

**Knowledge, attitudes and perceptions
of fifth-year medical students at a South African university
regarding their public health course**

By

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DECLARATION

I, Tladi Daniel Ledibane, declare

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Date: 31 August 2022

TD Ledibane

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This degree is dedicated to my late mother, Mrs KB Ledibane, who inspired and taught generations of underprivileged children in farm schools.

To God be the glory.

Thank you!

Dankie!

Ke a leboga!

ABSTRACT

The coronavirus epidemic has put public health in the spotlight like never before, with daily reports regarding epidemiological modelling and the control of the disease outbreak.

The public has become more aware of public health practices and the role of the public health profession in the fight to fight the pandemic. The renewed interest places the responsibility on academics in public health to equip students with the necessary knowledge and skills. In this way, competent and effective clinicians can be trained who can play a significant role in the fight against the current and future pandemics. Public health theories and practical modules are offered worldwide in undergraduate curricula of most medical schools. However, the content and period of exposure regarding teaching and learning in public health differ drastically between local medical schools and internationally.

The study aimed to understand fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course to inform curriculum renewal for this course.

A mixed-methods study design was used for this study. The study design for the quantitative and qualitative phases was descriptive cross-sectional with a phenomenological design. A five-point Likert scale questionnaire was used to gather data from the fifth-year medical students regarding their knowledge, attitudes and perceptions related to their public health curriculum. A focus group interview was conducted with student representatives as key informants. The qualitative and quantitative data were analysed in parallel. The results from each approach were used to cross-validate the findings.

This study showed that most students were conversant regarding relevant public health topics that should be included in the public health curriculum. However, most students were not satisfied with the public health course. The students felt that the learning opportunities in public health and research were limited and inadequate and did not include service or practical learning. In addition, the students felt that teaching

strategies employed by the department were ineffective. Finally, most students had positive perceptions of public health as discipline and felt it was an essential aspect of clinical medicine and should be part of medical training.

In conclusion, the study highlights the need to involve medical students in the curriculum renewal process, as well as to understand their attitudes and perspectives. This knowledge can be used in the future to help the curriculum developers to compile core curricula. In this way, their public health learning experience and medical school training can be improved.

Curriculum developers should consider integrating the disciplinary underpinnings of public health in clinical disciplines and employing experiential learning and interactive strategies to teach public health.

KEYWORDS

Undergraduate public health training,

Curriculum renewal.

OPSOMMING

Die coronavirus epidemie het openbare gesondheid in die kollig geplaas soos nog nooit te vore met daaglikse verslae rakende epidemiologiese modellering en die kontrole van die siekte-uitbreking.

Die publiek het meer bewus geraak van openbare gesondheidspraktyke en die rol van die openbare gesondheidsprofessie in die stryd om die pandemie te beveg. Die hernude belangstelling plaas die verantwoordelikheid op akademici in openbare gesondheid om studente met die nodige kennis en vaardighede toe te rus. Sodoende kan bekwame/effektiewe klinici opgelei word wat 'n betekenisvolle rol kan lewer in die stryd teen die huidige en toekomstige pandemies. Openbare gesondheidsteorieë en praktiese modules word wêreldwyd in voorgraadse leerplanne van meeste mediese skole aangebied. Die inhoud en tydperk van blootstelling wat onderrig en leer betref in openbare gesondheid verskil egter drasties tussen plaaslike mediese skole, en ook internasionaal.

Die studie het ten doel om kennis, houdings, en persepsies van vyfdejaar mediese studente in te samel om sodoende die kursusleerplan van die openbare gesondheidskursus in die toekoms te kan vernuwe.

'n Gemengde-metodes studie-ontwerp is vir hierdie studie gebruik. Die studie-ontwerp vir die kwantitatiewe en kwalitatiewe fases was 'n beskrywende deursnee-studie met 'n fenomenologiese ontwerp. 'n Vyf-punt Likert-skaal vraelys is gebruik om data rakende die vyfde jaar mediese studente se kennis, houdings en persepsies rakende hul openbare gesondheid kurrikulum in te samel. 'n Fokusgroep onderhoud is met studente leiërs as sleutel informante gevoer. Die kwalitatiewe en kwantitatiewe data is in parallel ontleed. Die resultate van elke benadering is gebruik om die bevindinge te kruis valideer.

Hierdie studie het aan die lig gebring dat die meeste studente op hoogte was van relevante openbare gesondheid onderwerpe wat in die openbare gesondheid kurrikulum ingesluit behoort te word. Die meeste studente was egter nie tevrede met

die openbare gesondheidskursus nie. Die studente het gevoel dat die leer geleentheid in openbare gesondheid en navorsing beperk en onvoldoende was en nie diens of praktiese leer insluit nie. Daarbenewens het die studente gevoel dat onderrigstrategieë wat deur die departement gebruik word, ondoeltreffend was. Ten slotte, die meeste studente het positiewe persepsies van openbare gesondheid as dissipline gehad en het gevoel dat dit 'n noodsaaklike aspek van kliniese medisyne is en deel van mediese opleiding moet wees.

Ten slotte beklemtoon die studie die behoefte om mediese studente by die kurrikulum vernuwings proses te betrek en hul houdings en perspektiewe te verstaan. Hierdie kennis kan in die toekoms gebruik word om die kurrikulum ontwikkelaars te help om kern kurrikulums saam te stel. Op hierdie manier kan hul openbare gesondheid leerervaring en mediese skool opleiding verbeter word.

Kurrikulum ontwikkelaars moet dit oorweeg om die dissiplinêre onderbou van openbare gesondheid in kliniese dissiplines te integreer en om ervaringsleer en interaktiewe strategieë te gebruik om openbare gesondheid te onderrig.

KERNWOORDE

Voorgraadse openbare gesondheidsopleiding,

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ACRONYMS AND ABBREVIATIONS

KAP	-	Knowledge, Attitudes, and Perceptions
HPCSA	-	Health Professions Council of South Africa
HNA	-	Health Needs Assessment
HREC	-	Health Research Ethics Committee
MBChB	-	Bachelor of Medicine and Surgery
MEHS	-	English for Health Sciences
PHM	-	Public Health Medicine
POME	-	Practice of Medicine
SOM	-	School of Medicine
SRQR	-	Standards for Reporting Qualitative Research

GLOSSARY

Health promotion: The process of enabling people to gain more control over their own health and be able to enhance it. It expands beyond human behaviour to include a variety of social and environmental interventions.

Hospi-centric health system: A health system where most health problems are managed mainly at the hospital level. Before admission, patients already developed serious complications instead of focusing on preventive care.

Curriculum: A curriculum is a standards-based sequence of planned experiences where students practice and achieve proficiency in content and applied learning skills. It must include the necessary goals, methods, materials, and assessment practices to support instruction and learning effectively.

Curriculum renewal: is the process of revising a curriculum and then closely monitoring it.

Integrated curriculum: refers to synchronous, trans-disciplinary delivery of information between the foundational sciences and the applied sciences throughout all years of a medical school curriculum

Flipped classroom refers to a teaching strategy in which the learning or lesson material is introduced to the students at prior to attending class, which is the opposite of the more typical approach of teaching new material in class and then giving the students tasks and homework to finish on their own at home.

Stata 12.0: Stata is a powerful statistical software that enables researchers to analyse, manage, and visualise their data.

Surveillance: An ongoing systematic collection, analysis, and interpretation of data, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling diseases.

CHAPTER 1 ORIENTATION OF THE STUDY

Overview

The motivation and context for this research is presented in Chapter 1. The study's context and objective are detailed to better understand the knowledge, attitudes, and perceptions of fifth-year medical students regarding their current public health course and improvements in course curriculum renewal. The research problem to be addressed is explained in the aims and objectives of this study, and the research question establishes the foundation for the answers to be investigated in this study. The chapter concludes with a summary of the research project.

1.1 BACKGROUND

The coronavirus epidemic has thrust public health into the spotlight like never before, with daily reports on epidemiological modelling and disease outbreak control. The public is more aware of public health practice and the role of public health professionals in the fight against the pandemic (Brisolara and Smith, 2020). Consequently, undergraduate students have a growing interest in pursuing a future career in public health (Powers, 2020). The renewed interest places the responsibility on public health academics to provide the students with the necessary knowledge and skills to be effective clinicians who can play a meaningful role in the fight against current and future pandemics.

Public health is the art and science of avoiding disease, prolonging life, and promoting health via coordinated social initiatives. (Winslow, 1920). More recently, public health has been defined as serving society's interest in ensuring healthy conditions for the people. Its purpose is to mobilise organised community efforts to advance the public interest in health through the application of scientific and technical knowledge for disease prevention and health promotion (Institute of Medicine, 1988); and as the modern implementation of a wide range of evidence-based managerial, scientific, and technical systems and actions to enhance the health of people and populations. The political and practical use of knowledge gained from past achievements and failures

in disease management, as well as the promotion of preventive measures to address current, changing, and re-emerging health risks and threats, are its key goals. (Tulchinsky and Varavikova, 2010).

