ROLES PLAYED BY MASTER OF PUBLIC HEALTH GRADUATES FROM SOUTH AFRICAN UNIVERSITIES DURING COVID-19

Ngaatendwe Gumbeze

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Public Health (MPH) in the School of Public Health.

Johannesburg, October 2024

CANDIDATE'S DECLARATION

I, Ngaatendwe Gumbeze, declare that this research report is my own work. It is being submitted for the degree of Master of Public Health in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature: 

Date: 3 October 2024

Student number: 2365546

DEDICATION

This work is dedicated to all Master of Public Health graduates from South African Universities.

Continue your great work.

Presentations arising from this research project:

- Gumbeze N, Zweigenthal V, Shung-King M, White J, Gwini G, Dlungwane T, Matlala F, Tshitangano TG, Christofides N, Mokgatle M, Nxumalo N, Opare A, Patrick S, Rispel L, Schaay N. Roles played by Master of Public Health graduates from South African universities during Covid-19. Poster presentation at the Public Health Association of South Africa Conference, 10-13 September 2023: Gqeberha, South Africa.

ABSTRACT

Background: Effective health systems with a prepared public health (PH) workforce are required to address emerging PH challenges (1). The South African (SA) Human Resources for Health (HRH) Strategy identified a need to develop a standardized competencies-based Master of Public Health (MPH) degree, with specified requirements.

Objectives: To gain insight into graduates' competencies and perceived relevance, this study explored the roles performed by MPH graduates from SA universities before and during the Covid-19 pandemic.

Methodology: A secondary analysis of 40 qualitative in-depth interviews (IDI's) which were drawn from the primary study on the competencies and utilities of MPH learning from SA universities was conducted. Thematic analysis was used to analyse the data.

Results: Findings illustrate that MPH graduates played a diverse range of roles before and during the pandemic. Graduates played many roles in managerial, leadership, research, health promotion/education and advisory positions. The following 5 broad themes were identified; the roles of MPH graduates before and during Covid-19, facilitating change: additional and priority roles during Covid-19, adapting to change: MPH graduates' flexibility and resilience and changes in roles: the psychological outcomes and emotional experiences. Many participants spoke of changing their roles or taking on new roles to assist in the effort to alleviate the effects of the pandemic. Some graduates coped with the changes associated with their roles while several graduates experienced increases in their workload and psychological stress.

Conclusion: The roles graduates played are relevant in the health system and can contribute towards health system strengthening efforts.

ACKNOWLEDGEMENTS

Co-investigators:

Zweigenthal V[1], Shung-King M[1], White J[2], Gwini G[1], Dlungwane T[3], Matlala SF[4], Tshitangano TG[5], Christofides N[2], Mokgatle M[6], Nxumalo N[2], Opare A[1], Patrick S[7], Rispel L[2], Schaay N[8]

1 School of Public Health, University of Cape Town.

2 School of Public Health, University of the Witwatersrand.

3 School of Nursing and Public Health, University of KwaZulu-Natal.

4 Department of Public Health, University of Limpopo.

5 Department of Public Health, University of Venda.

6 Department of Public Health, Sefako Makgatho Health Sciences University.

7 School of Health Systems and Public Health, University of Pretoria.

8 School of Public Health, University of the Western Cape.

TABLE OF CONTENTS

LIST OF FIGURES

Chapter Two

Chapter Three

LIST OF TABLES

Chapter Two

Chapter Three

NOMENCLATURE

AIDS:	Acquired immunodeficiency virus
ART:	Anti-retroviral treatment
B-BBEE:	Broad-based black economic empowerment
CEO:	Chief executive officer
CM:	Community medicine
NCDs:	Non-communicable diseases
DOH:	Department of health
GBV:	Gender-based violence
HICs:	High-income countries
HIV:	Human immunodeficiency virus
HSS:	Health systems strengthening
HR:	Human resource
HRH:	Human resources for health
IDIs:	In-depth interviews
IPC:	Infection prevention and control
LMICs:	Low- and middle-income countries
MOH:	Ministry of health
MPH:	Master of Public Health
NGOs:	Non-governmental organisations
PH:	Public health
PHEM:	Public health emergency fellowship
PPE:	Personal protective equipment
SA:	South Africa
SBCC:	Social and behavioural change communication
SDGs:	Sustainable development goals
SHE:	Safety health and environment
SMU:	Sefako Makgatho Health Sciences University
SSA:	Sub-Saharan Africa
TB:	Tuberculosis
UCT:	University of Cape Town
UK:	United Kingdom
UKZN:	University of KwaZulu Natal

UL:	University of Limpopo
UP:	University of Pretoria
UNISA:	University of South Africa
UNIVEN:	University of Venda
US:	The United States of America
UWC:	University of the Western Cape
WSU:	Walter Sisulu University
WHO:	World Health Organization
WITS:	University of the Witwatersrand

CHAPTER 1: INTRODUCTION

1.1 Background

In the 21st century we face a range of complex public health (PH) threats such as Covid-19, Ebola and Dengue (2). To address such PH challenges, effective health systems are required (1). These systems significantly depend on the quality and preparedness of the PH workforce (1). In order to achieve good health outcomes this workforce should be competent, responsive and productive (3). The sustainable development goals (SDGs) are a call to all countries to achieve a better future and they encourage global partnership (4). Goal three of the SDGs is a call to ensure healthy lives and promote well-being for all (5). Target 3c under this goal is to increase the development and training of the health workforce in developing countries (5,6). Public health training and education play a significant role in this regard (1). This is because graduate programmes in PH such as the Master of Public Health (MPH) degree, aim to equip students, who are future members of the health workforce, with the competencies and skills to address current PH challenges (7). Addressing these challenges helps to promote healthy lives and well-being.

Worldwide, Covid-19 made people aware of the need for well-trained PH professionals (8). The roles they played to control the pandemic and its effects, brought them to the forefront as the pandemic challenged all aspects of health systems (9). Some of the Covid-19 health system-related challenges that were faced particularly in Sub-Saharan Africa (SSA) included: inadequate service delivery, lack of reliable health information systems, staff shortages, medicine and equipment stock outs, inadequate laboratories, insufficient hospital beds and isolation centres, corruption and poor resource management (9).

Since then, scholars encourage those in relevant positions to reflect on the Covid-19 pandemic experience and consider what the PH workforce should look like in the future (10). Relevant institutions have been encouraged to actively assess the effectiveness of their health workforce's competencies in order to improve their training and preparedness (1). Low- and middle-income countries (LMICs) have illustrated that there are significant discrepancies between the requirements for

population health and the adequacy of PH training (11). Additionally, building resilient health systems requires the assessment of the relevant capabilities and weaknesses in the system before, during and after a crisis (12).

South Africa (SA) recorded the highest number of confirmed coronavirus cases in Africa (13). Although unfortunate, there is an opportunity to learn from this tragedy and improve preparedness of the health workforce for future emergencies. There is knowledge to be gained by learning about MPH graduates' perspectives on the roles they played during the pandemic and their perspectives on the roles that are relevant and required for them. Currently there is little knowledge of the roles and relevance of MPH graduates in the SA health system (14). In addition, although it is not a requirement, the MPH is one of the most acknowledged qualifications for leadership positions in health but there is little systematic information on the programme's curriculum and the characteristics and adequacy of graduates' PH skills (11,15). MPH graduates have diverse backgrounds (14) and establishing their roles within the health system is valuable. This is because resilient health systems recognise their human assets' strengths and vulnerabilities (12).

In support of existing health system capacity building efforts, governments are encouraged to invest in PH research because health system strengthening cannot be done without information to assess how the system is responding to inputs and processes (6). In SA, the Human Resources for Health Strategy includes a mandate to establish PH units at district and provincial levels to strengthen its health system (15). These units would require managers with PH qualifications based on the rationale that PH training equips managers with competencies that are required for PH practice (11,15). The primary study entitled "Competencies and utilities of Master of Public Health learning: a study of graduates from South African universities", sought to investigate MPH graduates from SA's perspectives on the benefits and competencies obtained from the program. Competencies are defined as the "effective application of available knowledge, skills, attitudes and values in complex situations" (16). These competencies, that are acquired through PH training programmes such as the MPH, will be applied in specific roles where MPH graduates would have been placed appropriately by employers. To perform a specific role, one must have the appropriate competencies (17–19).

Qualitative feedback from a study by Zwanniken et al. in LMICs found that the impact of these roles is dependent on the MPH graduates' job or workplace (17). Several countries have agreed on a set of key PH competencies that have guided their MPH training programmes. These competencies seek to highlight the fundamental areas of PH performance and include competencies in the following areas; policy development, planning and management, leadership and systems thinking, communication, PH assessment and analysis, context sensitivity and community and intersectoral engagement (17,18). Global health competency domains were identified under 3 main groups. The first domain describes skills and competencies that relate to the knowledge of health, burden of disease and the determinants of health. The second domain describes skills in policy development, analysis and programme management and the third domain describes soft skill competencies such as communication, political awareness and professionalism (20).

MPH training programmes in SA are offered on a full-time or part-time basis (11). The students are from SA, other African countries and from further abroad (11). They have a variety educational backgrounds in health and the social sciences and can be accepted for various specialisation tracks (21). The most common specialisation tracks in the MPH programmes are epidemiology, social and behavioural science and health policy and management (11). Dlungwane et al. investigated the MPH programme characteristics and curriculums in SA (11). They noted that the curriculum for the programme varies from institution to institution. These differences were in the weighting of coursework compared to research credits, variations in core competency guidelines and differences in programme quality assurance and validation processes (11). They encouraged collaboration between the various MPH programmes and standardization of the curriculums (11). The findings of this study therefore will inform MPH training institutions on the roles graduates played during the pandemic. This will in turn provide insight on their current ability to apply the skills and competencies attained from the programme in the workplace and in society. Furthermore, findings from this study will provide insight into the graduates' current strengths and weaknesses. This knowledge can be used to assess the current MPH training curriculums in SA. It can also provide information on curriculum adjustments that may need to be made to optimally prepare graduates to address future PH threats.

1.2 Literature review

Covid-19 impacted every country globally and its toll will not be known for many years (22). Although several studies have investigated the relevance and impact of MPH graduates in relation to the labour market, few studies have investigated the roles played by MPH graduates during the pandemic. More of the above mentioned studies on the relevance and impact of MPH graduates have been done in HICs than in LMICs (17). The section below therefore provides an overview of PH training programmes in LMICs and the roles played by MPH graduates in LMICs and high-income countries (HICs).

1.2.1 Overview of PH training programmes in LMICs

Africa bears over 20% of the global burden of disease while struggling with the challenge of an insufficient health workforce (23). Consequently, within the region, increasing the number of trained personnel in the health workforce is a matter of great importance (24). Although there is little information on PH training in Africa, it has been established that the MPH plays a significant role in training professionals to resolve PH problems (24). Upadhyay et al. provided an overview of PH development training programmes in LMICs with a focus on building the capacity of PH managers (25). They identified that core competencies in leadership and governance, programme planning, financial management, supply chain management, quality management, human resource (HR) management, monitoring and evaluation, and communication were required for PH managers to improve service delivery (25). They also highlighted that capacity building for PH managers can be done through training programmes that incorporate contextual learning (25). That is, training individuals in similar resource-limited settings as their respective countries to enable the application of their skills in these settings (25). Accordingly, PH training programmes in LMICs aim to contribute towards the development of human resources that can contribute towards service delivery that can achieve the SDGs in resource-limited settings (25).

1.2.1.1 Roles played by MPH graduates in LMICs

Czabanowska et al. acknowledged that while there are PH competencies required for PH professionals' preparedness that have been established such as research, epidemiological, employability, flexibility and communication competencies, Covid-19 has highlighted that these competencies are not enough (26). While the pandemic

brought to light the strengths and weaknesses of the health workforce's preparedness, it also highlighted other competencies that are required to address global PH threats (26). Such competencies include and are not limited to resilience, transformative leadership, emergency risk and crisis communication and acknowledging uncertainty through openness and transparency (26). Lessons learnt from the pandemic provide an opportunity to reorient heath workforce policy through participatory research that includes the voices of health workers (27).

The first time that impact variables for MPH graduates were validated across institutions in LMICs, was in Zwanniken et al's. mixed methods study (17). Institutions from LMICs and the Netherlands were included in the study. This study is useful as the validated variables are specific roles that MPH graduates can play in the workplace and in society to have an impact. Examples include graduates contributing to changes in policy, contributing to increased resource mobilisation for disadvantaged groups and publishing or posting an article or comment in popular public (including electronic) media (17). However, although these variables have been validated, to the authors' knowledge few studies have looked at the impact variables/roles of MPH graduates in such specific detail in LMICs. A mixed methods study was conducted to investigate the impact of MPH programmes on HSS in LMICs (28). They found that MPH graduates played considerable roles in the workplace and in their societies (28). The impact of these roles included enhanced leadership, the introduction of workplace innovations through training and influencing policy at national level through advocacy (28). MPH graduates also had an impact in HSS as they collaborated with different sectors in PH initiatives and engaged with communities to enable their members to partner in health care planning (28).

Several studies in LMICs have investigated the employment outcomes and jobs of MPH graduates. A study in SA found that most graduates from the University of KwaZulu Natal (UKZN) were employed in the public sector at 63% and 22% in academia (14). Another study in India mapped PH jobs available by investigating the jobs advertised in the country over 3 years. They particularly looked at job profiles and disciplines. Most vacancies consisted of posts with management responsibilities (29). The profiles most advertised were programme officer (38%), consultant (25.3%) and program manager (11.9%) (29). The job disciplines most advertised were

management of PH services/projects (39.8%), reproductive, maternal new-born and child health profiles (12.2%) and research (9.8%) (29). These two studies focus on the labour market for PH professionals.

In SA, a cross sectional study by Zweigenthal et al. analysed physicians who had completed an MPH from the University of Cape Town (UCT) (30). The study looked at the motivation and career intentions of these graduates. In terms of roles, this study only noted the roles played by the graduates within their places of employment prior to studying. They found that most graduates worked in the public health service and were clinicians or specialists (30). There were four researchers and two managers, who both worked in the private sector (30). The limitation of this study was that the sample size was small and the response rate was low (30).

Regarding the roles played by PH professionals during the Covid-19 pandemic, in India Nath et al. commented that PH professionals were not significantly involved in health policy development (31). Instead they found that their expertise was dismissed and pandemic control was led by politicians and bureaucrats (31). On the other hand, another study in India that looked at the roles played by community medicine (CM) professionals during the pandemic found that they were involved in national level policy development (32). Albeit, they did find that the roles of CM professionals were mainly the implementation of policy rather than development (32). The authors encouraged governments to work more with CM professionals and encouraged them to be more engaged in leadership and policy making roles as they felt their skills are being underutilized (32).

The other roles played by CM professionals in India during COVID-19 included generating evidence, publishing research articles, direct patient care, population health services and leadership at various positions (e.g. district level, non-governmental organisations (NGOs)) (32). They also developed tools to control the pandemic (e.g. guidelines) and played roles in community level infection containment, health education and promotion (32).

1.2.2 Roles played by MPH graduates in HICs

Although LMICs have made efforts to develop PH training programmes and the related competencies in their contexts, reviewing the impact of PH training programmes and competencies on health systems in HICs is useful. Although the context is different, lessons can be drawn in terms of the roles played and skills acquired by PH graduates in HICs. Several papers from HICs look at the employment outcomes of MPH graduates. In the United States (US), United Kingdom (UK) and Australia most PH graduates were found to be employed in the public sector (33–35). Within a year of graduation from an MSc PH programme in the UK, Buunaaise et al. found an enhancement in the graduates' roles in health policy analysis, planning and implementation (35). An enhancement in leadership and research roles, as well as in the evaluation of PH interventions was also found. (35). In the US, Plepys et al. analysed the first destination employment outcomes of PH graduates and found that for traditional PH roles and new Covid-19 related positions, graduates were more flexible about the roles they accepted (33). Although both studies mention job titles or disciplines, they do not give specific detail of the roles played by graduates in those jobs. This is also found in a study by Li et al. in Australia that looked at the labour market outcomes of PH graduates. A cross-sectional graduates' destination survey soon after graduation was done. They found that the 3 largest occupational groups were health care professionals (41%), graduates in managerial positions (13%) and in a business profession (9%) (e.g. statistician, policy analyst) (34).

In relation to the pandemic, a study in the US by Krasna et al compared the labour market competition for PH graduates before and during COVID-19. This was done by looking at US job postings from employers seeking MPH graduates. They found that there was a significant increase in demand for epidemiologists, statisticians, managers of health and medical services, natural sciences, research, and sales (36). There was also an increase in demand for chief executives, computer occupations, occupation mapping contact tracers, biologists and community health workers (36). However, the demand for general managers and roles in education and social services decreased (36). The increase in demand for chief executives and managers in specific services highlights that there was a need for more leadership during the pandemic (36). The

limitation for this study was that some occupations had no delegated codes and could not be correctly placed in the study e.g. policy analyst and advocacy (36).

A study by Trevino-Reyna et al looked at the employment outcomes of European Union Erasmus Mundus Masters Programme in Public Health graduates (37). They also looked at the relation of these outcomes to lessons learnt for PH and Covid-19 preparedness. Graduates were from European institutions from countries such as Spain, the UK, Denmark, France and Poland (37). From their survey, the most common employment positions were managerial (37%), consultancy (18%) and for researcher (13%) (37). Unlike the previous studies mentioned, most of these PH graduates were employed by non-governmental organizations (37).

Regarding other PH professionals' roles, a study in the US conducted a survey to examine the effects of Covid-19 on the roles and responsibilities of health educators during the pandemic (38). 63.7% of the respondents had a master's degree and 83.2% were in full time PH work (38). This study found that out of 913 respondents, 43.3% had to change their work priorities during the pandemic and 80% of them reported shifting their work priorities to Covid-19 related work (38). Many respondents (85%) had to fulfil their normal work responsibilities in addition to their new priority roles (38). They also reported feeling qualified for the shift in their roles with only 16% reporting that they did not feel qualified (38). Most respondents (77%) reported that they also had to work remotely during the pandemic. Another study that conducted a survey to establish the roles among Centres for Disease Control and Prevention international PH emergency management fellowship graduates found that they played key roles in different countries during the pandemic (39). The majority of respondents were working in Africa (69.7%), while others worked in countries in the Eastern Mediterranean, Europe, South-East Asia and the Western Pacific (39). During Covid-19 most respondents (65.2%) worked for the ministry of health (MOH) while others worked for other organizations such as private health institutes, NGOs and the WHO to name a few (39). A significant proportion of the fellowship graduates (89.9%) played incident management system functional roles such as incident manager, operations manager and roles in the management of plans and logistics (39). Many other roles were mentioned including providing scientific technical assistance (47,5%), providing public information, finance and administration (39).

To the author's knowledge, there is little research on the specific roles that MPH graduates played to alleviate the pandemic in HICs and in LMICs. Most of the research on the roles of graduates are quantitative or mixed methods and relates to the labour market. The studies done in India on PH and CM professionals roles during the pandemic, provide insight and detail on the specific roles played by these graduates during Covid-19. CM professionals are medical doctors, whereas with the MPH, students are also accepted from other disciplines such as nursing, social sciences and political sciences. As a result of their diverse backgrounds, gaining more perspective from MPH graduates may provide further insight and a wider range of roles that can be played by PH graduates in future PH emergencies.

1.3 Statement of the problem

The primary study identified that there is little evidence on the full range of MPH graduates' perspectives on the benefits and competencies obtained from SA universities and their application. These competencies are utilised by graduates in the health system when they perform their roles at their places of work. The Human Resources for Health (HRH) strategy also identified a need to develop a standardized competencies-based MPH with specified requirements (15). In SA currently, no consensus has been reached for MPH graduates (11). In LMICs particularly, there is insufficient evidence on the roles and relevance of PH graduates in developing, evaluating and implementing effective PH programmes (19).

Building health system resilience requires a review of performances and reorganisation of conditions when necessary (12). Without knowledge of the roles played by PH graduates in the South African context during the Covid-19 pandemic, improving the country's future response and building the health systems' resilience to PH threats, may be more challenging.

1.4 Justification

A key component of a resilient health system is a skilled health workforce (12). Achieving better health outcomes of any population largely depends on the knowledge and skills of the people who organise and deliver health services (6). This in turn highlights the importance of PH training and education (1). This secondary study seeks to explore the specific roles performed by MPH graduates from SA universities during

the Covid-19 pandemic. Gaining the perspectives of MPH graduates on the roles they played would provide more insight on the competencies they obtained from the MPH programme. These perspectives are a form of self-reported competency which along with self-reported academic outcome, are credible measures of higher education learning (40,41).

For the sake of improving health system performance, MPH graduates should possess competencies such as policy development, leadership, communication and critical and analytical thinking (42). In Sub-Saharan Africa most institutions offering postgraduate PH training are in SA and Nigeria (43). Describing the roles South African trained MPH graduates performed during the pandemic will provide insight on their competencies and preparedness for future global health threats. It will also assist in adapting postgraduate PH training in SA and throughout the continent. This could potentially improve health system performance and ensure the PH workforce is effective and relevant. A greater understanding of the roles and responsibilities of MPH graduates from SA would also improve collaboration within health systems (8) and provide insight into job niches for PH graduates.

To the authors knowledge most of the studies on the relevance of PH graduates have used mixed methods and quantitative study designs. The analysis has focused on results in relation to the labour market for these professionals. Hence this study used a qualitative design. It will focus on analysing the qualitative component of the primary study which explored the roles MPH graduates played during the pandemic. Considering the paucity in data on the roles of MPH graduates during the pandemic, this qualitative analysis aims to provide a deeper understanding.

1.5 Research question, aim and objectives

Research Question: What roles were performed by MPH graduates from SA universities during the Covid-19 pandemic?

The aim of the study is to describe the roles performed by MPH graduates from SA universities during the Covid-19 pandemic.

The specific objectives are:

1. To describe MPH graduates from SA universities' perspectives on the roles they performed before the Covid-19 pandemic.
2. To describe MPH graduates from SA universities' perspectives on any changes in the roles they performed during the Covid-19 pandemic.
3. To explore MPH graduates from SA universities' perspectives on the roles that are relevant and required for MPH graduates during pandemics like Covid-19.

