health promotion and health wellness initiatives which contributed immensely to the organization's growth.

> *"…. considering what we do here, having someone that is well versed in health wellness and health promotion strategies is very important. I am happy we found a very dedicated person who has helped us implement a number of health awareness initiatives. This has contributed to our growth..."* ***Informant 21***

A key role of MPH graduates in the private sector during the COVID-19 pandemic which was reported by informants was occupational health. Graduates assessed employees' risk of exposure to SARS-Cov2 and developed safety protocols and guidelines that ensured that the work environment was safe for all employees.

> *In the early stages of the pandemic, we had very little information about the virus and didn't know what to do and so we relied a lot on the MPH graduate working here to assess the risk of our employees being exposed or infected. She developed a safety protocol for us that really helped in my opinion. We had a few staff that got infected, but I think it would have been worse without the measures she helped us implement.* ***Informant 22***

Other roles of MPH graduates pointed out by informants included research and biostatistics. Graduates coordinated clinical trials and used statistical software to analyze and interpret health and market data to identify trends and opportunities for improvements.

5.9.3 Core competencies needed by MPH graduates for public health work in Africa

Informants from the six key sectors of health offered insights on the core competencies needed by MPH graduates for public health in Africa. Figure 42 provides a summary of the core competency domains highlighted by informants and Table 8 details the competencies for each work sector.

Figure 42: Competency domains highlighted by employers to be crucial to the PH work of MPH graduates in Africa

5.9.3.1 Research sector

The five key informants interviewed from this sector offered insights on core competencies they believed are needed by MPH graduates for public health work in the sector. Additionally, they highlighted competencies they believed are needed by MPH graduates for broad public health work in Africa. Informants drew extensively on their years of experience working in

health research organizations in Africa and their experience working with MPH graduates from different programs in Africa. The majority maintained that MPH graduates working in the research sector should have competencies in data analysis and interpretation. One added that MPH graduates employed in the research sector should have competencies in using statistical software and tools to analyze both qualitative and quantitative research data. Another indicated that she expects MPH graduates to demonstrate competency in interpreting research findings, including those published in peer-review journals and from surveillance reports.

> *"…like I mentioned earlier, because of the kind of work we do here, I expect any MPH graduate we hire to be able to analyze our research data and produce a good report out of it…and we conduct both qualitative and quantitative research work so I will expect any graduate we hire here to be competent in doing both analyses…"* ***Informant 4***

> *"…So in our organization, if you look at entry level MPH or entry level field epidemiologist, we expect them to be able to analyze research and surveillance data and interpret the findings. And this includes interpreting findings from other published research studies and surveillance reports as well"* ***Informant 3***

Some maintained that MPH graduates working in the research sector should have competencies in research proposal development. For example, one informant discussed how she expects MPH graduates working in her organization to demonstrate competencies in developing research proposals that are methodologically and ethically sound. Another informant highlighted that she expects MPH graduates to be able to examine research proposals to identify potential ethical and methodological issues that need to be addressed prior to data collection.

> *"…you know it all starts with developing a proposal, so I expect any MPH graduate we employ to be well versed in research proposal development. I mean be able to develop a proposal that is sound in terms of the methods and can get ethics approval with minimal corrections"* ***Informant 2***

> *"…so even if the proposal is coming from one of our students or another person, I expect the MPH graduate to be able to examine it critically and identify any issues. Whether it's the methods or any ethical issues that needs to be addressed…"* ***Informant 5***

Most informants maintained that MPH graduates working in the research sector should have competencies in managing research projects, including providing supervision and training to research team members. For example, one key informant highlighted the importance of training field workers involved in research at her institution and that she expects graduates working in her organization to have competencies around training. Another further elaborated that MPH

graduates should have competencies in developing the training tools and materials for research teams.

> *"We usually work with people from the community who assist us with our data collection. I will say most of them are very smart, but they still need some training you know. And like I mentioned earlier, the MPH graduate we work with has been doing a great job with training them you know. So, to answer your question, I will say as an employer, I expect MPH graduates to have this kind of skill [referring to training data collectors]"* ***Informant 3***

> *"…. there is also the aspect of developing the tool and materials for training the research team and I believe this is something an MPH graduate should be able to do".* ***Informant 4***

Familiarity with research financing and grant applications also emerged as a key competency expected of MPH graduates working in the research sector. While some informants maintained that entry level MPH graduates should at least have a good understanding of the research funding landscape in low- and middle-income settings, others expected MPH graduates to demonstrate competencies in preparing research grants, including budgeting for research projects.

> *"…. but you know, research requires money and that's why I was saying that for MPH graduates involved in research, they should at least be aware of the organizations and institutions that sponsor health research in low and middle income setting like ours and what their funding requirements are"* ***Informant 2***

> *"I'm not sure if this is part of what they are taught but I expect that at least they show some understanding of how to apply for grants and how to prepare research budget. The MPH graduates we have had here so far have been lacking in this aspect"* ***Informant 1***

All informants maintained that MPH graduates, irrespective of whether they were working in the research sector or not, should be able to communicate public health messages and research findings clearly and concisely to diverse audiences. Some also felt that MPH graduates should be able to translate research finding into formats that can be shared with policy makers, such as policy briefs.

> *"The way public health messages and research findings are presented to the public is very important…. so personally, I believe someone who has completed an MPH should be able to communicate well with both his peers and the public. You know, be able to break the message down in a way that can easily be understood…and I mean understood even by people with no public health background"* ***Informant 2***

> *"…having said that, then the important question is, what is purpose of the research we do here? It's to help inform policies and public health interventions. so, for someone with an MPH*

working here, I would expect that they have the skill to translate the lengthy research outputs into policy briefs, you know something that can be shared with policy makers" ***Informant 5***

Informants' perspectives on the competencies needed by MPH graduates to respond to public health emergencies, such as the COVID-19 pandemic, included the ability to develop factual educational materials using research evidence to counter misinformation among the public about the outbreak.

5.9.3.2 Government

Key informants working in the government sector discussed the core competencies needed by MPH graduates for their work in the government sector. All four informants believed that graduates working in the government sector should have leadership and management competencies. One respondent explained that, because MPH graduates often hold leadership positions in the public health sector, they should possess the skills to guide healthcare teams in identifying opportunities to strengthen the health system. This could be achieved by fostering sectoral growth through 'out-of-the-box' thinking and the adoption of innovative technologies. Another key informant felt that as leaders, MPH graduates should be able to foster collaboration and meaningful dialogue between communities and health organizations to promote health.

"so, if you have an MPH degree, then you are regarded as someone that can be entrusted with leadership positions in the health sector…and as a leader, you should be able to guide your team to identify opportunities for growth…and how do you do this?... I think by encouraging out of the box thinking among your team and being open to new ideas" ***Informant 9***

"…and I'm speaking from my over 7 years of experience working here. I believe one of the reasons why most of our colleagues here pursue the MPH degree is to help them advance to leadership positions…I don't have a problem with that but I believe leadership requires having certain skills you know… Like being able to foster collaboration and dialogue among different groups…and this is something I would expect from someone with the MPH degree" ***Informant 7***

Other key informants believed MPH graduates working in the government sectors should take the lead in mobilizing and allocating health resources. They also believed graduates should be able to implement evidence-informed public health interventions that address pressing health issues. One emphasized the importance of MPH graduates developing personal attributes such as empathy, integrity and resilience as well as the technical skills needed for public health work.

" ...at the end of the day, maintaining a balance is key because I mean I've worked, and I know of people who are highly technically competent but the interpersonal skills on a scale of 1 to 10 is zero…so I believe an MPH graduate aside from having the technical skills should also have the interpersonal skills…" ***Informant 8***

Most informants maintained that MPH graduates working in the government sector should have competencies in building collaborative partnerships with both local and international organizations. Furthermore, informants maintained that MPH graduates should have competencies to engage a range of stakeholders to co-create sustainable solutions to public health problems. In addition, they believed that MPH graduates should have competencies to advocate for polices that are public health oriented and in building robust professional networks that promote continuous learning.

"As an MPH graduate, you want to be able to engage with the community for solutions...you go in with that blank page and you say to your community and when I refer to community it could be community members, community leaders...What are we going to do to make sure that our girls do not have infertility as a result of bilharzia long term?" ***Informant 7***

"There is a lot that can be learned from others…so if you want to maximize your impact as an MPH graduate, then engage with your colleagues from the other sectors, like though in the water commission or Department of Water and Sanitation, you know." ***Informant 9***

A few informants believed that MPH graduates working in the government sector should demonstrate familiarity with the relevant legal and regulatory framework in their countries of practice.

"As an MPH graduate, know your law. Know the regulatory framework in which you operate...like the Labour Relations Act, Occupational Health and Safety Act, the Health Act." ***Informant 7***

Interestingly, one key informant volunteered that his years of experience working in the government sector highlighted the need for conflict resolution skills in the sector. He believed that graduates should be able to apply skills such as active listening, patience, empathy and negotiation to manage and resolve dispute in the public health sector

"You know as part of engaging with colleagues, communities, and other organizations, conflicts are bound to happen sometimes, and I expect that as an MPH graduate, you are able to serve as a mediator and showcase conflict resolution skills. You know, things like being able to listen to both sides, acting as a neutral third party to allow the conflicting parties to have meaning discussions and come to an agreement….and even in some cases showing patience and empathy" ***Informant 9***

In light of the COVID-19 pandemic, informants provided some insights into the competencies needed by MPH graduates to respond appropriately to public health emergencies and outbreaks. All believed that MPH graduates working in the government sector should be able to prepare evidence-based recommendations on how to reduce the spread of infections such as COVID-19, as well as design and implement vaccination campaigns aimed at dealing with outbreaks. Some informants further believed that MPH graduates should be familiar with measures such as quarantine and isolation and should be able to advise policy makers on their effectiveness in dealing with outbreaks such as the COVID-19 pandemic.

> *"As you have seen from the COVID-19 pandemic, the public and even policy makers in government are relying on people with public health training to provide some guidance on how to deal with the spread of the virus...so I think that is one area that MPH graduates should have competencies in… you know be able to provide recommendations on how to reduce spread of the virus backed by research evidence"* ***Informant 6***

5.9.3.3 Public Health Training Institutions

Four informants working in public health training institutions in four universities discussed their perspectives on the competencies needed by MPH graduates for public health work in the sector. Most believed that MPH graduates working in training institutions should have competencies in teaching or assisting with the teaching of public health-related courses such as epidemiology, biostatistics and environmental health science.

> *"…like I mentioned earlier, we get lots of assistance in our work here from some of our MPH students and graduates… and this, you know includes assistance in the teaching of some of our MPH courses…so I would expect an MPH graduate who has plans to go into academia to have some interest in teaching and also show some skills in teaching, you know, at least the basic skills."* ***Informant 11***

Some informants also believed that graduates working in public health training institutions should be able to develop educational/teaching materials on public health, such as on environmental health and health promotion, that can be used to train the public health workforce. One added that additional training in course content development and delivery may be required by MPH graduates with interest in becoming public health educators or trainers.

> *"…and another area that I believe graduates should be able to demonstrate skills in is in developing you know, developing training materials. And this doesn't have to be like materials for training university students like we do here…It could be materials for training community health worker and field workers involved in research"* ***Informant 12***

"…but like I was saying earlier, you know teaching doesn't always come naturally to everyone so think some graduates will need additional training in teaching…and I mean even in how to develop the materials to be used in teaching…" ***Informant 10***

All informants believed that MPH graduates working in public health training institutions in Africa should have competencies in conducting and managing health research. This include being able to identify public health problems in Africa that can be addressed through research, formulate appropriate public health research questions, systematically review research evidence to inform public health policies, and critically appraise research studies to identify strengths and limitations. One emphasized the importance of MPH graduates upholding high ethical standards in health research. He maintained that graduates should be competent in evaluating public health research protocols to ascertain their ethical and methodological soundness in protecting research participants. Another informant also acknowledged the contribution of peer-reviewed journals to the wider dissemination of research findings and believed that MPH graduates should be competent in preparing manuscripts from research projects for publication in reputable peer-reviewed journals.

"As you know, research forms an important part of what we do here in the department so I would expect an MPH graduate working here to have some competencies in this area…I mean things like preparing research protocols, being able to review the literature…those kind of things" ***Informant 11***

"…it's very important that we make sure research is conducted in a way that protect participants… and how do we ensure this?...I would say one way is reviewing research proposals and making sure that they are sound methodologically and ethically before approval.... so, this is something I believe MPH graduate should able to do" ***Informant 13***

"…and this is very important because I have come across many MPH graduates who struggle with this…I don't know if it is something lacking in the training, but I believe they [referring to MPH graduates] should be able to prepare manuscript from their research that meets the requirements for publication in peer reviewed journals…and by that I mean the reputable ones of course" ***Informant 12***

Most informants further maintained that the MPH graduates working in public health training institutions should be competent in managing public health training programs. One explained that because MPH graduates hold positions such as course conveners in public health programs, they should demonstrate skills in coordinating training activities. He, however, acknowledged that this is a competency he would expect from MPH graduates with some years of experience in academia rather than from entry level MPH graduates.

"If you look at our department, almost all of our course conveners/lecturers have the MPH… and personally, I believe their MPH background was a major consideration in their appointments…So I believe for an MPH graduate who is involved in public health education, you should have some skills in managing and coordinating educational activities. I am not saying I expect this from all graduates… I am talking more about graduates who have been in academia for some time." ***Informant 11***

All informants also argued that MPH graduates should demonstrate competencies in managing public health programs and projects. One explained that since her institution works with the Ministry of health on several HIV and maternal health programs and projects, she expects MPH graduates to demonstrate skills in managing and coordinating disease prevention and control programs/projects, such as HIV and TB prevention, in collaboration with the ministry of health.

"…. the MPH graduates we have employed to work on these projects have really contributed to the successful implementation of the projects. We have seen significant increases in the utilization of these services over the years…so I believe being able to manage disease prevention programs and projects like the one we have implemented here, in collaboration with the ministry of health, is a competency MPH graduates should have" ***Informant 13***

Informants gave their perspectives on the competencies needed by MPH graduates working in public health training institutions to enable them to respond to public health emergencies such as the COVID-19 pandemic. Some highlighted that during public health outbreaks, academically employed MPH graduates should be able to develop guidelines and protocols on infection control and contact tracing to help manage the pandemic. One key informant reflected on the level of involvement of MPH graduates from his institution in tracing and educating contacts of infected individuals on quarantine protocols and isolation during the COVID-19 pandemic. She maintained that this is a competency all MPH graduates should have.

"…. but I personally believe that the contact tracing exercise undertaken by the MPH graduates here contributed significantly to reducing the spread of the virus… some graduates were very good at this and there were others who needed some additional training…things like how to break the news of being a contact to people….so if you ask me, then I'll say, this is a competency all MPH graduates should have." ***Informant 12***

5.9.3.4 Non-governmental Organizations (NGOs)

The four key informants interviewed from the NGO sector gave their perspectives on core competencies needed by MPH graduates for public health work in the sector. All maintained that MPH graduates working in this sector needed to have leadership and management competencies to assist them with their public health work/roles. They highlighted that MPH graduates should be familiar with project management tools such as Gantt Charts and be able

to plan and coordinate NGOs activities. Additionally, graduates should be able to facilitate compliance of NGOs activities with local public health laws and regulations and demonstrate holistic thinking and understanding of the interconnectedness of public health issues.