Public health focuses on population-level interventions, whereas clinical medicine focuses on personal therapeutic interventions. Some of the skills required in the practice of public health embedded in the three public health domains are disease surveillance, health promotion, disease outbreaks control, analysis and emergency preparedness anchored in the three public health domains (Thorpe *et al.*, 2008). The three public health domains are health improvement, health protection and health service quality improvement (Thorpe *et al.*, 2008). Health improvement focuses on the socio-economic influences on health, health promotion, and addressing the social determinants of health (Thorpe *et al.*, 2008). Health protection is aimed at disease control by addressing environmental, chemical, radiation and nuclear threats; and occupational health risks (Thorpe *et al.*, 2008). And health service quality improvement, which incorporates healthcare systems and clinical governance. (Thorpe *et al.*, 2008)

Public health theory and practice modules are included in the undergraduate medical curriculum of most medical schools throughout the world. However, the content and duration of exposure concerning teaching and learning in public health vary significantly within countries and internationally (Ahmad *et al.*, 2009; Daher and Amin, 2010; Saleh, 2015).

For example, in South Africa, some medical schools teach public health modules such as biostatistics and research methodology at the first and second-year levels with further tuition in the third or fourth years. At one medical school, public health modules were only available as electives (Dommissie and Joubert, 2009).

Despite including public health training at the undergraduate level in South Africa and elsewhere, undergraduate public health education is not integrated into the clinical specialities (Dommissie and Joubert, 2009; Tyler *et al.*, 2009; Johnson *et al.*, 2011). The lack of integration may result in poor educational experiences in public health courses and a lack of positive role modelling in public health medicine speciality (Tyler *et al.*, 2009; Jang *et al.*, 2013).

Due to lack of integration, instruction in public health training in medical schools often takes a back seat favouring the more important core basic science and clinical courses (Finkel, 2012; Zeng *et al.*, 2020). Integrating public health with clinical disciplines can produce clinicians who understand and appreciate the social determinants of health (Finkel, 2012) and the tools that public health employs to prevent disease (Zeng *et al.*, 2020).

The students' experiences and attitudes towards public health were reported to be positive at medical schools where public health physicians taught students and where there was perceived integration between public health and other clinical specialities (Dommissie and Joubert, 2009; Saleh, 2015). The students expressed satisfaction and understood the role of public health and how it fits in with other clinical specialities (Tyler *et al.*, 2009; Jang *et al.*, 2013). Furthermore, involving students in research projects was also seen as a factor that may foster positive public health learning experiences (Ahmad *et al.*, 2009).

A curriculum is a structured educational experience that includes behaviour goals, instructional approaches, and actual learner experiences (Green 2001). While it is recognised that the medical curriculum will benefit from regular, periodic renewal, these renewal processes are often not informed by research and evidence-based research (Mcleod and Steinert, 2015). Researching the students' knowledge, attitudes and perceptions regarding their public health course might provide insights and help provide the evidence to inform and guide curriculum renewal.

1.2 CONTEXT

The study was conducted at a Health Sciences University in South Africa. The university's name is anonymised in the report as this was a prerequisite for ethics approval from the university. It will thus be referred to as 'University X' throughout the report. In terms of student enrolment and faculty makeup, the School of Medicine is the most significant component of University X. The University offers a six-year undergraduate medical programme and postgraduate and residency programmes in medicine. The undergraduate classrooms are large, with up to 250 students in each. The university's mission is to provide high-quality primary healthcare-oriented health sciences research, education, and services and implement educational techniques

that include evidence-based curriculum development and delivery methods rooted in the community.

The curriculum of University X is classified as 'hybrid' since it combines discipline-specific modules and clinical rotations with an integrating strand from the first year to the fifth year led by the Practice of Medicine Unit (POME). Although the modules are stand-alone in the early years, efforts are made to ensure synchronisation in the teaching sequence and thus better learning integration. POME plays a vital role in fostering community engagement and providing great chances for inter-professional learning in the clinical setting from the first year on. However, the level of integration remains variable between and within disciplines.

The six-year MBChB programme consists of the pre-clinical and clinical phases. Students are taught basic medical sciences and basic clinical skills throughout the preclinical phase. In addition, public health topics such as basic epidemiology and health promotion are introduced to the students. The clinical phase comprises mainly clinical ward rotations, primary health care visits in the mornings, and whole-class lectures in the afternoons. However, learning opportunities in the public health course are limited to didactic lectures with limited hands-on practical exposure, leading to passive learning and surface learning among the students. In addition, the importance of public health is lost in the overemphasis on clinical disciplines, which are perceived as the 'core' of the medical curriculum. While some public health modules are offered in the preclinical years, there are no public health modules offered in years five and six at University X, leading to a lack of integration between clinical disciplines and public health.

The lack of integration between the clinical disciplines and public health also creates the impression that public health is not as important as clinical courses, compounded by the hospi-centric nature of the health care provision in South Africa. Before the COVID-19 pandemic, public health class attendance at University X was poor, averaging less than five per cent attendance. The researcher found the students' lack of interest in public health important in disease prevention. Furthermore, the researcher wanted to gather evidence that would inform the ongoing curriculum renewal process for the public health course.

1.3 MOTIVATION FOR THE STUDY

The COVID-19 pandemic has brought public health into focus. Since the outbreak of the pandemic, the public has become aware of public health and the importance of public health professionals in the fight against the pandemic. Terms associated with public health, such as isolation and quarantine, have been thrust into the lexicon of the public. However, there remains negative attitudes and a lack of understanding of public health amongst students and clinicians. In the early days of the pandemic, the researcher was responsible for educating staff about the preventive measure against COVID-19 and COVID-19 admissions at the university's primary teaching hospital. This task led to interaction with many clinicians and medical students. Some clinicians could not remember taking a public health or community health course in their undergraduate training. Some could not understand how an obscure "non-clinical" speciality should be at the forefront of preventing COVID-19 infections among health care workers and patients and even questioned some control measures such as symptom screening, temperature checks, and social distancing. Public health class attendance was poor; generally, the students were not interested in public health and focused their attention on more "interesting" and "core" clinical courses. Therefore, it became necessary for the researcher to explore the general apathy and lack of understanding of the role of public health among the students and clinicians to inform curriculum renewal.

1.4 RATIONALE FOR THE STUDY

The rationale for the study was to understand the students' knowledge, attitudes, and perceptions toward their public health course. The study was designed to understand the students' lived experiences regarding the public health course and gain insight into their perspectives on how the course could be improved. Understanding the students' lived experiences regarding the course and their views on how to improve the course will play a significant role in the curriculum review process, which is in keeping with the teaching and learning strategy of the university that promotes student-centred learning and evidence-based teaching approaches. Furthermore, involving the students in the curriculum review process empowers the students as full participants in the renewal process. Lastly, failure to include the students in the curriculum review process will render such planning and operations based on faculty assumptions and biases devoid of evidence.

This study aims to understand the knowledge, attitudes, and perceptions (KAP) of fifth-year medical students regarding their public health course, make recommendations towards improvements in the public health course, and improve students' awareness and understanding of public health. KAP studies are studies of a particular population to collect data on what is known, believed and practised concerning a specific topic (Zahedi *et al.*, 2014). The traditional definition of knowledge states that it is a valid opinion supported by reason or a true belief that is justified (Hilpinen, 1970). Attitudes refer to the participants' feelings and emotions about a topic, whereas perception is defined as the individuals think about or the impression they have about a particular topic (Hatfield, 2001).

1.5 PROBLEM STATEMENT

Despite the increasing recognition of the role of public health medicine in disease prevention, research, and evidence-based medicine (Hartley and Perencevich, 2020; Pan *et al.*, 2020), undergraduate public health medicine training remains obscure and perceived to be less important (Finkel, 2012). For example, the role of public health interventions in managing the COVID-19 pandemic, such as non-pharmaceutical (Hartley and Perencevich, 2020; Pan *et al.*, 2020) intervention and vaccinations (Alley *et al.*, 2021), remain controversial throughout the world despite their impact in managing and control of COVID-19 and other diseases.

These controversies and the relative obscurity of public health leave students misinformed about the speciality. Limited teaching and learning opportunities in public health will likely leave students lacking generic public health skills necessary for their future clinical practice. The current COVID-19 pandemic has highlighted the need for the renewal of the medical curriculum to respond to the evolving global health needs and to capacitate future doctors with the requisite skills to manage future epidemics and pandemics (Brisolara and Smith, 2020; Kok, Idris and Koh, 2020; Narayan, Curran and Foege, 2021). Studies that explore students' knowledge, attitudes and perspectives regarding their public health course are limited and have not been performed at the University.