CHAPTER 2: METHODOLOGY

2.1 Introduction

This chapter describes the research methods that were used to answer the aims and objectives of this study. The chapter firstly describes the design of this study and that of the primary study from which the data for this study was drawn. It then provides a description of the study setting, study population and study sample. The chapter also gives an account of the methods used for data collection, data management and analysis. Finally the chapter concludes by narrating the ethical considerations.

2.2 Study design

This study used an exploratory qualitative secondary analysis study design. The data was drawn from a primary study that investigated the competencies and utilities of MPH learning from SA universities. The primary study incorporated mixed methods with two explorative qualitative components and one cross-sectional analytical quantitative component. These 3 components were interrelated. The aim of the primary study was to determine the competencies of MPH graduates, their perspectives on the benefits of the qualification and their perspectives and the skills learned from the MPH. It also explored their perceptions on the roles they played during the Covid-19 pandemic.

Conducting a secondary analysis of forty qualitative in-depth interviews (IDIs) drawn from phase 1 of the primary study, this current study aimed to describe the roles performed by MPH graduates during the Covid-19 pandemic. A qualitative method was deemed appropriate to answer questions related to experience and perspective and this data is usually not measurable (44). Analysing data using qualitative methods is useful when there is little knowledge about the group to be examined but the researcher believes there is something useful to discover (45).

2.3 Study setting

The primary study was conducted in South Africa (SA). SA is the largest country in Southern Africa and is classified as an upper middle-income country (46). It has a multi-racial population made up of Black African, White, Coloured and Indian groups (47). Due to the history of colonialism and apartheid, the SA health system has faced challenges in the equitable development and transformation of PH institutions (47). These challenges include racial segregation and inequalities in the distribution of

resources between the different geographical areas (47). Moreover, significant inequities in health outcomes related to race and gender still remain between and within its nine provinces (47). These are the Eastern Cape, the Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, the Northern Cape, the North-West and the Western Cape. Post-apartheid, the transition to democracy in 1994 led to health sector reforms and in 1997 three regional public health (PH) schools were established in Gauteng province, Western Cape and KwaZulu Natal (11,48). By 2014 there were 10 PH institutions albeit with geographic mal-distribution as they were concentrated in five out of the nine provinces: four institutions in Gauteng province, two in the Western Cape, two in the Eastern Cape, two in Limpopo and one in KwaZulu Natal (11).

SA is a suitable setting to explore the experiences of MPH graduates as it is one of the countries in Sub-Saharan Africa that has the most institutions offering postgraduate PH training (43). However the MPH is offered in 10 out of the 20 public universities which is limited for the population of 56 million in the country (11). Currently the institutions offering the MPH programme in SA are the Universities of Venda (UNIVEN), Pretoria (UP), Limpopo (UL), Cape Town (UCT), the Witwatersrand (WITS), the Western Cape (UWC), South Africa (UNISA), KwaZulu-Natal (UKZN), Sefako Mokgatho Health Sciences University (SMU) and Walter Sisulu University (WSU).

2.4 Study population and sample

The qualitative component of the primary study from which this secondary study was drawn included MPH graduates who completed their degree before 2012 or after 2016 from the following 8 universities in SA: UNIVEN, SMU, UP, UL, UCT, WITS, UWC and UKZN. Alumni, who graduated between 2012 and 2016 were excluded, as they were the targeted group for the quantitative component of the primary study. Therefore, the study population for this secondary study included all MPH graduates from all participating institutions, who completed their degree before 2012 or after 2016.

2.4.1 Study sample

In the primary study participants were purposively selected to ensure diversity and inclusiveness. This involved recruiting at least four MPH graduates from each

institution, including graduates from both the public and private sectors. Graduates were recruited from different levels (i.e. national, provincial and district level) and were employed in different capacities or roles (e.g. clinical, research, leadership). Graduates were recruited via email or telephone.

This secondary study sample included all forty purposively selected MPH graduates' transcripts recorded during interviews in the primary study from the 8 participating universities. Purposive sampling can be used in qualitative research as it aims to select participants who are likely to provide rich information that aligns with the study aim and objectives (49,50). This method also enables research resources which may be limited, to be used more effectively (50). The graduates who participated in the primary study are shown in table 2.1 below.

Table 2.1 Study sample

University	**Number of graduates**
University of Pretoria	7
University of the Witwatersrand	5
University of Kwazulu-Natal	5
University of Limpopo	5
University of Venda	5
Sefako Mokgatho Health Sciences University	5
University of Cape Town	4
University of the Western Cape	4
Total	40

2.5 Data collection

In the primary study, data collection for the quantitative and qualitative components was done in 3 phases as shown in figure 2.1 below.

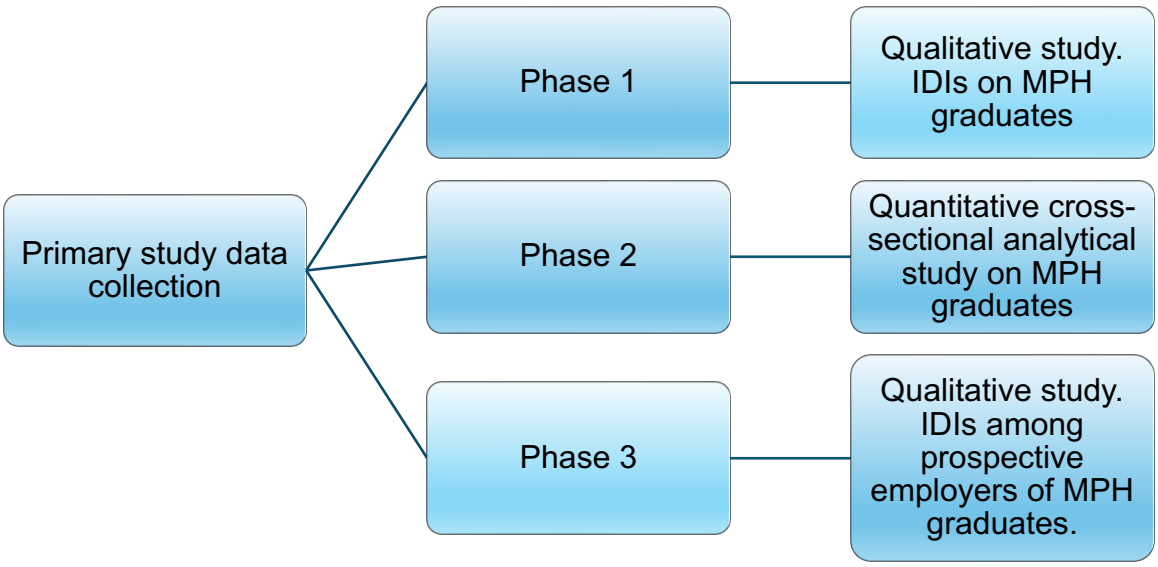

Figure 2.1 Primary study data collection

The first qualitative component (Phase 1) explored MPH graduates from SA universities perceptions on the roles they performed during the Covid-19 pandemic, their reflections on the utility of the MPH and their perceptions on the gaps in MPH training. The quantitative component (Phase 2) determined the MPH graduates' perspectives on the competencies and utilities of the MPH, the benefit of completing the degree and the application of the skills they acquired. The second qualitative component (Phase 3) explored the PH skills required by prospective employers of MPH graduates in the context of universal health coverage.

In Phase 1, IDIs with the graduates were conducted using a semi-structured interview guide (see Appendix 1). The in-depth conversations during IDIs enable the interviewer to gain valuable insights into the experiences of the participant that would not be uncovered in a questionnaire (51). There are different types of IDI methods (52). They can be unstructured interviews where the interviewer has the liberty to determine the questions required to collect the relevant data (52). They can be fully structured interviews where the interviewer follows a predetermined list of questions and probes with no liberty to deviate from them (52). While semi-structured interviews require experienced interviewers as they are given a predetermined set of questions and probes but have the liberty to modify the questions as they see fit depending on the

context and the individual (52). Additionally the design of these interviews enable a thorough assessment of the topics being explored (52). The semi-structured interviews were therefore deemed suitable for the IDIs in Phase 1 of the primary study.

Prior to the interviews participants were provided with information sheets and consent forms (see Appendix 2). The information sheet provided information about the aims of the study, voluntary participation, potential benefits and risks of participation and confidentiality. The consent forms provided the graduates with the opportunity to agree to participate in the study and for the interviews to be audio-recorded.

Interviews were recorded and conducted virtually (via Zoom, etc.) or face-to-face. Appropriate measures were taken for all in person interviews to reduce the spread of Covid-19. These preventative measures included social distancing, wearing of masks and hand sanitising. The questions in the interview guide covered the participants background, their work and roles before and during Covid-19, any changes in roles during Covid-19, the skills they used in their Covid-related roles and where these were acquired. It also covered the implications of acquiring these skills for the graduates, health programmes and services. All the interviews were conducted in English over 30-60 minutes. Field notes were taken to capture contextual aspects during the interview such as non-verbal language. Virtual meetings were recorded and participants and the interviewer had their video on to capture non-verbal body language. To ensure uniformity in the collection of data, PI's or field assistants were encouraged to refer to the interview guide during the interviews although a strict reliance on the guide was not required. Participants who needed data for a virtual interview were advised to inform the PI so that data could be purchased for them or reimbursed.

2.6 Data management

In the primary study, the Otter.ai app was used to convert the recorded interviews from audio to complete verbatim text transcripts with no omissions. Minor editing was done by the primary study research team to improve the confidentiality, comprehensibility and coherence of the participants' responses. Changes such as the correction of grammatical mistakes and the omission of names was done to ensure that the participants' meaning was maintained. The transcripts and audio files were stored on

a Google drive repository which could only be accessed by the primary study researchers upon signing a confidentiality agreement.

For this secondary study, to check the accuracy of the content, audio files were listened to while reading the transcripts. All transcripts and audio files were kept as software in a standard format on the researcher's password protected laptop while printed transcripts were kept in a locked file cabinet. Soft copy backup files were kept on an encrypted external drive and only the researcher and supervisors had access to these password protected files. Study identifier codes were used for the purpose of anonymity.

2.7 Data analysis

In this secondary study, the researcher analysed 40 qualitative IDIs from Phase 1 of the primary study on the competencies and utilities of MPH learning from SA universities. A thematic analysis approach was utilised to analyse the qualitative data (53). The researcher familiarized herself with the data by iteratively reading through the transcripts. Notes were taken by the researcher which were useful during coding and reference was made to the primary study audio-recordings when clarification of the content was necessary. Codes were generated from patterns noted within data extracts and were applied to consolidate a codebook. In addition, four independent co-coders verified the codebook in a 2-day workshop held in April 2023. By collating extracted coded data themes were searched for, derived and interpreted. Quotations from participants were shared as part of the results for evidence and to validate findings.

2.8 Measures of trustworthiness

Trustworthiness demonstrates that sufficient detail about the methods of data analysis have been provided to enable the reader to deem the process as credible (54). In the primary study peer debriefing meetings were held every two weeks by the co-investigators. All co-investigators had the adequate training, research skills and experience to conduct the IDI's appropriately. Amongst them, they hold many qualifications in higher education including diplomas, bachelor's and master's degrees in natural sciences, health sciences, social sciences, business administration and humanities. Most of the co-investigators had acquired an MPH degree and almost all had Doctor of Philosophy (PhD) degrees mainly in public health as well as social

policy, environmental health and in behavioural sciences. Their research interests span a broad range of topics which include public health education, health systems and policy, human resources for health, the social determinants of health, mental health, HIV and reproductive health, infection control in communicable diseases, health promotion, environmental health and community resilience, behavioural science, primary health care and governance. As noted in the data collection section, field notes were taken for analysis and storage. To ensure that the results could be generalised, purposive sampling to ensure that participants included graduates from different sectors, levels (i.e. national, provincial and district level), capacities (e.g. clinical, research, leadership) and countries was done. Furthermore, participants were from 8 out of the 10 SA universities offering postgraduate PH training, located within 5 out of the 9 provinces.

In this secondary study, regular debriefing meetings were held by the researcher and supervisors to discuss and agree on findings. To establish intercoder agreement (55), after the researcher and her supervisors analysed the same three transcripts and thereafter met for discussions. In these meetings they iteratively applied the codebook and definitions while discussing and agreeing on codes and themes. Any emergent and divergent themes were checked against the original themes and transcripts to ensure trustworthiness.

2.8.1 Reflexivity

On reflecting on my position in the study, I am a female MPH student with Doctor of Medicine and Master of Medicine (Ophthalmology) degrees. I have ten years of experience working as a clinician in the public health sector in a low-income country. With this in consideration, when analysing the data I was mindful of my expectations and perceptions of the roles I would expect to play during a pandemic like Covid-19. I was also aware of my perceptions of the competencies I believe I have gained from my training as a clinician and as an MPH student. I acknowledged that these expectations and perceptions are subjective and when analysing the data I was mindful of using an objective lens. Any potential bias was mitigated through the iterative data analysis process that the researcher conducted with her supervisors and co-investigators.

2.9 Ethical considerations

Ethical clearance was obtained from all eight participating universities for the primary study. Approval to conduct the secondary study was sought from the Human Research Ethics Committee (HREC) (Medical) of the University of the Witwatersrand - Ethics clearance certificate no. M230694. (See Appendix 3).

All transcripts and audio files were assigned a unique code and all files were kept protected as software in a standard format on the researcher's password protected laptop while printed transcripts were kept in a locked file cabinet. Soft copy backup files were kept on an encrypted external drive and only the researcher and supervisors had access to these password protected files to ensure confidentiality. Study identifier codes were used for the purpose of anonymity. All anonymised data will be destroyed after five years if the study findings are not published or after two years if published.

CHAPTER 3: RESULTS

3.1 Introduction

This chapter gives a detailed description of the findings of this study. It begins by describing the characteristics of the participants and then proceeds to give an account of perspectives from MPH graduates from SA universities on the roles they played before and during the Covid-19 pandemic. It goes on to describe their views on the changes in roles during that time and the emotions they experienced as they performed their roles. The last section of the chapter describes the graduates' perspectives on the roles they viewed to be relevant and required for them in future pandemics. As shown in table 3.1 below, their perspectives and experiences have been discussed under the following five broad themes: MPH graduates' perspectives on roles played before and during Covid-19, changes in roles during Covid-19, changes in roles as the pandemic evolved, reflections on emotions during the execution of roles and roles that are relevant and required for them in future pandemics. Three of the five broad themes will be discussed under the subthemes as shown in figure 3.1 below. Four of these sub-themes namely management and planning, leadership, policy development and communication cut across two of the main themes namely, roles played before and during Covid-19 and roles that are relevant and required in future pandemics.

Table 3.1 Summary of themes

Theme	Subthemes
Roles played before and during Covid-19 *(The roles of MPH graduates before and during Covid-19)*	▪ Management and planning ▪ Public health science and strategic analysis ▪ Community engagement and collaboration ▪ Leadership ▪ Policy development ▪ Ensuring access to services and knowledge ▪ Communication
Changes in roles during Covid-19 *(Facilitating change: additional and priority roles during Covid-19)*	▪ New and additional Covid-19-related roles ▪ Additional roles unrelated to Covid-19 ▪ Changes from working in-person to remotely
Changes in roles as the pandemic unfolded *(Adapting to change: MPH graduates' flexibility and resilience)*	
Emotions during execution of roles *(Changes in roles: the psychological outcomes and emotional experiences)*	
Roles that are relevant and required for them in future pandemics	▪ The perceived value of MPH graduates in pandemic responses ▪ Health promotion and education ▪ Leadership ▪ Data management and research ▪ Communication ▪ Policy development ▪ Management and planning ▪ Advisory roles

3.2 Participant characteristics

Forty MPH graduates participated in the study from eight out of the ten universities that offer the Master of Public Health Degree in South Africa. All the graduates were working in Sub-Saharan Africa at the time of the study. Many were working in the South Africa and a few were working in other countries namely, Ghana, Lesotho, Swaziland, Zambia and Zimbabwe. Out of the 40 graduates, most were female (25), while 15 were male.

The participants had specialised in a variety of MPH tracks. The track that was mentioned as completed by the most graduates was the health systems (strengthening) and policy track. Other tracks mentioned included social and behavioural change communication, hospital management, reproductive and adolescent health, occupational health, monitoring and evaluation, disease control, environmental health and epidemiology and biostatistics. The year of graduation from the MPH degree ranged from 2013 to 2021.

The participants in this study came a from wide variety of professional backgrounds. Over half of the participants (24) undertook a clinical undergraduate degree and had practiced accordingly. Ten had acquired a Diploma or Bachelor of Nursing degree, six had acquired a Bachelor of Medicine and Surgery degree, three a Bachelor of Physiotherapy degree and two a Bachelor of Pharmacy degree. The other undergraduate clinical degrees mentioned by the participants were the Bachelor of Dentistry, Bachelor of Dietetics and Bachelor of Veterinary Medicine degrees. Some of the graduates (5) had an undergraduate degree in the social sciences and one a Bachelor of Mass Communication degree. Several graduates had obtained other science related undergraduate degrees such as microbiology, genetics, botany and medical technology.

Just over half of the graduates in this study (22) had other postgraduate qualifications including diplomas, other masters and Doctor of Philosophy (PhD) degrees. Two graduates mentioned that they obtained a Postgraduate Diploma in Monitoring and Evaluation. Most of the post graduate qualifications mentioned were in management such as diplomas in public health management and primary health care, as well as master's in international policy and public management to name a few. The most mentioned PhD obtained was in Public Health. Several participants (9) had also completed several short courses or fellowships related to the field of public health. One graduated mentioned obtaining a Certificate in Monitoring and Evaluation for Health while another obtained a Certificate in Financial Management. Some of the other short courses that were mentioned included leadership and management in health, vaccinology and grant writing courses.

The participants in this study worked in various sectors. Eleven of them worked in the public sector, ten for a NGO, seven in the private sector and four worked for an international organization. Fifteen of the graduates had roles as programme leaders, managers or coordinators at national, district and hospital level in different organisations and institutions. Several other graduates worked in the areas of research in roles such as research coordinator/assistant, epidemiologist and in roles performing clinical trials. Several graduates had monitoring, evaluating and reporting roles in public sector departments, parastatal companies and at NGOs. A few participants were still practising clinically as medical doctors (3), physiotherapists (2), a nurse (1) and a pharmacist (1).

3.3 The roles of MPH graduates before and during Covid-19

Graduates played many roles before and during the pandemic. Their roles reflected competencies in the following seven areas: management and planning, public health science and strategic analysis, leadership, community engagement, collaboration and partnership, policy development, ensuring access to services and knowledge and communication.

3.3.1 Management and planning

Before the pandemic many graduates applied their competencies in planning and management as they spoke of performing roles as managers, coordinators and strategic planners at various levels and in various departments. Several graduates described managing and coordinating HIV/AIDS programmes which involved coordinating anti-retroviral (ART) treatment and linking patients to care. One graduate stated:

> *"I worked for the Ministry of Health as a National ART Treatment Coordinator for HIV."* (Participant 2 University 2 Country 1)

While another explained that:

> *"My core function is to make sure that people that have been tested for HIV and have been found to be positive are initiated on ART. So I'm the linkages coordinator."* (Participant 8 University 2 Country 1)

Several graduates explained that they played roles monitoring and evaluating the implementation of programmes related to HIV/AIDS and maternal health. This also involved reorienting health workers on new policies and updates. One graduate noted as follows:

> *"My role and responsibility is to make sure that the clinicians are implementing the TB, HIV and STI policies in the health facilities. Whenever there is a new policy or updates on the TB and HIV program, I reorientate the clinicians on the new policies and mentor them to make sure that they implement those policies."* (Participant 17 University 4 Country 1)

Another graduate described how before Covid-19 he monitored the implementation of the broad-based black economic empowerment (B-BBEE) policy in a parastatal company. He expressed that:

> *"So it was my role to see to it that the transformational policy (B-BBEE) is being implemented on the ground, and all the necessary targets that had been signed, are being achieved."* (Participant 32 University 6 Country 1)

Other graduates described managing and coordinating other programmes related to gender-based violence (GBV) for NGO's, data management for research projects, financial management for programmes and the management of veterinary public health programmes in the public sector. One graduate explained her role as she managed a GBV programme at an NGO as follows:

> *"I worked as a sub-district coordinator in a gender-based violence program project. I was supporting (hospital name) where it was mostly dealing with issues of sexual assault, ensuring that the minimum package of care it's (sic) rendered to the victims of gender-based violence. I was also conducting community campaigns to prevent GBV."* (Participant 31 University 6 Country 1)

Another graduate described his role in managing meat safety in the veterinary PH sector. He also described a supportive role he played through his coordination of laboratory diagnostic services. He explained that:

> *"Because I'm the senior manager for the programme, I'm also responsible for coordination of veterinary public health that is responsible for meat safety from the slaughter of animals. I'm also responsible for coordination of laboratory diagnostic services, which is a support role to all these functions that we are performing".* (Participant 22 University 5 Country 1)

Within their managerial roles, several graduates also mentioned performing roles such as resource mobilization and strategic planning for their respective programmes. One graduate noted his planning role at district level:

> *"I plan for the district like program planning, and general planning"* (Participant 38 University 8 Country 3)

Some graduates' managerial roles involved them having to perform site visits for oversight as they monitored data and reporting systems. One graduate explained performing the role of oversight to monitoring data and reporting systems by conducting support site visits to facilities in the district. He commented that:

> *"My role was to analyse the project data, and to perform support site visits to (make) sure that their recording systems are working and that they are reporting information and conducting audits."* (Participant 30 University 6 Country 1)

Before Covid-19 a few graduates also mentioned that they managed departments. This mainly involved managing staff and clinical services in departments such as physiotherapy and maternity. One manager of a maternity ward described her role in ensuring that mothers and babies were provided with health care accordingly as she indicated that:

> "*I was supervising a maternity department, where my focus was on mother and child. So most of my duties were supervisory ensuring that woman and babies are being taken care of accordingly."* (Participant 13 University 3 Country 1)