> *"Like I was saying earlier on, most of the graduates we have here are hired to work as coordinators and managers for our health projects… for that kind of work, we agree that there are some skills they will need to have for the job…I'm talking about having leadership and management skills…more like being familiar with project tools like the Gantt chart, being able to plan and coordinate project activities and see to the implementation of the projects"* ***Informant 16***

> *"The first thing is the ability to think all around... it's very important for an MPH graduate to look at how the public health issues we are trying to address as an organization are interconnected... for example, how is adolescent reproductive health linked to climate change?"* ***Informant 17***

Most informants highlighted further that MPH graduates working in the NGO sector should have competencies in monitoring and evaluation. These include being able to develop tools and indicators for monitoring and evaluating health projects, assess the impact of public health interventions, and establish mechanisms to ensure that the findings from monitoring and evaluation inform project improvement strategies.

> *"M&E is very important to the work we do there… and not just what we do here, I believed it is important in any organization…so I would expect an MPH graduate to have this skill…I mean be able to define your monitoring indicators, monitor overall progress, use that finding to improve the project"* ***Informant 14***

Demonstrating competencies in communication and advocacy was widely viewed by all four informants as being important to the public health work of MPH graduates in the NGO sector. Informants believed that MPH graduates should be able to convincingly communicate program activities and outcomes to donors and other key stakeholders through a range of modalities. Furthermore, they should advocate for the utilization of research evidence to guide public health policies and regulations. One key informant highlighted the importance of understanding the context when designing and implementing health promotion and advocacy interventions. He believed MPH graduates should have competencies in analysing the context to determine its effects on their health promotion efforts.

> *"Communication is absolutely critical in our context. As an MPH graduate, you have to communicate to internals stakeholders, you have to be able to communicate with your colleagues and other external stakeholders. You have to master the ability to influence others*

through communication. This communication can be in the form of report, oral presentation and other means you know" ***Informant 17***

"Another important skill which I believe MPH graduate should have is to be able to analyse the context in which the individual or audience who are the targets of any health intervention operates…. because there are various factors beyond the control of the individual or audience that influence their health, so it is very very important to take into account in health improvement efforts" ***Informant 14***

Some further believed that MPH graduates working in the NGO sectors should be competent in training and building human resource capacity for health. Other key informants also felt that MPH graduates should demonstrate competencies in effectively and efficiently allocating health resources in a way that maximizes the public health impact.

Interestingly, one informant argued that most graduates do not pay much attention to the profound and multifaceted impact climate change has on health and believed that MPH graduates should demonstrate an understanding of the link between climate change and public health. He maintained that graduates should be familiar with international and local climate change policies and frameworks.

"…and then there is the issue of climate change, I don't think I have seen much attention paid to this area by the MPH graduates I have worked with in the past…. but you know the effects on health is very great…I'm not sure if they learn about this in school but I believe it is something MPH graduates should pay attention to…. things like how climate change affect health and the international and local policies on climate change" ***Informant 17***

To help graduates working in NGOs to respond appropriately to public health emergencies such as the COVID-19 pandemic, informants believed that they should be able to critically appraise information shared with the public during public health emergencies and outbreaks and where necessary, produce factual information to counteract any misinformation.

5.9.3.5 Social Movement Organizations (SMOs)

Informants working in social movement organizations detailed core competencies needed by MPH graduates for public health work in the sector. All three informants maintained that MPH graduates working in social movement organizations should have competencies in health advocacy. Specifically, MPH graduates should be able to advocate for prioritization of public health issues and policies through lobbying and building partnerships. Additionally, informants highlighted that MPH graduates should be able to develop materials and reports, such as policy briefs and research, for advocacy purposes. Furthermore, they argued that graduates should be

able to push for the inclusion of marginalized groups like women and young people, in public health programs and interventions.

> *What they [referring to MPH graduates] do here really contributes to our health advocacy efforts…. the materials, I mean things like the policy briefs and research evidence they help us produce have been very important and those are the kind of things I believe an MPH graduates working in a place like this should be able to do.* ***Informant 19***

> *"…. especially in our African context where marginalized groups like women and young people are excluded from the planning of public health programs and interventions, an MPH graduate should be able to advocate for the inclusion of these marginalized groups…I mean push for these women and young people to be included in the planning of public health interventions…get their perspectives and contributions listened to especially at the community level"* ***Informant 18***

Most informants further maintained that MPH graduates working in social movement organizations should have competencies in health promotion and education. For example, one highlighted that MPH graduates working in his organization should be able to design and implement awareness creation interventions that empowers individuals and communities to take proactive steps in protecting their health. Another maintained that MPH graduates working in social movement organizations in Africa should be able to develop health promotion strategies to dispel myths and misinformation about diseases like HIV and TB to reduce stigma and discrimination.

> *"You know the kind of myth and misinformation that exist in our society around diseases like HIV and TB and how this leads to stigma and discrimination…. for us this is a major problem…but then the question is how do we address this?... we can think of health promotion strategies to help dispel these myths and misinformation…. I believe this is something MPH graduates should be able to do"* ***Informant 20***

Some noted that MPH graduates working in social movement organizations in Africa should have competencies in leadership and management. One explained that because social movement organizations in Africa rely on volunteers and community members for their health advocacy campaigns, MPH graduates working in this sector should be able to inspire members to work together towards achieving their common public health goals.

> *"The MPH graduates who assist us here are very much respected by the team…As I mentioned, most of them are here as volunteers but the other team members look up to them for directions on how to go about with our advocacy work…I believed they should be able to inspire and unite the team to work together"* ***Informant 19***

During public health emergencies and outbreaks such as the COVID-19 pandemic, informants argued that MPH graduates working in social movement organizations could contribute significantly to the public response if they have competencies in mobilizing resources (food, medical suppliers etc.) to support marginalized groups and communities.

> *"…. most of the communities we support needed things like food, medical supplies, toiletries during the pandemic…. It wasn't easy to supply all these things on our own you know…so we really relied on the resource mobilization efforts led by some of the MPH graduates who volunteered with us here…they really helped us reach more people…I believe this is something we can say would be needed by MPH graduates in our kind of setting to deal with pandemics"* ***Informant 18***

Reflecting on the psychological impact which outbreaks, such as the COVID-19 pandemic, had on populations, and the limited mental health services available to people in many African countries, most informants highlighted that MPH graduates should have competencies in designing and implementing low-cost mental health support programs/interventions. Informants argued that mental health support groups could help families deal with losses during public health emergencies and outbreaks.

5.9.3.6 Private Sector

The two key informants from the private sector also voiced their perspectives on some of the core competencies needed by MPH graduates for public health work in the sector. Both informants noted that graduates working in the private sector should have some analytical skills. For instance, one emphasized the importance of collecting, analyzing and interpreting public health related market data to inform business decisions, and maintained that MPH graduates should be competent in doing this. The other informant also believed that MPH graduates should be able to analyze health care trends to identify business opportunities within the private sector. Expectedly, both informants felt that MPH graduates working in the private sector need to be competent in developing and implementing strategic business plans and goals

> *"I will be very frank with you…. you know, because of what we do here, we usually look for people who are both public health oriented and also understands the business aspect of our work…. I must say it is not always easy to find people like that…. what do I mean, it's either they know a lot about the business aspect but have very little knowledge about health and the other way around…so to answer your questions, I would say as an MPH*

working in the private sector, you should be able to analyze health care trends…be able to identify business opportunities out of that" ***Informant 22***

Both informants also believed that MPH graduates working in the private sector should be familiar with the principles of budgeting and economic analyses as it relates to public health programs and interventions in the private sector.

> *"Another area that some of the graduates we have employed in the past seem to be lacking is in the area of finances…you know things like budgeting, being able to conduct a cost-benefit analysis for health projects, those kind of things…I really believe this is an area MPH graduates should have some skills in"* ***PR1 Employer 21***

The informants also highlighted that MPH graduates working in the private sector should be familiar with the legal framework of the settings they operate in. Specifically, they argued that MPH graduates should be familiar with the public health laws and regulations that guide the operation of private companies they work for. This they maintained will enable graduates to ensure that companies operate within the confines of the laws and carry out activities that are not harmful to the health of the public. Recognizing the important role of public-private partnership in advancing health, one highlighted that MPH graduates working in the private sector should be familiar with the laws and regulations that govern public-private sector partnerships.

> *"From my years of experience working with MPH graduates in the private sector, one thing I have noticed is that most of them don't really pay much attention to the legal aspect of what we do here…I mean things like making sure that companies they work for are operating within the confines of public health law… I'm not saying they need to be law experts but at least have a good knowledge about the laws which guide the operation of private companies involved in health…and why is this important?....as a person with an MPH who is looked up to by the public, you want to make sure that companies you are involved with are not doing anything that will harm the health of the public in the long term"* ***Informant 22***

Informants further maintained that MPH graduates working in the private sector should also be competent in developing health promotion and health wellness strategies that meet the needs of the public. They also highlighted that MPH graduates should have leadership and management competencies. One argued that MPH graduates working in the private sector should be able to demonstrate calmness, kindness and respect when dealing with people from diverse backgrounds.

Key informants also spoke about the core competencies needed by MPH graduates to deal with public health emergencies and outbreaks, such as the COVID-19 pandemic. They highlighted

that MPH graduates should be able to develop safety protocols and guidelines to guide workplace safety and reduce exposure to infections during outbreaks. Additionally, informants argued that MPH graduates should demonstrate competency in assessing risk of exposure to infections during public health outbreaks.

5.10 Discussion

This study explored employers' perspectives on the core competencies needed by MPH graduates for PH work and their roles across six key health sectors in Africa. The study found that MPH graduates working in the different sectors occupied key technical and managerial positions. In these positions, they performed critical roles that significantly contributed to health systems strengthening in Africa. The study also found that competencies in key domains such as data analysis and interpretation, health promotion and advocacy, project management, health financing/budgeting, conflict management, monitoring and evaluation, public health-related law, leadership, communication, environmental health and outbreak management are needed by MPH graduates for public health work in the region. This study is particularly important to the African context especially in light of current efforts to tailor MPH curriculums and training to the health systems needs of the continent (16). This is because, despite some studies assessing the roles and contributions of MPH graduates to health systems strengthening in low and middle income settings (85, 159) none has focussed specifically on the roles and contribution of MPH graduates to health systems strengthening in Africa. Additionally, no study has explored the competencies needed by MPH graduates for sector-specific public health work in Africa.

The study findings showed some overlaps in the roles and corresponding competencies needed by MPH graduates across the different sectors, as well as some differences. Graduates working in research and PH training institutions perform roles which included research coordination, data analysis, and training of students and research team members. These roles according to key informants required graduates to have competencies in using statistical software and other tools to analyze data, and in developing research proposals. Considering that research forms an integral part of the work undertaken by PH training institutions and research organizations in Africa, this finding is not unexpected. This finding also aligns with a recent review by Rabiei et al. (2024), which identified skills such as proficiency in handling and analyzing research and surveillance data as key to the work performed by PH professionals in academic and research institutions (160). Communicating research findings to diverse audiences using tools such as posters, infographics, oral presentations and publications in academic journals emerged as a

key competence needed by MPH graduates in research and PH training institutions. This finding concurs with a study by Riera et al. (2023), which identified effective communication of scientific evidence to healthcare managers, policymakers, and non-specialist (lay) audiences as important for health knowledge translation and improving population health (161). The findings also accord with a study by Rabbani et al. (2016) which found that public health professionals working in research and academic institutions in LMICs countries play a crucial role in communicating research findings to policy makers, and in so doing help shape public health policies at local and national levels (162). The findings further showed that competency sets for graduates working in research and training institutions needed to extend to the ability to prepare manuscripts for publication in peer reviewed journals. This may be due to academic success in these institutions being largely measured by publications in high-quality research journals, as is reported by Hou et al. (2022) (163).

For MPH graduates working in government, NGOs, the private sector and in social movement organizations, this study found that they often held positions that required them to take on leadership roles at different levels. To effectively perform these roles, employers argued that graduates should have competencies in; team building, negotiations and conflict resolution, health resource mobilization and partnership building. Employers also believe that MPH graduates serving in leadership positions should showcase commitment to equity, honesty, integrity and respect for others. This finding reinforces that of other studies which identified health leadership competencies to be critical to public health work across different sectors of health. For instance, a study conducted by Zwanikken et al. (2016) which explored the contributions of MPH graduates to health systems strengthening in LMICs settings found that MPH graduates working in NGOs and government sectors took on leadership roles at multiple levels and contributed significantly to health systems strengthening (159).

MPH graduates working in all six key sectors often performed some management roles. This required technical skills in planning and coordinating health related activities and training programs, monitoring and evaluation and familiarity with tools such as the Gantt chart. This accords with Schleiff et al. (2021) who argued that robust management skills are needed by health professionals especially those in resource-limited settings to handle health problems efficiently and effectively (164). As found in Bhandari et al. (2020) study to identify core competencies needed by health professionals in India to address the country's health problems, this study found project management skills were crucial to the implementation of health programs and interventions that targeted common health challenges in Africa (165).

Health economics and research financing were strongly viewed by employers in the private and research sector to be important domains which MPH graduates should have competencies in. Employers in the research sector believed that MPH graduates should be familiar with the research funding landscape in Africa and have skills in research grants application. The importance of financial competencies in advancing research in low and middle income settings is widely acknowledged (166, 167). A review conducted by Franzen et al. (2017) found that most research projects in low and middle income countries suffer due to researchers limited knowledge of funding landscapes and from inadequate financial management skills (166). The call for MPH graduates working in the research sector to have competencies in research grant applications was expected since most research institutions in Africa often face significant funding limitations, leading to reliance on external funding for research. Several studies have acknowledged the importance of external funding in research across Africa and have highlighted the crucial role grant application skills can play in increasing funding for research on the continent (159, 168, 169). Some employers in the research sector specifically expressed concerns about inadequate skills in areas such as budgeting and pointed out that this was not addressed in MPH programs. Similar concerns were reported in a Canadian study where developing a business plan as a capstone project in Canadian MPH programs found that most students lacked skills in areas like budgeting and business plan development (170). The study concluded that integrating business plan development and budgeting into MPH programs as capstone project can help student develop skills which are critical to performance in real-life settings (170). Within the private sector, employers acknowledged the important contributions to organizational growth made by MPH graduates with a health economics background and emphasized the need for graduates to have skills in budgeting, cost-benefit and cost-effectiveness analysis. It is widely known that despite the private sector contributing significantly to health care delivery in Africa, it is often business and profit driven (171-173). This dual goal of improving health while ensuring a sustainable and profitable business in the private sector could possibly explain why emphasis was placed on health economics and other financial-related competencies by employers. Nonetheless the importance of health economics and other financial-related competencies across different sectors of health, not just the private sector, is also widely reported (174-176).

Employers from the government, NGOs and the private sector further believed that MPH graduates working in the sector should have some competencies in the domain of law (i.e. legal competencies). Within the government sector, maintaining a working knowledge of legal and

regulatory frameworks such as labour, health, and occupational and safety legislation was considered by employers to be very important. In the NGO and private sector, employers believed that graduates should be familiar with local laws, policies and regulations that guide the operation of businesses and NGOs involved in health. Employers also believed that graduates should maintain a working knowledge of the local laws and regulations that guide public-private partnerships for health. The importance of health professionals having legal and law-related competencies in low- and middle-income countries has been reported in several studies (165, 177). Legal competencies are considered to be core to effective PH practice, (1, 178) and according to the Council on education for public health (CEPH), understanding the legal aspects of PH is crucial for creating policies that protect population health and ensures equity (178).