1.6 RESEARCH QUESTION

What are fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course?

1.7 AIM OF THE STUDY

The study aimed to understand fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course to inform curriculum renewal for this course.

1.8 OBJECTIVES OF THE STUDY

The objectives of the study were to:

1. Determine fifth-year medical students' public health knowledge following completion of the public health course.
2. Explore the fifth-year medical students' attitudes and perceptions towards the public health course and;
3. Make recommendations towards improvements in the public health course to improve students' awareness and understanding of public health.

1.9 ASSUMPTIONS

Curriculum renewal is the process of revising a curriculum and then closely monitoring it (Mcleod and Steinert, 2015). The renewal's overarching aim should be to provide timely, evidence-based curriculum responsiveness to changes in practice, health care, student needs, and educational methods based on good research (Mcleod and Steinert, 2015; Thomas *et al.*, 2016). Curricula in the health sciences, particularly those currently being created, will benefit from regular periodic reviews (Mcleod and Steinert, 2015).

1.10 OUTLINE OF THE RESEARCH ASSIGNMENT

The research assignment comprises six chapters.

- **Chapter 1** provides an overview of the research assignment and orientates the reader to the study.
- In **Chapter 2**, the literature review relevant to the study is presented.
- The methodology and research design of the study is described in **Chapter 3**.
- **Chapter 4** presents the results, followed by

- The discussion of results in **Chapter 5**. In addition, recommendations, based on the results, are proposed to inform curriculum renewal and teaching strategies.
- Study limitations and strengths are discussed in **Chapter 5**.
- **Chapter 6** concludes the assignment by amalgamating the findings with the aims and objectives of the research.
- Recommendations for future research are made in **Chapter 6**.

CHAPTER 2 REVIEW OF THE LITERATURE

Overview

Chapter 2 provides a literature overview of public health education in undergraduate medical education. Different types of curricula and learning styles are discussed. To conceptualize the phenomena of interest, identify the knowledge gap, and justify the establishment of research questions, other researchers' work has been critically and systematically assessed. Furthermore, different types of curricula that are employed in medical schools such as integrated, spiral, competency-based, experiential and service-learning curriculum are discussed.

2.1 INTRODUCTION

The fight against COVID-19 has positioned public health as one of the lead medical specialities in the battle against the pandemic (WHO, 2021). Terms associated with public health, such as outbreak response, quarantine and flattening the curve, have been brought into the public's lexicon (Brisolara and Smith, 2020). More than ever, public health physicians and practitioners have been called to do interviews on various media platforms (Brisolara and Smith, 2020). There is an appreciation of public health practice in managing the pandemic and other diseases that affect the public (Brisolara and Smith, 2020).

More recently, public health has been defined as serving society's interest in ensuring healthy conditions for the people. Its purpose is to mobilise organised community efforts to advance the public interest in health through the application of scientific and technical knowledge for disease prevention and health promotion (Institute of Medicine, 1988); and as modern application of a vast array of scientific, technological, and administrative systems that apply measures to enhance the health of individuals and populations. Its primary aims are the political and practical application of lessons learned from past triumphs and failures in disease management, as well as the promotion of preventive measures to address current, changing, and re-emerging health hazards and risks. (Tulchinsky and Varavikova, 2010).

The main goal of public health is to improve the health and well-being of communities or populations by employing population-level strategies (Myles *et al.*, 2014). Its practice operates within the three domains: health protection, health services and health improvement (Myles *et al.*, 2014). Health surveillance underpins the strategies employed in public health to achieve its goals (Myles *et al.*, 2014).

Public health practice extends beyond the medical field, requiring both undergraduates and postgraduates in public health to function in a multidisciplinary environment (Finkel, 2012; Brisolaro and Smith, 2020). For example, public health practitioners are expected to work with policymakers, community leaders, and health activists, among others, to address the social determinants of health (Kiviniemi and Przybyla, 2019). It is, therefore, imperative that future doctors receive public health training in their undergraduate medical programmes as it benefits their clinical practice and the communities they serve (Rao *et al.*, 2020).

2.2 PUBLIC HEALTH TRAINING

Public health modules are included in the undergraduate medical curriculum of most medical schools throughout the world, although the content and duration of exposure concerning teaching and learning in public health vary significantly within countries and internationally (Ahmad *et al.*, 2009; Daher and Amin, 2010; Saleh, 2015). For example, in South Africa, public health modules such as biostatistics and research methodology were at first and/or second-year levels, with further tuition in the third or fourth years in some medical schools. Public health modules were only available as electives (Dommissie and Joubert, 2009).

While there is recognition of the need to include public health training in the undergraduate training of doctors, there remain challenges of public health being underrepresented in medical school curricula (Lyon *et al.*, 2016). It is often perceived as a non-core subject (Finkel, 2012) and lacks engagement among medical students (Vyas *et al.*, 2017). These challenges may lead to students having negative perceptions toward public health and not seeing it as equally important as clinical disciplines and thus a future career option (Zweigenthal *et al.*, 2018, 2019).

Various authors have written about the explanations for the low profile of public health in the medical curricula. However, challenges remain with engagement knowledge

regarding public health among medical students. These challenges are classified as student, teacher, curriculum and content factors. Curriculum factors associated with poor student engagement in public health are caused by an overcrowded curriculum (Myles *et al.*, 2014) and the lack of work-based training in public health (Gillam *et al.*, 2016). Among the students' factors leading to poor student engagement is the perception of public health as being outside a doctor's scope of practice (Ivory *et al.*, 2013) and their lack of interest in the social sciences. Lack of training in pedagogical methods among public health lecturers and failure to connect with younger generations are educator issues blamed for poor student engagement. The content factors that lead to poor student engagement are that the underlying disciplinary basis of public health may be at odds with the biomedical model's perceived objectives (Vyas *et al.*, 2017).

Experiences and attitudes of students towards public health were reported to be positive at medical schools where public health physicians taught students and where curriculum integration was perceived between public health and other clinical specialities (Dommissie and Joubert, 2009; Saleh, 2015). The students expressed satisfaction and understood the role of public health and how it fits in with other clinical specialities (Tyler *et al.*, 2009; Jang *et al.*, 2013). Furthermore, involving students in research projects was also seen as a factor that may foster positive learning experiences in public health (Ahmad *et al.*, 2009).

2.3 CURRICULUM

A curriculum is a planned educational experience that encompasses behavioural goals, instructional methods and actual experiences of the learners (Green, 2001). A curriculum is an educational programme with aims and objectives, content, experiences, outcomes, and processes. It also includes a description of the training structure, length and organisation of the programme, including its assessment method and the intended learning, teaching, feedback, and supervision methods (Thomas *et al.*, 2016).

The current COVID-19 pandemic has proven to be a catalyst for curriculum renewal in medical education (Brisolara and Smith, 2020; Zeng *et al.*, 2020). However, such a curriculum should be evidence-based and student-focused to enhance learning, among other factors (Mcleod and Steinert, 2015). Furthermore, the curriculum renewal

should assure responsiveness to changes in practice, student needs and educational approaches (Mcleod and Steinert, 2015). While the recognised medical curriculum will benefit from regular, periodic renewal, these renewal processes are often not informed by research and evidence-based research (Mcleod and Steinert, 2015). Investigating students' knowledge, attitudes and perceptions regarding their public health course might provide insights and help provide the evidence to inform and guide curriculum renewal.

In undergraduate medical education, medical schools worldwide use several curriculum models: traditional discipline-based, integrated, organ-based, competency-based, and community-oriented curricula are some of the curricula employed in medical education. Each curriculum has its advantages and disadvantages (Arja, 2017). Some medical schools provide hybrid curricula, i.e., combining two types of curricula. For example, some schools employ problem-based learning and teaching approaches and an organ-based curriculum (Arja, 2017).

There are different curricula approaches that are employed to teach public health in the undergraduate level. For example, the integrated curriculum is employed since it affords the students the skills set to manage complex health determinants in wholistically.

2.3.1 Integrated curriculum

The integrated curriculum is a medical school curriculum that delivers material in a fully synchronous, cross-disciplinary manner throughout all of the foundational and applied science years (Brauer and Ferguson, 2015). Integration aims to eliminate the barriers between basic and clinical sciences due to conventional curricular designs (Brauer and Ferguson, 2015). Integration can be achieved by either vertical or horizontal integration. Horizontal integration is attained by coordinating and integrating basic and clinical science courses. In contrast, vertical integration occurs when clinical sciences and clinical education are integrated into basic sciences and vice versa. Integration should increase knowledge retention and skill acquisition through the repeated and gradual development of concepts and their applications (Brauer and Ferguson, 2015) and provide students with high-quality, long-lasting learning experiences (Kiviniemi and Przybyła, 2019).