While another graduate noted how she managed the physiotherapy department:

"And in terms of managing the physio department, that was both the supervision of staff, the clinical services, and as well as the day-to-day runnings of the department." (Participant 6 University 2 Country 1)

Corresponding to before the pandemic, most graduates performed various roles related to management and planning during Covid-19. Notably, several graduates who were involved in the management of HIV/AIDS patients before Covid-19, also found themselves in roles related to the management of Covid-19 cases. This involved ensuring that confirmed cases were linked to care and that the clinicians were empowered to take care of patients. One graduate described her role in Covid-19 case management and explained that:

> *"I was still responsible for HIV and TB, but I assumed added responsibility as the country focal for case management. So managing patients that had Covid."* (Participant 2 University 1 Country 1)

During Covid-19, several graduates described other managerial roles such as managing quarantine centres and supervising burials for those that had been lost to the virus. One graduate expressed how his workload increased as a results of this:

> *"I think the work streams that I would do expanded five workstreams more. I had to do (Covid-19) testing for the returnees, manage those who were quarantined, do supervised burials and follow up."* (Participant 38 University 8 Country 3)

Some graduates also reportedly managed Covid-19 data in the district, ensuring that it is submitted on time to the next level of the health system. One graduate who worked

for an NGO described how he managed data flow and report submissions in the district as follows:

> *"So I had to come in and intervene and come up with a tool for them to use to record information and then make sure that the data flow was consistent, and that they are submitting report(s) on time. Because they were expected to report data through the structures that we created during that time. I had to make sure that we comply and then get information to the next level."* (Participant 30 University 6 Country 1)

They also set up sites for Covid-19 patients who could not be accommodated in the hospital facilities due to space constraints. One graduate explained that:

> *"We erected a tent just next to our emergency unit to say, Okay, let's have a tent where we can accommodate 10 (Covid-19) patients."* (Participant 4 University 1 Country 1)

She also described how she managed and coordinated the mobilisation of resources for a solidarity fund which enabled the supply of medical equipment to her entire province. She commented as follows:

> *"We coordinated a solidarity funding for the entire province and even availed nursing support for the entire province from the solidarity fund."* (Participant 4 University 1 Country 1)

During the pandemic, several graduates applied their management and planning skills in their roles as coordinators. Graduates described roles where they had to coordinate meetings within their workplaces and with various stakeholders in their communities as described by the following graduate:

"I'm the one who organizes the meetings. I'm the one who invites the speakers to come and do the presentations. And I'm the one who eventually gives each and every person a platform to share their inputs within the meeting." (Participant 28 University 6 Country 1)

Several graduates also performed roles as safety coordinators and compliance officers during the pandemic. This involved ensuring that the Covid-19 infection and prevention control guidelines and protocols were adhered to in the workplace and in the community. For example this included ensuring compliance to social distancing, the wearing of masks and the use of sanitisers. One graduate explained this role of safety coordination in the workplace as follows:

> *"My role at work as a safety coordinator is to make sure that the workplace is safe… I developed some infection prevention guidelines. And then I made sure that those guidelines were followed."* (Participant 14 University 4 Country 1)

While a physiotherapist graduate explained how his role evolved to also performing the role of a compliance officer to the players he provided clinical services to. He noted that:

> *"I had an added job to make sure that my players always wear masks and do social distancing. I had a lot to do instead of like sitting there, watching the game. So in sports, basically, as a medical personnel, you become a compliance officer also."* (Participant 15 University 3 Country 1)

A few graduates also coordinated the collection of ART for patients outside the hospitals to minimize the number of people presenting at the hospitals. One graduate explained her role as follows:

"So I was responsible for the Differentiated Care Portfolio...this includes decanting of patients out of facilities. So, during the peak of Covid, there was a lot of focus on making sure that patients move out of the facility when they were stable and that they collect their treatment out of the facility." (Participant 18 University 4 Country 1)

A few graduates also expressed how they were significantly involved in health planning during Covid-19. This included planning for the collection of multi-month doses for patients on chronic medication, planning on how staff would be checked for proper use of personal protective equipment (PPE) and planning to ensure that hand sanitisers were at all entrance points. Graduates highlighted the need to strategise

health promotion efforts to raise public awareness of Covid-19. One graduate described his role in health planning during Covid-19 as follows:

> *“So my role changed a bit because I also look more into how health systems work and also more into health planning…How we're going forward at work in the form of checking that everybody, for example, has the right apparel, which is PPE, so that sanitizers are at every entrance point…. And also making sure that there's also health awareness or health promotion”* (Participant 26 University 5 Country 4)

During Covid-19 several graduates spoke about how they had key roles that involved managing human resources. This included empowering clinicians to be able to manage Covid-19 patients, empowering hospital staff to use oxygen and the oxygen ordering tools that were developed, as well as managing a diverse range of personnel such as nurses all the way to pharmacy assistants. One graduate explained*:*

> *“We did a bit of training for the guys who work in oxygen, the guys who are maintenance and technical staff who've not really understood oxygen.”* (Participant 3 University 1 Country 1)

While another expressed that:

> *"I was in charge of managing 45 people, from nurses to data capturers to pharmacy assistants.”* (Participant 18 University 4 Country 1)

A few graduates also shared that they had the additional tasks of managing the procurement and storage of medications, ventilators and PPE as conveyed by the following graduate:

> *“Of course, our roles have changed since the Covid-19 pandemic, meaning we now do extra work. Extra work in terms of procurement and storage of medications, and just the responsibility towards medication. So now we tend to store a lot of PPE, we store a lot of ventilators, the things that are needed for Covid-19.”* (Participant 27 University 5 Country 1)

He also stated that he was involved in managing the distribution and storage of the Covid-19 vaccine. He commented that:

> *"The public are getting vaccinated, so I monitor the storage and the distribution of the vaccine"* (Participant 27 University 5 Country 1)

Another graduate explained how it was important to place procurement orders ahead of time to ensure that they would have enough stock on hand. She explained that:

> *"We had to be proactive with our logistics and procurement, we had to make sure that we have enough on hand. And that the lead time for…we had to observe the lead time for ordering so that everything was in place"* (Participant 39 University 8 Country 1)

3.3.2 Public health science and strategic analysis

Before the pandemic, most graduates applied their PH science knowledge and skills in various roles. Several graduates played the role of providing technical assistance/advice at various levels within the health system. One graduate provided technical assistance at national level by providing advice to countries on the implementation of social and behavioural change communication (SBCC) interventions in emergency settings. He noted that:

> *"My role at the regional office really is to provide this sort of dual…provide technical assistance for the countries, and quality assurance for the implementation of SBCC interventions within emergency settings."* (Participant 1 University 1 Country 1)

Some graduates were involved in providing technical advice at district level centred on data analysis and management. One graduate explained how he performed this role and later advised the Department of Health (DOH) on how to strengthen their monitoring and evaluation systems to ensure that data is analysed better. He explained how he transitioned from advising at district level to national level as follows:

"Before Covid, I was a technical advisor for the district. So during that time, I was seconded to the Department of Health, whereby I was assisting the department with the strategic planning and then, and then strengthening their monitoring evaluation systems. That included the data flow, and then also making sure that they analyse their data better". (Participant 30 University 6 Country 1)

Before Covid-19 another graduate applied his knowledge of PH science as he provided training and research technical advice as a consultant across various sectors. He mentioned that:

"We would do consultancies for employers, government institutions or even other private institutions. Before Covid-19, what we were doing mostly was TRC, which is Training and Research Consultancy." (Participant 12 University 3 Country 1)

Before Covid-19 several graduates also performed various research roles. This included writing research protocols, conducting clinical trials and implementing research from TB studies within districts. One graduate explained his research role as follows:

"So I was an implementing researcher. I would investigate the model that we can implement in terms of improving the problem of TB. So I used to implement the research of the study that we would have been conducting of linkage to care." (Participant 28 University 6 Country 1)

While another explained that:

"I have been working for (NGO name) since then, also in clinical trials, predominantly focused on cardiovascular trials." (Participant 24 University 5 Country 1)

Several graduates also described performing roles as data managers which involved data cleaning and data analysis. They wrote technical reports and published manuscripts. These roles were performed at their workplaces as also conveyed by the following graduate:

> *"Within the division, I would also assist with any other studies that needed someone to analyse the data or clean the data, I would help out with that… I would also help with building databases and protocol writing"* (Participant 35 University 8 Country 1)

A few graduates also applied their PH science competencies by performing the role of disease prevention and control. This was in different capacities such as preventing the spread of HIV/TB and animal and vector borne diseases as expressed by one of the graduates:

> *"Before Covid-19, we were doing the routine a disease control of small outbreaks that we've had over the years, brucellosis, rabies and other animal diseases."* (Participant 22 University 5 Country 1)

Several graduates also performed roles as health educators. Some graduates were educating adolescents on HIV prevention, while others were lecturing at universities. One graduate explained:

> *"I was heading up a program on adolescents. This included a health component, but it also included an education component plus a protection component"* (Participant 5 University 1 Country 2)

While another graduate conveyed the role he played as a university part-time lecturer. He noted that:

> "*A part time lecturer. Yes, when Covid started I was with the (university name).* (Participant 27 University 6 Country 1)

Before Covid-19 some graduates also spoke of performing several other roles where their public health science and analytical skills were required such as performing economic evaluations for smoke quitting products and implementing results-based financing models at work. One graduate described how he worked on various programmes with donors that enabled the implementation of RBF in his district.

> *"We're fortunate enough to work with other donors, in terms of the results-based financing model, where we pay-for-performance kind of model."* (Participant 38 University 8 Country 3)

In terms of roles played during the pandemic several graduates also described how they provided technical assistance to government institutions. Most of these graduates aided the Department of Health (DOH), that is advising on Covid-19 case management, the disinfection of offices and on infection, prevention and control measures. One graduate explained his voluntary role as:

> *"I had to then volunteer…to advise the team in the department that handles Covid cases in the department. I've had to present a lecture on Covid, the disease. Where (it) came from, how it is transmitted. And then I've also had to advise why the disinfection of offices needed to take place and explain some of the difficult concepts."* (Participant 23 University 5 Country 1)

Another graduate describes how she sat on various technical working groups that would develop strategies on how to manage Covid-19 as follows:

> *"I was sitting in a lot of technical working groups that were just looking at key strategies around Covid-19"* (Participant 18 University 4 Country 1)

During Covid-19 a few graduates advised the DOH on other PH needs. One graduate highlighted that she provided advice on monitoring universal health coverage during the pandemic. This was in relation to child immunisation and malnutrition. She commented that:

"We were doing analysis of the public health needs during the Covid-19 period. So that was mostly in clinics looking at the changes in immunization rates and also malnutrition. And trying to provide technical advice to the to the Department of Health, trying to monitor progress towards universal health coverage during that time." (Participant 16 University 4 Country 1)

Some graduates noted how they provided technical advice on diseases. One specifically mentioned providing advice on malaria in countries across Africa. He expressed as follows:

"I provide technical support and assistance to malaria program implemented in countries across Africa." (Participant 36 University 7 Country 1)

Several graduates spoke of playing roles related to their PH science and analytical skills in relation to creating different tools for collecting data and recording information during the pandemic. One graduate explained that:

"There was a requirement to collect data with regard to like your reduction of headcount in facilities…you need information on staff who have contracted Covid…We also had to gather information on our facility closures if, say, for example, there has been a person who's been found to, to have contracted Covid. And so we'd have to tally those kind of stats and create new data collection tools that were more focused on ensuring that we cover all bases with regards to Covid." (Participant 9 University 2 Country 1)

Another graduate indicated how they played the role of facilitating the use of an oxygen ordering tool to make ordering oxygen easier at hospitals in his province. She explained this as follows:

"I was trying to get them to use an ordering tool that we'd set up, a very quick little red cap tool that my colleague who is part of the (institution) had developed. We'd rolled out to a couple of hospitals in the (province) because they had lots of problems with the ordering (oxygen). So we really developed a

tool to intervene here. And it worked really well in some of the hospitals" (Participant 3 University 1 Country 1)

One graduate who had been seconded to the DOH to assist with the Covid-19 response described how he developed a monitoring and evaluating framework for a Covid-19 related project. He mentioned that:

> *"I was requested to participate in (the) development of a monitoring and evaluation framework, because they were looking for somebody who understand (sic) in terms of designing some sort of logic model and then theory of change. Although the project was not yet qualified for a theory of change design, I had to come in and assist in terms of that."* (Participant 30 University 6 Country 1)

Many graduates played roles related to data management and research during the pandemic. These graduates spoke of cleaning, analysing and managing Covid-19 data. One graduate explained that:

> *"I just assisted in terms of analysing the data, looking at the data, not technically writing everything, but just to help there in terms of data cleaning."* (Participant 28 University 6 Country 1)

While another participant described the role he played by modelling the pandemic trend in a company in the mining sector. This data enabled the mining company to plan how best to allocate their staff and resources as the pandemic evolved. She expressed this as follows:

> *"I also did a short term contract for a mining company, where I gave inputs on their workers, Covid rates, and we worked with a data science team to model, the pandemics trend within this mining company so that they could plan where their workers are getting sick, where they need to put resources and things like that."* (Participant 33 University 7 Country)

Several graduates took part in Covid-19 research by conducting studies, reviews and publishing papers that contributed towards increasing the knowledge of the Covid-19 virus. One graduate who works at a health research unit described how she reviewed many Covid-19 related studies, particularly due to the surge of research in that area. She explained this as follows:

> *"We'd review work that comes from outside. We have received a lot of Covid studies more than any disease category since Covid began, so we're working more than before because of those reviews related to Covid clinical trials and Covid observational studies."* (Participant 10 University 2 Country 1)

Another graduate described how their PhD-related research was a pathway to playing a role during Covid-19. They noted how it sought to provide ways to assess and address the impact of Covid-19 on cancer and immunization services and noted that:

> *"As part of my PhD, we also looked at providing evidence on strategies that can be used to assess and address the impact of the pandemic on routine immunization services…I also did a review on the impact of the Covid pandemic on cancer services during the pandemic"* (Participant 36 University 7 Country 1)

During the pandemic several graduates also performed teaching and training roles. These graduates were teaching patients and staff about Covid-19 and workplace safety in health facilities. One graduate who works for an NGO that supports the DOH with health system strengthening (HSS) noted as follows:

> *"We spend a lot of time in clinics with clinic staff training and mentoring them. So, when Covid-19 came obviously we had the additional tasks of educating both the patients and the staff in the clinics."* (Participant 20 University 4 Country 1)

Another graduate explained their role in educating the public about the Covid-19 vaccine. He noted that:

> *"With health promotion and health awareness, we literally try to educate people about (Covid-19) vaccination…telling them, you vaccinate for flu every year, for example, you vaccinate your kid, this is also a vaccination."* (Participant 26 University 5 Country 1)

One graduate described how his role in health promotion and ensuring environmental hygiene was important during this Covid-19. This was in the form of encouraging people to dispose of their masks appropriately so that they are not lying around in the environment where other people, particularly children would pick them up. He remarked that:

> *"Health promotion became critical in terms of ensuring hygiene, hand hygiene and environmental hygiene, [and how you dispose] of a facemask – because we have children pick them up you know, chewing them and so forth"* (Participant 38 University 8 Country 3)

Several graduates indicated how they shifted their focus from their primary programs and had to perform various other roles such as screening patients for Covid-19 and contact tracing of Covid-19 positive patients. One graduate expressed:

> *"I didn't attend much on my program, the TB, HIV and STI. I had to join the Covid-19 teams to trace the positive Covid patients and their contacts at home."* (Participant 17 University 4 Country 1)

While another graduate who worked as a physiotherapist for a sports team explained that he had to take on a new role of screening the players for Covid-19:

> *"During Covid we are doing the screening. It is what we do as a part of our work."* (Participant 15 University 3 Country 1)

One graduate explained how he used his PH science knowledge of disease and outbreak control to avert malaria outbreaks that occurred during the lockdown period. She explained her role as follows:

"And also maybe just to avert further outbreaks, because at that time, there were some outbreaks of malaria during that lockdown periods." (Participant 23 University 5 Country 1)

3.3.3 Community engagement and collaboration

Before Covid-19 several graduates who worked with NGOs spoke about how they were involved in collaborating with the DOH in different projects. One graduate described his collaboration with the department in a project aimed at reaching the HIV/AIDS 90-90-90 targets as follows:

"I was collaborating with the Department of Health in the sub-district that I was in charge of. I was collaborating with them in terms of achieving what we call the 90-90-90. HIV targets set by WHO." (Participant 18 University 4 Country 1)

While another graduate described their role in collaborating with the DOH to improve TB detection and treatment in the district. He noted that:

"We are helping the Department of Health to improve in terms of TB detection, TB treatment, and also ensuring that people are adhering to the treatment." (Participant 28 University 6 Country 1)

A few other graduates highlighted how engaging with various stakeholders was necessary as they performed their roles before Covid-19. One graduate described how he engaged with various stakeholders to analyse data in a HIV/AIDS project spearheaded by the DOH. He indicated that:

"We scrutinized data working with different stakeholders, that included the provincial AIDS council and the district AIDS council. So my role was to analyse the project data." (Participant 30 University 6 Country 1)

While another graduate described collaborating with different stakeholders on different programmes aimed at improving access to safe water, sanitation and hygiene in his district as follows:

> *"I also do work with various stakeholders. Usually they are programs to do with WASH ,water, sanitation, and hygiene and to do with community based workers that are working in the community."* (Participant 38 University 8 Country 3)

One graduate spoke about engaging directly with his community before the pandemic. This was in the form of community dialogues and campaigns about HIV/AIDS and GBV. He described how he would provide support for victims of GBV through dialogue and community campaigns. He stated that:

> *"We would run groups, gender-based violence support groups, HIV support groups, which we would facilitate that through (NGO), doing community dialogues and community campaigns."* (Participant 31 University 6 Country 1)

In contrast to before the pandemic, more graduates engaged directly with their communities and collaborated with various other stakeholders during Covid-19. This was to increase the community's awareness of the virus and how they can prevent its spread. These graduates performed these roles at their places of work as well as volunteers in their respective communities. One graduate highlighted that:

> *"My role changed a little bit in terms of engagements, ensuring that communities were aware of what Covid-19 was."* (Participant 5 University 1 Country 2)

Several graduates collaborated with other stakeholders at work. On the one hand some graduates continued to collaborate with the DOH as they did before Covid-19, however their roles were now in response to the impact of Covid-19 on non-Covid-19 related programmes. This was expressed by one graduate who explained how he played the role of working with the DOH to increase child immunization rates as they had decreased since the pandemic started. She commented that:

> *"I'd go to places like (province name) because they were really struggling with things like vaccination. And so the aim was to increase the rates of vaccination*

to where they used to be before the Covid-19 pandemic" (Participant 16 University 4 Country 1)

On the other hand, other graduates found themselves collaborating with other actors in other sectors more than they did before Covid-19. One graduate described their role at an NGO where they collaborated with private pharmacies to ensure that HIV patients would be able to collect their medication outside hospital facilities. She noted as follows:

"So, we collaborated with (private pharmacy names) so that patients can pick up their repeat medication there so that the clinicians who are at the facility level can focus on patients that are acutely ill." (Participant 18 University 4 Country 1)

Another graduate working at the MOH highlighted how it was necessary to engage and collaborate with other ministries, nurses and the public to ensure an effective response to Covid-19. She explained their engagement with the public and their collaboration with nurses to educate communities as follows:

"So now, we had to involve other stakeholders within the ministry, we had to involve the education ministry, we have to involve the DPMs office, which is the Deputy Prime Minister's office, we had to sensitize all the other ministries that are within the government so that we all understand that as the Ministry of Health, we could not win this battle, we need the people. And then we even involved the public such that their adverts that were being done to sensitize the public. And on another note, we also had to request nurses that are attending church, to also educate through sessions in their church whereby they'll be educating the people on the issues of Covid." (Participant 8 University 2 Country 6)

A few other graduates also spoke about how collaborating with other stakeholders was centred around ensuring preparedness for the Covid-19 response as expressed by the following graduate:

> *"So the there was a lot more work to be done coordinating everything else, and of course, with partners and stakeholders in preparation, checking on preparedness for Covid-19."* (Participant 23 University 5 Country 1)

During Covid-19 several graduates engaged with the community and collaborated with other sectors by volunteering in different capacities. Graduates mostly spoke of volunteering roles related to health promotion, vaccinating and screening while others volunteered by collaborating with their local churches and the police. One graduate remarked:

> *"I was asked to present in church about the disease and help people better understand."* (Participant 2 University 2 Country 1)

While another described how he volunteered to screen at the institution where he worked as follows:

> *"So I was among the first people whom we were screening people as they were coming in and seeing to it that no…all the necessary protocols within the institution are being implemented."* (Participant 32 University 6 Country 1)

Another highlighted that:

> *"I stepped in as a volunteer vaccinator."* (Participant 33 University 7 Country 1)

In relation to involvement with the police sector, it was noted that this involved the graduates' participation in meetings where there were discussions related to infection prevention measures and educational messages to communities. A graduate expressed that:

> *"I also participated in the (police) meetings that we usually hold with the traffic cops and the police, where we plan on how to prevent (the spread of) Covid-19 to the community or on how to spread the message to the community."* (Participant 13 University 3 Country 1)

Some graduates noted that their volunteering roles involved providing psychosocial support. One explained how they used social media platforms to facilitate this role. He noted that:

> *"We were able to start some friendship groups where we had WhatsApp groups, where we would touch base with mainly women. We realised that some of them might be stuck at home, and they didn't have any way to vent. So, it was a platform for them to have weekly conversations with other women as part of debriefing and preparing oneself for the new week."* (Participant 25 University 5 Country 1)

Interestingly, a few graduates mentioned that their volunteering roles evolved to become formal and paid roles. One graduate described that she was volunteering at an NGO but her boss felt she should be paid for her role. She further explained:

> *"So he hired me as a fixed term employee with (NGO). I was on the administrative side of the facilities' readiness team."* (Participant 3 University 1 Country 1)