Across all six sectors of health, employers also acknowledged the important roles played by MPH graduates during the COVID-19 pandemic. These roles included conducting research to inform the public health response; developing educational materials on the pandemic; using different media platforms to disseminate accurate information to counteract misinformation about the virus and vaccines, developing SOPs and training materials for contact tracing, supporting health departments to develop or revise their SOPs to help reduce infections, conducting risk of exposure assessments in workplaces to ensure staff safety, and mobilizing resources and support for marginalized communities. The role of the public health workforce in responding to public health emergencies such as the COVID-19 pandemic is well documented (179, 180). Historically, MPH graduates in Africa have been instrumental in the response to epidemics and pandemics by carrying out roles similar to those reported in this study (181, 182). For example, during the 2014-2016 Ebola outbreak, MPH graduates working with the WHO, Africa CDC and NGOs such as the Médecins Sans Frontières (MSF) were involved in surveillance, contact tracing and community education to reduce the spread of the virus (183). Since the start of the HIV/AIDS pandemic, MPH graduates in Africa have also played key roles in areas such as conducting research to inform policies and the implementation of prevention and treatment programs (159, 184).

The competencies which employers believed are needed by MPH graduates in Africa to effectively respond to PH emergencies appear to be mostly informed by the roles performed by graduates during the COVID-19 pandemic. These included a need for graduates to demonstrate skills in; conducting, reviewing and interpreting research evidence to inform responses to public health emergencies, designing and implementing vaccination programs,

leading resource mobilization campaigns, producing factual educational materials to counteract misinformation, health advocacy and community engagement, developing guidelines and protocols on infection control, training other health care professionals in outbreak responses (such as contact tracing) and maintaining a working knowledge of laws and regulations that guide infection control measures such as isolation and quarantine. The importance of leveraging competencies in domains such as research, community engagement and advocacy in responding to public health emergencies have also been highlighted in several studies (185, 186). For example, a review by Collins et al. (2023) concluded that skills in research, resource mobilization, advocacy and health promotion used over the years to address the HIV/AIDS pandemic could be leveraged to strengthen the response to the COVID-19 and future outbreaks (185). Other studies have also found competencies in domains like leadership and management identified in our study to be important in coordinating the response to PH emergencies especially in low and middle income countries (186, 187).

One of the notable domains emphasized in this study was outbreak and epidemic management, which likely reflects the heightened awareness and urgency resulting from the COVID-19 pandemic. While this focus is understandable, it may have overshadowed equally important domains such as Global public health, migration and climate change and the increasing burden of non-communicable diseases.

5.11 Study Limitations

This study has some limitations. A qualitative study method was used, and the scope of this method must be acknowledged. The study did not intend to generate findings that are generalizable to all MPH graduates and their employers. However, employers from different sectors of health were purposively included to capture the diversity in perspective that exist across different spectrum of work settings. While the study included 22 employers of MPH graduates from six key public health sectors, the number of respondents per sector ranged from only two to five. This small sample size per sector limits the generalizability of the findings and their ability to represent the broader perspectives of entire sectors across Africa.

Furthermore, despite efforts to capture the perspectives of employers of MPH graduates from all five sub regions in Africa, none of the participants invited from organizations and institutions in North Africa responded to requests for interviews. This means that the perspective of employers of MPH graduates from this part of Africa was not captured in the findings. The effect of this on the study findings is however expected to be minimal since the North African health context is not significantly different from that of the rest of Africa (188).

Data specific to each organization or institution was also not presented as this would violate anonymity and confidentiality of key informants.

5.12 Conclusion

To the best of our knowledge, this is the first known study that explored the core competencies needed by MPH graduates for a range of public health work in Africa. The study found that MPH graduates working in different sectors of health in Africa hold key positions in their organizations and carry out roles that contribute significantly to strengthening health systems. To effectively perform their roles, employers believe that graduates should have competencies in key domains like leadership, health promotion, advocacy, project management, health financing, data analysis, public health education and training, monitoring and evaluation, environmental health, public health related law and outbreak management. Employers considered these competencies to be within the scope of what an MPH graduate should be competent in upon completing their degree. The future of MPH graduates in the African health system according to the study finding looks positive with employers recognizing their potential to drive health systems reforms and improvement through the roles they perform. The study however highlights the need for continuous efforts by MPH programs to ensure that graduates are equipped with the knowledge and skills that are relevant to addressing the health system challenges in Africa. Programs can achieve this by revising their curriculum to purposively include training in key competency domains like health economic/financing, public health law and monitoring and evaluation where graduates were reported to have limited competencies, despite being important to their work. Additionally, considering the lack of harmonization in the teaching of competencies across MPH programs in Africa, future research should focus on exploring the potential challenges that MPH programs could encounter in adopting and harmonizing core competencies like those suggested by employers in our study across MPH programs in the region.

Table 8: Core competencies (extracted from the interviews) that employers believe are needed by MPH graduates in Africa for their public health.

Sector	Competencies	Related Public Health role/domain
Research	• Utilizes statistical software and standard qualitative tools to analyze both qualitative and quantitative research data	Data analysis and interpretation/Biostatistics
	• Interprets the results of statistical analysis found in public health research	Data analysis and interpretation/Biostatistics
	• Demonstrates a thorough understanding of the research funding landscape in low- and middle-income settings, including funding sources and criteria.	Programme financing
	• Demonstrate basic understanding of budgeting for research projects, including a willingness to learn and improve skills in research budgets development.	Programme financing
	• Prepares research grant applications that meets the requirement of research funding agencies	Programme financing
	• Manages research projects, including planning and coordinating research activities and overseeing data collection	Project Management/Academic/Research
	• Facilitates collaboration between research teams and institutions	Project Management/Academic/Research
	• Develops proposal for public health research that reduces or mitigate risk of adverse events, errors and incidents of harm to participants	Project Management/Academic/Research
	• Examines research proposals to identify ethical and methodological issues that needs to be addressed prior to implementing the proposal (i.e. starting data collection etc.)	Academic/Research
	• Utilizes media such as PowerPoint presentations, posters, infographics and journals to clearly, coherently and concisely communicate research findings to diverse audiences	Communication/Soft Skills
	• Translates public health research into policy guiding documents (e.g. policy briefs) that can inform decisions and practices aimed at addressing public health needs	Communication/ Soft Skills
	• Develops tools and materials for training research team members and other lay field workers in data collection	Health research capacity building/
	• Trains and supervises lay fieldworkers involved in research data collection	Health research capacity building
	• Conducts research aimed at producing evidence to guide the response to public health emergencies, such as the COVID-19 pandemic	Outbreak Management and emergency preparedness
	• Utilizes research evidence to develop educational materials on public health emergencies or outbreaks (such as the COVID-19 pandemic) for healthcare professionals and the public	Outbreak management and emergency preparedness

Non-government Organizations	• Demonstrates holistic thinking and understanding of the interconnectedness of various public health issues.	Leadership and management
	• Plans and coordinates NGO activities, geared towards improving public health	Leadership and management
	• Incorporate values and equity into public health work, with strong focus on public health and human rights.	Leadership and management
	• Builds human resource capacity for public health activities through workshop and seminar training for staff, health workers, volunteers and community members	Capacity building/Leadership
	• Allocates resources (human, financial and material) to various project activities in a way that maximize the public health impact	Leadership & Management
	• Demonstrates familiarity with tools and methods used in project management (e.g. Gantt Chart)	Health project management
	• Facilitates NGOs compliance with the local public health regulations, legislations and legal frameworks that guides the operation of non-governmental organizations in African countries.	Legal compliance in public health/Public Health Law
	• Develops tools and protocols, including appropriate indicators for monitoring and evaluating public health interventions and programs	Monitoring and Evaluation
	• Utilizes monitoring and evaluation tools and methods to track the progress and assess the impact of public health interventions and programs.	Monitoring and Evaluation
	• Establishes mechanisms for active utilization of monitoring and evaluation findings in decision-making, and continuous improvement of public health interventions and programs.	Monitoring and Evaluation
	• Demonstrates an understanding of the link between climate change and public health	Environmental health
	• Demonstrates familiarity with international and local climate change policies and frameworks	Environmental health
	• Advocates for the utilization of research evidence to guide policies, legislations, financial plans, and service delivery across all levels and contexts of public health.	Advocacy
	• Communicates program activities and outcomes to donors and other key stakeholders by preparing comprehensive reports and presentations	Advocacy
	• Analyzes the context in which individual or audience who are the targets of any health intervention operates to determine its effects on the outcome of the intervention.	Awareness of social and political context.

	• Appraises information shared with the public during public health emergencies and outbreaks and where necessary, produce factual information to counteract any misinformation	Outbreak Management and emergency preparedness/Communication
Government	• Fosters collaboration and meaningful dialogue among communities and different organizations to promote health.	Leadership and management
	• Guides health care teams to identify opportunities for growth in the public sector through encouraging innovative thinking and supporting the use of safe and cost-effective technologies in the delivery of health.	Leadership and management
	• Applies conflicts resolutions skills (active listening, negotiation, empathy and patience) in managing and resolving disputes that arises among individuals, communities, social groups and other organizations involved in public health work	Leadership and management
	• Utilizes research evidence to develop public health interventions that addresses pressing public health issues.	Leadership and management
	• Implements public health interventions aimed at improving health, including monitoring and evaluating the impact of implemented interventions	Leadership and management/ M&E
	• Mobilizes resources (human, financial, technological, infrastructure, social and material) needed to provide comprehensive public health services to populations.	Leadership and management
	• Ensures workplace health and safety standards are met.	Leadership and management
	• Maintains a balance between having technical skills and personal attributes (empathy, integrity and resilience) that ensures both high technical performance and effective interpersonal interactions.	Leadership and management
	• Engages with stakeholders from different cultural, religious, geographical and organizational background to identify public health challenges and co-create sustainable solutions to address local public health issues	Leadership/Collaboration for health
	• Builds and maintains collaborations and partnerships with both local and international organizations that share the common goal of improving population health	Leadership/Collaboration for health
	• Advocates for policies and strategies that are public health oriented.	Advocacy
	• Builds a robust professional network that promotes continuous learning and drives policies that are favourable to public health.	Advocacy and collaboration for health

	• Maintains a working knowledge of the public health related legal and regulatory frameworks of the settings in which public health work take place.	Legal compliance in public health/Public Health Law
	• Applies human right principles such as equity and social justice in decision making and in the implementation of public health interventions	Legal compliance in public health/Public Health Law
	• Designs and implement vaccination campaigns for infection control during outbreaks such as the COVID-19 pandemic.	Outbreak management and emergency preparedness
	• Drafts evidence-based recommendations for infection control during outbreaks such as the COVID-19 pandemic	Outbreak Management and emergency preparedness
	• Advises on the effectiveness of measure such as quarantine and isolation in addressing outbreaks such as the COVID-19 pandemic	Outbreak Management and emergency preparedness
Social Movement Organizations	• Advocates for the prioritization of public health issues and policies through lobbying and partnership building	Advocacy
	• Develops materials such as reports, policy briefs, and research documents for advocacy purposes.	Advocacy
	• Advocates for the inclusion of marginalized groups (women and young people) in participatory public health programs/interventions; ensuring that the perspective of marginalized groups are taken into consideration in the development of public health interventions.	Advocacy
	• Develops health promotion strategies to dispel myths and misinformation about diseases like HIV and TB, reducing stigma and discrimination.	Health promotion
	• Implements awareness creation interventions that empowers individuals to take proactive steps in protecting their health	Health promotion
	• Inspires team members, communities and volunteers to work together towards achieving common public health goals.	Leadership
	• Mobilizes resources (human, food, medical supplies etc.) to support marginalized groups and communities especially during public health emergencies, such as during the COVID-19 pandemic.	Outbreak management and emergency preparedness
	• Implements low-cost mental health support programs/interventions (e.g. support groups) to help individuals, families and communities cope with the psychological impact of public health emergencies, such as the COVID-19.	Outbreak management and emergency preparedness

Private Institutions/ Organizations	• Analyzes health care trends to identify business opportunities.	Leadership
	• Develops strategic plans and long terms goals that contributes to the improvement of health.	Leadership
	• Implements health wellness programs including nutrition and healthy eating workshops, fitness plan for different age groups and stress management workshops.	Leadership and management
	• Shows calmness, respect, and kindness when dealing with people from different background and under pressure.	Leadership and management
	• Plans and coordinates clinical trials.	Leadership and management
	• Collects, analyzes and interprets public health related market data to inform business decisions.	Data analysis and interpretation
	• Maintains a working knowledge of the regulations and legislations that guides the operation of private companies involved in public health work in African countries	Legal compliance in public health/Public Health Law
	• Demonstrate familiarity with laws and regulations that govern public-private partnerships in African countries.	Legal compliance in public health
	• Develops and implement health strategies to promote health and improve health wellness	Health promotion
	• Demonstrate familiarity with the principles of budgeting, cost benefit-analysis and cost effectiveness analysis as it relates to public health initiatives and interventions in the private sector.	Health economics and financing
	• Develop safety protocols and guidelines to guide workplace safety and reduce exposure to infections during public health outbreaks such as the COVID-19 pandemic	Outbreak management and emergency preparedness
	• Assess the risk of exposure to infectious agents during public health outbreaks such as the COVID-19 pandemic.	Outbreak management and emergency preparedness
Public Health Training Institutions	• Demonstrates skills in teaching or assisting in the teaching of public health subjects (E.g. Epidemiology, Biostatistics, Environmental Health Science and Health Policy and Management.	Capacity building/Academic/Research
	• Develops educational/teaching materials on public health (e.g. on health promotion, health data collection and analysis, health policy development and analysis and environmental health) that can be used to train the public health workforce	Capacity building/Academic/Research

	• Manages public health training programs; including coordinating training activities to ensure that educational objectives are met	Capacity building/Academic/Research
	• Facilitates practical sessions as part of public health training programs (e.g. internships and field placements) which assist students to gain hands on experience in the in the field of public health	Capacity building/Academic/Research
	• Manages and coordinates disease prevention and control programs/projects (e.g. prevention programs for HIV and TB)	Project management
	• Produces information dissemination materials (e.g. posters, PowerPoint presentations) to communicate public health information to diverse audiences	Communication
	• Identifies public health problems that can be addressed using scientific research	Academic/Research
	• Formulates research questions that are relevant to addressing identified public health problems	Academic/Research
	• Demonstrates skills in systematic review of research evidence to inform public health policies and responses.	Academic/Research
	• Evaluates public health research protocols to ascertain their ethical and methodological soundness, including whether they ensure protection of research participants.	Academic/Research
	• Demonstrates skills in critiquing research studies, including recognizing conflicts of interests, strength and limitations of studies	Academic/Research
	• Develops research manuscripts from research projects for publication in peer-reviewed journals.	Academic/Research
	• Develops guidelines and protocols (e.g. standard operating procedures-SOPs, contact tracing protocols) in response to public health emergencies such as the COVID-19 pandemic	Outbreak Management and emergency preparedness
	• Demonstrates skills in contact tracing, including interviewing contacts, educating contacts on isolations and quarantine protocols during public health emergencies, such as the COVID-19 pandemic.	Outbreak Management and emergency preparedness

CHAPTER 6

Harmonizing Core Competencies across MPH Programs in Africa: Acceptability and Challenges from Stakeholders' Perspective

6.1 Background

The PH workforce plays a crucial role in addressing the health needs of populations (189-191). It is a diverse group that includes epidemiologists, biostatisticians, health educators, health economists, and clinicians, each contributing in different ways to improving health. Due to their diversity, studies that have explored the contribution of the public health workforce toward improving health, have usually focused on specific groups (43, 72, 86). For example, a study by Zwanikken et. al (2016) explored the contribution of MPH graduates towards health system strengthening in LMICs and found that MPH graduates contribute significantly to improving population health through research, advocacy, community engagement and providing policy advice to Ministries of Health (6). This thesis explored the roles of MPH graduates across different sectors of health in Africa, and the core competencies needed by graduates to perform these roles. As reported in Chapter 5, the findings were that MPH graduates perform leadership and management, research and analytical, health promotion and advocacy, pandemic and emergency response, and teaching and capacity-building roles which contribute significantly to health systems strengthening in Africa. Other studies conducted in LMICs have also found that programs that train public health personnel like MPH graduates have had a positive impact on a variety of health outcomes including reduction in morbidity and mortality and improvements in health behaviours (16, 26, 85, 125, 192).