Public health practice requires practitioners to solve complex determinants of health in an integrated manner, which makes an integrated curriculum ideal for teaching and learning in public health. For example, health challenges presented to health systems worldwide are multifaceted and need skills beyond the biomedical model. Risk communication, health promotion and project management to plan and manage vaccination programmes are skills required to complement the clinical management of COVID-19 patients (Rao *et al.*, 2020). Integrating public health with clinical disciplines will empower medical students to appreciate their future roles as doctors in health promotion, education, and vaccination drive to primary disease prevention. This integration will also aid in how the burden of disease impacts health services by making it explicit and how basic knowledge in the discipline relates to real-world content applications (Kiviniemi and Przybyla, 2019).

Furthermore, the students may realise how evidence-based medicine plays a role in clinical medicine without recognised and established treatment options for diseases, as experienced in the recent COVID-19 pandemic. Early introduction of integrative approaches develops student competency and leadership, equipping students for a smooth transit into clinical practice. (Challa *et al.*, 2021).

However, the spiral curriculum has been effectively used in different settings as part of the integrated curriculum to teach effectively teach public health (Johnson *et al.* 2011).

2.3.2 Spiral curriculum

A spiral curriculum is one in which topics, concepts, or ideas are revisited iteratively throughout the course. A spiral curriculum is more than just repeating a lesson; it also necessitates a deepening of it, with each interaction building on the preceding (Harden and Stamper, 1999). The advantages of a spiral curriculum are that it leads to a thorough comprehension of the material, competence in performance, development of the learner's confidence, improvement of long-term memory and thinking abilities, problem-solving abilities, and decision-making. (Shariati *et al.*, 2021). The benefit of the spiral curriculum for public health is that it enhances learning in public health and fosters integration with clinical disciplines and demonstrates the relevance of public health and epidemiology in clinical medicine (Martinez *et al.*, 2015).

2.4 CURRICULUM DELIVERY METHODS

There are several pedagogical approaches that have been employed to teach public health globally. Competency-based education (Bennett and Walston 2015) and problem-based learning (Leon *et al.* 2015) have shown improvement in students' grades.

2.4.1 Competency-based education

Competency-based education (CBE) trains doctors for practice centred on graduate outcomes and organised around competencies drawn from a study of society and patient needs. It promotes accountability, flexibility, and learner-centeredness rather than time-based training. (Frank *et al.*, 2010).

Problem-based learning has been used in various settings to the achieve the objectives of competency-based education (Chorazy and Klinedinst 2019) and can be employed together with other teaching approaches such as service learning and experiential learning.

2.4.2 Problem-based learning

Problem-based learning (PBL) can be characterised as an instructional method whereby the educator uses engaging tasks or problems as a starting point for learning. Students self-direct and self-regulate their learning and may work in groups to tackle these tasks. Finally, the role of educators is to facilitate this process (van der Vleuten and Schuwirth, 2019). The benefit of PBL is that it can homogenise the experience to meet competencies and foster teamwork among the students (Trevena, 2007) and encourage active learning.

There is the recognition that service learning in public health empower students to integrate, synthesize, and apply classroom learning by combining rigorous academic coursework with community engagement (Chorazy and Klinedinst 2019) and can improve the students' confidence in decision making.

2.4.3 Service-learning

Service-learning is a pedagogy of engagement in which students respond to actual community health needs by volunteering in a way that is explicitly linked to the academic curriculum through structured continuing reflections (Hunt *et al.*, 2011; Muir *et al.*, 2014).

Despite evidence showing little impact on 'deep' learning, lectures remain among the most common knowledge transfer techniques in undergraduate and postgraduate education. Lectures might become more effective learning opportunities if presenters had a more excellent knowledge of the limitations of human memory and the learner's capacity to concentrate for long periods (Martinez *et al.*, 2015). A well-structured lecture with specific learning objectives establishes contextual links, and theory-to-experience connections are more likely to maximise the learning potential of individuals in the lecture.

Engagement pedagogies empower students, such as service-learning, providing real-life experiences that foster critical thinking, problem-solving, and knowledge application (Stewart and Wubben, 2014). For example, service-learning experiences may illuminate public health concepts such as the social determinants of health if accompanied by preparation, service and reflection (Wells and Martinez, 2014). Furthermore, When the high-impact service-learning practice is implemented in delivering a senior capstone experience, it is beneficial to students and communities (Mackenzie *et al.*, 2019).

Experiential learning is closely intertwined with service learning. Since it affords the students the opportunity to acquire and apply knowledge and skills in appropriate and relevant settings (Cashman and Seifer 2008)

2.4.4 Experiential learning

Experiential learning is defined as the process by which knowledge is created by transforming experience (Kolb, 1984) Knowledge is the result of grasping and transforming experience. In public health education, experiential learning allows students to thoughtfully read, synthesise, and evaluate scientific knowledge about

public health and; communicate and translate public health information and science to a large and varied audience through a range of media (Chorazy and Klinedinst, 2019). In addition, students get practical experience in public health practice and research and identify the cultural environments in which public health practitioners operate (Chorazy and Klinedinst, 2019). Furthermore, experiential learning can create a positive learning experience and perceptions about public health among students (Navinan *et al.*, 2012) and can foster active learning.

2.4.5 Active learning

Active learning is defined as any teaching strategy that actively involves learners in the learning process (Barr and Tagg, 1995), in contrast to students passively receiving information from the lecturer. Active learning works across diverse basic science disciplines of physics, biology, and chemistry. Students learned better in an active learning environment than in a passive lecture format (Freeman *et al.*, 2014). Active learning fosters higher engagement and critical thinking levels and leads to enriched learning on public health course topics (Goldman *et al.*, 2008; Kjellgren *et al.*, 2008). Despite the known advantages of active learning the formal didactic lecture remains the predominant educational format in higher education (Bucklin *et al.* 2021)

Curriculum renewal efforts should be aimed at producing future health practitioners who will be able to meet the changing societal health needs and positively impact their graduate attributes (Unger and Hanekom 2014).

2.5 CURRICULUM RENEWAL

Curriculum reform and revision aim to improve student learning, engagement, experience, and outcomes. The curriculum review and enhancement process should be evidence-based and guided by emerging societal trends, health care innovations, and education practices (Mcleod and Steinert, 2015). For example, the public awareness and expectations concerning public health response to the COVID-19 necessitate public health curricular review at both medical undergraduate and postgraduate levels. Doctors are expected to treat and manage COVID-19 patients and effectively communicate the economic disparities and determinants associated with poor health outcomes among COVID-19 patients (Johnson *et al.*, 2020).

Furthermore, future doctors should be prepared to deal with the current and future pandemics (O'Byrne *et al.*, 2020).

Today's health problems require a public health approach and clinical skills for doctors to provide equitable health care (Rao *et al.*, 2020). Medical education needs to include knowledge and skills from public health (Rao *et al.*, 2020) to reduce the risk of non-communicable diseases and improve health equity. Innovative ways of teaching public health have become necessary to help future doctors meet the evolving population's health needs.

In undertaking curriculum renewal, academics should focus on developing an array different of learning opportunities to enable the development of graduate attributes such as students' knowledge, attitudes and perceptions (Unger and Hanekom 2014).

2.6 STUDENTS' KNOWLEDGE, ATTITUDES AND PERCEPTION TOWARD PUBLIC HEALTH

Several studies indicate that medical students understand and appreciate the value of public health in the medical school undergraduate curriculum (Tyler *et al.*, 2009; Navinan *et al.*, 2012; Thakur *et al.*, 2016; Mukesh *et al.*, 2018). However, students identified several factors that influenced their (negative) attitudes and perceptions of public health: namely, poor educational experiences in public health courses, a lack of positive role models, particularly exposure to public health medicine specialists, an overemphasis on statistics and epidemiology, and negative attitudes toward public health topics (Tyler *et al.*, 2009).

Furthermore, in several other studies, students cited poor educational experience in public as a major contributor to negative perceptions regarding public health. For example, in South Africa, students reported that public health courses were boring and irrelevant (Zweigenthal *et al.*, 2018). Similarly, in a study conducted in India, the students said they were not inspired to read more about the topic or routinely review what they had learned in the public health course (Navinan *et al.*, 2012).

The poor educational experience in public health also plays a role in choosing public health as a career choice (Zweigenthal *et al.*, 2018). In addition, the following factors were found to have a significant relationship with choosing public health as a career: perception of public health as an important field; having a positive opinion of public health before beginning the course; finding the field-based experience enjoyable and

beneficial to the community; and feeling competent to work in the community at the end of the course (Navinan *et al.*, 2012).