Another graduate explained how his volunteering role evolved into an opportunity to formally teach students as he was screening at the border. He further remarked:

> *"So we were screening people coming into the country along with students whom we are teaching because we thought it is the best opportunity for them to experience what we have been teaching them in class."* (Participant 12 University 3 Country 1)

Several graduates noted how their primary roles at work limited opportunities to volunteer because they were experiencing high workloads. While others did not want volunteer citing fear of infecting their families. One graduate explained:

> *"I was not doing any additional work because it was really hectic. It was strenuous at that time."* (Participant 29 University 6 Country 1)

While another highlighted that:

> *"I did not even volunteer as a nurse because I just thought I would be putting my baby and my family at risk."* (Participant 19 University 4 Country 1)

3.3.4 Leadership

Before Covid-19 a few graduates also described experiences related to leadership within programmes. These leadership roles were technical, where they attended to adolescent care services and disease outbreaks. This is noted by the following participant:

> *"I was a program lead on adolescents' involvement. Basically providing technical leadership around responding to the needs of adolescents."* (Participant 5 University 1 Country 2)

Another graduate explained the benefits of his competencies in disease control in his leadership role as follows:

> *"Having this qualification (MPH), disease surveillance, disease prevention and disease control has been of benefit to me in my leadership role whenever there are disease outbreaks."* (Participant 22 University 5 Country 1)

During Covid-19 more graduates found themselves in leadership roles as they were called to provide technical leadership and advice in various committees. Most of these roles were related to developing a strategy to provide an effective response to the Covid-19 pandemic. One graduate explained her role in providing guidance to the MOH on how to set up the clinical response to Covid-19. She noted:

> *"I assumed added responsibility as the country focal for case management. So managing patients that had Covid."* (Participant 2 University 1 Country 1)

Another graduate described how he led a Covid-19 committee that ensured the implementation of rapid response measure directives from the MOH. He commented that:

> *"I am leading (the) Covid-19 committee within this division, which we call rapid response. We are the ones responsible for ensuring that all measures that have been passed by the Ministry of Health are implemented."* (Participant 12 University 3 Country 1)

One graduate who worked for an international organisation explained how she led a team to work with the local government to develop a national response plan for Covid-19. She expressed that:

> *"I had to lead the (international organisation name) team to participate in a government-led process on developing a national response plan for Covid-19. And that Covid response plan of course, included a strong component on prevention."* (Participant 5 University 1 Country 2)

A few participants explained other forms of leadership that they assumed during Covid-19. These reportedly involved running hospitals and leading the strategy to ensure preparedness to cater for Covid-19 patients as well as to support other hospitals. This involved bringing together various experts and hospital staff members through workshops. A hospital chief executive officer (CEO) noted as follows:

> *"We developed a strategy to say this is what we're going to, do this is how we're going to support (hospital name) as a cluster and then this is how we're going to render these services to the entire country…Then soon I convened a workshop with my various teams, nurses, doctors, other experts and even cleaners."* (Participant 4 University 1 Country 1)

One graduate described how she felt leadership was required as she assisted people in other countries to access commodities that they were struggling to acquire from her country because of the lock down. She explained that:

"As (country) was in hard lockdown, the other countries were not necessarily in hard lock down. And there's a lot of things that pass through (country). Either they are imported from other countries or are manufactured in (country). So they were countries which were affected. And I think I played quite a big role in going out of the way…the extra mile in trying to, you know, get them to access the commodities that they were not easily accessing because of the lockdown. You know, in terms of explaining to them what the regulations are and reaching out to other departments as well…so I think that really, you know, required leadership" (Participant 23 University 5 Country 1)

3.3.5 Policy development

Only a few graduates spoke of experiences where they took part in developing policy before Covid-19. One graduate developed a hospital policy to ensure quality of care for patients. He highlighted that as follows:

"I wrote a policy for the hospital. They put me in quality assurance to make sure that whatever we do is evidence-based at the hospital." (Participant 15 University 3 Country 1)

Another graduate reportedly developed guidelines for TB treatment at national level and also conducted situational analyses that would assist in informing future policy. She explained that:

"We do situational analyses to better inform next policy decisions." (Participant 2 University 1 Country 1)

During Covid-19 more graduates were involved in influencing policy through developing guidelines, protocols and policy. These graduates formulated Covid-19 protocols and infection prevention and control (IPC) guidelines at their places of work. This was to guide how patients would be managed and how services would be provided at the facilities in the context of the pandemic. One graduate commented that:

> *"I developed Covid protocols and some infection prevention guidelines. And then I made sure that those guidelines were followed*." (Participant 14 University 3 Country 1)

One graduate was involved with formulating Covid-19 policy at the MOH that would guide communication with the public as well as Covid-19 response roll-out strategies. He explained as follows:

> *"The Ministry of Health roped us in to come up with policies and protocols that guide how we are going to manoeuvre in this pandemic. So we are responsible for formulating policies and also responsible for coming up with the plan of how we are going to communicate with the public and how we are going to roll-out initiatives at different health institutions in the country."* (Participant 12 University 3 Country 1)

A few graduates expressed that they provided evidence during Covid-19 that they believed was useful for Covid-19 policy formulation. One graduate noted as follows:

> *"I basically deal with data to measure the impact of Covid-19 and also come up with the risk factors that are associated with Covid-19, which are valuable for policy. "* (Participant 21 University 5 Country 1)

Another graduate explained how he published a rapid review on a treatment modality for Covid-19. He went on to express how he hoped that the evidence he was providing would be used to shape policy. He noted that:

> *"During the pandemic, for instance, I mentioned that I was able to co-author a rapid a Cochrane rapid review on the use of antibodies and convalescent plasma for treating Covid patients. I mean, that review was one of the earliest reviews published, you know, that time we published it as early as May or June 2020s. I'm hoping that this evidence will be used to inform public policy practice and an early response to the pandemic" (Participant 36 University 7 Country 1)*

He also shared that he published a paper on the impact of the pandemic on routine immunization services which was cited in one of the WHO Covid-19 policy statements. He indicated this as follows:

> *"So that was from my PhD, and I'm happy that we published a paper on that, and it was used, it was cited by WHO. I think it was cited in one of their policy statements in terms of strategies for revitalizing or restarting immunization services after the Covid-19 lockdown."* (Participant 36 University 7 Country 1)

3.3.6 Ensuring access to services and knowledge

Before the pandemic a few graduates described roles where they provided services in a way that improved the accessibility and availability of health services to various community members including disadvantaged groups. These graduates were physiotherapists who described how they would take part in community outreach providing physiotherapy services at homes, clinics and schools. One graduate explained as follows:

> *"Our outreach community services, such a large part of the hospital, in fact, it's (sic) like the heart of our services, because we're also taking services to the previously disadvantaged groups"* (Participant 6 University 2 Country 1)

While the other graduate commented that:

> *"Before the start of the pandemic, we used to see inpatients on a regular basis, almost every day and doing all the modalities, physiotherapy modalities, and doing the outreach services to the clinics, doing home visits and schools outreach."* (Participant 11 University 3 Country 1)

During the pandemic a few more graduates were involved in providing services in a way that improved access for the communities. This was particularly in situations where the context of the pandemic had made it difficult for them to receive or provide certain health related services. One participant who was a district manager described

how he organised community-oriented health services in his district to facilitate access to health services for the community in his district. He stated that:

> *"We do community-oriented health services. We offer them these kind of services in these communities so that they can access these services."* (Participant 38 University 8 Country 3)

While another graduate explained how she took part in discussions to ensure equal access to the Covid-19 vaccine in Africa as follows:

> *"..it's still at discussion stage as part of the vaccines for Africa initiative. Our main focus is just vaccine development and access in Africa related to Covid."* (Participant 34 University 7 Country 1)

3.3.7 Communication

The MPH graduates also described communication roles before the pandemic. One graduate mentioned their role in implementing social and behavioural change communication interventions by communicating health information on different campaigns in emergency settings. He commented that:

> *"We were doing a bit of capacity strengthening work, being a bit of communication on different campaigns, so the focus was on health communication."* (Participant 1 Country 1 University 1)

Another participant described her role as a communications manager at her place of work. Before the pandemic she reportedly facilitated communication in writing and orally through various means with staff and the public to facilitate the day to day running of the organisation. She explains this as follows:

> *"We're kind of the caretakers of two conversations. And the one conversation is between [org name] and the public. That involves things like the website, external newsletter of staff, and then the tools that our staff are using: the job aids, pamphlets, etc. So the other point is that the conversation is about talking*

and listening. So we use tools to get information back from the public through community advisory groups and our public feedback channels." (Participant 37 University 8 Country 1)

During the pandemic a few graduates spoke about performing communication roles. They described how they communicated information relating to Covid-19 through media platforms to provide clarity on particular content related to the virus, particularly when the public had limited knowledge. One graduate indicated that he answered questions and provided information about quarantine on a social media platform as follows:

"We could comment on the social media and other platforms…You will tell them what is quarantine, and stuff like that. I remember once answering that, talking on the national portal" (Participant 30 University 6 Country 1)

Two of the graduates, a district manager and a hospital CEO both described how they had to appropriately chair the media while providing updates and public health information about Covid-19. One of them expressed:

"I was the one chairing the media. People really [have to] understand what you're doing in the district in terms of communications, you [need to] communicate effectively, efficiently and in time." (Participant 38 University 8 Country 8)

It was evident that in some organisations there was a need to increase the frequency of communication during the pandemic. This was to ensure that all staff and clients were informed about the current status of the pandemic and the organisations' plans. This was reportedly done virtually as most people were working remotely during the lockdown. One graduate stated that:

"In the early stages, what we tried to do was increase the frequency of communications from head office to everyone else. And we had to do that online like through videos that were sent via WhatsApp and in some cases with a link on an SMS" (Participant 37 University 8 Country 1)

She further explained how she made efforts to alert patients about clinic closures. This was in instances when there when there was a detected case of infection. She noted that:

> *"I was trying to communicate with clients about clinic closures. Because yeah, if a clinic, especially in the Eastern Cape, if there was a…someone…there was a case detected then the clinic was closed."* (Participant 37 University 8 Country 1)

3.4 Facilitating change: additional and priority roles during Covid-19

There was a change in roles for most graduates during the pandemic, with only a minority experiencing no changes in their roles. Changes included being assigned additional roles, having to stop their pre-pandemic roles to take on new priority roles and a change from working in-person to working remotely. Most of the new and additional roles assigned to graduates were Covid-19-related. These changes are described in further detail below.

3.4.1 New and additional Covid-19-related roles played by MPH graduates

Several graduates described experiences where they had to explicitly change the role they were playing before Covid-19 to take up a new role during the pandemic, meaning that they had to take up new roles within the Covid-19 space. One participant described this experience as follows:

> *"So now I basically deal with data to measure the impact of Covid-19 and to come up with the risk factors that are associated with Covid-19, which are valuable for policy. So my role has basically switched from being a laboratory researcher to a data analyst."* (Participant 21 University 5 Country 1)

It was evident that in having to change roles to focus on Covid-19, several graduates specifically had to move away from HIV/TB-related work to training health workers on the management of Covid-19 patients. One participant described this change as:

> *"I would say we had to change (roles) because with Covid most of the activities they had to come to a standstill. So, the ministry (MOH)… since most of us are used to conducting trainings for health care workers in different aspects of HIV program, stopped our core function and prioritized the training of healthcare workers on Covid-19."* (Participant 8 University 2 Country 1)

Other graduates had to stop their core functions and take on roles that were a higher priority at the time, including roles such as contact tracing and health education about how to prevent the spread of the virus. One graduate explained this as follows:

> *"Yes, it was different because I didn't attend much on my program, the TB, HIV and STI. I had to join the Covid-19 teams to trace the positive Covid patients and their contacts at home. When they asked us to drop our programs, we did it to be part of the Covid-19 task teams and we educated the patients who were positive and their contacts."* (Participant 17 University 4 Country 1)

Unlike before the pandemic, during Covid-19 some graduates spoke of influencing the development of policy by advocating for the continuation of HIV/TB programmes, child immunisation services as well as the regulation of alcohol. In taking up an advocacy role within their core area of work, one graduate explained:

> *"(I was) negotiating with government, not to move all key service providers to the COVID response because we needed to continue providing maternal health services. So I also had to engage in advocacy to ensure service continuity"* (Participant 5 University 1 Country 2)

On other forms of assumed advocacy roles, another participant remarked:

> *"During the pandemic, for example, there was a lot of advocacy around alcohol regulation rights, so I was involved in those conversations and the advocacy and the submissions to parliament that we did at that time".* (Participant 31 University 7 Country 1)

A few graduates also mentioned that they experienced a change to a leadership role or promotion during the pandemic. One graduate explained how his role changed during Covid as follows*:*

> *"I had to lead the (international organisation name) team to participate in a government led process on developing a national response plan for Covid-19* (Participant 5 University 1 Country 2)

While another graduate explained how they had to be the key person responsible for a clinic:

> *"So then we have a clinic, before Covid I was just in charge of the consumables, but during Covid I was made the focal person for the clinic."* (Participant 7 University 2 Country 1)

Several graduates applied their public health science and analytical skills as they were assigned additional roles such as ensuring compliance to Covid-19 protocols in facilities, screening patients and staff members, contact tracing in the homes of Covid-19 positive contacts and vaccinating at Covid-19 vaccination sites. One graduate explained their additional role as follows:

> *"We had to go to the different facilities to observe the nurses that were putting on the PPE gear. We had to make sure that are they doing it the right way. And even when they're removing it, we made sure they do it the right way."* (Participant 8 University 2 Country 1)

When asked about additional roles another graduate commented on how they assume the role of screening other staff:

> *"Yes, at the beginning of the pandemic, we had to screen the other staff members who were not part of our clinical section at the administrative block. We had to go to them on daily basis to screen them in the morning."* (Participant 11 University 3 Country 1)

While another noted how they had to then take part in contact tracing in households:

> *“(My additional role) that's the one of contact tracing because that's not my part of my responsibility. I had to join the teams that are doing home tracing for the Covid positive patients and their contacts.”* (Participant 17 University 4 Country 1)

Regarding vaccination, a few doctors took on the additional role of administering the Covid-19 vaccine. Some of them were of the view that this was not the best use of resources but also acknowledged that it was a priority task that had to be done by whoever was competent on the ground. One graduate commented that:

> “*I was one of the vaccinators with the nurses but I was also the (data) capturer so you know your role basically on a day to day changed. Whether you were capturing for your other clinicians or vaccinating, it was probably not the best use of resources, because I was a doctor. But it was hands, they needed hands and the vaccinations were the priorities.”* (Participant 40 University 8 Country 1)

It was evident that for some participants these additional priority roles were not formally added to their job descriptions and led to additional hours spent at work. One graduate explained this as follows:

> *“You find that we were knocking off at eight o'clock, nine o'clock in the evening, you know. So the roles will now change to now focus on Covid-19, but not in my job description. It was just an additional role that was added on my on my site.”* (Participant 30 University 6 Country 1)

Some participants were of the view that the additional roles related to sending key messages to the public were of great importance during Covid-19. These messages included providing information to the public about preventing the spread of the virus and educating them on the importance and benefits of vaccination. One graduate remarked that:

"Yes, I was one of the people who were doing the loud-hailing at the community. Loud-hailing telling the community on how to take care of themselves during this Covid" (Participant 13 University 3 Country 1)

Another graduate mentioned that the additional role specifically related to health promotion among patients:

"The additional volunteer work that I wasn't doing before, is the health promotion just trying to educate patients more on Covid… and also, the advantages of vaccination" (Participant 26 University 5 Country 1)

3.4.2 Additional roles unrelated to Covid-19 played by MPH Graduates

Some graduates mentioned that they were assigned additional roles that were not directly related to Covid-19. These responsibilities were given to them because of the influence of the pandemic. Some participants described how due to staff constraints exacerbated by Covid-19, they developed some contingency measures to mitigate these constraints. While other staff took on Covid-19 roles, some graduates reportedly had to take on executive roles. One graduate explains this as follows:

"Covid fell under our directorate and we are very thin (short staffed), so I had to take on my boss' role. He focused on Covid-19, solely. So I had to take care of everything else." (Participant 23 University 5 Country 1)

Although many graduates had additional roles assigned to them during Covid-19, there were a few that had no additional or new roles assigned to them at work. This was because they were either too busy to have additional roles assigned or they were involved in roles related to the financial management of projects. One such graduate explained that:

"There hasn't really been a change in my roles except for the fact that people got retrenched…I have been doing a financial management project. There hasn't really been a change in my roles." (Participant 20 University 4 Country 1)

3.4.3 MPH graduates' perspectives on the change from working in-person to remotely during Covid-19

Several graduates expressed that they experienced a change from performing their roles in person, to performing them remotely. They attributed this change to helping prevent the spread of Covid-19 while also noting that adapting to this change was a learning curve. Working from home particularly involved adapting to the use of online platforms for communication with colleagues. The following graduate noted that:

> *"We had to adapt from the normal way of doing things to now. Well, working from home relying on technology for almost everything"* (Participant 19 University 4 Country 1)

One of the graduates who was a technical advisor also added that he had to learn how to provide remote advice as opposed to the in-person interactions he was used to as follows:

> *"What has changed is that we've had to learn to provide remote assistance, as opposed to, you know, the physical in-person technical assistance country visits that we were used to before Covid."* (Participant 1 University 1 Country 1)

Another graduate further indicated how they extended their roles by using remote platforms. He noted that he organised a webinar to increase hospital staff's knowledge about oxygen and its use. He invited all SA public hospital technical staff, maintenance staff and CEO's. This webinar was also recorded to give staff the option to view the webinar at a suitable time for them. The graduate explained as follows:

> *"We did a bit of training for the guys who work in oxygen, the guys who are maintenance and technical staff who've not really understood oxygen. So we started off with a basic introduction and we did it as a webinar with one of the engineers from (hospital name) in (name of province)…So we invited all of the (country name) public hospitals and their technical staff and maintenance staff, CEOs, anyone who was interested to attend this training. And so we did it online with ZOOM, I think, and gave people an option to also view the recordings"* (Participant 3 University 1 Country 1)

It was evident that because of the different stages of the pandemic the graduates had to adapt and plan accordingly. Some graduates had to learn how to plan and adapt protocols for the return of staff to work as institutions started opening after the hard lockdown. One graduate explains this as follows:

> *"I was quite involved in those kinds of return-to-work planning, I could see it was a cause of a lot of stress for the decision makers, and people were feeling very unsure."* (Participant 33 University 7 Country 1)

In some instances the inability to provide in-person services during the pandemic led to graduates having to stop some of their roles completely. Community home and school visits could no longer be done to prevent the spread of Covid-19. One graduate indicated that:

> *"We used to do home visits whereby we were going to patients' homes. So currently during the pandemic, we are no longer doing that as we thought we must keep patients safe and not bring some conditions from the hospital to their homes."* (Participant 11 University 3 Country 1)

3.5 Adapting to change: MPH graduates' flexibility and resilience

Some graduates expressed how the changes in their roles happened according to different time frames, as the pandemic evolved. Participants mentioned changes at the beginning of Covid, in the midst of Covid, when the vaccine came and when pandemic fatigue came.

At the beginning of Covid-19 several graduates mentioned that their workload increased significantly. This was because of the additional roles assigned to them at their workplaces that were mainly centred around providing an effective Covid-19 response. This included the procurement of medications, managing disease prevention and managing quarantine centres to mention a few. One graduate remarked that:

> *"Of course, our roles have changed since the COVID-19 pandemic, meaning we now do extra work. Extra work in terms of the procurement and storage of medications, and just the responsibility towards medication. So now we tend to store a lot of PPE, we store a lot of ventilators, the things that are needed for Covid-19."* (Participant 27 University 5 Country 1)

Another graduate described how at the beginning of the pandemic his scope of work expanded. He continued his clinical work while also putting measures in place to reduce Covid-19 community transmission. He described how he was managing a quarantine centre which involved testing for Covid-19, following up on positive cases and engaging with various stakeholders.

> *"I think the work streams that I would do expanded five workstreams more. That means you had to do testing for the returnees, to managing the quarantined, to do supervised burials, to, to follow up."* (Participant 38 University 8 Country 3)

Following on with the notion of managing a quarantine centre, he went on to explain the challenges of people having misconceptions about the centre and the resistance thereof. This reportedly made it harder to manage those who were staying there. He also highlighted the importance of clear communication to enable understanding from them and adequate resources to support them. He explains this as follows:

> *"[There were] a lot of.... rumours that came through, you know, it was kind of like managing quarantine centres, people being put in quarantine centres, and they have to be tested before being released. And it was a challenge, because you will find that people will start demonstrating in these quarantine centres (and saying) that we need to get tested, why are you putting us in these detention centres like detainees and without any resources".* (Participant 38 University 8 Country 3)

Furthermore this graduate explained how it was necessary to mobilise resources such as food and sanitary packs for the people staying in the centre as he noted:

> *“There may not be capacities, in terms of foodstuffs and so we had to run around to look for food and do resource mobilization.”* (Participant 38 University 8 Country 3)

In the midst of Covid-19 graduates had the responsibility of ensuring that staff and members of the public were safe by enforcing Covid-19 measures such a proper use of PPE. One graduate explained that:

> *“In the midst of Covid, I had to ensure that staff members have got appropriate PPE's and there is enough space for the patients that are taken care of as well as psychological support of staff.”* (Participant 13 University 3 Country 1)

When the vaccine came the graduates were of the view that health promotion and education became critical, hence they had to assume that role. This was because of the various misconceptions from the public and even some health workers about the Covid-19 vaccine. The graduates expressed that it was necessary to inform them on the benefits of being vaccinated to increase the acceptance of the vaccine. One graduate commented that:

> *“When the vaccine came out, oh my goodness, we have anti Vaxxer family members, and I've got anti Vaxxer healthcare workers, not anti vaxxers, anti-Covid vaxxers. So it was a lot, and they would often come to me because I'm the doctor. So I'd have to sift through the evidence and be like, these are the reasons these are the studies, this is how it works. And then also sifting through policies for lay people like our CHWs, who are going out and recruiting people for vaccines as well as for nurses who will give the vaccine but they don't want to take the vaccine themselves.* (Participant 40 University 8 Country 1)

Pandemic fatigue occurs when people are demotivated to follow recommended protective measures (56). One graduate expressed how he was playing the role of health promotion during the time when people were no longer coming for vaccinations and there were a lot of misconceptions at that time. He explained this as follows:

"And you start to see the pandemic fatigue, people not coming through for vaccinations and so forth people. The misconception then comes [in], and the issue about health promotion, you're working all around you are just making sure that you are um, you're providing health service" (Participant 38 University 8 Country 3)

Figure 3.2 shows the changes in roles of a district manager/medical officer who expressed how his roles evolved at different stages of the pandemic.