Because of the crucial roles that MPH graduates play in health systems strengthening, the topic of improving their training have gained momentum in recent years. In Africa, organizations such as the ASPHA have emphasized the need for MPH programs to adapt their curriculums and training to meet the skill requirements of graduates' work and the overall health systems needs of the continent (35). Identifying competencies that are relevant to the work of MPH graduates and harmonizing these competencies across MPH programs have been proposed as important steps in the efforts to improve MPH education in Africa (156-158).

While there is consensus on the need to identify core competencies for MPH graduates in Africa, as explored in Chapters 3 and 5 of this thesis, concerns have been raised about the acceptability of harmonizing competencies across programs among stakeholders and institutions (16, 34). Additionally, there are concerns about the challenges that MPH programs

might encounter in adopting harmonized or common sets of core competencies (26, 34). Exploring the acceptability towards the adoption of competencies across MPH programs in Africa has become important. This is because it will help inform the ASPHA whether there is buy-in from member institutions. Exploring the perspectives of MPH programs in Africa about the challenges that may arise in adopting common sets of core competencies will inform the ASPHA about potential barriers to the process of harmonization. Furthermore, it will inform the ASPHA about the resources and support that needs to be provided to MPH programs to facilitate their adoption of any identified core competencies.

6.2 Aim of Study

To explore the acceptability and challenges of adopting harmonized or common sets of core competencies across MPH programs in Africa.

6.3 Objectives

1. To explore the acceptability towards the adoption of harmonized or common sets of core competencies across MPH programs in Africa.
2. To explore the perspective of key stakeholders – lecturers, and heads of MPH programs about the challenges that might be encountered in adopting common sets of core competencies across MPH programs in Africa.

6.4 Methodology

This was an exploratory study that employed both a survey and in-depth interviews to capture the perspectives of key stakeholders—lecturers and heads of MPH programs—on the acceptability and challenges of harmonizing core competencies across MPH programs in Africa. The survey was used to gather perspectives from a diverse range of stakeholders, offering a broad understanding of their views. In-depth interviews were well suited to gain deeper, more nuanced insights into stakeholders' experiences and opinions. Additionally, rapport had already been established with informants through their participation in the study on core competencies reported in Chapter 4, facilitating more open and detailed discussions during the interviews.

6.4.1 Study population

The study population comprised lecturers and heads of MPH programs in Africa that are members of the ASPHA.

6.4.2 Sampling and recruitment of study participants

All heads of the 53 MPH programs which were members of the Association of Schools of Public Health in Africa as of the 5th of February 2023 were invited to take part in a survey. Additionally, twenty (20) lecturers who teach core MPH courses in five purposively sampled MPH programs were also invited to participate in interviews. The five programs were the same five from which graduates and lecturers gave inputs on the applicability and depth of the identified competencies in Chapter 5. First, a link to an online survey was shared with the ASPHA secretariat. The secretariat then sent this link via email to all the heads of the 53 MPH programs that are members of the association. The lecturers from the five MPH programs were also invited via email by the doctoral student to participate in the study.

6.4.3 Data collection

An online survey questionnaire **(https://redcap.link/aspha)** was sent via email to all heads of MPH programs that were members of the ASPHA as of the 5th of February 2023. The questionnaire was developed using the aims and objectives of the study as a guide. Information on demographics, educational background, and how long respondents had served as heads of their MPH program was collected. Information on the level of support of heads of MPH programs and their institutions towards the harmonization of core competencies across MPH programs in Africa was also collected on a Likert scale. The scale had five levels – 1=strongly oppose, 2=somewhat oppose, 3=neutral, 4=somewhat in support, 5=strongly in support). Information on the challenges that MPH programs might encounter in adopting harmonized or common sets of core competencies across their programs was collected using both open ended and close ended questions. Effects of challenges related to resource limitations, institutional approval process, and resistance from faculty members on core competencies harmonization was graded on a Likert scale — 1= will significantly affect, 2= will somewhat affect, 3= will not affect. Another option of "Don't know" was available for programs heads who did not know the effects of the challenges on their institutions adoption of harmonized core competencies. The survey also had open ended questions that allowed programs heads to share their perspectives on their support and challenges to harmonization as free text/comments. The survey was circulated in February 2023 and data was collected from February 2023 to April 2023. Fourteen out of the twenty invited lecturers who agreed to participate in the study were interviewed using semi-structured questionnaires (Appendix 7). Interviews were conducted remotely using Zoom and Microsoft Teams.

6.4.4 Data analysis

Data obtained from the survey of heads of MPH programs was entered into Microsoft Excel for cleaning and analysis. Data analysis was done using STATA 14. Descriptive analysis for variables derived from close-ended questions and summary statistics (with appropriate measure of central tendency) for normal and non-normally distributed variables was conducted. Differences in responses by demographic and institutional variables were analyzed using appropriate statistical tests (t-tests, Mann-Whitney tests/Wilcoxon rank-sum test, ANOVA, and chi-square test) at a 0.05 level of significance. Analysis of the Likert scale items involved counting the number of responses for each item/category and computing this as a percentage. Bar charts were then used to visually present the responses.

Interviews with lecturers/course convenors were audio-recorded and transcribed by the PhD student using a data transcription software— Otter ai. The transcribed data was cleaned and checked for errors by listening to the audio recording several times and comparing it with what was transcribed by the data transcription software. Using a deductive data analysis method, the transcribed data was categorized under four themes — Resources, competencies adoption process, resistance from faculty member, institutional differences. To assure rigour, the error-check transcript and data collected under the four themes were cross-checked by a senior member of the research team (PhD supervisor). There was a high level of agreement between the doctoral student and the supervisor regarding the accuracy of transcripts and the extraction of data under the predefined themes. Quotations that best illustrate themes were then selected for inclusion in the final presentation of the results.

6.5 Ethical approval

Ethical approval with reference number 332/2020 was obtained from the University of Cape Town Health Sciences Research Committee.

6.6 Informed consent

Before completing the online survey, heads of MPH programs were asked to complete an informed consent form **(https://redcap.link/formconsent).** The form provided participants with details about the study, including its purpose and that participation was voluntary. Lecturers were also required to complete an electronic consent form (Appendix 8) once they accepted the invitation to participate in the study. On the day of the interviews, a verbal confirmation of consent was also obtained from the interviewees.

6.7 Privacy and confidentiality

Anonymity, privacy, and confidentiality of the information collected was emphasized and upheld throughout the interviews and in the surveys. The data collected were securely stored on two password-protected computers. In any document or presentation emanating from the study, no identifiers of individuals are made. The interview recording will be destroyed two years after the study is closed.

6.8 Reimbursement for participation

Participants in this study received no remuneration or compensation.

6.9 Results

6.9.1 Survey of Heads of MPH programs

6.9.1.1 Response Rate and Demographics of Respondents

Twenty-six (26) out of the fifty-three heads of MPH programs invited to participate in the survey responded (49.1% response rate). The median age of respondents was 54 (IQR: 52-58 years). The majority of the respondents were males (69.2%) and 30.8% were females. The median age of males was 52.5 (IQR: 51-54 years) and that of females was 57.5 (IQR: 54-62 years) and this difference was statistically significant (p=0.02). Figure 43 shows the age distribution of respondents.

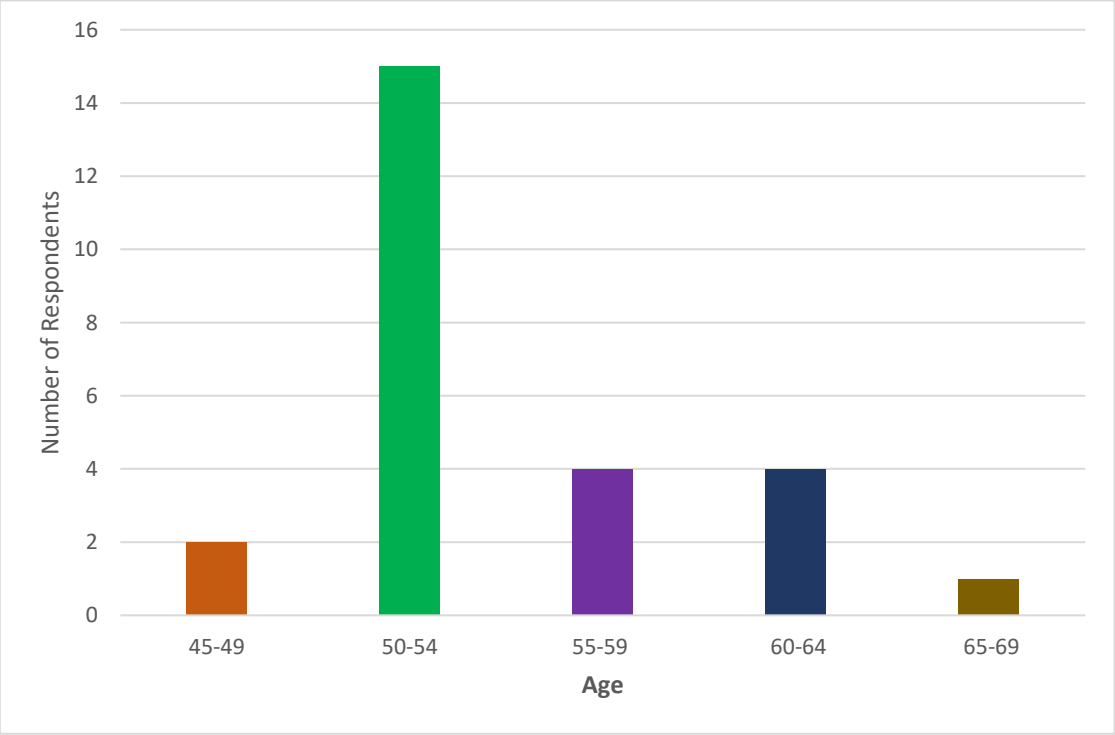

Figure 43: Age distribution of participants (n=26)

Expectedly, the highest level of education for most (i.e. 84.6%) of the respondents was a PhD degree and 15.4% reported having a master's degree as their highest level of education. Respondents served as heads of MPH programs in institutions that span the five sub-regions of Africa (i.e. West, Central, Northern, Eastern and Southern Africa). Most respondents (85%) were from MPH programs in West Africa, Southern and Eastern Africa compared to (15%) from north and central Africa (p=0.01) (Figure 44 and Table 9)

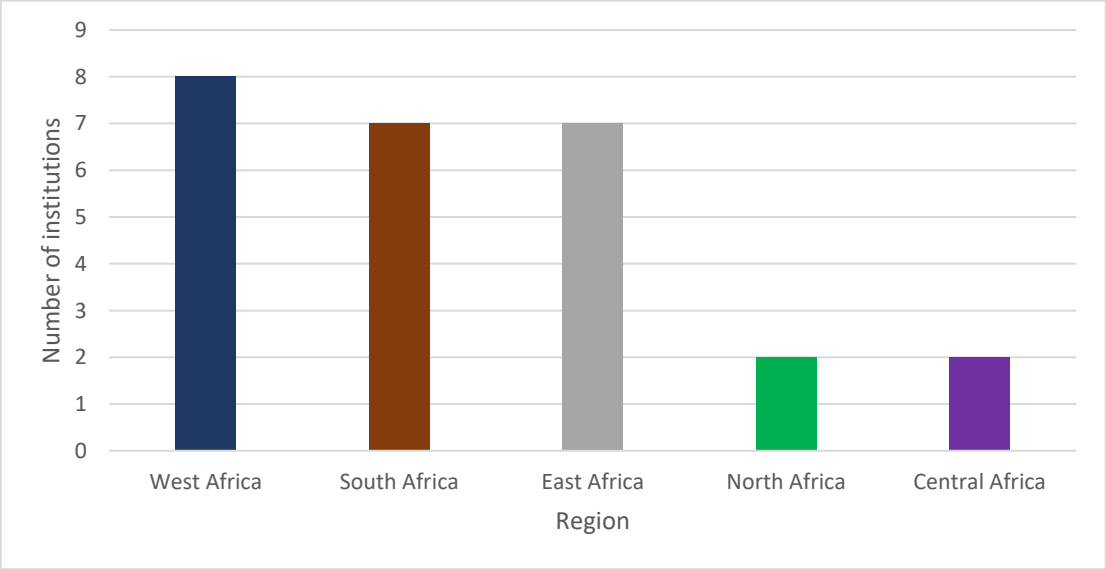

Figure 44: Regional representation of institutions whose heads of MPH program completed the survey

Table 9: Institutions whose head of MPH program completed the survey

Region	Number of Institutions	Institutions whose head of program completed the survey	Country
West Africa	8	Ensign Global College	Ghana
		School of Public Health, University of Health and Allied Sciences	Ghana
		School of Public Health, Kwame Nkrumah University of Science and Technology	Ghana
		Babcock University	Nigeria
		Department of Community Health & Primary Health Care, University of Lagos	Nigeria
		Department of Public Health, University of Calabar	Nigeria
		Institute of Public Health. Obafemi Awolowo University	Nigeria
		Institut African de Santé Publique	Burkina Faso
Southern Africa	7	Kamuzu University of Health Sciences	Malawi
		University of the Western Cape	South Africa
		University of Cape Town	South Africa
		Department of Public Health, University of Lusaka	Zambia
		School of Public Health, University of Botswana	Botswana
		School of Public Health, University of Namibia	Namibia

		School of Public Health, Eduardo Mondlane University	Mozambique
East Africa	7	Meru university of Science and Technology	Kenya
		Tropical Institute of Community Health and Development	Kenya
		School of Public Health, University of Nairobi	Kenya
		University of Gondar	Ethiopia
		School of Public Health, Admas University	Ethiopia
		College of Public Health and Medical Sciences, Jimma University	Ethiopia
		School of Public Health, Horseed International University	Somalia
North Africa	2	Department of Epidemiology. University Hospital Farhat Hached	Tunisia
		High Institute of Public Health, Alexandria University	Egypt
Central Africa	2	Department of Community Medicine/Public Health, University of Juba	South Sudan
		School of Public Health, University of Kinshasa	Democratic Republic of Congo

The mean number of years that participant reported serving as heads of MPH programs was 5.5 years. Male respondents had served longer as heads of MPH programs compared to female respondents (p=0.003). Prior to becoming heads of the MPH programs, all the respondents held lecturing positions in their institutions/universities. Some had also been directors of research and programme coordinators. Respondents reported working in their respective institutions for a mean number of 8.2 years before their appointment as heads of the MPH programs. Compared to males, female respondents worked for longer period in their respective MPH programs before their appointments as heads (p=0.001). Despite the difference in the regional representation of respondents in terms of numbers (Figure 43), the four respondents from MPH programs in north and central Africa did not differ significantly from those from other regions of Africa in terms of age (p=0.29), number of years they served as heads of MPH programs (p=0.17) and number of years they worked in their respective MPH programs before their appointment as heads (p=0.14).