2.7 SUMMARY

The learning environment influences the students' behaviour or attitude towards a course. Students' perceptions of their learning environment are linked to their behaviour (Genn, 2001). Their performance, satisfaction, and success in medical school are related to their perceptions of the educational environment in which they learn (Genn, 2001). Experiential learning and employing innovative teaching approaches such as community-based projects and group discussions are factors that may improve the educational experience in public health (Navinan *et al.*, 2012). However, these changes to the curriculum should include the students' voices. According to Genn (2001), there is a need to evaluate students' perceptions and views regarding their preferred learning environment before implementing changes to the curriculum.

CHAPTER 3 METHODOLOGY

Overview

The theoretical framework that underpins the research and the methods used in this study are discussed in Chapter 3. This chapter describes the research's settings, participant recruitment strategies, and the data collection process for the study's qualitative and quantitative aspects. The methodology section explains why mixed-method research was chosen, which involves a quantitative survey followed by a focus group interview for the qualitative phase of the research. In Chapter 3, the researcher's function and the ethical problems faced while performing this research are also explained.

3.1 THEORETICAL FRAMEWORK

A paradigm is a worldview or philosophy that influences the researcher's theoretical perspective and methodological approach (Guba, 1990).

Positivism drives the quantitative approach prevalent in science and medicine, emphasising establishing causal relationships, choosing variables, and generalizing to a population. The premise is that there is a "truth", and science's purpose is to uncover it (Creswell, 2022).

Constructivism is generally linked with the qualitative viewpoint, a more interpretive perspective, due to its emphasis on comprehending the meanings stated by participants who hold diverse world views (Creswell and Creswell, 2018). The constructivist premises that individuals actively create information based on prior knowledge, affordances and impediments of the current learning context (Creswell and Creswell, 2018).

The researcher used the mixed-method approach in this study. Mixed-method processes are associated with pragmatism, a third philosophical paradigm. The emphasis is on the outcomes or utility of research and developing a pluralistic approach based on what works in practice (Creswell, 2022). This study aims to understand the knowledge, attitudes, and perceptions of fifth-year medical students

regarding their public health course to inform curriculum renewal for this course. The objectives of the study were to determine fifth-year medical students' knowledge of public health following completion of the public health course. Also, to explore the fifth-year medical students' attitudes and perceptions towards the public health course and make recommendations towards improvements in the public health course to improve students' awareness and understanding of public health. The researcher, therefore, used a mixed-method approach since this approach affords the researcher the ability to validate the findings using quantitative and qualitative data sources by using convergent design to compare findings from qualitative and quantitative data sources. Figure 3.1 below pictorially depicts the convergent mixed-method design.

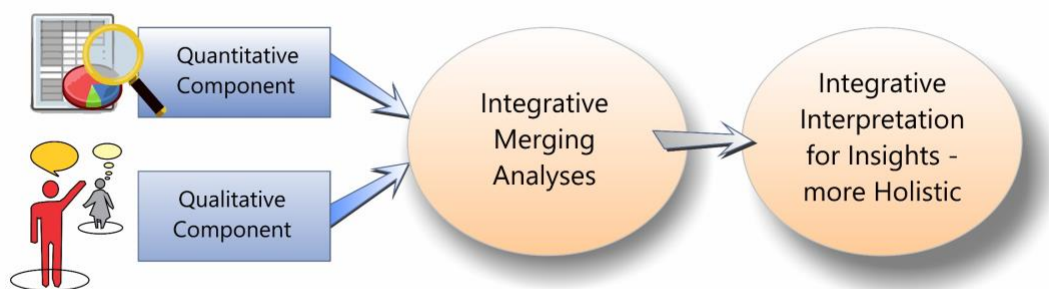


Figure 3.1 Convergent mixed-method design mode (adapted from Plano-Clark, 2019)

3.2 METHODOLOGY

Research design is defined as a plan that includes all aspects of a proposed study, from conceptualising the problem to disseminating findings (Creswell and Creswell, 2018). Furthermore, the research design provides the framework for collecting and analysing data during a research process.

A mixed-method approach was used to assess the students' knowledge, attitudes, and perceptions regarding their public health medicine course. Mixed-methods research combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis and inference techniques) for the breadth and depth of understanding and corroboration by a researcher or team of researchers (Creswell and Plano-Clark, 2018).

The study design was a mixed-methods study design. Fixed mixed-methods designs are mixed-methods studies in which the employment of both quantitative and qualitative methods is predetermined and planned at the outset of the research process. The procedures are carried out according to the plan (Creswell and Plano-Clark, 2018). The qualitative and quantitative methods are used equally and in parallel, and the results from each approach may be used to cross-validate the finding (Steckler *et al.*, 1992). The researcher analyses the results separately and decides afterwards if each method's results suggest the same conclusions. If they do, the confidence in the findings and conclusions is strengthened, and conversely, if the results are not the same, the researcher tries to understand why (Steckler *et al.*, 1992; Creswell and Plano-Clark, 2018). The study design for the quantitative and qualitative phases was a descriptive cross-sectional study design and a phenomenological design. A descriptive cross-sectional study design provides a 'snapshot' of a population at a point in time. The objective of phenomenology is to explore a phenomenon from the perspective of people who witnessed it in order to comprehend the meaning individuals assign to that phenomenon (Teherani *et al.*, 2015).

The implicit knowledge and individual perspectives of people who derive explanations from their own lived experiences are the foundations of phenomenological exploration. The goal of phenomenology is to depict the meanings of these experiences, describing what they were and how they were perceived (Neubauer *et al.*, 2019).

This section reviews the study's research question, aim, and objectives to ensure that they align with the methods used.

3.3 RESEARCH QUESTION

What are fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course?

3.4 AIM OF THE STUDY

The study aimed to understand the knowledge, attitudes, and perceptions of fifth-year medical students regarding their public health course in order to inform curriculum renewal for this course.

3.5 OBJECTIVES OF THE STUDY

The objectives of the study were to:

1. Determine fifth-year medical students' knowledge of public health following completion of the public health course;
2. Explore the fifth-year medical students' attitudes and perceptions towards the public health course and;
3. Make recommendations towards improvements in the public health course to improve students' awareness and understanding of public health.

3.6 THE ROLE OF THE RESEARCHER

The researcher is a senior lecturer and course coordinator for the public health course in the 4th year. The researcher conducted data collection. The researcher's role was to gain access (Sutton and Austin, 2015) to the students' knowledge, attitudes and perceptions regarding their public health course.

At the time of data collection, the students had completed their studies in PHM (Public Health Medicine) and would have no further contact with the researcher in the form of teaching, learning and assessment. Therefore, students were guaranteed that their responses would not negatively influence their results during and after the study.

For the qualitative phase of the study, the researcher described the goal of the research to the participants. Then, the researcher ensured they fully understood the reason for their selection and that they volunteered to participate in the study. The researcher minimized the power relations (Creswell and Plano-Clark, 2018) by explaining the study's rationale to the participants explaining that there are no right or wrong answers. The researcher clarified that their responses would be confidential, and privacy would be protected during and after this study.

During the process of data collection and data analysis, the researcher remained conscious of his prior understanding and preconceptions about teaching and learning in public health. This was achieved through reflexivity (Hennik *et al.*, 2011; Creswell and Plano-Clark, 2018) and by keeping the researcher's personal beliefs and views bracketed (Neubauer *et al.*, 2019). Reflexivity or reflective practice assumes that the researcher is aware of his or her values, self-identity and ideologies (Hennik *et al.*, 2011; Creswell and Plano-Clark, 2018). Conversely, bracketing is an attempt by the researcher to achieve neutrality by putting aside prior understanding or preconception

by either using the field notes as a reflective diary-writing the researcher's observations, assumptions, and confusions.

3.7 DATA GENERATION ACTIVITIES

3.7.1 Study settings

The research was conducted at University X, which is a six-year undergraduate medical curriculum including postgraduate and residency programmes. The six-year MBChB course is divided into pre-clinical and clinical phases. Students are introduced to public health and epidemiology fundamentals in the pre-clinical phase. In the fourth year of study, basic and applied public health principles are taught. For both the pre-clinical and clinical phases the teaching strategies employed by the department involves lectures that are structured as didactic whole-class lectures, with the lecturer transmitting the learning material to the students. Students write four summative assessments at the end of each module and an examination at the end of the academic year.

Table 3.1 depicts an overview of the public health modules and taught in the preclinical phase.

3.7.2 The public health curriculum

Table 3.1 The public health modules presented, MBChB I and II

<i>Module</i>	<i>Number of lectures</i>	<i>Credits *</i>	<i>Notional hours</i>
Epidemiology	12	5	50
Health Promotion	3	1	10
Research	5	2	20

*Includes assessments and preparation time

The summary of the fourth-year public health course at the University is depicted in Table 3.2. All public health modules are didactic whole-class lectures with no practical exposure.