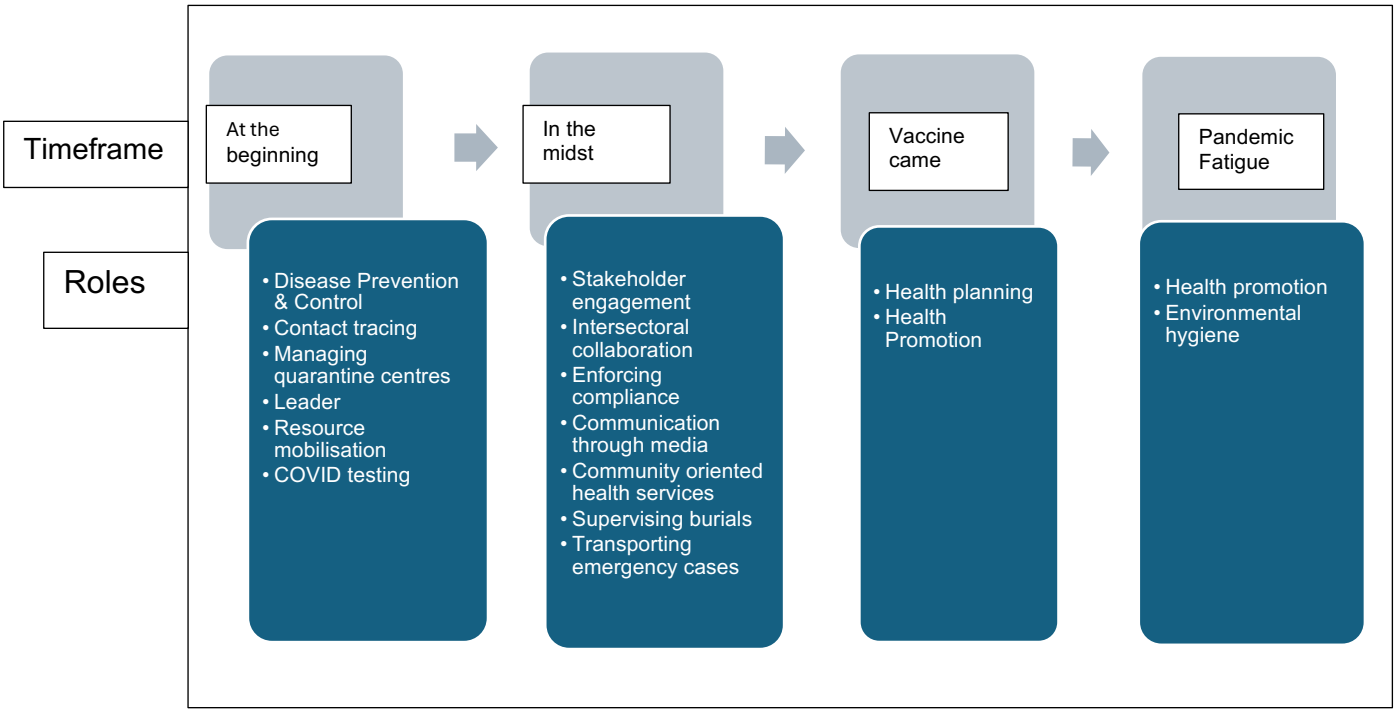

Figure 3.1 – Changes in Roles of Participant 38 University 8 Country 3 at Different Stages of the Pandemic

3.6 Changes in roles: the psychological outcomes and emotional experiences

The restrictions, workload, social context and behaviour of individuals and communities during Covid-19 had its effects on graduates as they performed their roles. Several graduates expressed that they felt stressed as they performed their roles and had to find ways to cope as noted by the following graduate:

"You see, I've been stressed myself. I needed psychological support" (Participant 8 University 2 Country 1)

Another graduate shared how due to his assumed his leadership role, he was not able to be hands-on to help people during the pandemic. He alluded to how the context he found himself in made it difficult to do so. He commented that:

> *"Yeah, like the captain in the cockpit. You're driving everything and the weather is not conducive. It's not conducive for me to save everyone."* (Participant 38 University 8 Country 3)

Some graduates felt they needed to be able to reflect and process what happening around them but struggled to find ways to do so. One graduate reflected that:

> "*You couldn't even attend counselling sessions properly because now the country's closed so yeah, I had to find means within myself to cope."* (Participant 19 University 4 Country 1)

Another graduate who was working as a nurse during Covid-19 expressed in detail that she did not have the time to reflect and process what she was going through at work during the pandemic. This led to her wondering whether one requires a skill to do so. She explained this as follows:

> *"I realized that I did not have the time when I could have a reflection of everything that was happening…I didn't have that. I don't know if it's a skill, but I didn't have time to sit and reflect and actually be… understand what is going on, during Covid-19."* (Participant 29 University 6 Country1)

She further explained that:

> *"I think there was a time when I was in a cocoon. I was just acting now because things were happening around me. Hence, you were numb in a way. I was numb in a way. And I don't know but at a later time, at a later stage. I could find myself crying, I don't know what about… but I know it was about Covid."* (Participant 29 University 6 Country1)

While some graduates felt that more psychological support was needed, others felt well supported by colleagues, stakeholders and by assistance from the private sector. One graduate explained how through the support of his team, they developed a plan manage Covid-19. He noted that:

> *"Because I had the ability to think project management I looked at Covid as an incident and as a project rather than something that I will have to deal with forever. I applied the(sic) project management and I developed a plan with the support of my team of course."* (Participant 4 University 1 Country 1)

He went on to describe how he was proud about how well they did to get to a point where they could say they were over the pandemic. He highlighted that the support from stakeholders and the private sector was remarkable as follows:

> *"I must say the assessment now that we are in the fifth wave, that has weakened, is showing that we are over the pandemic. We are sitting here priding ourselves that we actually did well. The cooperation and the support from the internal stakeholders and external stakeholders is amazing. We also developed relations with the private sector, private people, the help that came from outside and everybody else."* (Participant 4 University 1 Country 1)

However, not all graduates experienced comradeship as another graduate expressed that he felt burnt out due to an increase in his workload and a lack of support from other colleagues. He commented as follows:

> *"You know the workstreams, expanded. So you then ask them and say, oh, how do I navigate? Sometimes, this leads to burnout, and you're the only one and you're not getting support from other colleagues because they will say that this is public health work, when it's (supposed to be) community work."* (Participant 38 University 8 Country 3)

Some graduates mentioned that they felt that their skills were underutilised during the pandemic. A few graduates expressed that they felt that the DOH had the opportunity

to call more MPH graduates to assist with the response as they have the skills to do so. One graduate commented that:

> "*During pandemics like this one, I feel maybe the department is not taking us seriously. Why I am saying that is because they know that there are students who have already graduated from MPH. They should have just called us to say all the students who graduated from MPH must come in to assist."* (Participant 13 University 3 Country 1)

Figure 3.3 represents the words used by graduates as they described how they felt as they performed their roles during the pandemic.

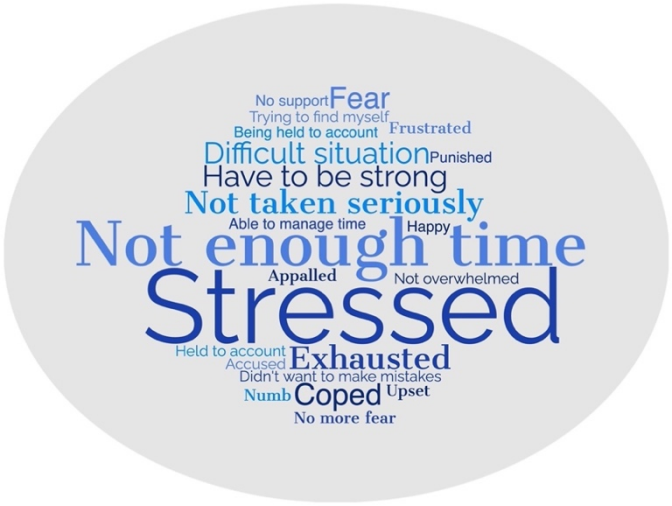

Figure 3.2 - Words of emotion used by graduates

3.7 MPH graduates' perspectives on roles that are relevant and required for them in future pandemics

3.7.1 The perceived value of MPH graduates in pandemic responses

Many participants expressed that MPH graduates have a significant role to play in future pandemics. Their relevance was described as extensive as participants explained that graduates can play valuable roles in every country's health workforce during a PH response. One graduate noted:

> *"So the role of public health specialists is quite enormous."* (Participant 38 University 8 Country 3)

While another explained how their roles cut across different spheres of public health. He noted as follows:

> *"So, I mean, public health graduates have a role to play in everything. I mean, basically everything that can be thought about, every aspect of a public health response."* (Participant 36 University 7 Country 1)

He further explained:

> *"…MPH graduates represent a valuable asset to every country and across the world. So they are a very useful assets to deploy in response to any threats to public health."* (Participant 36 University 7 Country 1)

Participants also voiced that graduates should be at the forefront of the response and that the voice of PH specialists must be heard. Notably, few graduates conveyed that they felt that most of the people who were at the forefront of the response may not have had the required skills to perform their roles. One graduate commented that:

> *"The voice of public health specialists must be heard…most of (the) people who are in the forefront…I don't think they have got that necessary skill set even though at higher level"* (Participant 36 University 6 Country 1)

He went on to say:

"I think MPH students must be on the forefront because that is where they belong." (Participant 36 University 6 Country 1)

Another participant highlighted that even graduates who are not working should volunteer and assist in the response in the districts in future pandemics. He commented that:

"Those who are not working, they (can) go and volunteer in the district and assist the district and then you deploy them there…even if it's one for one week, or for one month, they will go and assist there. So then as long as they sign confidentiality and stuff like that." (Participant 30 University 6 Country 1)

3.7.2 Health promotion and education

Several graduates expressed that they felt that health promotion and education roles are essential and relevant for them in future pandemics. One graduate noted that:

"Health promotion is very key, and also (a) fundamental role to be played by an MPH graduate." (Participant 30 University 6 Country 1)

Graduates voiced that they could perform these roles in the public sector while ensuring that key messages that promote preventative measures such as hand washing are received and understood by key populations. One graduate noted that:

"I think in the whole public health sector, we can be employed; I mean for the health promotion. Like with the pandemic that just have (sic) taken place. I think all of us will be relevant." (Participant 17 University 4 Country 1)

While another graduate highlighted that:

"Health promotion and education, I think, intrinsically is where MPH candidates also fall in. Because I think it's one thing for, you know, the radio hosts and the president and all of that to just say, oh, wash your hands social distance. But

are we actually communicating that on a ground level? Are we actually getting that message to the key populations within South Africa specifically? (Participant 24 University 5 Country 1)

It was evident that a few graduates felt that in the future it would be necessary for graduates to be well positioned and given the platform to address bigger communities. This would be to provide people with more insight about public health challenges. They also expressed that graduates should also take the initiative, come forward and communicate that they have the public health knowledge that enables them to be well utilized for health promotion. One graduate explained this as follows:

"If we can be placed in a position where we can address bigger communities, you know, to actually shed some light about public health challenges and public health concerns…I think we would really go far" (Participant 20 University 4 Country 1)

While another graduate highlighted that:

"But if you come forward and present yourselves to them to say I have knowledge on the public health issues…it is then they can utilize you properly in regard to health promotion" (Participant 11 University 3 Country 1)

A few graduates were also of the view that health promotion and education are key roles for them in the future as they would assist in reducing the number of people who are hesitant to accept the vaccine. One graduate commented as follows:

"You see like recently, we are having the issue of vaccine hesitancy, I still feel that public health specialists were supposed to be on the forefront to try and diffuse the fears that people are living with." (Participant 33 University 5 Country 1)

3.7.3 Leadership

Many graduates expressed that they should take on more leadership roles in future pandemics. They were of the view that they should set the vision and direction of the

response while ensuring it is evidence based and sensitive to communities' needs. It was evident that graduates felt that they need to be part of the pandemic solution as expressed by the following graduate:

> *"Graduates should be in strategic leadership roles, where they can influence, where they can provide the technical leadership and advisory services, particularly to policymakers. They should be able to guide areas that require research."* (Participant 3 University 1 Country 1)

Another graduate highlighted the role graduates must play as leaders who apply their public health knowledge in decision making while also involving the community in the process. He explained that:

> *"I think that the other role is to ensure that the response is sensitive to community needs and realities and to provide the technical leadership. Because as I said earlier, not everyone is really up to speed with approaches, theories, the use of evidence, using data to inform interventions and approaches of engaging communities around decision making.*" (Participant 5 University 1 Country 2)

A participant expressed that he felt that graduates should take a lead role in coordinating logistics in future pandemics. He also highlighted how they should ensure that leadership is evidence-based, unselfish and strategic so that the results of interventions are long lasting. He commented on graduates leadership roles as follows:

> *"Just to say, leadership in terms of ensuring that the logistics are in place…you're coordinating logistics, making sure they are in place. And these are the duties of public health experts*. (Participant 38 University 8 Country 1)

He further explained that:

> *"…for us to have evidence- based leadership, we need to align the goals ...we need to align our goals… we need to align the behaviours... to achieve results.*

Such that the results that we get are balanced, they're selfless, they're strategic, they're lasting at the end of the day. So MPH plays a role." (Participant 38 University 8 Country 1)

3.7.4 Data management and research

Many graduates voiced that they should be assigned to roles that involve data management and research. Graduates expressed how they have an important part to play in roles such a disease surveillance, providing statistics and demographics, data analysis, data interpretation and in determining the impact of the virus. One graduate explained how useful epidemiologists placed at hospital level could assist in determining the infection rate as follows:

"They can employ epidemiologists at the hospital level to check infection rate. I think that as MPH graduates we can assist a lot if they can place us there." (Participant 15 University 3 Country 1)

While other graduates expressed that in the future they should model data and draw pandemic trends, provide statistics on burden of disease and identify the risk factors for the virus. One graduate commented that:

"I thought it was going to be nice if as MPH students, we could actually do our own stats, trend lines so that we can draw a picture and kind of like predict the manner in which we are moving in terms of the pandemic." (Participant 19 University 4 Country 1)

Another graduate emphasised that MPH graduates are suitable to take on such roles as they have the skills to do so. He noted that:

"We need people with the skills to tell us the burden, the true burden of the pandemic, and the risk factors and people who are mostly affected. And those people who can do that are MPH graduates, you know, people who have acquired skills in epidemiology and biostatistics." (Participant 21 University 5 Country 4)

Many participants were also of the opinion that research roles are relevant for MPH graduates in future pandemics like Covid-19. They expressed that graduates should take part in research to provide evidence to guide the response and to build on the existing knowledge about the virus. They expressed that they should also provide evidence for future pandemic recommendations. While reflecting, one of the graduates expressed the benefits of research and documenting what has been done for the current pandemic response as follows:

> *"If we could have documented, to share the best practices of how we have done things during Covid-19…and then also done research to say this is what happened and these are the future recommendations that need to be done in terms of Covid."* (Participant 8 University 2 Country 1)

Another graduate encouraged more research in the future as she pondered on whether enough research was conducted during this current pandemic. This was linked to the challenges she mentioned around vaccine hesitancy and the self-prescribed use of herbal medicines to treat Covid-19 by community members:

> *"Have we thought about doing research around vaccination, about the acceptability of vaccination and around how people have treated themselves with homeopathic remedies during Covid?"* (Participant 19 University 4 Country 1)

3.7.5 Communication

It was evident that several graduates were of the view that they should be assigned communication roles during the pandemic. Graduates mentioned the need for the right platforms to be able to ensure that people understand all the pandemic public health information given. Some expressed that they should use various platforms such as TV, radio, social media and regularly updated websites to communicate the right messages to the public. One graduate articulated this as follows:

"*I think it is up to us to make sure that we take the platform, and we take the stand, then we go out there and educate the communities about these pandemics or other health concerns that they are."* (Participant 11 University 3 County 1)

She went on to express how outreach campaigns could be used via various digital platforms to provide communities with the correct information so that they can handle the pandemic better:

"We should do more outreach like campaigns. Be out there out in the field out in front of big crowds. I mean if we can get slots on the radio stations or TV channels then by all means, we should take up those spaces, so that we can get a bigger audience to educate more people at once. I think we should be more hands on in the field, in the communities and inform them on the right messages." (Participant 11 University 3 County 1)

Moreover, a few other graduates highlighted the importance of being more involved in simplifying health information and communicating in a way that the public can understand. He explained that:

"We need to advocate to help spread the message across…even then we will tell them, even our families, what's going on…we should explain at that level of brotherhood, I'm not talking terminologies but then I'm explaining to him in such a way that he would understand." (Participant 27 University 5 Country1)

While another graduated noted that:

"We could have definitely been more involved with communication and helping people sort of understand what's really going on." (Participant 35 University 7 Country 1)

Another graduate expressed that she felt graduates with relevant skills in behavioural science should be involved in crafting the mass media messages that encourage the

public to perform behaviours that prevent the spread of the virus. She explained this as follows:

> *"Throughout the pandemic I received like little SMSs from the government saying, you know, wash your hands, wear a mask and things like that. But I do think that those kind of messages could be even more effective if you had people with a behavioural science background, umm crafting those messages because we know that there are specific ways to craft messages in order to boost uptake. And, and other countries have demonstrated that. So I'd like to see more of that happening in (country). And I know that we have really qualified people who can do that."* (Participant 33 University 7 Country 1)

A few participants highlighted that they felt that MPH graduates should be in the forefront of communication. They expressed that they feel they can help the community understand the virus and how it affects their overall lives even from an economic perspective. One graduate expressed that:

> *"I feel they should also be in the in the front line to help the communities to understand the virus, the extent to which the virus can affect their lives, the economy, the economic part and what needs to be done to prevent to help themselves so that they are safe. I felt they should be put in the front line so that in ensuring that their community is safe."* (Participant 31 University 6 Country 1)

One graduated specifically highlighted how graduates have a role to play in communicating the correct information to prevent the spread of misinformation. She expressed that she felt that misinformation negatively affects how the pandemic is handled by communities. She explained this as follows:

> *"I think communicating the correct information, because when you are in MPH, you're taught about diseases and epidemiology, and how they spread and the prevention thereof. So as MPH candidates or graduates, I think we should be more hands on in the field, in the communities and informing them upon the right messages because what I saw is that because of wrong information, the*

whole Covid situation wasn't handled better by the communities" (Participant 10 University 2 Country 1)

3.7.6 Policy development

A few participants expressed that in future pandemics graduates should be more involved in influencing the development of policy related to the response. They noted that graduates are key actors in this regard. While another participant emphasized the role of providing evidence to policymakers and relevant stakeholders during pandemics. He explained this as follows:

"We need to inform people, the policymakers and other stakeholders (who) need those (sic) data which can only be generated by MPH students, you know, based on the skills that they have acquired." (Participant 21 University 1 Country 1)

While another graduate stated that:

"I do think MPH graduates are key in terms of influencing policy" (Participant 5 University 1 Country 2)

A few graduates highlighted how during Covid-19 politicians were drafting health policies. He commented that MPH graduates are suited to draft policies in future pandemics and they have the experience and skills to do so. One graduate stated that:

"They should be in policymaking. Right now we see a lot of politicians drafting health policies. And yeah, I feel like that's where MPH students should be. We should be writing a lot of guidelines and influencing these policies and guidelines." (Participant 15 University 3 Country 1)

Another graduate expressed how she felt there were not enough graduates involved in the policy development process during Covid-19 and how in the future MPH graduates have a role to play in this regard. This would be with particular focus on ensuring access to health care. She commented that:

"I feel like there are a lot of MPH people working on epidemiology. I would like to see more MPH work focused on policy and on access [to health care] because I think we saw a lot of lot of inequities (during Covid-19)" (Participant 37 University 8 Country 1)

A few graduates explained how graduates should also collaborate with the appropriate stakeholders to hold discussions and provide sound evidence to shape policy. One of the graduates described how this would also involve ensuring that data systems are functional and up to date. She explained that:

"(They should) bring the right stakeholders to discussion and come up with good evidence to support whatever policy direction will be taken. And also make sure that there are data systems that can regularly give information of where things are" (Participant 2 University 1 Country 1)

While another graduate highlighted the need to involve relevant stakeholders when developing national policy and guidelines. She commented as follows:

"When developing policies at national level or developing guidelines, you cannot sit in your office and then write those policies or write those documents. You know that now when I'm developing a policy, it is not for me, but it's for the people. Hence, we need to involve the stakeholders." (Participant 8 University 2 Country 6)

3.7.7 Management and planning

Several graduates were of the view that in future pandemics they should be assigned to managerial roles. Graduates expressed that they could handle various situations, even in a crisis. One graduate stated that:

"Because of their background, they can be hired for management posts because MPH graduates are empowered to handle any situation." (Participant 19 University 4 Country 1).