6.9.2 Harmonizing core competencies across MPH programs: Acceptability among heads of MPH programs and their institutions.

The majority (69.2%) of program heads were strongly in support of the harmonization of core competencies across MPH programs in Africa and 19.2% were somewhat in support (Figure 45). One respondent somewhat opposed the harmonization of core competencies across

programs while 7.7% were neutral. None of the program heads was strongly opposed to the harmonization of core competencies across programs. The respondent who somewhat opposed the harmonization of core competencies across programs explained their response, arguing that the process presumes similar contexts which they believed was not necessarily so.

> *"The notion of harmonized competencies for MPH (or any paraprofessional training) presumes a fairly homogenous set of public health challenges and needs. I am not sure it's a meaningful activity to try to 'harmonize' beyond very high-level themes/trends",* **Respondent 14**

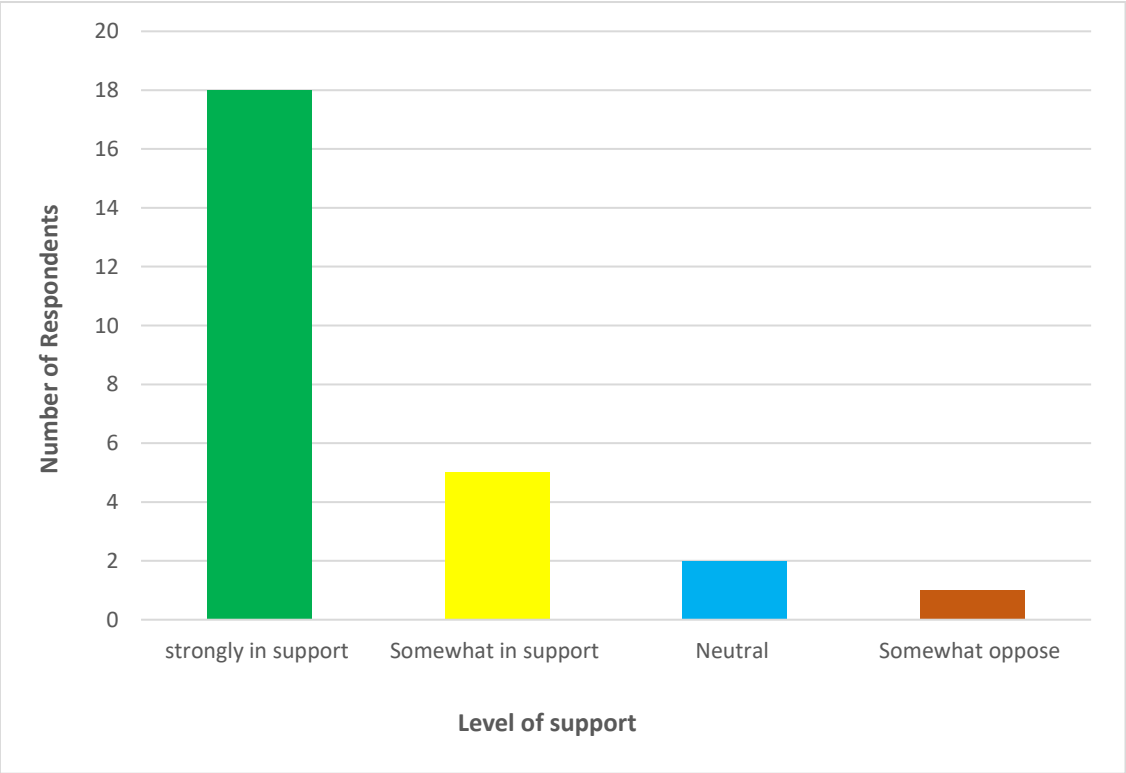

Figure 45: Level of support among heads of programs for the harmonization of core competencies across MPH programs in Africa (n=26)

When asked to grade what they perceived was the level of support of their MPH program towards the harmonization of core competencies across programs, 57.7% felt their MPH programs were strongly in support and 15.4% felt that their programs were somewhat in support. Few (11.5%) of the heads of MPH programs felt their MPH programs held neutral positions and 15.4% reported that they did not know the position of their programs. None of the heads of MPH programs felt their MPH programs strongly or somewhat opposed the harmonization of core competencies across MPH programs in Africa (Figure 46). Almost three-quarters (73.1%) and a quarter (26.9%) of program heads completely or somewhat agreed that identifying common sets of core competencies and harmonizing these across MPH programs would improve graduate's contribution to health systems strengthening. Most program heads

completely agreed (65.2%) or somewhat agreed (34.8%) that it would be feasible to integrate any common sets of core competencies identified for programs in Africa into their existing curriculum, and none reported that this will not be feasible, Figure 47.

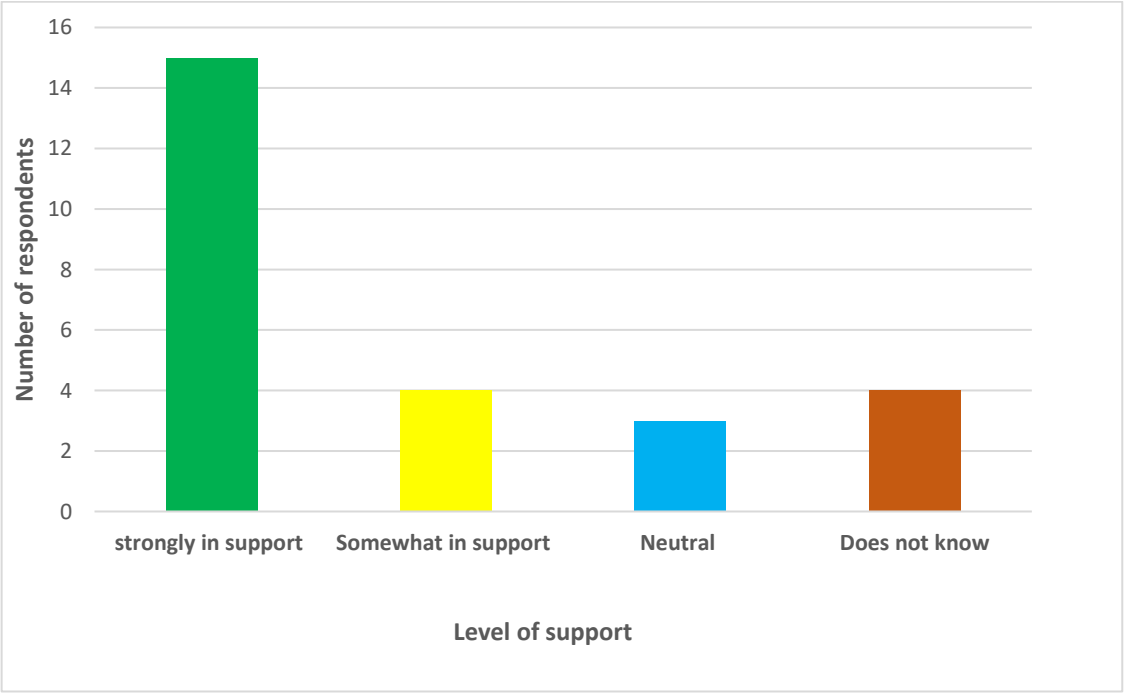

Figure 46: Institutional support for harmonization of core competencies across MPH programs (n=26)

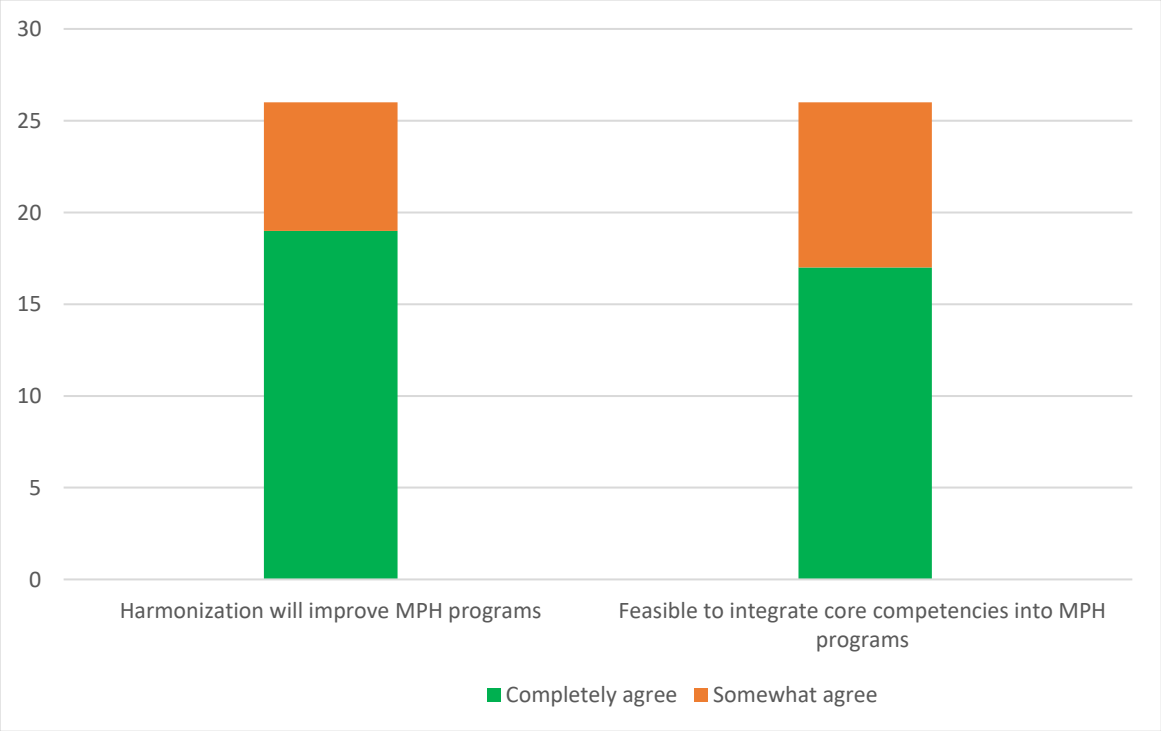

Figure 47: Impact of harmonization on MPH program improvement

6.9.3: Challenges of adopting harmonized core competencies across MPH programs in Africa

6.9.3.1 From survey of heads of MPH programs

Heads of MPH programs who completed the survey graded the extent to which challenges related to institution's approval, resistance from faculty members and resource limitations could hinder their adoption of harmonized or common sets of core competencies on a scale of 1-3. Challenges that majority of the heads of MPH programs felt could significantly or somewhat affect the adoption of harmonized competencies included; limited resources by way of staff to teach new core competencies previously not covered in their curriculum (76.9%) and limited funding to support additional training of new or existing staff to teach new sets of core competencies (73.1%), Figure 48. Few heads of programs (19.2%) felt that challenges related to getting their institution's approval to adopt harmonized core competencies would significantly or somewhat affect the adoption of competencies. Very few heads of programs (11.6%) felt that resistance from lecturers who may consider the teaching of new competencies as an additional burden could significantly or somewhat affect the adoption of these competencies in their programs. Other challenges that program heads felt could hinder the adoption of harmonized core competencies included the unavailability of textbooks and other relevant reading materials needed to teach newly identified core competencies, as well as a lack of lecturer skills to deliver them.

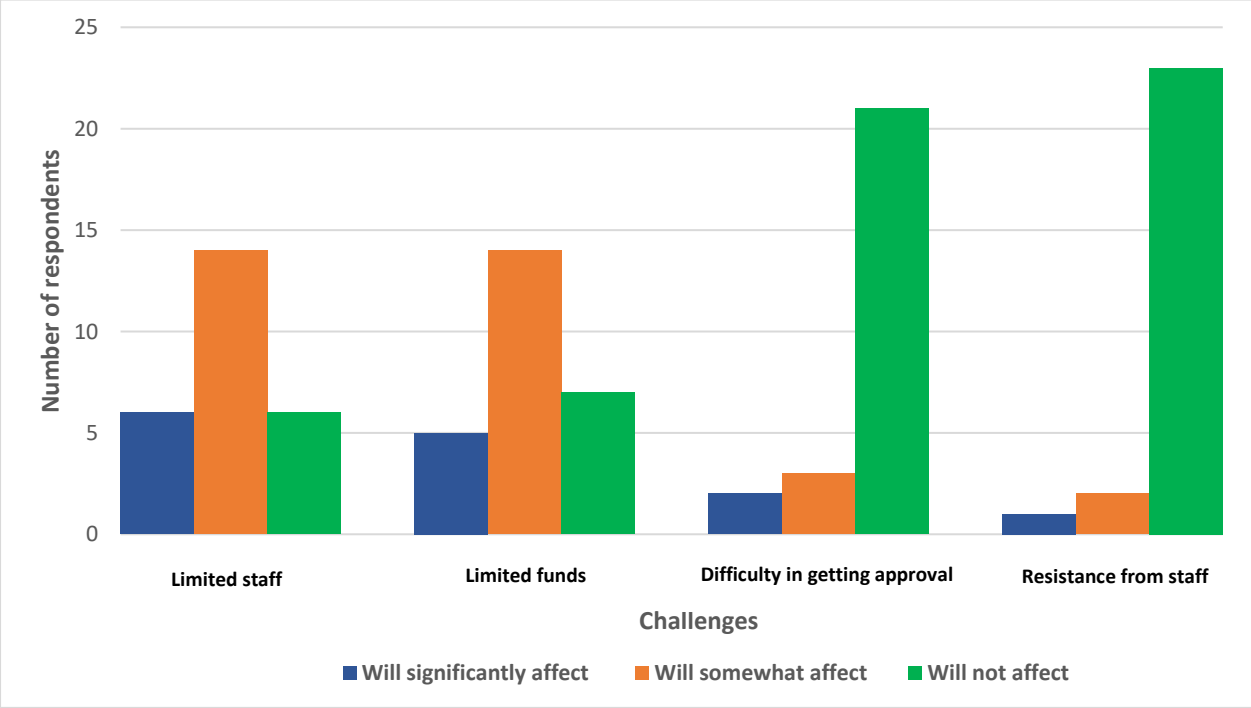

Figure 48: Challenges of adopting harmonized core competencies across MPH programs

Program heads also made recommendations on how the process of adopting harmonized core competencies across MPH programs could be made as smooth as possible. These recommendations included creating buy-in to the plan by inviting all heads of programs for a brainstorming session on the core competencies prior to their adoption by programs; offering joint regional training and information sessions for lecturers on the harmonized core competencies; providing support and mentorship from experts in curriculum review and competency integration to programs as they implement the harmonized core competencies, while also fostering strong partnerships among MPH programs to encourage peer learning

> *"I will strongly recommend an invitation of all heads of Programs to a conference for a brainstorming session"* ***Respondent 8***

> *"I think that it would be good to be provided with some support eg. have educational 'experts' or experienced public health teachers or lecturers help or mentor teams to incorporate new competencies into their curriculum…."* ***Respondent 6***

6.9.3.2 Findings from interviews of MPH lecturers

6.9.3.2.1 Demographics of Respondents

The mean age of participants was 52 years. Majority (64%) of the participants were males and 36% were female. The mean age of male participants was higher than that of female participants (53 versus 50 years), but this difference was not statistically significant (p=0.8). Participants had between 5 to 30 years of experience in public health education and had spent between 3 to 20 years teaching MPH courses in their respective programs. The challenges reported and highlighted by the lecturers in the interviews were very similar to that from the survey of heads of MPH programs and are presented under the following themes

6.9.3.2.2 Resources needed to teach harmonized competencies

Challenges related to resources, both human and material needed to teach harmonized core competencies were expressed by most of the lecturers as a potential hindrance to their institutions adoption of core competencies. Lecturers or course convenors foresaw that adopting harmonized or common set of core competencies would require additional training of existing staff members and in some cases the hiring of new staff members to teach the harmonized core competencies. Lecturers were concerned that funds needed to achieve this may not be available.