Table 3.2 The public health modules presented, MBChB IV

<i>Module</i>	<i>Number of lectures</i>	<i>Credits *</i>	<i>Notional hours</i>
Disease Control	20	7	70
Health Policy and Law	6	3	30
Health Measurement	8	4	40
Occupational Health	6	3	30

*Includes assessments and preparation time

Disease Prevention and Control

The disease control module teaches students about the epidemiological foundations of disease control, such as health promotion, screening, outbreak investigation, and the levels of prevention

Health Policy and Law

The health policy and law module provide students with a broad understanding of the laws and regulations that regulate the provision of health services in South Africa and the South African health system.

Health Measurement

The health measurement module offers students an understanding of public health's fundamental disciplines, such as epidemiology and demography.

Occupational Medicine

A summary of typical workplace disorders and their prevention is presented in occupational medicine.

3.8 STUDY PARTICIPANTS

The study participants were fifth-year enrolled medical students registered at University X during the 2020 academic year. The total number of the study population was 248.

3.9 RECRUITMENT

The aim of the study was announced on Blackboard for the fifth-year class online learning platform. Blackboard is an online learning management system that provides course content, enables lecturer-student communication, and allows for online assessments and student feedback in an electronic format. (Bradford *et al.*, 2007). Blackboard provides synchronous and asynchronous lectures, formative assessments, and a repository for course content and communication with students in the School of Medicine.

The researcher notified students that participation in the study was voluntary and would have no bearing on their academic performance. Invitation letters to participate were sent by email and posted as a Blackboard announcement.

Below are the recruitment strategies for the quantitative and qualitative phases of the study.

3.10 SAMPLING

3.10.1 Quantitative phase

All fifth-year medical students were invited to participate in the quantitative phase of the study. The target population for the quantitative phase of the study was the 248 students who completed the public health medicine course in 2019, the fifth-year class of 2020.

3.10.2 Qualitative phase

Study participants were recruited through purposeful sampling for the qualitative phase of the study. Purposive sampling is the deliberate selection of specific people based on the crucial insight they can provide (Sharma, 2017).

All fifth-year medical students who had been class representatives in the third and fourth years of study were invited to participate in the study. The total number of students who agreed to participate in the study was five (5) out of the potential eight (8) former class representatives. Former class leaders were purposively selected as vital informants and members of the Academic Planning and Curriculum Development Committees (APCDC). Both third and fourth-year students attended the APC planning and evaluations meetings, thus having more informed opinions on renewing the course.

3.11 DATA INSTRUMENTS

3.11.1 Quantitative phase data instruments

The questionnaire was compiled based on a review of the literature. First, the researcher consulted the literature to ensure that the underlying theme or topic under investigation is consistent with relevant and important prior research and theory. Second, he also sought to identify existing survey scales or items that could be used or modified. (Artino *et al.*, 2014). Third, the researcher convened a meeting with faculty from the PHM department to broaden his knowledge and understanding of the subject.

As the questionnaire could have been influenced by the researcher's knowledge of the faculty, literature, and personal experiences, it was submitted to the faculty for scrutinizing (discussions, recommendations, and revisions) to validate it. These suggestions were subsequently integrated into the questionnaire and afterwards tested among PHM registrars for clarity. The registrars' observations and questionnaire assessments were recorded and used to revise the questionnaire's final draft (See Appendix A).

3.11.2 Qualitative phase data instruments

The researcher developed an interview guideline to ask relevant questions (See Appendix B); however, participants were also allowed to communicate their perceptions and experiences regarding the public course.

3.11.3 Pilot study

The researcher conducted a pilot study to test the reliability and validity of the survey questionnaire. Two public health medicine registrars were requested to participate in the pilot study. Their suggested adjustments to the language used in the questionnaire were implemented to improve clarity, and items deemed unnecessary were removed.

Furthermore, the researcher piloted the interview guide by conducting an interview with one department in the faculty to assess whether questions were relevant and to evaluate the reliability of the recording and data collection processes. The information gathered during that interview was discarded.

3.12 DATA COLLECTION

3.12.1 Quantitative phase data collection

Quantitative data were collected using an online self-administered questionnaire. Participating students had to provide electronic consent before completing the online questionnaire (See Appendix C).

The questionnaire recorded the participants'

- basic demographic information,
- knowledge,
- attitudes, and
- perceptions about the public health course.

The researcher employed a 5-point Likert scale questionnaire with the following options: “Strongly Agree” (5), “Agree” (4), “Do not know” (3), “Disagree” (2), and “Strongly Disagree” (1). Attitudes about public health were measured by asking students how much they agreed that public health should be taught in medical school and whether it is relevant to their careers as doctors. In addition, the students were asked to indicate how much they agree that core competencies of public health, such as epidemiology, should be taught in medical schools. Participants/students also needed to indicate their perceptions of teaching methods implemented in the public health course. Finally, students were required to score their satisfaction with the public health training (See Appendix A).

Using an open-ended questionnaire, the researcher conducted one focus group interview with a group of five (5) fifth-year medical students. The focus group was conducted in person, and all COVID-19 safety protocols were adhered to before, during and after the interview. A focus group interview allows the researcher to interview the participants in a group and gives the researcher control over the direction of questioning (Creswell and Miller, 2000). The researcher asked questions such as "what do you know about public health", and "explain why public health should be included or excluded in the undergraduate curriculum" and asked their views on how to improve the public health curriculum (See Appendix B).

A focus group interview was used in this study since the researcher wanted to explore students' perceptions regarding the public health course. Furthermore, focus group interviews allow participating students an opportunity to think and clarify their beliefs and assumptions (Cleland and Durning, 2015) and allow participants to provide past information. In addition, focus group interviews will enable the researcher to control the line of questioning (Creswell and Creswell, 2018). The researcher conducted the interview in English. The English language was chosen because, although it is not the home language of some of the participants, those participants have an advanced grasp of English since they are studying at an English medium university. After obtaining informed consent, the researcher took notes and voice-recorded the interviews with the research participants (See Appendix D).

3.13 DATA MANAGEMENT

3.13.1 Quantitative data management

A spreadsheet containing responses from the quantitative survey was downloaded onto the researcher's computer and then exported into Stata 12.0 (StataCorp., College Station, TX, USA) for data cleaning and analysis.

3.13.2 Qualitative data management

The original voice recording of the focus group interview was downloaded on the researcher's password-protected computer. The recording was emailed electronically to the transcriber, who then emailed the transcripts back after converting speech to

text. To ensure confidentiality, audio recordings were anonymised before transcription and analysis. Confidentiality refers to "information that has been conveyed in confidence, the revealing of which would or would result in particular harm or prejudice Giordano and Reilly (2007)

Sensitive information obtained during the research was treated as confidential. All hardcopy records relating to the study were kept in a lockable cabinet in the researcher's office. All electronic data sets were stored on the researcher's personal computer's hard disk and were password protected.

3.14 DATA ANALYSIS

3.14.1 Statistical data analysis

Quantitative data were manipulated using the Stata 12.00 (StataCorp., College Station, TX, USA) statistical software package.

- Categorical data were summarized into proportions and frequency tables.
- Summary statistics were prepared to describe continuous variables.
- Tables were compiled to display data in a tabular format providing a visual grouping of information and
- Graphs to represent data pictorially.

3.14.2 Qualitative data analysis

Qualitative data analysis means organising and interrogating data to allow researchers to observe emerging patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, and generate new theories (Leech and Onwuegbuzie, 2007). For this study, the analysis of the data was guided by the **thematic analysis approach**. Thematic analysis is a process of finding and categorising themes and patterns during the data analysis phase of qualitative research (Braun and Clarke, 2006). The researcher employed the six-step process of thematic analysis described by Braun and Clarke (2006).

Firstly, the researcher became familiar with the data by repeatedly reading the transcriptions and listening to the voice recording of the focus group interview, as

mentioned by Sutton and Austin (2015). Secondly, the researcher created initial codes for all data and collated the data associated with each code (Sutton and Austin, 2015). Thirdly, the researcher identified the themes and all related data. Fourthly, the themes associated with the coded extracts were established and expanded into a thematic map (Vaismoradi *et al.*, 2013). Fifthly, the researcher defined the themes and assigned them names. And finally, a report summarizing the findings from the analyses of the research question and relevant and important literature was produced (Vaismoradi *et al.*, 2013).

The researcher considered various perspectives throughout the thematic analysis process and incorporated reflections and notes into the report.

The summary of the data analysis process is depicted in Table 3.3 below.