One graduate mentioned that MPH graduates could be in managerial roles in future pandemics. This could involve incident management, including overseeing general organisation, finance and administration. He highlighted this view as follows:

> *"I believe public health experts need to work to ensure that in this crisis, there is incident management. It involves planning, organization. It also involves leadership, finance and administration. "* (Participant 38 University 8 Country 3)

Another participant explained that graduates in managerial roles should work with safety, health and environment (SHE) coordinators to ensure workplace safety for staff and patients through training on safety procedures. She noted that:

> *"They should be placed or hired as coordinators and be at the managerial level…and they (MPH graduates) work with SHE coordinators to ensure that staff training is implemented.* (Participant 14 University 3 Country 1)

One graduate highlighted how he felt MPH graduates would be useful as managers of disease surveillance and contact tracing in most organisations. He articulated this as follows:

> *"I believe if we are managers in most organizations as public health practitioners and we are responsible for outbreak investigations or surveillance and contact screening, then we can be very much (sic) useful."* (Participant 12 University 3 Country 1)

He further highlighted that MPH graduates should be at the forefront of managing these interventions:

> *"Roles that are played by MPH (graduates), the most important role that we should play is being in the forefront more especially when it comes to surveillance, when it comes to contact screening."* (Participant 12 University 3 Country 1)

3.7.8 Advisory roles

Several graduates expressed that in future pandemics graduates should perform advisory roles to various stakeholders. This would involve providing technical advice on public health interventions, vaccine roll out strategies and participating in discussions that would shape policy. One graduate explained how graduates should be deployed in advisory roles and mentioned that:

> *"MPH graduates should be deployed to technical working groups, to advisory groups, where they can contribute to developing policies, developing vaccine rollout strategies, advising governments on approaches to certain public health strategies or interventions. So that is on an advisory leve.l" (Participant 36 University 7 Country 1)*

Another graduate highlighted that while MPH graduates have a role to play in advising committees at national level, in future pandemics they could also be positioned to provide technical advice at district and municipality level.

> *"We don't have to have the committee that is advising the president to only at the national level. We also need that within the different municipalities and different districts."* (Participant 28 University 6 Country 1)

A few graduates further explained how this would entail all district hospitals having a PH consultant who would advise on how to deal with various conditions. One graduate commented that:

> *"…as well as the districts, I think they need more of the public health graduates so that they can be given advice on dealing with the various conditions in the public health sector."* (Participant 11 University 3 Country 1)

While another expressed:

> *"I feel like every hospital should have like a public health consultant, who should be primarily responsible for, you know, like a certain district."* (Participant 6 University 2 Country 1)

Interestingly one graduated expressed that he felt that MPH graduates could play a role in advising donors on how best they can allocate their resources depending on what needs to be done. He expressed this as follows:

> *"Even from the side of donors though, I think the MPH students can be situated there. Because sometimes the donors ask for things, you know, and then the donors need some advice in terms of what things they should be asking people to be done."* (Participant 1 University 1 Country 1)

3.8 Conclusion

Graduates expressed that they played a diverse range of roles before and during the pandemic and even when the pandemic was evolving. Many participants spoke of changing their roles or taking on new roles to assist in the effort to alleviate the effects of the pandemic. These roles ranged from management and planning roles, public health science and strategic analysis roles, leadership, community engagement, policy development, ensuring access to services and knowledge and communication roles. This led to several graduates experiencing increases in their workload, changes in the way they worked and psychological stress/overwhelm. Nonetheless, some graduates coped and felt supported as they performed their roles. Evidently the graduates were of the view that they can play various key roles at various levels of the health system, during future pandemics like Covid-19.

CHAPTER 4: DISCUSSION

4.1 Introduction

The study aimed to describe MPH graduates from SA universities' perspectives on the roles they performed during the Covid-19 pandemic. It also aimed to describe their perspectives on any changes in their roles during Covid-19 and their thoughts on the roles that are relevant and required for them in future pandemics. These descriptions are based on the graduates' experiences before and during Covid-19.

The findings of this exploratory study indicate that MPH graduates from SA universities applied their skills and competencies to play a diverse range of roles before and during the pandemic. These roles included management and planning , public health science and strategic analysis roles, leadership, community engagement and collaboration, policy development, ensuring access to services and knowledge and communication roles. Findings also show that during Covid-19 the graduates experienced changes in their roles which included taking on new and additional roles including the change from working in-person to working remotely. While some graduates coped with the workload associated with their roles and the changes they experienced as the pandemic evolved, others were stressed and overwhelmed highlighting the need to respond to their mental health. The graduates felt that they can play various key roles at the forefront of future pandemics such as health promotion and education, leadership, data management and research, communication, policy development, management and planning and advisory roles.

This chapter will discuss the findings within the broader literature on the roles played by PH professionals in various other settings. Findings will be discussed under the following two main headings; roles played by MPH graduates: the application of acquired skills and changes in MPH graduates' roles during Covid-19. Several sub-headings discuss the details of these main headings.

4.2 Roles played by MPH graduates: the application of skills acquired

Findings in this study demonstrate that MPH graduates from SA universities applied their skills and competencies to play various roles before and during the pandemic.

Post graduate public health training aims to equip future members of the health workforce with the skills and competencies required to address public health challenges (7). Most of the participants took part in contributing towards the effort to alleviate the effects of the pandemic. The roles they played during the pandemic fell within the realm of PH competencies identified in a study by Zwanniken et al (17). Their study identified and validated PH competencies that can guide MPH training programmes in LMICs and therefore have an impact on their PH contexts. The competencies identified were policy development, planning and management, leadership, communication, assessment and analysis, context sensitivity and community and intersectoral engagement (17). The graduates also displayed environmental health sciences and social and behavioural science competencies, as described as part of the MPH degree core competencies by Calhoun et al. for the Association of Schools of Public Health in the USA (57). This was shown as the graduates described roles where they assessed and controlled Covid-19-related environmental hazards. In addition, they also identified pertinent stakeholders for the planning and implementation of Covid-19 PH interventions. The graduates also displayed practical skills as described by Wen et al. as part of the core competencies for MPH students in China (58). Graduates in this study described practical roles such as organising regular health education and proposing Covid-19 control measures. The graduates were able to apply their skills in their workplaces and in their communities. Although their skills and competencies may have been acquired from the MPH degree, their ability to perform many diverse roles could also be attributed to skills acquired from the various other fellowships, qualifications and work experience obtained by the graduates.

The findings in this study indicated that graduates had diverse educational backgrounds and workplace experience. This could explain the wide range of roles described in this study. Public health is a diverse field that requires a diverse workforce (59). One of the recommended strategies to diversify the PH workforce is to diversify the education pipeline as a workforce with diverse experience and perspectives leads to innovative PH approaches that contribute towards better health outcomes (60). As shown in this study, diverse graduates can play roles in the various fields of PH. Their diverse work experience and educational backgrounds can significantly contribute to innovations that are required to combat resource constraints and problem solving

during pandemics like Covid-19 (61). The many roles they can play and the diverse experience and perspectives they have highlights the utility of PH professionals during pandemics as demonstrated by graduates in this study. Community medicine professionals in India reportedly played a variety of key roles such as surveillance, screening and training of frontline workers during Covid-19 (32). While CDC International Public Health Emergency Management Fellowship (PHEM) graduates, who were mostly based in Africa as well as the Eastern Mediterranean region, Europe, South-East Asia and the Western Pacific, performed essential roles in country Covid-19 responses (39). Similar to the findings in this study many of the PHEM graduates spent most of their time in the workplace on emergency preparedness or response activities for Covid-19 and other PH emergencies during the pandemic (39).

Findings from this study highlight that the effectiveness of the graduates depended on where they were positioned in the health system as well as whether they were given the opportunity to use their skills. A few of the graduates highlighted that there were instances where they felt they had the skills to perform certain roles such as communicating with communities about the pandemic but did not have the opportunity to do so. This notion can also be supported by graduates who expressed the view of having greater involvement at the forefront of the pandemic response. In this instance, they expressed that they felt the MOH should have called them to participate more in the process of the pandemic response. Public health professionals in Israel were of the same view as they expressed that PH professionals have a low perceived professional status in their setting (62). They highlighted that inadequate resources are directed towards the PH workforce which results in challenges in delivering routine PH needs such as vaccinations (62). They also expressed that inadequate resources lead to burnout (62).

More graduates in this study worked in the PH sector while some were employed in various NGO's and the private sector, specifically in international organisations. Similarly, a 2016 study in SA reported that most of the MPH graduates were working in the public sector (63%) followed by academic institutions (22%) (14). Notably, 58% of the PHEM fellowship graduates were employed by the MOH in their respective countries and 31% in a national PH institute (39). Human resource (HR) management systems in all institutions may benefit from assessing whether PH professionals are

being optimally utilised during pandemics particularly in the public sector where more graduates seem to be positioned. Findings in this study showed that there were instances where graduates took on additional roles because of staff shortages. HR management systems and MOH leaders could consider recruiting more PH professionals to address these shortages during pandemics like Covid-19. This would enable graduates to effectively apply their skills and knowledge, assist in alleviating the effects of the pandemic and assist in reducing the overall workload.

4.2.1 Public health science and strategic analysis roles

Many graduates in this study played roles where they applied their knowledge in public health science and strategic analysis. Findings from the current study demonstrate that before Covid-19, graduates were significantly involved in providing technical advice to the private and public sector, at district and national levels. However, during Covid-19 graduates spoke more about giving technical advice to the DOH or MOH in their respective countries. Krishnan et al. also reported that most of the PHEM fellowship graduates who supported the Covid-19 response were involved in providing Covid-19-related scientific technical advice at national and international levels (39). A study in India by Satpathy et al. indicated that in India community medicine (CM) professionals took part in providing technical support on advisory committees that were focused on Covid-19 control measures and preparedness (32). This highlights that graduates alongside other PH professionals were required to provide valuable Covid-19 related scientific technical advice and would likely be required to do the same in future pandemics.

This study identified that graduates were notably involved in data management and research roles before and during Covid-19. Before the pandemic more graduates took part in HIV/AIDS, TB and cardiovascular disease studies whereas during the pandemic there was a shift, as graduates were more involved in Covid-related data management and research. This is not surprising as research ethics committees in SA accelerated Covid-19 studies while other studies that were unrelated to Covid-19, were placed on hold when the national state of disaster was declared in 2020 (63). In the UK it was also reported that the prioritisation of Covid-19 vaccine studies delayed the recommencement of studies in other clinical areas (64). This highlights that in

future pandemics although the current threat needs to be prioritised in terms of resources, there is a need to ensure that resources are allocated in a way to enable the continuation of other services related to other diseases. This can be incorporated in pandemic preparedness plans and protocols. The World Health Organization (WHO) encourages countries to strengthen preparedness for future pandemics by focusing on addressing gaps identified during past pandemics and by routinely updating preparedness plans (65,66). The Covid-19 preparedness plan in SA was built on the pandemic influenza preparedness response while adhering to the five WHO global pandemic phases (67). This strategy may have been adopted by other countries in the WHO African region as pandemic influenza preparedness plans were in place in most African countries (68). This is likely because before the coronavirus the next predicted pandemic was to be caused by influenza (69). A study by Sambala et al. found that while most African countries (74%) had pandemic influenza preparedness plans, they were inadequate and had not been updated over time (68). That being said, in their study SA had the highest preparedness plan score and was noted to have consistent updates to its plan (68).

The role of developing various tools for reporting information and data collection was not mentioned by graduates as they described their roles before the pandemic. However the pandemic necessitated the development of tools for collecting various data on the impact of the virus in health care facilities and mines. An example of this are the various tools that were developed to facilitate the process of ordering oxygen in hospitals. CM professionals in India also created various tools to assist in controlling the pandemic (32). These included a tool that was used to assess the community response to the outbreaks (32).

The findings of this study highlight that health promotion and education is another role that MPH graduates were significantly involved in during the pandemic. This was done at work to staff and patients and in various places in their communities such as churches, schools and to Covid-19 positive patients contacts. This highlights the need for health education and promotion during pandemics as it improves behaviour change measures (70). In the US PH students from academic institutions partnered with PH agencies to support community-based health education during the pandemic (71). Furthermore the role of health education from school nurses was appreciated by MPH

graduates with school aged children in the US during the pandemic (72). Health education is a tool for improving health literacy which in turn improves peoples compliance to therapeutic and preventative disease measures (73).

4.2.2 Management and planning roles

The findings of this study highlight that graduates were significantly involved in management and planning roles before and during the pandemic. Managerial skills are required by PH professionals to inform and empower individuals in communities to take charge of their health and wellbeing (74). While more graduates voiced that they were involved in managing programmes related to HIV/AIDS, TB and sexually transmitted infections before Covid-19, during the pandemic most graduates who were in management roles were involved in Covid-19 related programmes. It was evident that participants who were particularly involved in HIV/AIDS and TB case management and health worker training shifted to Covid-19 case management and health worker training. Karim et al. noted that SA had well developed infrastructure and well experienced health workers for infectious diseases (HIV and TB) through international partnerships and collaborations with various organisations (63). This enabled the country to shift these resources to respond to the Covid-19 pandemic (63).

Several graduates in this study reported having to shift focus from HIV/TB and cardiovascular disease-related work to prioritise the Covid-19 response. This is echoed in the US by Heidi et al. as they found that the PH professionals in their study working in chronic disease-related roles, were the most likely to report having to shift to focus on Covid-19 (38). This highlights the shift in health priorities during pandemics and draws attention to relevant authorities to be cognisant of the chronic diseases that lose out on allocation of resources such as staff and funding during pandemics. Several studies have documented the negative impact on health outcomes as a result. Marti et al. conducted a survey to investigate the impact of the pandemic on TB services at anti-retroviral clinics in LMICs. Most of the clinics (70%) were in Africa while the rest were in the Asia-pacific region (75). They found that 85% of the clinics reported a disruption in routine HIV services leading to reduced access to TB care and delays in follow-up visits (75). They attributed these disruptions mainly to staff and other resource shortages (75). Furthermore a survey by Chudasama et al. investigated the

views of health care professionals, mainly in in Europe (47%) and Asia (20%), on the impact of Covid-19 on chronic disease care (76). Similarly, they found that diabetes, hypertension, cancer and chronic obstructive pulmonary disease services were negatively impacted due to a reduction in access to health care (76). They also attributed the negative impact on chronic disease health outcomes to a reduction in healthcare resources during Covid-19 (76). As previously mentioned, these experiences call attention to the need for optimal human resource management to ensure the continuation of chronic disease related services during pandemics.

Findings in this current study highlight that resource mobilisation was necessary during the pandemic as graduates had to do so to facilitate the response. Mobilising resources was a requirement when it came to sourcing medical equipment and managing quarantine centres. Quarantine is a proven method utilised to reduce the transmission of Covid-19 (77) as it is part of the testing-tracing-isolation control strategy (78). Managing a quarantine centre included various functions such as organising transport for suspected Covid-19 cases and their contacts (78). It also involved providing these individuals with meals, individual case management and wellness check-ins (78). As highlighted in this current study, graduates performing such Covid-19-related roles in addition to normal pre-Covid roles would certainly experience and increase in workload. This study also identified that managing these centres involved managing discord and conflict from those who were quarantined. In the current study, this included controlling situations where people demonstrated against being detained in quarantine. A cross sectional survey done to investigate compliance and the psychological impacts of quarantine done among adults in Wuhan, China found that quarantine was associated with feelings such as frustration, annoyance, anger and worry (79). While, a cross sectional study in institutional isolation and quarantine institutions in Qatar found that 25.9% of the respondents reported symptoms of anxiety (80). As was highlighted in this study by demonstrations mentioned at quarantine centres, the authors explained that this anxiety could be related to a paucity in information about Covid-19 which was found to be more pronounced in their isolation facilities compared to the quarantine facilities (80). This underlines the importance of providing clear accurate information to people being kept in quarantine and isolation facilities and a need to be cognisant of assessing and managing their mental health during wellness check-ins. This would assist in

managing anxiety, anger, frustration and the other repercussions of quarantine on mental health (79).

Before and during the pandemic many graduates played roles as coordinators of various health and health-related programmes. Before the pandemic these programmes varied from TB, HIV/AIDS, adolescent health and education, water sanitation and hygiene and refugee assistance programmes amongst others. During the pandemic most graduates were involved in coordinating Covid-19-related programmes. This included ensuring procurement of PPE, safety and compliance to Covid-19 regulations and IPC. This current study highlighted the role graduates played in coordinating IPC in facilities during the pandemic. Vassallo et al. affirmed that MPH graduates are well suited to play the role of infection preventionists as they possess skill sets such as epidemiologic assessment and complex data analysis, which are useful in infection prevention and control programmes (81).

While many graduates in this study were managing and coordinating Covid-19-related programmes, some played key roles in ensuring the continuity of other services including managing the collection of ART outside facilities, coordinating the continuation of child and immunisation services and managing malaria outbreaks. This highlights MPH graduates' relevance to the health system during pandemics. This is not only to the response itself, but also to ensure the continuation of other relevant health services. This includes other outbreaks that may not be in the spotlight but remain relevant. Public health officials in Guinea and Zaire played key roles as they collaborated with local and international agencies to manage the Ebola outbreaks that occurred during Covid-19 in 2021 (82). In Guinea the outbreak was declared over within 3 months and the swift response was attributed to several factors including the investment that the country had made in training and hiring a range of PH officials (82). Overall this highlights that improving health workers skills and providing platforms to utilising them appropriately can assist towards ensuring an effect response to public health threats.

4.2.4 Community engagement, collaboration and communication

A cross sectional study in Thailand investigated employers' perspectives on the managerial skills that are required of MPH graduates (83). According to employers

who participated in this study, collaboration skill was the most important (83). The authors emphasized that preventing the transmission of Covid-19 required collaboration between organisations and the community (83). Findings from this current study highlight that more graduates were involved in community engagement roles during Covid-19. However, they still felt that in future pandemics they would need to be more involved in engaging with communities. This would be particularly regarding communicating about the virus in a way that the public can have a good understanding of the threat and how they can best protect themselves. Graduates went on to say that if the public has a good understanding, it will lead to having an overall better response. This notion is echoed by Strand et al., where in their findings PH professionals are encouraged to be proactive in educating the public about basic infection control (84). They felt that this facilitates the public to have a good understanding of the basis of Covid-19 measures (84).

Few graduates in this study played communication roles before and during Covid-19. Graduates in this study highlighted the need for an increased frequency of effective communication during the pandemic. They felt communication roles are relevant for them in the future as they expressed that the information communicated to the public needs to be factual to minimise the spread of misinformation. Misinformation and playing the role of clarifying it was also highlighted in a study in Bangladesh (85) where health workers and governments were encouraged to be proactive in reducing the spread of misinformation around Covid-19 treatments (85). Communication issues and misinformation were also noted in Lebanon and the US (84,86). Many sources of information during Covid-19 were not credible resulting in coining of the term “infodemic” during the pandemic (86). Studies have shown that community engagement is effectively used for social and behavioural change communication and risk communication (87). Furthermore community engagement with inappropriate actors and inconsistent messaging that is not well explained have been identified as barriers to community engagement for Covid-19 prevention and control (87). Open communication with clear two-way channels and ongoing engagement processes were identified as facilitators (87). As graduates in this study felt that community engagement and communication are relevant for them in the future, it appears both roles work together in assisting towards infection control during a pandemic response.

Multisectoral engagement was also identified as a facilitator for community engagement for Covid-19 prevention and control (87). This may explain how findings from this study show that the graduates found themselves collaborating with more actors outside the health system during the pandemic compared to before. Several graduates collaborated with other ministries such as the ministry of education, public benefit organisations such as churches and the department of police. This collaboration was performed at work and as volunteers in communities. Although they did not explicitly give explanations of their reasons behind volunteering, graduates volunteering in addition to their current, new and additional roles is commendable. Tungki et al. investigated health professional students' volunteering activities during Covid-19 (88). These students included students from various health professions such as medical, nursing and public health (88). Students were driven to volunteer from a sense of moral responsibility and duty, some were driven as a potential learning opportunity and others out of personal interest and financial compensation (88). Similar to the graduates in this study, some health professional students in Tungki et al's. study chose not to volunteer during the pandemic (88). They cited fear of contracting the virus as a reason and the fear of being identified as a risk to others (88). However, the graduates who did not volunteer in this study cited the fear of putting their families at risk and simply not having enough time to do so. This highlights the internal dynamic that individuals face when considering a volunteering role. This dynamic involves the struggle between the will to look out for the interest of others and the will to look out for oneself (89).

Linkages between academic and public health institutions can be mutually beneficial when students gain experience while contributing to the PH workforce (90). This was evident in this study through the experience of a graduate's volunteering screening role that evolved into an opportunity to give students the practical skill of screening at a border post. Similarly, in a US study, Burns et al. reported how several PH students supported PH agencies through activities such as contact tracing and community-based health education and training programmes (71). Burns et al encouraged future funding to intentionally link PH students to PH activities to measure the impact this would have on PH responses (71).

Almeida et al. conducted a narrative review that investigated the impact of the pandemic on women's mental health. The study found that women who are pregnant, postpartum or experiencing social/psychological stress from experiences such as miscarriage or intimate partner violence were at high risk of developing mental health problems during Covid-19 (91). They also noted that social support is a key protective factor and highlighted that it can be provided on online platforms (91). In the same regard a few graduates in this study did play this relevant role of providing such psychosocial support to women at work and as voluntary roles during the pandemic.

4.2.3 Policy development and leadership roles

While a few graduates mentioned developing policy and guidelines before the pandemic more graduates were involved in such roles during Covid-19. Notably, the roles they played were related to influencing policy decisions through the provision of evidence and through advocating for alcohol regulation and the continuation of other services. In the same manner in Israel, a group of physicians who specialised in various fields including PH, collaborated to advocate for the safe reopening of schools as they highlighted the importance of education as a determinant of health (92). This group of physicians used their skills in analysis, health policy and their PH experience to provide evidence to ministries. Paltiel et al. advocated for science-based public advocacy where there are platforms for academics to participate in the policy-making process (92). The safe reopening of schools in Israel involved collaboration between the physicians and government ministries. Findings from the study in Israel highlighted that in future PH crises there is a benefit to such public-scientific engagement where policy-makers engaging with academic groups to have an input on decision-making (92).