"Already the program is struggling with getting funding from the University for important things like research and I am not sure we will have the funds to provide additional training to staff members to enable them teach the core competencies" ***Lecturer 13***

"……. we are experiencing a situation where staff members have to take on more courses and supervise more students for their thesis than we are supposed to because the university hasn't received the financial clearance to hire more staff. I think we will have a major challenge adopting the competencies if we have to hire new lecturers to teach them" ***Lecturer 3***

Aside from the challenge of limited funds to support additional training or hiring of lecturers to teach the harmonized core competencies, participants were concerned about the challenges that might be encountered in obtaining the necessary teaching and learning materials (textbooks, handouts etc.) needed to teach the harmonized competencies.

"……. You know these competencies might be new to some of us which means that we might not have all the textbooks and handouts needed to teach them at the beginning…. I hope some support/guidance will be provided with regards to the teaching materials" ***Lecturer 14***

One participant expressed concern about the limited time available to cover course content and how adding core competencies to existing courses—without first reviewing them to identify redundant content for replacement—could place lecturers under immense time pressure.

"……I will tell you this, personally I am not against the adoption of common set of core competencies but most of us already struggle to complete our lesson because we have to cover a lot within a short period of time. …. And remember we have other work responsibilities aside from teaching. I am afraid but if we have to add additional competencies to what we need to cover in our existing courses, then we might simply not have enough time to do this…." ***Lecturer 5***

6.9.3.2.3 Competencies adoption process

Many Lecturers noted that adding new competencies or courses into their MPH programs involve a thorough curriculum review process. One mentioned that adding or removing courses in her MPH program first must go through a curriculum review process starting from the departmental level, then to the faculty and finally to the university for approval. They were therefore concerned that curriculum review processes, which are usually time consuming and face bureaucratic hurdles, could affect the timely adoption of the harmonized competencies. Lecturers also noted concerns about curriculum reviews processes in their institutions which typically take place at specific time intervals. This meant that if the adoption of the harmonized competencies had to take place after a recent curriculum review has been conducted, then adoption would be delayed.

"…we had our curriculum review recently and the next review will only take place in 2027, so am wondering what will happen if we have to adopt any core competencies before the next review..." ***Lecturer 1***

Some added that in some instances – such as when a set of competencies are deemed to be critical and needed to address local health needs – their universities allowed for incorporation of these sets of competencies under existing courses without the need for a full curriculum review.

"……. however, if a course or sets of competencies are deemed to be very important for our local context, then they can be incorporated under existing courses avoiding the new for this very time consuming and tedious curriculum review..." ***Lecturer 8***

6.9.3.2.4 Resistance from faculty members.

Some lecturers pointed out that the incorporation of new sets of competencies into MPH programs – through curriculum review, with changes to existing courses and teaching methods – could face resistance from some faculty members. This would affect the adoption of any harmonized core competencies. A few lecturers were concerned about the additional time lecturers may have to spend teaching the harmonized core competencies and argued that this could lead to resistance from lecturers who considered this as additional work.

"……. I foresee some resistance from some of our faculty members who will not be happy with changes made to their courses to accommodate any proposed competencies..." ***Lecturer 11***

"……. I hope the addition of any new courses or competencies will be discussed right from the beginning with all staff members for their approval because I don't think any of us will be happy if we are just given additional work without compensation..." ***Lecturer 4***

One Lecturer was concerned about how dissatisfaction among staff members in her institution over salary freezes in the past three years and little compensation for faculty members who took on additional responsibilities could lead to resistance from some lecturers if they perceive the teaching of the harmonized competencies as additional work without compensation.

"Financially, things are tough here and honestly, most of us are not happy that our salaries haven't been increased in the past three year…and if we have to take on this additional work of teaching new competencies, it will mean we are doing it out of the goodness of our hearts and not everyone will be happy with that" ***Lecturer 1***

6.9.3.2.5 Institutional differences

Lecturers discussed broader challenges that could affect the adoption of harmonized competencies across MPH programs in Africa. Many pointed out that those institutional differences such inequitable resources – both human and financial – between MPH programs would make it difficult to harmonize competencies across programs. They were concerned that

institutions with financial challenges would struggle to adopt the harmonized competencies if hiring of new staff or additional training of existing staff was needed which would disadvantage their program and students.

> *"The reality is not all programs have the resources needed to adopt the harmonized competencies…My institution is lucky to have a lot going well for us at the moment, but I have colleagues who complain about the financial challenges they have to deal with at their institutions."* ***Lecturer 6***

Some noted that differences in the educational systems, institutional culture and curriculum review processes across institutions in different countries could also lead to delays in the adoption of harmonized competencies in some institutions while this might not be the case for others. One mentioned that if the ultimate aim of harmonizing competencies across programs is to move towards some form of standardization and accreditation of MPH programs, then differences in accreditation processes and standards across different countries could pose a challenge. Furthermore, interviewees felt variation in cultures and languages across countries could be a major challenge if competencies are not formulated and interpreted in a way that makes them culturally appropriate to the local context.

6.10 Discussion

This study employed a mixed-methods approach, complementing a broad survey with in-depth interviews to explore the acceptability and challenges of harmonizing common sets of core competencies across MPH programs in Africa. The study found that most heads of MPH programs in Africa (i.e. 88.4% of respondents) were either strongly or somewhat in support of the harmonization of core competencies across MPH programs in Africa. Over the years, discussions around core competencies harmonization across educational programs have been closely linked to program accreditation and improvement in training (193). Educational institutions that have sought to improve their program have usually integrated competencies identified or developed by national and regional associations into their curriculums (1, 159, 165). Organizations that have developed core competency frameworks have also done so with the intention of harmonizing competencies across programs – to ensure that regardless of which institution of training, graduates are equipped with the skills, knowledge and attributes needed to address public health problems (165, 194). For example, associations like the US Council for Linkage between Academia and Public Health which developed core competency frameworks for US public health programs emphasize the important role harmonizing competencies can play in program improvement and accreditation (16, 85, 159, 195). In the

African context, during ASPHA conferences, a close link between core competencies harmonization and program improvement and accreditation has been highlighted in stakeholder discussions. These discussions involved lecturers and heads of MPH programs. For example, during the Ugandan 2019 ASPHA conference, the need to identify and harmonize core competencies across programs was agreed to be a first step toward improving MPH education and program accreditation in Africa. The overwhelming support for harmonization of core competencies found in this study could reflect a recognition by heads of MPH programs – who have been involved in ASPHA discussions about the potential benefits that such an exercise could contribute to improving MPH education in Africa.

The barriers to harmonizing core competencies across programs, as pointed out by heads of programs, aligned with those identified in interviews with lecturers. These barriers – related to inadequate resources, emerged from the survey and interviews. Both heads of programs and lecturers acknowledged that limited funding and staff shortages would impact negatively on the harmonization project, particularly if additional skilled staff needed employment. Some lecturers argued that the limited time available to cover course materials, along with unavailability of teaching and learning materials on new competencies would be obstacles to competencies harmonization. Similar to the findings of this study, resource limitations have been found in several studies to be a major barrier to the successful implementation of new curriculum and the adoption of new competencies across educational programs (196, 197). For example, a study by Nevenglosky (2018) which assessed the barriers to effective curriculum implementation, identified inadequate staffing and funding to be major obstacles (197). Successful implementation of new curriculum or competencies in educational programs are also reported to be reliant on ongoing training of educators (196, 197). Echoing the findings of this study, Onyura et al. (2022) argue that in institutions where financial resources are limited, this can result in a gap in educator training and readiness and affect the effective integration of new competencies/courses into programs (196).Bureaucratic hurdles associated with curriculum review and reform are widely reported in the literature as barriers to the integration of new competencies/courses into existing curriculums (198, 199). Studies conducted in the US., Belgium and Kenya have found that, extensive administrative tasks required for curriculum review, along with complexities in aligning new competencies with existing curricular structure, can delay or hinder their integration into educational programs (198-201). As is reported in the literature, Lecturers in this study acknowledged that adding new competencies/course into their programs would involve complex and lengthy curriculum

review and approval processes which could delay core competencies adoption. On the contrary, few heads of MPH programs (19.2%) believed that curriculum review and institutional approval processes would significantly affect their institutions' adoption of harmonized core competencies. Typically, heads of programs are more exposed to institutional administrative processes than lecturers and may be more accustomed to navigating the bureaucratic hurdles which are typical of curriculum reforms and new competencies integration. This could possibly explain why only a few heads of MPH programs compared to lecturers believed that institutional bureaucratic hurdles would significantly affect the adoption of harmonized competencies across programs.

This study further found resistance from faculty members to be a potential barrier to the adoption of harmonized core competencies across MPH programs in Africa. This perspective was widely shared by lecturers who believed that an increased workload without increasing compensation would lead to dissatisfaction and resistance among colleagues. Studies have shown that introducing new competencies/course into educational programs can significantly increase staff workload due to the time faculty must invest in their professional development and training and the effort required to teach additional contents (202, 203). Increase in workloads, associated with curriculum change, can physically and mentally adversely affect faculty members leading to dissatisfaction and resistance towards future curriculum reforms (202-204). For example, a review of the well-being and challenges confronting academic staff in South African universities, found that excessive work demands – including heavy workload during introduction of new courses, led to staff burnout which negatively impacted their health, performance and in some cases and led to dissatisfaction and resistance (205).

Institution and country differences – in resources, culture, curriculum review, and accreditation processes emerged as one of the challenges that could hinder the harmonization of core competencies across MPH programs in Africa. Disparities in resources among higher educational institutions (HEIs) in Africa are widely recognized (201, 206, 207). Studies have shown that while most HEIs in Africa grapple with inadequate resources compared to their counterparts in developed countries, huge gaps still exist among the different HEI in Africa (207). Some HEIs in Africa have more resources in terms of funding for research, technological infrastructure and academic facilities compared to others. Similar to the findings of this study, Mugimu (2021) argue that disparities in resources among institutions can affect standardization of curriculum across programs offered in different institutions in Africa, and are obstacles to regional accreditation of programs (206). Studies that have assessed

curriculum review and accreditations process among HEIs within and across countries in Africa have also reported some differences. For example, a study by Materu (2007) which assessed the status and practice in quality assurance and accreditation among HEIs in sub-Saharan Africa found significant difference in accreditation process across countries (208). Differences were linked to variations in legal frameworks, institutional capacity, and external influences (208).

Despite the challenges to core competencies harmonization shared by both heads of MPH programs and lecturers, most believed that it is still feasible to harmonize core competencies across MPH programs in Africa if institutions are committed to this project. They made recommendations on ways to achieve this. These included: further strategic and implementation workshops for program heads, staff information sessions, joint regional training, expert support and mentorship to institutions implementing new competencies as well as building strong partnership among MPH programs to learn from each other's experience.

6.11 Study Limitations

Data for this study were collected using qualitative methods (i.e. interviews with lecturers in MPH programs) and quantitative methods (survey of heads of MPH programs), to capture a range of perspectives and explore them in greater depth. Both methods have limitations. Social desirability bias may have affected the responses of heads of MPH programs elicited through the survey. The study included only heads of MPH programs which were members of ASPHA. Recruitment was through the ASPHA network which, for many years, has been advocating for harmonisation of core competencies among MPH programs in Africa. As this thesis had limited timeframe for completion, inclusion of and use of the network of ASPHA MPH programs was necessary. ASPHA buy-in ensured their permission to engage all its members without the need to go through the lengthy processes of applying for ethical approvals from individual programs. Since most MPH programs in Africa are members of the ASPHA, selection bias was unlikely. However, it is acknowledged that inclusion of non-ASPHA member institutions may have introduced additional perspectives or variations that were not captured in this study.

The qualitative component involved interviews with only 14 lecturers from five purposively sampled MPH programs, whose perspectives may not be representative of the diverse experiences across MPH programs in Africa. Nonetheless findings from the qualitative component align with findings from the survey. While study results may not be fully representative of perspectives of MPH programs in Africa, they should inform stakeholders

pursuing harmonizations projects about challenges that programs might encounter in adopting common set of core competencies.

6.12 Conclusions

This study demonstrates a high level of support for harmonizing core competencies across MPH programs in Africa. Harmonization would not only improve MPH education but would also equip graduates with skillsets and attributes to contribute to health systems strengthening on the continent. Potential challenges that programs might encounter in adopting harmonized core competencies include resource limitations across programs, institutional bureaucratic hurdles, institutional differences in terms of resources, culture, curriculum review processes and accreditation, as well as faculty members who may resist the process due to anticipated increases in workloads. While these challenges highlight the complexity associated with standardizing MPH education in a region with diverse educational context, strong commitment from institutions should enable this process. Interventions enabling implementation include high-level strategic planning workshops, staff information sessions followed by training as well as provision of expert support and mentorships to implementing institutions and building strong partnership between MPH programs. These should facilitate curriculum reform focussed on equipping graduates with contextually relevant skills, making them ‘fit for purpose’, as well as harmonisation of curriculum that should assure graduate competence and improve their contributions to health systems strengthening in Africa. Future studies could explore in more depth the pros and cons of harmonizing core competencies across MPH programs in Africa.

CHAPTER 7

Summary of the Evidence and Recommendations

This thesis aimed to identify a set of core competencies relevant to the public health work undertaken by MPH graduates across various public health settings in Africa, to address health and health system challenges in the region. It also explored the challenges of adopting harmonized or common sets of core competencies across MPH programs in Africa. Four interrelated studies were conducted; each contributed to achieving the overall aim of the thesis. This chapter summarizes the key findings from the studies and provides recommendations based on these key findings.