Table 3.3 Summary of the data analysis process using the descriptive phenomenological approach

STEPS	SUMMARY OF DATA ANALYSIS
Step 1	The researcher familiarised himself with the data by repeatedly listening to the audio recording and reading the transcript of the interview
Step 2	The researcher generated initial codes across all the data and collated data that were relevant to each code
Step 3	The researcher identified the emerging themes from the coded data
Step 4	The researcher developed a thematic map from the confirmed the coded extract
Step 5	The researcher defined and named the themes
Step 6	The researcher produced a report guided by the study aim and relevant literature

3.15 QUALITY CRITERIA

The Standards for Reporting Qualitative Research (SRQR) is a checklist to ensure that all of the study's primary components were depicted (O'Brien *et al.*, 2014). The following characteristics were evaluated to ensure the quality of qualitative research: credibility, transferability, dependability, and confirmability (Stalmeijer *et al.*, 2014). Figure 3.2 provides an overview of the quality parameters employed by the researcher to ensure research quality in this study.

To ensure transparency and, consequently, the data's reliability, the approach, methodologies, and stages involved in data analysis and interpretation have been explicitly stated. Sustained or prolonged engagement with respondents' data was applied (Frambach *et al.*, 2013; Stalmeijer *et al.*, 2014; Ramani and Mann, 2016). Furthermore, the research supervisor double-checked the study outcomes at each level of the investigation.

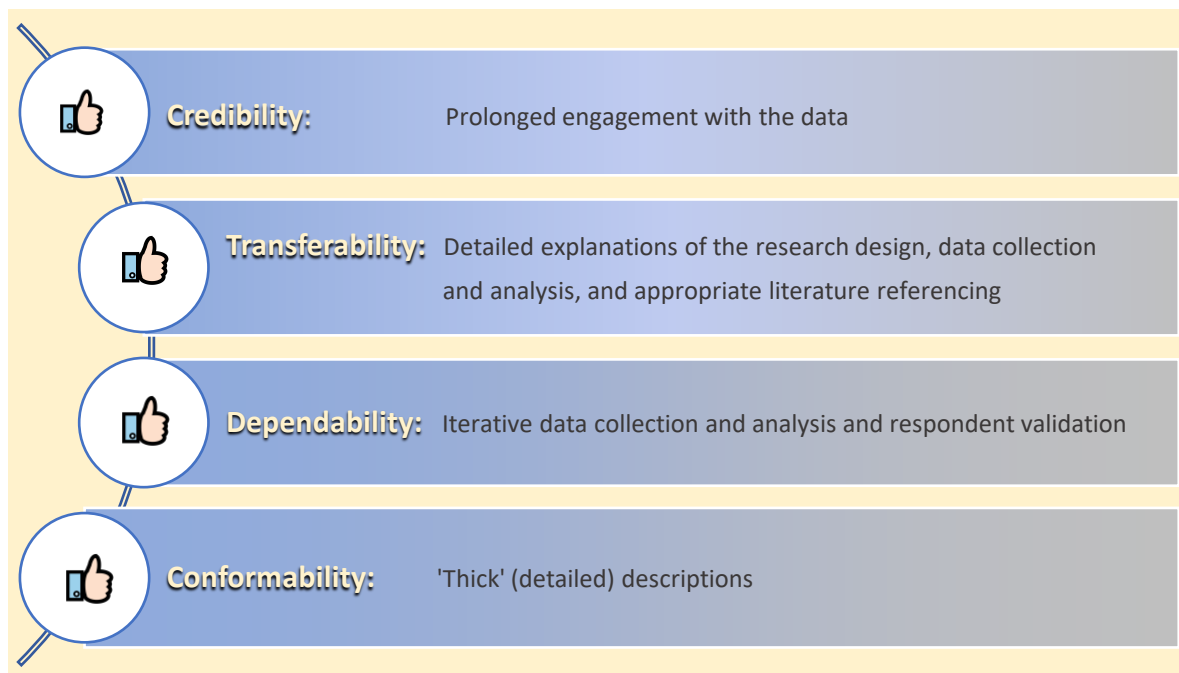


Figure 3.2 Parameters to ensure research quality

3.15.1 Credibility

Credibility refers to the degree to which the study results are accurate and credible to other researchers (Stalmeijer, McNaughton and Van Mook, 2014). Credibility involves both the methodology and presentation of findings (Sundler *et al.*, 2019). Extensive, prolonged interaction with data, processes, methodologies, and stages involved in data analysis and interpretation have been described; therefore, data is considered transparent and trustworthy (Frambach *et al.*, 2013; Stalmeijer *et al.*, 2014; Ramani and Mann, 2016).

3.15.2 Transferability

Transferability in qualitative research seeks to determine the extent to which the findings of a particular study are applicable in other contexts and settings (Frambach *et al.*, 2013). The researcher followed a process that included detailed explanations of the research design, data collection, data analysis and citations. Mentioning pertinent literature enables other researchers to determine whether the study can be conducted in different situations or whether the findings could be extrapolated to similar settings. (Frambach *et al.*, 2013; Ramani and Mann, 2016).

3.15.3 Dependability

Dependability or consistency of evidence is defined as the extent to which the findings are consistent concerning the contexts and settings in which they were generated (Frambach *et al.*, 2013). Consistency is concerned with whether the same results would be obtained if observations were to be repeated. Iterative data collection and analysis in qualitative research is systematic, repetitive, and recursive. It emphasises the need for the researcher to describe in detail the ever-changing context in which the research occurred and how these changes affected how the researcher approached the study.

3.15.4 Conformability

Confirmability seeks to ensure that the findings reflect the study participants and settings and are not a creation of the researcher's biases or prejudices (Frambach *et al.*, 2013; Ramani and Mann, 2016). 'Thick' descriptions, which included detailed information about the research, have been provided to ensure conformability (Ramani and Mann, 2016).

3.16 ETHICAL CONSIDERATIONS

The Health Research Ethics Committee (HREC) at Stellenbosch University approved this study (S19/10/279) (See Appendix E). The Health Sciences University Research Ethics Committee of University X ratified the study, but the university requested that the study site be anonymised (See Appendix F).

For the quantitative phase of the investigation, an email was issued to all fifth-year medical students outlining the goal of the study. To access the questionnaire, students were required to grant electronic consent.

During the qualitative phase of the investigation, the researcher received written consent from each research participant. The researcher informed potential research participants about the study's nature and aim, their rights regarding voluntary participation, and the methods used to ensure their confidentiality and anonymity. Each participant completed and signed a consent form before the onset of the focus group interview.

The researcher observed the following ethical considerations during the process of collecting, analysing and documenting data, namely, informed consent, confidentiality, and anonymity (Boet *et al.*, 2012), to protect the participants from possibly unfair judgement and management of information. Personal, identifiable information confidentiality was ensured by secure data storage and a coding approach to protect participants' confidentiality throughout the data processing procedure. Participants were informed that their digital recordings would be erased upon the study's conclusion and publication of the findings. The study's findings were distributed to students and stakeholders.

3.17 SUMMARY

Chapter three described and explained the methodological processes employed in this study.

A mixed-method research approach, entailing a descriptive study design and a phenomenological approach (Creswell and Plano-Clark, 2018), was implemented to assess students' knowledge, attitudes, and perceptions regarding their public health medicine course. For the qualitative phase of the study, no sampling was performed. All fifth-year medical students were invited to complete an online questionnaire. Purposive sampling was employed for the qualitative phase of the study. All former class representatives were invited to participate in the focus group interview, which was conducted face to face; the data were analysed using the Braun & Clarke (2006) thematic analysis technique. Data quality included credibility, transferability,

dependability, and confirmability (Stalmeijer et al., 2014; Ramani and Mann, 2016). All ethical principles were adhered to for this study.

The results of the study are presented in Chapter 4.

CHAPTER 4 RESULTS

Overview

The results of this study are presented in chapter four. The quantitative results from the survey are presented, followed by the qualitative result from the focus interview. The participants completed an online questionnaire to explore their knowledge, attitudes, and perceptions regarding their public health course. In addition, former class representatives participated in a focus group interview to explore their knowledge, attitudes, and perceptions regarding their public health course. The participants gave insights as to how the course could be improved. The focus group interview yielded themes and sub-themes, which are described. To support individual themes, direct quotations from the data have been provided. The grammatical structure of the quotations has not been modified to maintain their authenticity.

4.1 QUANTITATIVE RESULTS

- Eighty-five students (85) from a total of 248 students responded to the online questionnaire, representing a response rate of 34 per cent.
- The mean age for the participants was 24 years, ranging from 22 to 38 years.
- The female respondents were 61 (71.8%) compared to 24 (28.2%) male respondents.

4.1.1 The students' perceptions of the public health course

Table 4.1 below shows the students' perceptions of the public health course. The majority, 71 out of 85 (83%) of the survey respondents strongly agreed that the medical and public health fields work together to benefit patient care. Among the survey participants, 70 (82%) strongly agreed that doctors are part of the public health system, and 69 (81%) strongly agreed that doctors play an important role in patient education. However, 41 (48%) survey respondents strongly agreed that physicians should be required to learn public health.