While some MPH graduates from this study were involved in policy development before and during Covid-19, a few participants highlighted that they would want to see MPH graduates more involved in future pandemics. They emphasised that MPH graduates have the skills and experience to participate in drafting policies related to the response. They can provide evidence to shape policy decisions during the response to bring the appropriate stakeholders for discussions during the policy-making process. This notion of PH is echoed by Satpathy et al. who commented that

in India CM professionals were more involved in policy implementation than development (32). Nath et al reported that policy makers in India did not engage with PH professionals to seek their scientific advice during the pandemic (31). This calls attention to policy makers, national public sector ministries and national leaders to proactively involve PH professionals in policy making at all levels of the health system (31,92).

Some graduates in this current study assumed various leadership roles before and during the pandemic. In both phases, this involved leading various programmes and committees to ensure preparedness and an effective response. Graduates assumed leadership roles at organisational and district level, they also gave technical advice to the MOH and DOH in their respective countries. The findings show that participants felt that MPH graduates should be assigned more leading roles in future pandemic responses. Similarly Satpathy et al. encouraged CM professionals to take up leadership roles at district, state and national levels during future public health threats (32). Importantly, they believe this will place India in a position to achieve better population health outcomes (32). In the US, Strand et al. conducted a qualitative study to describe the lived work experiences of 48 PH professionals during Covid-19. Participants from this study expressed that input from PH and medical professionals was sought inconsistently by state leaders (84). These findings concur with the PH professionals in the current study feeling excluded when it came to the leadership of the response.

4.2.5 Ensuring equitable access to services and knowledge

Inequities in access to the Covid-19 vaccine, Covid-19 diagnostic tests and treatments between the global north and south were evident during the pandemic (93). There was also limited sharing of intellectual property by the global north to enable equitable manufacturing of Covid-19 vaccines in the global south (93). This reality highlights the relevance of the role featured in this study of taking part in discussions centred around ensuring equitable access to the Covid-19 vaccine. Findings in this current study illustrate that only a few graduates described roles related to ensuring access to services and health information before and during the pandemic. Graduates reflected that in future pandemics they should be more involved in policy development that

relates to access to health services. To this extent, Gleeson et al. developed frameworks to examine the reasons behind the inequities seen in vaccine access during Covid-19 and identified “policies, politics and institutions” as one of the structural drivers of vaccine access inequities (93). As mentioned in the findings of this current study, MPH graduates should have a significant role to play in the development of policies related to access to health products and services in future pandemics.

Participants in this study also highlighted that they should be positioned and given the relevant authority to ensure that the public has access to the correct information during pandemics. Several participants expressed that there was a need for graduates to let relevant authorities know that they can perform certain roles such as health promotion and education. Health education and promotion increase health literacy (73). Improving the health literacy of communities empowers individuals to understand health information and apply it in a way that assists in maintaining good health (73). Rukchart et al. reported that PH professional employers noted health promotion as a desirable skill for PH graduates during Covid-19 (83). In the same notion PH managers in Baskin et al’s. study expressed that PH professionals should be more involved in health promotion activities (62). As findings in this current study showed that graduates had the perception that they must advocate for themselves and the competencies they have also calls attention to the notion that that some graduates had the perception that their skills are being underutilised. Considering the increase in workload and staff shortages also highlighted in this study, the idea that PH professionals were possibly underutilised should be further investigated by human resource management systems.

4.3 Changes in MPH graduates roles during Covid-19

4.3.1 New and additional roles

Findings in this study highlight that graduates took on new and additional roles during the pandemic. This was a result of certain roles taking priority and graduates having to take on additional roles to cover other staff that had been allocated to Covid-19-related roles. While there are a few studies that document the effects of the pandemic on the roles of PH professionals during Covid-19, a study by Heidi et al. investigated how the pandemic affected the work experiences of 920 health educators in the US

(38). Most of the participants were Certified Health Educators (79.9%), 16.5% were Master Certified Health Education Specialists and 2.5% were Certified in Public Health (38). They found that 43% of the participants reported having to change work priorities during Covid-19 and similar to this study, most role changes (80%) were related to taking on a Covid-19 focused roles (38). Corresponding to this study, many of the health educators (85%) took on additional roles on top of their normal responsibilities (38). This highlights that Covid-19 became a priority for health professionals in these two settings, causing a shift in roles and additional roles. Similar to this study, the change from working in person to remotely was also noted by Heidi et al. (38). Moreover, in agreement with the findings in this current study, they further noted that this change was found mostly in participants working in training institutions such as universities and in those working for NGOs (38). However, graduates in this current study also noted that the change also included the change from travelling to other countries to give technical advice to giving remote assistance. Notably, in this study some roles could not be performed remotely such as certain health worker training programmes and school screening programmes.

Interestingly, Heidi et al. also reported that the health educators who reported having to shift to Covid-19-related roles felt qualified to do so (38). This perspective was not investigated in this study, however MPH graduates in this study gave detailed accounts about their new and additional roles displaying flexibility and adaptability. Therefore, whether they felt qualified for these changes cannot be ascertained from this study. Furthermore the health educators from the above-mentioned study were trained in the skills outlined in the Responsibilities and Competencies for Health Education Specialists (38). They commented that the ability of the educators to effectively shift roles may have been attributed to that training (38). As previously highlighted, no competencies framework has been established for MPH training in SA.

The findings of this study showed that certain roles were needed more at different stages of pandemic. Roles such as providing technical advice, training for Covid-19 case management, health promotion and education, screening, contact tracing and vaccinating were some of the roles that were mentioned frequently and noted as key during the pandemic. Further investigation into which roles were priority roles during

Covid-19 may assist with planning in the form of mobilising adequate human resources in future pandemics.

4.3.2 Coping with change

Findings in this study indicated that the pandemic and the changes in the graduates' roles resulted in several of them feeling stressed and overwhelmed. A study by Hassan et al. investigated mental stress among 309 health care professionals during Covid-19 in countries that had a similar Covid-19 infection curve such as Ireland at the time (94). The study used the Cohen Perceived Stress Scale as part of their survey and found that the average score for all participants represented the moderate stress category (94). The study encouraged psychological support to be provided to medical staff in stressful periods like the pandemic (94). Although all the participants in the Hassan et al. study were frontline clinicians, it seems psychological support was also required by some MPH graduates in this study as they highlighted that they needed it. Others conveyed that they did not have a chance to reflect and process what they were experiencing during the pandemic. This illustrates the relevance of psychosocial support for PH professionals during pandemics like Covid-19.

However, several graduates in this current study managed to cope with the changes and their roles during the pandemic. They cited that they had peer support from their colleagues at work. Besides peer support and psychological support facilitated by human resource management departments at work, the development of soft skills during training may assist in helping health professionals cope in future pandemics (95). Soft skills are a group of skills and emotional competencies that facilitate optimisation of work performance (95). Sancho-Cantus et al. investigated the importance of soft skills in nursing and health sciences students (95). These social-emotional competencies include and are not limited to critical thinking, problem solving, conflict resolution, creativity and emotional intelligence (EI). Emotional intelligence encompasses self-awareness, self-regulation, motivation, empathy, and social skills (96). Huili et al. investigated the correlation of EI and negative emotions of front-line nurses in Wuhan, China (97). They found that EI was associated with reduced intensity of negative emotions, anxiety and depression during Covid-19 (97). Huili et al. encourage managers to increase the EI of frontline nurses stating that it

can be beneficial in future PH emergencies (97). Although there is currently little consensus on how best to develop these skills in students, efforts are being made to develop these skills amongst this group (95). In addition, although there is currently a lack of a competency-based curriculum for MPH students in SA, including a more intentional approach to the training of emotional competencies may assist future PH professionals' resilience and coping skills in future pandemics.

4.4 Study strengths and limitations

4.4.1 Study strengths

This was a multi-site study including participants from eight universities in SA. Multisite studies have the benefit of providing a diverse sample which improves external validity (98). The participants in this study were diverse as they worked in different sectors, provinces and countries. Qualitative research with a diverse group is useful when little information is known on the topic being researched (99). Interviewing a diverse group enables the collection of diverse and differing views, thus adding to the richness of the data. The eight universities in this study cover a wide geographical variation which captures participants' views in terms of their contextual differences. The sample of participants was sufficient to reach data saturation, which indicates that the study captured the optimal range of views from the participants.

4.4.2 Study limitations

This study provided insights on MPH graduates perceptions of the roles they played during Covid-19 based on self-reported data. Self-reported data in this case maybe prone to an overly positive bias from graduates to show loyalty to their university and a tendency to give consistent evaluations across a set of questions. As the proposed study is a secondary analysis, the researcher was not involved in data collection. As a result the researcher may be unaware of subtle study specific glitches or nuances that may be relevant to the interpretation of the data [44].

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study aimed to describe the perceptions of MPH graduates from SA universities on the roles they performed before and during the Covid-19 pandemic. It also aimed to gain insight on their perspectives on any changes in the roles they performed and the roles that are relevant and required for them in future pandemics. This chapter presents the conclusions obtained from the findings. It also makes corresponding recommendations for HR management systems, policymakers, MPH training programmes and future research efforts.

5.2 Conclusion

Health system challenges such as inadequate service delivery, human and financial resource constraints and poor governance were amplified in SSA during Covid-19 (9). HR development and training, productive policy development and effective governance are some of the methods that countries in this region have been implored to apply to improve health system functioning during pandemics (9). To achieve good health outcomes, health systems rely on the quality and preparedness of a competent and responsive PH workforce (1,2). MPH training aims to equip graduates with the skills and competencies required to address PH threats (7). The findings in this study indicate that MPH graduates played a diverse range of roles during Covid-19 and contributed towards the effort to alleviate the effects of the pandemic. MPH graduates in this study had diverse educational backgrounds and workplace experience which could explain their ability to play such a diverse range of roles. Although a competencies framework for MPH training in SA has not yet been established (15), the graduates played roles that displayed competencies and skills in the following areas; management and planning, PH science and strategic analysis, leadership, community engagement and collaboration, policy development, ensuring access to services and knowledge and communication. Most of the roles played by graduates can be applied to address the health system challenges faced by LMICs.

Health systems are context specific and local knowledge and experience is vital for health system development (101). This study highlights that as the pandemic evolved, the graduates displayed flexibility and adaptability as they experienced changes in their roles. These changes included the change from working face-to-face to working

remotely and the changes associated with taking on new and additional roles. The ability to adapt to the evolving context illustrates the value of MPH graduates during pandemics like Covid-19. Rather than relying on an understanding of health and the competencies required to improve population health from an HIC perspective, LMICs should develop context specific competency frameworks based on local research.

With the aim of addressing HS challenges faced in LMICs such as insufficient laboratories and deficient health information systems (9,102), graduates could be positioned to apply their competencies in capacity building efforts. Building capacity assists towards improving service delivery and access to health care (9). Planning and management roles would be relevant in this regard. Additionally research particularly in health policy and systems is required to further develop health systems (103). The application of PH science and analysis skills is relevant and required in the research process. Other HS problems identified in LMICs during Covid-19 included leadership challenges related to lack of political will and corruption (9). Swanson et al. also identified leadership issues related to a lack of accountability amongst health managers while highlighting the need for leadership that articulates a vision and strategy for health system strengthening (102). MPH graduates in this study expressed that leadership roles are relevant and required in future pandemics. Community engagement and collaboration are also important in HSS as they enable building consensus at societal level and they assist in achieving synergy among sectors (102). Findings in this current study demonstrated that MPH graduates expressed an openness to dialogue and communication with the public and communities which is also important in this aspect. Policy development at national level significantly affects HSS capacity (102) and highlights the importance of evidence-based policy development roles in LMICs with fragile health systems.

Evidently certain roles became priority roles during the pandemic and as a result resources were shifted accordingly. However issues such as staff shortages and insufficient resources led to difficulty in continuing other services such as HIV/TB health care and child immunisation. Although the WHO recommended the continuation of essential services while dealing with Covid-19, health system resource constraints and community level challenges were barriers to achieving this for chronic non-communicable diseases (NCDs) in SSA (104). Facilitating loan facilities to

address financial constraints and increasing community engagement to increase community support for people living with chronic NCDs was recommended by Amu et al. (104). These are roles that can be played by MPH graduates as they display competencies in stakeholder engagement, management and planning, community engagement and collaboration. Additionally, many LMICs lack adequate human resources for health in particular (9). MPH graduates can play key roles in the training of future health workers and PH professionals which are needed for adequate health service delivery in LMICs.

Findings in this current study showed that while some graduates coped with the changes in roles, others were overwhelmed and experienced psychological stress, underlining the need for psychosocial support for PH professionals during pandemics like Covid-19. Findings illustrate that the graduates felt that they can play various roles at the forefront of future pandemics such as health promotion and education, leadership, data management and research, communication, policy development, management and planning and advisory roles. These roles are deemed crucial to responding to the above mentioned PH challenges in LMICs. Importantly Schools of Public Health have been identified as a key component to improve health in LMICs (105). In these institutions, the roles of health education, training and research are crucial.

5.3 Recommendations

5.3.1 Recommendations for human resource management systems

The WHO encourages countries to strengthen preparedness for future pandemics by focusing on addressing gaps identified during past pandemics (65). More graduates are positioned in the public PH sector based on findings in this study. Human resource management systems in the South African PH sector can increase preparedness for future pandemics by:

- assessing whether PH professionals were optimally positioned and utilised during the pandemic. On the strength of their diverse educational backgrounds and professional experience, optimally utilising MPH graduates is

advantageous as they demonstrate flexibility and the ability to perform a diverse range of roles within a health system.

- gaining more insight into which roles became a priority during the pandemic. With this insight HR management systems can consider recruiting more PH professionals to assist in specific priority roles such as the management of quarantine centres, disease mapping, health promotion and education, IPC, screening and contact tracing.

- leveraging the collaboration between academic institutions and public health agencies by using students to assist in emergency settings such as pandemics (90). This can also be done through practice based internships (90), where the students benefit from the practical experience and the agencies benefit from having more resources to assist with managing staff workload.

- providing mental health and social support in communities, workplaces and other facilities such as quarantine centres during pandemics like Covid-19 (79,80,91). Mental health and social support professionals such as psychologists, occupational therapists, counsellors, social workers, health coaches and peer-support groups should be used to provide psychosocial support to staff and communities in future pandemics.

- assessing their community engagement and communication personnel and structures during Covid-19 to prepare for better community engagement and communication with the public in future pandemics. Community engagement has a wide range of uses such as for surveillance, contact tracing and SBCC (87). As a result of the restrictions on social gatherings and face-to-face approaches, innovative approaches to conduct effective community engagement would be required (87). Considering MPH graduates skills and competencies, positioning them and other relevant PH professionals in community engagement and communication roles during future pandemics is encouraged. Providing reliable information to the public in a way that they can

understand assists in minimising misinformation, mitigating the negative psychological impacts of pandemics and it assists in infection control (80,87).

5.3.2 Recommendations for policymakers

While priority is being given to the imminent PH threat, to ensure the continuation of other disease-related services policymakers can:

- plan to ensure that the allocation of resources such as staff and funding are done in a fashion that allows the continuation of services related to other diseases. This includes clinical services and research. This would minimise the disruption of essential routine services such as immunization, HIV/TB and chronic NCD-related health care. Notably the prevalence of chronic NCDs in SSA is high and these disease are a major cause of mortality in the region (104). Additionally, most people who died from Covid-19 had underlying chronic NCDs. This highlights the importance of planning for the continuation of these other services during future pandemics.

- regularly update pandemic preparedness plans while ensuring they are adequate.

- continue to invest resources towards developing PH infrastructure and improving health worker training as the resulting gains can be shifted and adapted to address emerging PH threats (63).

- have open channels for public-scientific engagement for policy decisions during pandemics. Policymakers are encouraged to collaborate with academic groups to allow their participation and input in the policy-making process (92). Such an approach promotes policy based on empirical data and shared societal values (92). Additionally, MPH graduates and other relevant PH professionals have the skills and competencies to bring relevant stakeholders to the process and facilitate a bottom-up, rather than a top-down approach.

5.3.3 Recommendations for MPH training programmes

To increase preparedness for future pandemics MPH training programmes may:

- assist in the process of establishing a competencies framework for MPH training in SA.

- develop the soft skills of MPH students while emphasizing training in emotional competencies such as emotional intelligence and resilience skills during MPH training. This would assist in optimising work performance (95), and coping skills in future pandemics.

5.3.4 Implications for research

Weak research systems are limited in their ability to identify and prioritise health needs (105). They also limit the process of developing and implementing context specific interventions for their determinants (105). In LMICs there is a shortage of individuals and organisations carrying out research related to health systems and policy (101). To contribute towards HSS, evidence-based policy and preparedness for future PH threats, more research is required. More studies on the impact of the pandemic on the roles of PH professionals would provide evidence on how to effectively prepare, position and support these health workers in future pandemics. Such research would also assist in identifying priority roles which may be of use in future HR recruitment processes. Research on whether graduates felt qualified to take on their new and additional roles and research on whether graduates coped with the other changes related to the pandemic (e.g. change from working face-to-face to remotely), are also required. Insights from such studies would be relevant for post-graduate PH training programmes as they prepare the PH workforce for their roles in addressing future PH threats.

REFERENCES

1. Institute of Medicine (US), Board on Health Promotion and Disease Prevention, Committee on Educating Public Health Professionals for the 21st Century. Who will keep the public healthy?: Workshop Summary. The National Academies Press; 2003.
2. Bloom DE, Cadarette D. Infectious disease threats in the twenty-first century: Strengthening the global response. Front Immunol. 2019;10(549):1–12.
3. World Health Organization. Everybody's business: strengthening health systems to improve health outcomes: WHO's framework for action. Geneva: WHO; 2007.
4. Kumar S, Kumar N, Vivekadhish S. Millenium development goals (MDGS) to sustainable development goals (SDGS): Addressing unfinished agenda and strengthening sustainable development and partnership. Indian J Community Med. 2016;41(1):1–4.
5. United Nations Statitics Division. SDG Indicators Metadata Repository [Internet]. 2022 [cited 2023 Nov 23]. Available from: https://unstats.un.org/sdgs/metadata?Text=&Goal=3&Target=3.c
6. World Health Organization. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: World Health Organization; 2010.
7. Begg MD, Galea S, Bayer R, Walker JR, Fried LP. MPH education for the 21st century: design of Columbia University's new public health curriculum. Am J Public Health. 2014;104(1):30–6.
8. Brisolara KF, Smith DG. Preparing students for a more public health-aware market in response to COVID-19. Prev Chronic Dis. 2020;17(E56):1–5.
9. Amu H, Dowou RK, Saah FI, Efunwole JA, Bain LE, Tarkang EE. COVID-19 and Health Systems Functioning in Sub-Saharan Africa Using the "WHO Building Blocks": The Challenges and Responses. Front Public Heal. 2022;10(856397):1–5.
10. Galea S, Vaughan R. Preparing the public health workforce for the post-COVID-19 era. Am J Public Health. 2021;111(3):350–2.
11. Dlungwane T, Voce A, Searle R, Stevens F. Master of Public Health programmes in South Africa: issues and challenges. Public Health Rev.

2017;38:1–13.
12. Kruk ME, Myers M, Varpilah ST, Dahn BT. What is a resilient health system? Lessons from Ebola. Lancet. 2015;385(9980):1910–2.
13. Galal S. Number of coronavirus (COVID-19) cases in the African continent as of November 18, 2022, by country [Internet]. [cited 2024 Jan 23]. Available from: https://www.statista.com/statistics/1170463/coronavirus-cases-in-africa/
14. Dlungwane T, Knight S. Tracking Master of Public Health graduates: Linking higher education and the labour market. African J Heal Prof Educ. 2016;8(2):132–4.
15. National Department of Health. HRH Strategy for the Health Sector: 2012/13 - 2016/17. Pretoria: National Department of Health; 2011.
16. Calhoun J, Davidson P, Sinioris M, Vincent E, Griffith J. Toward an understanding of competency identification and assesment in healthcare management. Qual Manag Health Care. 2002;11(1):14–38.
17. Zwanikken PAC, Alexander L, Huong NT, Qian X, Valladares LM, Mohamed NA, et al. Validation of public health competencies and impact variables for low- and middle-income countries. BMC Public Health. 2014;14(1):1–10.
18. Yigzaw T, Assefa M, Kaba M, Kitaw Y, Worku S, Bulto T. Practice analysis to validate master of public health core competencies and identify education gaps in Ethiopia: A national cross-sectional study. Ethiop J Heal Dev. 2020;34(1):16–24.
19. Sadana R, Mushtaque A, Chowdhury R, Petrakova A. Strengthening public health education and training to improve global health. Bull World Health Organ. 2007;85(3):163–4.
20. Sawleshwarkar S, Negin J. A review of global health competencies for postgraduate public health education. Front Public Heal. 2017;5(46):1–12.
21. Sanders D, Guwatudde D, Alexander L. Accessible public-health education: a potential growth area? We. Bull World Health Organ. 2008;86(8):A-B.
22. Feehan J. Is COVID-19 the worst pandemic? Elsevier Public Heal Emerg Collect. 2021;149:56–8.
23. Niohuru I. Healthcare and disease burden in Africa: the impact of socioeconomic factors on public health. Springer International Publishing; 2023. 35–85 p.
24. Mokwena K, Mokgatle-Nthabu M, Madiba S, Lewis H, Ntuli-Ngcobo B. Training

the public health workforce at the National School of Public Health: meeting Africa's needs. World Hosp Health Serv. 2008;44(2):27–31.