7.1 Key findings from the structured literature review of core competencies for Master of Public Health Programs in Africa

The study identified 187 individual competencies across nine discipline-specific and seven cross-cutting domains that may be relevant to public health work in Africa, as depicted in Figures 17, 18 and Table 6. Out of the sixteen domains identified, only five (epidemiology, biostatistics, health systems, policy & management, health promotion and social and behavioural science) were viewed as core domains or courses by most MPH programs. Domains such as monitoring and evaluation, public health law and outbreak management were either missing or not considered to be core in most MPH programs' curriculum. The first is a cornerstone of public health work in African country settings, and the latter two have been shown to be critical in the light of recent pandemics and growing injustice in health among minority and vulnerable groups. The study also identified methodological commonalities used by associations of schools of public health across the world to identify core competencies for their MPH programs, which informed the methodologies of this thesis. These methods include review of the literature to create a preliminary set of competencies, followed by stakeholder consultations – interviews, survey of public health experts and educators and in some cases Delphi panels to refine or add to the competencies identified.

7.2 Applicability, level of confidence, acquisition, and depth of coverage of identified competencies in MPH programs in Africa.

The study found that the MPH contributed to a shift in graduates roles from clinical to managerial and improved their employability. Although most MPH graduates were highly confident in their ability to apply PH sciences and research competencies to address health issues, these competencies were not the most applicable to their work. Graduates were less

confident in their ability to utilize competencies in domains such as leadership, communication, monitoring and evaluation, community and intersectoral collaboration, outbreak management, and health promotion but these were the most applicable to their work. Furthermore, while the MPH contributed substantially to their acquisition of the public health sciences and research competencies, it contributed little to graduates' acquisition of competencies in domains like monitoring and evaluation, communication, leadership, community and intersectoral and outbreak management, which were more applicable to their work. There were some similarities as well as differences in the depth of coverage in domains like epidemiology, biostatistics, health systems/policy, health promotion and environmental health sciences across the different MPH programs. While all program equipped graduates with the foundational knowledge they need to perform domain related tasks, there were variations in the practical opportunities provided during the MPH for real-life application of this knowledge across the different programs. Some programs had mandatory internship components which motivated learners to apply the knowledge they acquired from the program to real-life work or challenges. Other programs either had optional internships and elective practicum components or no practical training opportunities, which provided little motivation for learners to apply the knowledge they acquired from the course to real-life work.

7.3 Perspectives of employers of MPH graduates on core competencies needed for public health work in Africa.

The study found that MPH graduates working in six public health work settings in Africa – government, non-governmental organizations working in public health, private for-profit organizations, social movements, research networks, and training institutions – were viewed positively by their employers, held key positions, and performed critical roles that contributed significantly to health systems strengthening on the continent. To effectively perform roles, employers of MPH graduates believed that they should have competencies in key areas such as leadership, health promotion and advocacy, project management, health financing, communication, data analysis, public health education and training, monitoring and evaluation, environmental health, public health related law and outbreak management. (Table 8). The study also found that during the COVID-19 pandemic, MPH graduates working in the different sectors of health played vital roles which contributed to the health systems response to the pandemic. These roles were in the areas of research, policy development and implementation, communication, infectious disease control, and community engagement.

7.4 Harmonizing core competencies across MPH programs in Africa-Acceptability and Challenges

The study found strong support among heads of MPH programs in Africa towards the adoption of a common set of core MPH competencies across programs in the region. They agreed that harmonization of core competencies across MPH programs will enhance MPH education in Africa and improve graduates' contribution to health systems strengthening in the region. The study also identified potential challenges that MPH programs in Africa could face in adopting harmonized or common sets of competencies. These challenges centered around resource limitations – human, financial, time and materials, institutional bureaucratic hurdles, institutional differences in terms of resources, culture, curriculum review processes and accreditation, as well as resistance from faculty members who may foresee increases in workloads. While these challenges underscore the complexity of harmonizing core competencies across programs in a region with diverse educational contexts, strong institutional commitment can facilitate this process. Key enabling interventions include high-level strategic planning workshops, staff information sessions followed by targeted training, expert support and mentorship for implementing institutions, and the development of strong partnerships between MPH programs to promote cross-learning.

7.5 Recommendations

Based on the research findings, recommendations are made that include considerations about core competencies for MPH programs and course content, as well as the process of adopting core competencies across and within African health systems.

1. **Continental and country level considerations**

   While adoption of the core competencies identified through this thesis across all MPH programs in Africa is encouraged, the diversity that exists across the different countries and different MPH programs in the region is acknowledged. Some flexibility in the adoption of these competencies across programs which allow institutions to take into account their unique cultural and educational contexts is recommended. MPH programs should analyze their local context and health systems needs and identify which sets of competencies from those identified in this thesis are relevant to their local health and educational context and emphasize these in their MPH curriculums.

2. Shifts in MPH program structure

MPH programs in Africa should provide students with more opportunities for practical application of the knowledge and skills acquired during the MPH to real-life work. This could be achieved through partnering with government, research institutions, non-profit organizations, social movement groups and the private sector to provide fieldwork, internships and practicums as part of the MPH. To ensure that all students take advantage of these practical training opportunities, internships, fieldwork and practicums should be made a compulsory component of the MPH training where possible.

Since MPH graduates in Africa often work in interdisciplinary and inter-sectoral roles, programs should emphasize cross-cutting generic competencies, like monitoring and evaluation, public health law, advocacy, health promotion, communication, data analysis and project management which are useful across all public health sectors. Training should prepare graduates to adapt these skills to specific sectoral contexts.

Adding the core competencies identified in this thesis to what is already taught in MPH programs will increase the list of competencies to be covered in programs. To accommodate this, provisions must be made to allow some competencies to be covered under specialized tracks like health economics, while foundational competencies can be a requirement for all students pursing the MPH.

3. Addressing MPH core competency gaps

Given the rise in epidemics and pandemics in recent years and the crucial roles MPH graduates played during the COVID-19 pandemic, there is an urgent need for MPH programs in Africa to equip students with the competencies they need to address any future epidemics and pandemics. Domains such as outbreak management should be considered for inclusion in the core courses or domains offered in MPH programs – in future curriculum review exercises.

Considering the financial constraints faced by most countries in Africa and their impact on the health system, there is a need for MPH programs in Africa to equip students with at least the basic tenets of health financing. Fundamental skills in budgeting, fundraising for health programs/projects, research grant applications, and the elements required to conduct cost-effectiveness analysis could be integrated into existing courses in the MPH. More sophisticated health finance competencies can be pursued post-MPH through specialized programs such as health management diplomas.

Good leadership and management are key to addressing most of the health systems challenges in Africa. The MPH has historically served as a steppingstone for graduates to occupy key leadership and management positions within the health care systems in most African countries. It is therefore recommended that MPH programs in Africa should at least equip graduates with the basic tenets of organizational management. Fundamental skills in leadership such as conflict resolution, negotiation and cultural sensitivity identified in this thesis should be integrated into existing courses in MPH programs. More sophisticated leadership competencies can be pursued through specialized programs post-MPH.

4. Managing change

The adoption of a core competency framework and resultant changes to courses across MPH programs in Africa are likely to face challenges. To effectively navigate challenges, such as those identified in this thesis, robust, evidence-based change management strategies need to be implemented at continental, national and university specific levels. These could include high-level strategic planning workshops at all levels, staff information sessions in institutions to ensure buy-in, followed by targeted training, expert support and staff mentorship, as well as the development of strong partnerships between MPH programs to promote cross-institutional learning.

The public health landscape in Africa is constantly evolving, with emerging challenges such as climate change impacting health systems. At continental and country levels, mechanisms need to be set up to ensure that any new competencies which are adopted across programs are constantly reviewed and updated to keep them relevant to the evolving health context. The ASPHA could play a critical role in supporting the operationalization of the core competency framework by establishing or coordinating the development of a regional accreditation mechanism for MPH programs. Such a mechanism would ensure quality assurance, foster alignment across programs, and provide guidance to institutions as they adopt and adapt the harmonized competencies to their specific contexts.

To further develop a robust and context-specific set of core competencies for MPH programs in Africa, it's essential to combine a review of the literature, regionally relevant core competency frameworks and MPH curricula documents with other participatory research methods which allow for inputs from key stakeholders across different sectors of health. This should be managed by a credible continent-wide umbrella body such as ASPHA.

In conclusion, this thesis on core competencies which incorporated perspectives from a range of stakeholders—including graduates, MPH educators, and employers—provides a critical foundation for developing a competency framework that ensures MPH graduates are work-ready and equipped to contribute meaningfully to improving health systems in Africa. The study highlights key factors that must be considered and outlines the processes necessary for the successful harmonization of competencies, ultimately advancing PH in Africa.

8.0 References

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9.0 Appendices

Appendix 1: PubMed Search strategy, modified as needed for other electronic databases

1.	MeSH	Competency-Based Education[MeSH]
2.	Free text	Core competencies OR core competency OR competency OR competencies OR core knowledge OR core skills OR knowledge OR skills OR core domain
3.	1 OR 2	
4.	MeSH	Public Health [MeSH] OR Students, Public Health Education [MeSH], Public Health Professional [MeSH] OR Schools, Public Health [MeSH] OR Public Health Practice [MeSH]
5.	Free text	Master of Public Health OR Master of Public Health OR MPH or MSc in Public Health OR MA Public Health OR Public Health courses OR Public Health institutions OR Master in Public Health course OR Public Health programme OR Public Health training OR Public Health University OR Public Health Universities OR Public Health School OR Public Health Schools
6.	4 OR 5	
7.	3 AND 6	

Appendix 2: List MPH institutions that are members of the ASPHA

Sub-region	Country	MPH institution	Website
SOUTHERN AFRICA	Botswana	School of Public Health, University of Botswana	http://www.ub.bw
	Malawi	School of Public Health & Family Medicine, University of Malawi	**http://sphfm.medcol.mw**
	Namibia	School of Public Health, University of Namibia	**http://www.unam.edu.na**
	South Africa	School of Public Health and Family Medicine, University of Cape Town	**http://www.uct.ac.za**
	South Africa	School of Health Systems and Public Health-University of Pretoria	**http://www.up.ac.za**
	South Africa	School of Public Health, University of the Western Cape	**http://www.uwc.ac.za**
	South Africa	School of Public Health, University of Witwatersrand	**http://www.wits.ac.za**
	South Africa	Division of Community Health, Stellenbosch University	**http://www.sun.ac.za**
	Zambia	Department of Public Health, University of Lusaka	**http://www.unilus.ac.zm**
	Mozambique	School of Public Health, Eduardo Mondlane University	**http://www.uem.mz**
NORTH AFRICA	Egypt	High Institute of Public Health, Alexandria University	**http://au.alexu.edu.eg**
	Tunisia	Department of Epidemiology, University Hospital Farhat Hached	
CENTRAL AFRICA	Democratic Republic of Congo	School of Public Health University of Kinshasa	**http://www.unikin.cd**
WEST AFRICA	Ghana	School of Public Health, University of Ghana	**http://www.ug.edu.gh**
	Ghana	School of Public Health, Kwame Nkrumah University of Science and Technology	**http://www.knust.edu.gh**
	Ghana	School of Public Health, University of Health and Allied Sciences	**http://www.uhas.edu.gh**
	Ghana	Ensign College of Public Health	**https://www.ensign.edu.gh**
	Nigeria	School of Public Health, Babcock University	**http://www.babcock.edu.ng**
	Nigeria	Department of Community Health & Primary Health Care, University of Lagos, Lagos	**http://www.unilag.edu.ng**
	Nigeria	Health Department of Preventive Social Medicine, University of Port Harcourt	**http://www.uniport.edu.ng**
	Nigeria	Institute of Public Health, University of Nigeria	**http://www.unn.edu.ng**

	Nigeria	Department of Public Health, University of Calabar	**http://unical.nucdb.edu.ng**
	Nigeria	Department of Community Medicine, Nnamdi Azikiwe University and Teaching Hospital	**http://www.unizik.edu.ng**
	Nigeria	Department of Community Health, University of Benin	**http://www.uniben.edu**
	Nigeria	Faculty of Public Health, University of Ibadan	**http://ui.edu.ng**
	Nigeria	Institute of Public Health. Obafemi Awolowo University	**http://www.oauife.edu.ng**
	Nigeria	Department of Community Health, Almadu Bello University	**http://www.abu.edu.ng**
	Nigeria	Department of Community Medicine, Usman Dan Fodio University	**http://udusok.edu.ng**
	Nigeria	Department of Community Medicine, University of Jos	**http://www.unijos.edu.ng**
	Nigeria	Department of Community Medicine, Bayero University	**http://www.buk.edu.ng**
	Burkina Faso	African Institute of Public Health (Institut African de Santé Publique	**http://www.usta.bf**
EAST AFRICA	Somalia	School of Public Health, Horseed International University	**http://www.hiu-edu.com**
	Kenya	School of Public Health, Great Lakes University of Kisumu	**http://www.gluk.ac.ke**
	Kenya	School of Public Health, Moi University	**http://www.mu.ac.ke**
	Kenya	School of Public Health, University of Nairobi	**http://www.uonbi.ac.ke**
	Kenya	Department of Environmental Health, University of Kabianga	**http://www.kabianga.ac.ke**
	Kenya	Faculty of Health Sciences, Jaramogi Oginga Odinga University of Science and Technology	**http://www.jooust.ac.ke**
	Ethiopia	College of Public Health and Medical Sciences, Jimma University	**http://www.ju.edu.et**
	Ethiopia	Department of Public Health, Admas University	**http://www.admasuniversity.com**
	Uganda	School of Public Health, Makerere University	**http://www.musph.ac.ug**
	Ethiopia	Institute of Public Health, University of Gondar	**http://www.uog.edu.et**
	South Sudan	Department of Community Medicine/Public Health, University of Juba	**http://jubauni.net**
	Tanzania	School of Public Health and Social Science, Muhimbil University of Health and Allied Sciences	**https://www.muhas.ac.tz**

Appendix 3: Modified version of the Joanna Briggs Institute QARI data extraction form for qualitative studies

Study ID				
Research/Analytical question(s)				
Geographical setting				
Cultural setting/social context				
Data collection method				
Data analysis				
Participants				
Study findings/Core competencies	**Discipline specific domain**	**Elements of discipline-specific domain**	**Cross-Cutting domain**	**Elements of cross-cutting domain**
	Epidemiology		**Communication**	
	Biostatistics		**Commitment to equity**	
	Health Promotion		**System thinking**	
	Health systems, Policy and Management		**Professionalism**	
	Social and behavioural sciences		**Awareness of political context**	
	Public Health Law			

	Environmental Health		**Other (Add as many rows as needed)**	
	Other (Add as rows as needed)			
Other Key Findings				
Illustration from publication (including page number)				
Evidence (Tick as apply)	**Category**	**Yes**		**No**
	Unequivocal			
	Plausible			
	Unsupported			
Author's conclusions				
Reviewer's conclusions				

Appendix 4: Form for extracting core competencies from MPH programs

MPH institution	Document source	Core Competency (Discipline specific domains)								
		Epidemiology	**Biostatistics**	**Health Policy and Management**	**Environmental health**	**Social and behavioural sciences**	**Public Health Law**	**Health Promotion**	**Other (specify)**	**Other (specify)**
Detailed competencies										
		1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	.1_____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____
		1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	.1_____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____
		Core Competency (Cross-cutting domains)								
		Leadership	**Communication**	**System thinking**	**Professionalism**	**Personal skills**	**Awareness of political context**	**Other (specify)**	**Other (specify)**	**Other (specify)**
		1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	.1_____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____	1._____ 2._____ 3._____ 4._____ 5._____ 6._____ 7._____ 8._____

Appendix 5: Form for extracting what is covered in MPH programs and depth on Miller's triangle

MPH institution	Document source	Epidemiology		Biostatistics		Health Systems, Policy & Management		Health Promotion & Education		Environmental Health Science		Social & Behavioural Science	
		What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle
		1. _____ 2._____ 3.._____ __ 4._____	1. _____ 2._____ 3.._____ _ 4._____	1. _____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ 4._____
		Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle
		1. _____ 2._____ 3.._____ __ 4._____	1. _____ 2._____ 3.._____ _ 4._____	1. _____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ 4._____
		What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	SWhat is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle	What is taught under the domain	Level on Miller's triangle
		1. _____ 2._____ 3.._____ __ 4._____	1. _____ 2._____ 3.._____ _ 4._____	1. _____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ 4._____
		Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle	Student assessment	Level on Miller's triangle
		1. _____ 2._____ 3.._____ 4._____	1. _____ 2._____ 3.._____ 4._____	1. _____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ ___ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3.._____ 4._____	1._____ 2._____ 3._____ 4._____

Appendix 6: Guide for interviews with MPH lecturers/course convenors

Suggested sequence: Review MPH content of the course taught by lecturer in the MPH curricula document prior to the interview

Objective of interview:

- To gain insight into the depth of coverage of current core MPH competencies otherwise not explicit in the curricula document.
- Gain insight into how students are assessed in the course you teach
- To explore the factors that influence what is covered in the classroom during the teaching of courses/ domains considered to be core by MPH institutions.
- To explore the opinion of MPH lecturers on competencies needed by MPH graduates for public health work in Africa.
- To explore the challenges that institutions might encounter in adopting harmonized/common sets of competencies for MPH programs in Africa

Data we are hoping to derive:

- What is currently covered in the classroom during the teaching of courses/ domains; considered to be core by MPH institutions.
- How students are assessed in the course
- What competencies are needed by MPH graduates for public health work in Africa.
- Challenges that institutions might encounter in adopting harmonized/common sets of competencies for MPH programs in Africa

Introduction

(Verbal confirmation of consent)

Introductory remarks

We appreciate your decision to participate in this study and making time for this interview.

We are trying to gain deeper insight into what is currently covered in the classroom during the teaching of your course.

Additionally, we would like to gain insight into how students are assessed in the course you teach

Finally, we would like to explore your opinion on the competencies needed by MPH graduates for public health work in Africa.

How data will be utilized: All data collected through this interview will be treated with the highest level of confidentiality. Information obtained through this interview will not be considered as an evaluation of your teaching or MPH programme.

Demographics and professional background

1. Can you please tell me about yourself?

Probe:

- Number of years involved in public health education.
- Number of years spent in teaching core course at current or most recent institutions (if retired).

Depth of coverage of core competencies

1. **Can you share some details about what is covered in your course?**
    - Probe on whether the content stated in the MPH curriculum documents are covered
        - Anything not listed in course content in the curriculum document that is covered in the teaching of the course?
2. **Can you share some details about how students are assessed on the course?**

    Probe:

    - Nature of assessment (Assignment nature, MCQ or written exams etc.)
    - Any practical exposure (Internship/Attachments etc.)
    - Are students given assignments and exercises that simulate real world work situations?

Opinion on competencies for public health work in Africa

1. **Based on your years of experience teaching MPH students, what are some of the competencies you believe are needed by students to contribute to effectively to health systems strengthening**

    Probe:

    - What competencies are needed by MPH graduates working in public health training institutions like your university?
    - What cross-cutting competencies are needed by all MPH for public health in Africa?

Challenges of adopting harmonized/common sets of core competencies

1. **Do you think the lack of harmonized sets of core competencies for MPH institutions in Africa possibly affect MPH graduates' contribution to health systems strengthening?**

    Probe:

    - Do you think it will help improve graduates' performance at the workplace?)
2. **Are there any challenges that your institutions might encounter in adopting common sets of competencies developed for MPH programs in Africa.**
   Probe:
    - Will limited staff to teach proposed core competencies be a challenge?
    - Will limited funding to support further training of existing staff to teach core competencies previously not covered in the MPH programme
    - Will difficulty in getting University's approval in adopting the harmonized core competencies be a challenge?

- Will resistance from lecturers who may consider the teaching of harmonized core competencies as an additional burden be a challenge?
- Any other challenges you haven't spoken about yet?

3. **Any recommendations on ways to ensure that the adoption of harmonized core MPH competencies by your institutions is as smooth as possible?**

Question

1. **Do you have any questions for me?**

Once again, thank you for your participation in this study and your time

Appendix 7: informed consent for lecturers/course convenors

Introduction

I am a PhD candidate in the School of Public Health and Family health at the University of Cape Town (South Africa). In collaboration with the Association of Schools of Public Health in Africa (ASPHA), I am conducting a study that aims to explore the depth of coverage of current core competencies in MPH programmes across Africa.

The purpose of this study is to gain insight into what is currently covered in the classroom during the teaching of courses/ domains; considered to be core by MPH institutions.

Additionally, this study seeks to explore the opinion of lecturers or course convenors on any additional competencies that should be emphasized in the teaching of core courses/domains to help maximize graduates' contribution to health systems strengthening.

Why is this study being done?

- ✓ This study is in response to the dearth of a framework that spells out what core competencies Master of Public Health (MPH) graduate in Africa should possess upon completing his/her degree to contribute effectively to health systems strengthening.
- ✓ This study will help identify core competencies that should be emphasized in MPH programmes in Africa
- ✓ The result of this study will also help inform the development of a core competency framework for MPH programs in Africa.

How many people will take part in this study?

About 30 lecturers or course convenors who teach current core MPH competencies in five selected ASPHA MPH programmes will take part in this study

Voluntary participation:

As an MPH course convenor who convenes/teaches a course/discipline-specific domain that was identified to be core in a previous study, I would like to kindly invite you to participate in the study and take part in an interview. The interview will provide valuable information that could inform Master of Public Health training programmes in Africa. You should not feel compelled to participate and your decision to participate is voluntary. You do not need to respond to questions or issues that make you uncomfortable and you may withdraw from the study at any time without consequences.

What will happen if you agree to take part in the study?

If you decide to take part in the study;

- ✓ We will invite you take part in a virtual (online) interview. The interview will take about 30 minutes. The interview will be recorded and transcribed and your participation and identity will not be disclosed to any third party.

This interview will seek to;

- ✓ Gain insight into what is currently covered in the classroom during the teaching of courses/ domain you convene/teach.
- ✓ Gain insight into how students are assessed in the course you teach
- ✓ Explore your opinion on competencies needed by MPH graduates for public health work in Africa.
- ✓ You may be requested to provide of your course document. The information obtained from analysis of these documents will assist in making a judgement on the depth of coverage of core competencies you teach or convene and will not serve as an evaluation of your course in anyway. The documents you provide us with will be treated with the highest form of confidentiality.

What are the potential risk of this study?

There is no personal risks associated with this study since there will be no direct contact. The only known risk is breaching your confidentiality. However, significant precaution will be taken throughout the study process to protect any information you share with us.

What are the Potential benefits?

There are no direct benefits to you if you take part in this study. The information gained through this study will however help improve the Master of Public Health training in Africa and contribute to health systems strengthening in the long term.

What about confidentiality?

If you agree to take part in this study, all information collected will be kept strictly confidential. We will assign you a code, which will only be known, to members of the research team. The data we will collect from the interviews will be securely stored on two password-protected computers. If the results of this study are published, no names or

identifying characteristics will be mentioned except where consent to do so has been granted

What will happen to the interview recordings after the study is completed?

We will destroy the interview recordings two years after the study is closed and the intended articles from the study have been published.

Who do I need to speak to if I have any questions about the study?

If you have any questions about your participation, you may kindly contact

Dr. Abraham Opare, Email: oprabr001@myuct.ac.za

The UCT Human research ethics committee: hrec-enquiries@uct.ac.za

I hereby give my consent to participate in this study.	Yes		No	
I am aware that the interview will be tape recorded and transcribed	Yes		No	
I am aware that the interview recordings will be destroyed six months after the study is completed	Yes		No	
I understand I am taking part freely without being coerced into doing so.	Yes		No	
I am aware that my answers and opinions will remain confidential	Yes		No	
I understand that I can withdraw from the study at any time without any consequences.	Yes		No	
I confirm that I am willing to provide the course outline and assignment documents for the core domain I convene or teach and I give permission for these documents to be analyzed to determine the depth of coverage of the domain.	Yes		No	
I would like to receive a copy of the research findings	Yes		No	

_____ _____ _____

Name of Participant Signature Date

Dr. Abraham Opare A.O

_____ _____ _____

Name of Investigator Signature Date

Appendix 8: Guide for interviews with employers of MPH graduates

Suggested Sequence: Share a brief infographic explaining what is meant by 'core competencies' in the context of this research.

Objective of interview:

- Explore stakeholders' experience working with MPH graduates including their roles in the organization and contributions to tackling the COVID-19 pandemic
- **E**xplore the perspectives of stakeholder on core competencies needed by MPH graduates for public health work in their organization and Africa.

Data we are hoping to derive:

- Stakeholders' experience working with graduates, graduates' roles in the organization and contributions to tackling the COVID-19 pandemic
- Views of stakeholders on core competencies needed by MPH graduates for public health work in their organization and Africa.

Introduction

(Verbal confirmation of consent)

Introductory remarks

We appreciate your decision to participate in this study and making time for this interview.

We are trying to identify what core competencies are needed by MPH graduates in Africa for public health work in the region.

<u>Stakeholder's experience working with MPH graduates</u>

1. **Can you please share your experience working with MPH graduates in your organization with me?**
2. **Can you tell me a bit about the role of MPH graduates in your organization?**

   Probe:

   - Your opinion of graduates' contribution to the development of your organization. (E.g. Bringing onboard innovative initiatives, evidence-based decision making, leadership roles etc.
   - The contributions of MPH graduates to tackling the COVID-19 pandemic
   - Any sets of competencies graduates had which positively influence their contributions to your organization's development and in responding to the COVID-19 pandemic response

Core competencies expected of MPH graduates from stakeholders

3. **In your view, which of the core competencies shared with you prior to the interview do you expect MPH graduate to possess to contribute effectively to organizational development and health systems strengthening?**

   Probes

   - Among the key competencies, which five in your view are the most relevant and applicable in your organization?
   - What reason do you assign to your choice of these five core competencies as being the most relevant?
   - Would you expect these competencies to be developed during an MPH?

4. **In your view, what competences are needed by MPH graduates for the work conducted in your organization?**

   Probes:

   - Why are these competencies important to the work graduates in your organization
   - Would you expect these competencies to be developed during an MPH?
   - Are they any cross-cutting competencies you believe can help graduate contribute effectively to health systems strengthening in Africa.

Closing Questions

5. **Do you have any questions for me?**

Once again, thank you for your participation in this study and your time!

Appendix 9: Informed consent for employers of MPH graduates

Introduction

I am a PhD candidate in the School of Public Health and Family health at the University of Cape Town (South Africa). In collaboration with the Association of Schools of Public Health in Africa (ASPHA), I am conducting a study that aims to explore the views of key stakeholders on core competencies needed for public health practice in Africa.

Why is this study being done?

- ✓ This study is in response to the dearth of a framework that spells out what core competencies Master of Public Health (MPH) graduate in Africa should possess upon completing his/her degree to contribute effectively to health systems strengthening.
- ✓ This study will help identify core competencies that needed by MPH graduates for public health work in a range of organizations.
- ✓ The result of this study will also help inform the development of a core competency framework for MPH programmes in Africa.

How many people will take part in this study?

Thirty stakeholders from seven key sectors in Public Health education and practice in Africa will take part in this study.

Voluntary participation:

As a key stakeholder in health, I would like to invite you to participate in the study and take part in an interview. The interview will provide valuable information that could inform Master of Public Health training programmes in Africa. You should not feel compelled to participate and your decision to participate is voluntary. You do not need to respond to questions or issues that make you uncomfortable and you may withdraw from the study at any time without consequences.

What will happen if you agree to take part in the study?

If you decide to take part in the study;

- ✓ We will invite you take part in a virtual (online) interview. The interview will take about 30 minutes. The interview will be recorded and transcribed and your participation and identity will not be disclosed to any third party.
- ✓ We will send you a brief infographic explaining what is meant by 'core competencies' in the context of this study.

What are the potential risk of this study?

There is no personal risks associated with this study since there will be no direct contact. The only known risk is breaching your confidentiality. However, significant precaution will be taken throughout the study process to protect any information you share with us.

What are the Potential benefits?

There are no direct benefits to you if you take part in this study. The information gained through this study will however help improve the Master of Public Health training in Africa and contribute to health systems strengthening in the long term.

Are there any rewards for participating in the study?

If you agree to take part in this study, you will receive no remuneration or compensation.

What about confidentiality?

If you agree to take part in this study, all information collected will be kept strictly confidential. We will assign you a code, which will only be known, to members of the research team. The data we will collect from the interviews will be securely stored on two password-protected computers. If the results of this study are published, no names or identifying characteristics will be mentioned except where consent to do so has been granted.

What will happen to the interview recordings after the study is completed?

We will destroy the interview recordings two years after the study is closed and the intended articles from the study have been published.

Who do I need to speak to if I have any questions about the study?

If you have any questions about your participation, you may kindly contact

Dr. Abraham Opare, Email: oprabr001@myuct.ac.za

The UCT Human research ethics committee: hrec-enquiries@uct.ac.za

I hereby give my consent to participate in this study.	Yes		No	
I am aware that the interview will be tape recorded and transcribed	Yes		No	
I understand I am taking part freely without being coerced into doing so.	Yes		No	
I am aware that my answers and opinions will remain confidential	Yes		No	
I understand that I can withdraw from the study at any time without any consequences.	Yes		No	
I would like to receive a copy of the research findings	Yes		No	
I confirm that I am willing to participate in the subsequent Delphi study	Yes		No	

……. ……
……
Name of Participant Signature Date

Dr. Abraham Opare A.O

…… ……..
……
Name of Investigator Signature Date

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room G50- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
quiries@uct.ac.za
/humanethics/forms

Appendix 10: Ethical approval from the University of Cape Town

21 July 2020

HREC REF: 332/2020

Prof V Zweigenthal
Division of Public Health
Falmouth Building-FHS
Email: virginia.zweigenthal@uct.ac.za
Student: Oprabr001@myuct.ac.za

Dear Prof Zweigenthal

PROJECT TITLE: HARMONIZING CORE COMPETENCIES FOR MASTER OF PUBLIC HEALTH TRAINING PROGRAMMES IN AFRICA-DOCTORATE CANDIDATE-DR. ABRAHAM OPARE

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study, subject to: -

1. Adding the full contact details of the HREC to the informed consent document and why they can contact us.
2. The head of HR approval of UCT for accessing staff.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19, dated 17 March 2020.

Approval is granted for one year until the 30 July 2021.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: - Dr Abraham Opare will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

Signed by candidate

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
NHREC-registration number: REC-210208-007

This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.