25. Upadhyay K, Goel S, John P. Developing a capacity building training model for public health managers of low and middle income countries. PLoS One. 2023;18(4):1–17.
26. Czabanowska K, Kuhlmann E. Public health competences through the lens of the COVID-19 pandemic: what matters for health workforce preparedness for global health emergencies. Int J Health Plann Manage. 2021;36(S1):14–9.
27. Azzopardi-Muscat N. A public health approach to health workforce policy development in Europe. Eur J Public Health. 2020;30(4):IV3–4.
28. Zwanikken PAC, Alexander L, Scherpbier A. Impact of MPH programs: contributing to health system strengthening in low- and middle-income countries? Hum Resour Health. 2016;14(1):1–19.
29. Dahal S, Sharma A, Zodpey S. Mapping of Public Health Jobs in India—Where Can the Public Health Graduates Be Employed? J Health Manag. 2018;20(1):1–11.
30. Zweigenthal VEM, Marquez E, London L. "Why do an MPH?" Motivations and intentions of physicians undertaking postgraduate public health training at the University of Cape Town. Glob Health Action. 2016;9(1):1–9.
31. Nath L, Mathur M, Ali A, Aggarwal P, Mathur N, Verma A. A perspective on Master of Public Health (MPH) Graduates in India: Current role and way head. Indian J Community Heal. 2022;34(1):140–3.
32. Satpathy P, Singh AK, Agarwal N, Majumdar A, Goel AD, Yadav K. Can proactive roles played by Community Medicine professionals in times of COVID-19 Pandemic bring the leadership of public health in India in the right hands? J Fam Med Prim Care. 2022;11(1):18–26.
33. Plepys CM, Krasna H, Leider JP, Burke EM, Blakely CH, Magaña L. First-destination outcomes for 2015-2018 public health graduates: Focus on employment. Am J Public Health. 2021;111(3):475–84.
34. Li IW, Awofeso N. Labour market outcomes of public health graduates: Evidence from Australia. Perspect Public Health. 2014;134(5):283–8.
35. Buunaaisie C, Manyara A., Bird E., Bray I, Ige J, Jones M, et al. Employability and career experiences of international graduates of MSc Public Health: a mixed methods study. Public Health. 2018;160:62–9.

36. Krasna H, Czabanowska K, Beck A, Cushman LF, Leider JP. Labour market competition for public health graduates in the United States: A comparison of workforce taxonomies with job postings before and during the COVID-19 pandemic. Int J Health Plann Manage. 2021;36(S1):151–67.
37. Treviño-Reyna G, Czabanowska K, Haque S, Plepys CM, Magaña L, Middleton J. Employment outcomes and job satisfaction of international public health professionals: What lessons for public health and COVID-19 pandemic preparedness? Employment outcomes of public health graduates. Int J Health Plann Manage. 2021;36(S1):124–50.
38. Heidi L, Hancher-Rauch, Bishop C, Campbell A, Cecil K, Yazel L. Effects of COVID-19 Pandemic on the Professional Roles and Responsibilities of Health Educators. Health Promot Pract. 2021;22(2):156–62.
39. Krishnan S, Espinosa C, Podgornik MN, Haile S, Aponte JJ, Brown CK, et al. COVID-19 response roles among CDC International Public Health Emergency Management Fellowship graduates. Emerg Infect Dis. 2022;28(13):S145–50.
40. Blömeke S. The challenges of measurement in Higher Education: IEA's teacher education and development study in mathematics (TEDS-M). InModeling and measuring competencies in higher education. Sigrid B, Olga Z-T, Christiane K, Judith F, editors. Rotterdam: Sense Publishers; 2013. 91–112 p.
41. Gonyea R. Self-reported data in institutional research: review and recommendations. New Dir Institutional Res. 2005;127:73–89.
42. Mahat A, Bezruchka SA, Gonzales V, Connell FA. Assessment of graduate public health education in Nepal and perceived needs of faculty and students. Hum Resour Health. 2013;11(1):1–12.
43. Nachega JB, Uthman OA, Ho YS, Lo M, Anude C, Kayembe P, et al. Current status and future prospects of epidemiology and public health training and research in the WHO African region. Int J Epidemiol. 2012;41(6):1829–46.
44. Hammarberg K, Kirkman M, De Lacey S. Qualitative research methods: When to use them and how to judge them. Hum Reprod. 2016;31(3):498–501.
45. Stebbins RA. Exploratory research in the social sciences: what is exploration? SAGE Publications; 2011. 2–17 p.
46. UNFPA ESARO. Republic of South Africa: Facts and Prospects [Internet]. 2019 [cited 2022 Oct 30]. Available from:

https://esaro.unfpa.org/en/publications/republic-south-africa-facts-and-prospects

47. Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. The health and health system of South Africa: historical roots of current public health challenges. Lancet. 2009;374(9692):817–34.
48. Reddy J. Regional consortia, partnerships, mergers and their implications for the transformation of the South African higher education system. South African J High Educ. 2000;14(1):79–87.
49. Campbell S, Greenwood M, Prior S, Shearer T, Walkem K, Young S, et al. Purposive sampling: complex or simple? Research case examples. J Res Nurs. 2020;25(8):652–61.
50. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K, et al. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Adm Policy Ment Heal Ment Heal Serv Res. 42(5):533–44.
51. Allmark P, Boote J, Chambers E, Clarke A, McDonnell A, Thompson A, et al. Ethical Issues in the use of in-depth interviews: literature review and discussion. Res Ethics. 2009;5(2):48–54.
52. Mueller AE, Segal DL. Structured versus semistructured versus unstructured interviews. Cautin R, Lilienfield S, editors. The Encyclopedia of Clinical Psychology. John Wiley & Sons, Inc; 2015. 1–7 p.
53. Braun V, Clarke V. Using thematic analysis in psychology using thematic analysis in psychology. Psychiatr Q. 2006;3(2).
54. Nowell LS, Norris JM, White DE, Moules NJ. Thematic Analysis: Striving to meet the trustworthiness criteria. Int J Qual Methods. 2017;16(1):1–13.
55. Lombard M, Snyder-Duch J, Bracken C. Practical resources for assessing and reporting intercoder reliability in content analysis research projects, a tutorial. Temple University; 2006.
56. Abdul Rashid MR, Syed Mohamad SN, Tajjudin AIA, Roslan N, Jaffar A, Mohideen FBS, et al. COVID-19 pandemic fatigue and its sociodemographic, mental health status, and perceived Causes: a cross-sectional study nearing the transition to an endemic phase in Malaysia. Int J Environ Res Public Health. 2023;20(4476):1–18.
57. Calhoun JG, Ramiah K, Weist EMG, Shortell SM. Development of a core

competency model for the master of public health degree. Am J Public Health. 2008;98(9):1598–607.
58. Wen SH, Ma XQ, Liu LJ, Ren WM, Xu F, He X. A survey on core competencies of Master of Public Health students in China. Public Health. 2013;127(10):964–6.
59. Cohen JJ, Gabriel BA, Terrell C. The case for diversity in the health care workforce. Health Aff. 2002;21(5):90–102.
60. Coronado F, Beck A, Shah G, Young J, Sellers K, Leider J. Understanding the dynamics of diversity in the public health workforce. J Public Heal Manag Pract. 2020;26(4):389–92.
61. Wu TC, Ho CTB. A narrative review of innovative responses during the COVID-19 pandemic in 2020. Int J Public Health. 2022;67(1604652):1–10.
62. Bashkin O, Otok R, Leighton L, Czabanowska K, Barach P, Davidovitch N, et al. Emerging lessons from the COVID-19 pandemic about the decisive competencies needed for the public health workforce: A qualitative study. Front Public Heal. 2022;10(990353):1–12.
63. Abdool Karim Q, Baxter C. COVID-19: Impact on the HIV and tuberculosis response, service d elivery, and research in South Africa. Curr HIV/AIDS Rep. 2022;19:46–53.
64. Mallen C. Research in the time of COVID. Eur J Gen Pract. 2020;26(1):154–5.
65. World Health Organization. Preparedness and resilience for emerging threats (PRET) [Internet]. [cited 2024 Feb 27]. Available from: https://www.who.int/initiatives/preparedness-and-resilience-for-emerging-threats
66. World Health Organization. Strengthening pandemic preparedness planning for respiratory pathogens: policy brief. Geneva: World Health Organization; 2022.
67. National Department of Health. Preparedness and response plan: novel coronavirus. Pretoria, National Department of Health; 2020.
68. Sambala EZ, Kanyenda T, Iwu CJ, Iwu CD, Jaca A, Wiysonge CS. Pandemic influenza preparedness in the WHO African region: Are we ready yet? BMC Infect Dis. 2018;18:1–13.
69. Williams BA, Jones CH, Welch V, True JM. Outlook of pandemic preparedness in a post-COVID-19 world. npj Vaccines. 2023;8(178):1–12.

70. Van den Broucke S. Why health promotion matters to the COVID-19 pandemic, and vice versa. Health Promot Int. 2020;0:1–6.
71. Burns KF, Strickland CJ, Horney JA. Public health student response to COVID-19. J Community Health. 2021;46(2):298–303.
72. Rose ID, Murray C, Hodges AM, Dyer H, Wallace S. Perceived role of the school nurse in providing pertinent COVID-19 information to the school community: experiences of public health graduate students with school-aged children. J Sch Nurs. 2023;0(0):1–6.
73. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health Promot Int. 2000;15(3):259–67.
74. Johnson J, Davey K. Essentials of managing public health organizations. Riegelman R, editor. Massachusetts: Jones & Bartlett Learning; 2021.
75. Marti M, Zürcher K, Enane LA, Diero L, Marcy O, Tiendrebeogo T, et al. Impact of the COVID-19 pandemic on TB services at ART programmes in low- and middle-income countries: a multi-cohort survey. J Int AIDS Soc. 2022;25(10):1–9.
76. Chudasama Y V, Gillies CL, Zaccardi F, Coles B, Davies MJ, Seidu S, et al. Impact of COVID-19 on routine care for chronic diseases: a global survey of views from healthcare professionals. Elsevier. 2020;14(5):965–967.
77. Al-Tawfiq JA, Sattar A, Al-Khadra H, Al-Qahtani S, Al-Mulhim M, Al-Omoush O, et al. Incidence of COVID-19 among returning travelers in quarantine facilities: a longitudinal study and lessons learned. Travel Med Infect Dis. 2020;38(101901):1–6.
78. Fan VY, Fontanilla TM, Yamaguchi CT, Geib SM, Holmes JR, Kim S, et al. Experience of isolation and quarantine hotels for COVID-19 in Hawaii. J Travel Med. 2021;28(7):1–3.
79. Lin Y, Hu Z, Alias H, Wong LP. Quarantine for the coronavirus disease (COVID-19) in Wuhan city: support, understanding, compliance and psychological impact among lay public. J Psychosom Res. 2021;144(110420):1–9.
80. Reagu S, Wadoo O, Latoo J, Nelson D, Ouanes S, Masoodi N, et al. Psychological impact of the COVID-19 pandemic within institutional quarantine and isolation centres and its sociodemographic correlates in Qatar: a cross-

sectional study. BMJ Open. 2021;11(1):1–8.
81. Vassallo A, Boston KM. The Master of Public Health Graduate as infection preventionist: navigating the changing landscape of infection prevention. Am J Infect Control. 2019;47:201–7.
82. Resolve to Save Lives. Epidemics that didn't happen case study: Ebola in West Africa. How improved systems and skills following deadly epidemics contained two Ebola outbreaks [Internet]. 2024 [cited 2024 Feb 20]. Available from: https://preventepidemics.org/epidemics-that-didnt-happen/ebola/
83. Rukchart N, Buakate P, Mohd Shamsudin F, Chutipattana N. Managerial skills required for new community public health graduates during the COVID-19 pandemic: employers' perspective. Cogent Educ. 2022;9(2151249):1–19.
84. Strand MA, Sidhu S, Hohman A, Jansen R, McDonough S. Qualitative Analysis of a Roundtable Exercise "Reflecting on the COVID-19 experience of public health professionals." J Public Heal Manag Pract. 2023;29(4):E128–36.
85. Godman B. Combating COVID-19: Lessons learnt particularly among deveoping countries and the implications. Bangladesh J Med Sci Spec Issue COVID19. 2020;103–8.
86. Di Ruggiero E, Ardiles P. Health promotion perspectives on COVID-19. Glob Health Promot. 2021;28(1):3–4.
87. Gilmore B, Ndejjo R, Tchetchia A, De Claro V, Mago E, Diallo AA, et al. Community engagement for COVID-19 prevention and control: a rapid evidence synthesis. BMJ Glob Heal. 2020;5(10):1–11.
88. Umar TP, Samudra MG, Nashor KMN, Agustini D, Syakurah RA. Health professional student's volunteering activities during the COVID-19 pandemic: a systematic literature review. Front Med. 2022;9(797153):1–10.
89. Byrne MHV, Ashcroft J, Wan JCM, Alexander L, Harvey A, Arora A, et al. Examining medical student volunteering during the COVID-19 pandemic as a prosocial behaviour during an emergency. Postgrad Med J. 2023;99(1174):883–93.
90. McCoy SI, MacDonald PDM. Need to amplify health security? Fuse Academia and Practice. Public Health Rep. 2020;135(4):420–3.
91. Almeida M. The impact of the COVID-19 pandemic on women's mental health. Arch Womens Ment Health. 2020;23:741–8.
92. Paltiel O, Hochner H, Chinitz D, Clarfield AM, Gileles-Hillel A, Lahad A, et al.

Academic activism on behalf of children during the COVID-19 pandemic in Israel; beyond public health advocacy. Isr J Health Policy Res. 2021;10(1):1–14.

93. Gleeson D, Townsend B, Tenni BF, Phillips T. Global inequities in access to COVID-19 health products and technologies: a political economy analysis. Health Place. 2023;83(103051):1–13.
94. Hassan M, Jordan F, Tawfick W. Mental stress in health care professionals during COVID-19 outbreak. Ir J Med Sci. 2022;191(6):2681–7.
95. Sancho-Cantus D, Cubero-Plazas L, Botella Navas M, Castellano-Rioja E, Cañabate Ros M. Importance of soft skills in health sciences students and their repercussion after the COVID-19 epidemic: scoping Review. Int J Environ Res Public Health. 2023;20(6):1–10.
96. Goleman D. What Makes a Leader? Harvard business review. Boston, Massachusetts. Harvard Business School Publishing; 1998.
97. Huili Sun BS, Shuling Wang BS, Wei Wang BS, Guanghong Han BS, Zhijian Liu BS, Qi Wu BS XPM. Correlation between emotional intelligence and negative emotions of front-line nurses during the COVID-19 epidemic: a cross-sectional study. J Clin Nurs. 2021;30(3–4):385–96.
98. Flynn L. The benefits and challenges of multisite studies: lessons learned. Am Assoc Crit care nurses Adv Crit care. 2009;20(4):388–91.
99. Cohen M, Phillips J, Palos G. Qualitative research with diverse populations. Semin Oncol Nurs. 2001;17(3):190–6.
100. LaDonna KA, Artino AR, Balmer DF. Beyond the Guise of Saturation: Rigor and Qualitative Interview Data. J Grad Med Educ. 2021;13(5):607–11.
101. Mirzoev T, Topp SM, Afifi RA, Fadlallah R, Obi FA, Gilson L. Conceptual framework for systemic capacity strengthening for health policy and systems research. BMJ Glob Heal. 2022;7(8):1–7.
102. Swanson CC, Atun R, Best A, Betigeri A, de Campos F, Chunharas S, et al. Strengthening health systems in low-income countries by enhancing organizational capacities and improving institutions. Global Health. 2015;11(1):1–8.
103. Gilson L, World Health Organzation. Health policy and systems research: a methodology reader: the abridged version. Geneva: World Health Organization; 2013.

104. Amu H, Dowou RK, Boateng LA, Tarkang EE. Implications of covid-19 for the management of chronic non-communicable diseases in sub-Saharan Africa: application of the chronic care model. Pan Afr Med J. 2020;35(Supp 2):1–3.
105. Rabbani F, Shipton L, White F, Nuwayhid I, London L, Ghaffar A, et al. Schools of public health in low and middle-income countries: an imperative investment for improving the health of populations? BMC Public Health. 2016;16(941):1–12.

Appendix 1 – Primary study interview guide

1. Can you tell me a little bit about yourself in your professional capacity?
   Probe:
   - Your professional background (What you pursue at the undergraduate level)
   - Any postgraduate qualifications before the MPH
   - When you enrolled for your MPH degree
   - Any degrees, diploma or short courses you have pursued after your MPH
   - Where you are currently working.
   - Other places you have worked since completing your MPH

2. Tell me a little bit about your work (before COVID19)?

   Probe:
   - Your usual roles (Before Covid19)

3. Can you give an overview of your roles during the Covid-19 pandemic?

   Probe:
   - How did your roles during the Covid19 pandemic differ from your usual roles?
   - How your roles changed as the pandemic unfolded?
   - Did you do any additional volunteer activities that were not part of your formal roles?

4. What are your reflections about the skills from your MPH that you drew on in your Covid19 roles:
   Probe:
   - The skills that you brought to bear on the work
   - Are there any other skills (soft skills, leadership etc) you brought to bear?

- Where you acquired these skills (If MPH, can you specify the skills, if other where they acquired the skills)
- For the skills you got from the MPH, how prepared were you by the MPH to apply those skills.
- The skills gap you were conscious of at the time and
- now in retrospect.
- What is your sense of your value-add to the response to the pandemic?

5. In the light of a pandemic like Covid19, what are your thoughts about the roles of MPH graduates?
6. In light of a pandemic like Covid19, where should MPH graduates be situated/employed?
7. In light of pandemics like Covid19, what do you think the implications are for what you were taught in MPH programmes?
   Probe:
   - What content needs to be taught?
   - What skillsets need to be emphasised?
8. What are your reflections of the wider public health response to the Covid19 pandemic
9. Any other thoughts you want to raise?

Thank you for your reflections on these issues

Appendix 2 – Primary study information sheet

Introduction

We are a team of researchers, listed below, from different universities in South Africa that provide the Master of Public Health (MPH) degree programmes. We are conducting research on the perspectives of MPH graduates on the following:

- ✓ Their roles during the Covid-19 pandemic
- ✓ Their perceptions about the contribution of the Master of Public Health training/programme to dealing with the Covid-19 pandemic in their province/South Africa/work milieu
- ✓ Reflections on competencies enabling their response, or on skills gaps

The interview should take around half an hour to complete and completing the electronic survey should take about 25 minutes of your time, so altogether this should take an hour of your time.

Voluntary participation

We would like you to participate in the interview and the survey, as it will provide valuable information that could inform University and health policy in South Africa. However, your participation is voluntary and there will be no negative consequences if you do not want to participate. The qualitative study will assist us to analyse and strengthen the public health response in view of the Covid-19 epidemic. *Since this study is one of a set of Africa wide studies that aim to identify core competencies that should be emphasized in MPH programmes, the* information we aim to elicit from the survey should assist the development of public health professional career paths, particularly in the health systems of South Africa and other African countries as they work to achieve the global goal of universal health coverage.

Potential benefits and risks

There are no personal risks or direct benefits from participating in the study. However, there are indirect benefits of the study. We intend preparing an article for publication that reports on the qualitative findings.

We will also provide you with feedback about the results of the qualitative study should you wish.

Confidentiality

All the information collected will be kept strictly confidential. All study participants will be assigned a code which will only be known to members of the research team. We undertake that all information provided by you will be used only for the purpose of the study. For the research output of the qualitative study based on the interviews, your identity will be reflected by the year of graduation and the province where you live. Your responses to the survey will be discarded as it forms part of the pilot for the questionnaire. Your feedback about the survey will, however, inform the final version of the survey.

Ethical Approval

Ethical approval for this study has been obtained from each of the participating Universities.

Questions

We will be happy to answer any question you have about this study. If you have any questions about your rights as a study participant, or questions or concerns about any aspect of the study, you may contact any of the relevant individuals listed in this information sheet.

Researcher	Institution	Contact details
Dr V Zweigenthal	University of Cape Town	virginia.zweigenthal@uct.ac.za
Dr T Dlungwane	University of KwaZulu-Natal	dlungwane@ukzn.ac.za
Prof N Christofides / Dr Janine White	University of the Witwatersrand	nicola.christofides@wits.ac.za janine.white@wits.ac.za
Ms N Schaay	University of the Western Cape	shaay@mweb.co.za
Prof T Tshitangano	University of Venda	takalani.Tshitangano@univen.ac.za
Prof S Madiba	Sefako Mokgatho University	sphiwe.madiba@smu.ac.za
Prof F Matala	University of Limpopo	france.matlala@ul.ac.za
Dr SM Patrick	University of Pretoria	sean.patrick@up.ac.za

If you have any queries about the conduct of this study, you can contact the Ethics committee of the institution where you trained.

Institution	Contact name	Contact details
University of the Witwatersrand	**Zanele Ndlovu**	Zanele.ndlovu@wits.ac.za

Appendix 3 – Primary study consent form

I hereby give my consent to participate in this study.	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 transcript of the interview	Yes	No
I would like to receive a copy of the article about MPH competencies and its utility when the study is complete	Yes	No

Signed: ……. Interviewer:

…….

Name: …… Name:

……

Date: ……. Date:

…….

Appendix 4 – Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Dr N Gumbeze

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M230694

NAME: (Principal Investigator)	Dr N Gumbeze
DEPARTMENT:	School of Public Health Medical School University
PROJECT TITLE:	*Roles played by Master of Public Health graduates from South African universities during Covid-19*
DATE CONSIDERED:	Ad hoc
DECISION:	Approved unconditionally
CONDITIONS:	Sub-study under M20/11/56
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Drs J White and N Nxumalo; Professor T Tshitangano
APPROVED BY:	Professor P Ruff, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2023/08/10 **EXPIRY DATE:** 2028/08/09

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **June** and therefore reports and re-certification will be due in the month of **June** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator — Date: 31 August 2023

Appendix 5 – Plagiarism declaration

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Ngaatendwe Gumbeze (Student number: 2365546) am a student registered for the degree of Master of Public Health in the academic year 2023.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: _____ Date: 17 March 2024

1

Appendix 6 – Turnitin report

turnit Full draft (2) 21 March_2365546_N Gumbeze.docx

ORIGINALITY REPORT

7%	5%	2%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Sefako Makgatho Health Science University Student Paper	2%
2	phasa.samrc.ac.za Internet Source	1%
3	wiredspace.wits.ac.za Internet Source	1%
4	Submitted to University of Witwatersrand Student Paper	<1%
5	hdl.handle.net Internet Source	<1%
6	Heidi L. Hancher-Rauch, Charity Bishop, Alli Campbell, Kara Cecil, Lisa Yazel. "Effects of COVID-19 Pandemic on the Professional Roles and Responsibilities of Health Educators", Health Promotion Practice, 2020 Publication	<1%
7	Submitted to University of Cape Town Student Paper	<1%