Table 4.1 General students' perceptions regarding public health

General perceptions	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
The medical & public health fields working together benefit patient care.	71 (83.5%)	14 (16.5%)	0 (0%)	0 (0%)	0 (0%)
Doctors are part of the public health system.	70 (82%)	14 (16%)	0 (0%)	1 (1%)	0 (0%)
Doctors play an important role in patient education.	69 (81.1%)	15 (17.7%)	0 (0%)	1 (1.2%)	0 (0%)
Public health education is relevant to your career as a doctor.	63 (74.1%)	22 (25.9%)	0 (0%)	0 (0%)	0 (0%)
Doctors play an important role in health education and disease prevention.	63 (74.1%)	0 (0%)	18 (21%)	3 (3.5%)	0 (0%)
It is important for doctors to learn about population health strategies.	62 (73%)	23 (27%)	0 (0%)	0 (0%)	0 (0%)
Public health education benefits clinical care.	60 (70.6%)	23 (27.1%)	0 (0%)	2 (2.6%)	0 (0%)
Physicians should be required to learn public health.	41 (48.2%)	38 (44.7%)	2 (2.6%)	4 (4.7%)	0 (0%)
Public health education in medical school changes/enforces policy.	32 (37.7%)	35 (41.2%)	17 (20%)	0 (0%)	1 (1.2%)
Public health information is common sense knowledge.	7 (8.24%)	26 (30.6%)	11 (12.9%)	38 (44.7%)	3 (3.5%)

4.1.2 Knowledge regarding the public health topics

Table 4.2 displays the respondents' knowledge of important topics that should be part of the public health curriculum. All 85 (100%) survey respondents agreed or strongly agreed that **mother and child health epidemiology, communicable and health promotion** are essential public health topics that should form part of the public health curriculum. About forty-one per cent, 41.2%, (35) of the survey participants strongly agreed that **epidemiology and occupational medicine** should be part of the public health curriculum.

Table 4.2 Knowledge about public health topics relevant to the medical curriculum (N=85)

Public Health Topics	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
Mother and Child Health	69 (81.2%)	16 (18.2%)	0 (0%)	0 (0%)	0 (0%)
Communicable Diseases	66 (77.7%)	19 (22.4%)	0 (0%)	0 (0%)	0 (0%)
Health promotion	62 (72.9%)	23 (27.1%)	0 (0%)	0 (0%)	0 (0%)
Non-communicable diseases	52 (61.2%)	30 (35.3%)	3 (3.3%)	0 (0%)	0 (0%)
Public health policy	40 (47.1%)	38 (44.7%)	6 (7.1%)	1 (1.2%)	0 (0%)
Epidemiology	35 (41.2%)	43 (50.6%)	6 (7.1%)	1 (1.2%)	0 (0%)
Occupational medicine	35 (41.2%)	41 (48.2%)	7 (8.2%)	2 (2.6%)	0 (0%)
Health services administration	34 (40%)	34 (40%)	14 (14%)	3 (3.6%)	0 (0%)
Cultural competency diversity	34 (40%)	35 (41.2%)	11 (12.9%)	5 (5.9%)	0 (0%)
Population health	27 (31.7%)	44 (51.8%)	10 (11.8%)	4 (4.7%)	0 (0%)

4.1.3 Public health teaching methods

Table 4.3 shows respondents' perceptions regarding teaching methods that should be incorporated into the public health course. Forty-two (49.4%) and 31 (36.5%) of the survey respondents strongly agreed that **hand-on projects in public health and tutorials** should be applied to teach public health, respectively. Twenty-five (29.4%) of the respondents strongly agreed that the department should use online and blended learning in the public health course, whereas 23 (27.1%) strongly agreed that the department should use formal face-to-face lectures. Forty-four (51.8%) survey respondents did not know whether **flipped classroom techniques** should be used to teach public health. The advantage of the flipped classroom technique is that students

come prepared to class as they receive the information/readings beforehand, need to answer some questions and then review them in a formal class setting.

Table 4.3 Respondents' perception regarding teaching public health

Teaching methods	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
Hands-on projects in public health	42 (49.4%)	34 (40.0%)	6 (7.1%)	3 (3.5%)	0 (0%)
Tutorial method	31 (36.5%)	42 (49.4%)	6 (7.1%)	4 (4.71%)	2 (2.4%)
Assignments	28 (28%)	35 (35%)	5 (5.9%)	16 (18.8%)	1 (1.2%)
Online teaching	25 (29.4%)	35 (41.2%)	6 (7.1%)	17 (20%)	2 (2.4%)
Blended learning	25 (29.4%)	44 (51.8%)	12 (14.1%)	4 (4.71%)	0 (0%)
Formal face-to-face lectures	23 (27.1%)	37 (43.5%)	6 (7.1%)	16 (18.9%)	3 (3.5%)
Self-study method	12 (14.1%)	20 (23.5%)	11 (12.9%)	30 (35.3%)	12 (14.1%)
Flipped classroom	5 (5.9%)	23 (27.1%)	44 (51.8%)	11 (12.9%)	2 (2.4%)

4.1.4 Satisfaction rate

Figure 4.1 depicts the students' satisfaction rate regarding the quality of public health training. Eleven (11) participants (about 13%) reported that they were unsatisfied or very unsatisfied, and 36 (42%) participants were neutral.

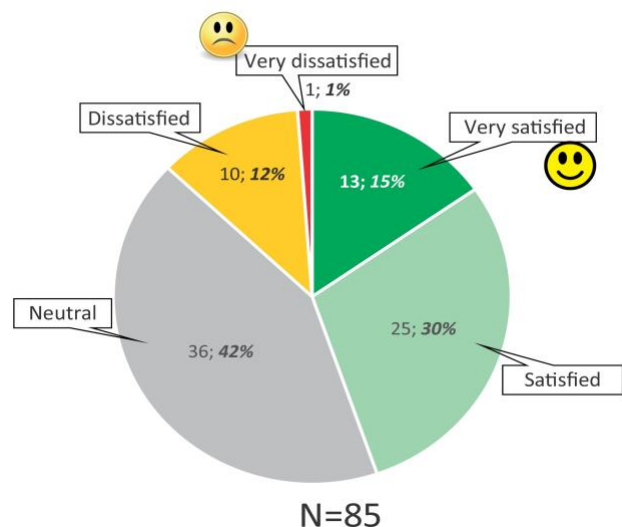


Figure 4.1

The students' satisfaction rate regarding the quality of public health training

4.2 QUALITATIVE RESULTS

Five (5) out of 11 (45%) former class representatives participated in the focus group interview. The participants ranged from 22 to 38 years, and the group included two males and three females. The participants expressed their views on their knowledge, attitudes and perceptions regarding the public health course.

The themes that emerged from the discussion were the scope of public health practice, the teaching and learning experience and attitudes towards their public course. See Figure 4.2 and Table 4.4 below.

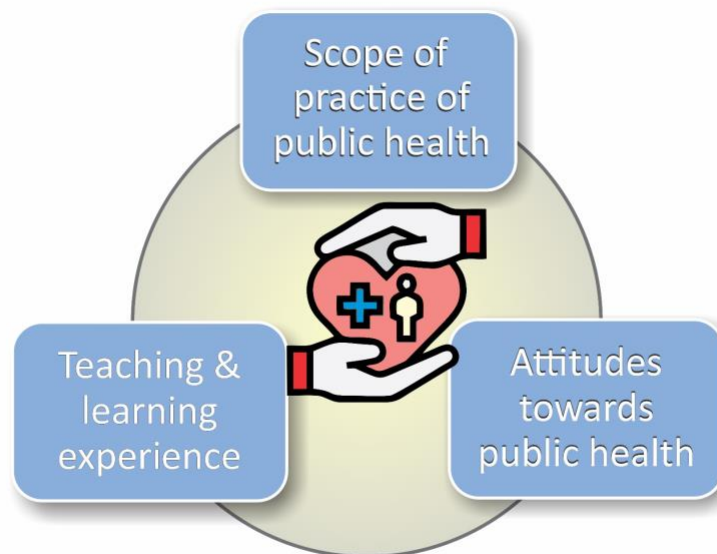


Figure 4.2 Key themes identified from the focus group interviews

Table 4.4 Themes, subthemes and categories that emerged from the data

Themes	Sub-themes	Categories
1. Scope of practice of public health	1.1 Population-level interventions	1.1.1 Target population 1.1.2 Focus on public health
	1.2 Disease prevention	1.2.1 Health education 1.2.2 Health promotion
2. Teaching and learning	2.1 Timing of public course exposure	2.1.1 Late exposure
	2.2 Learning opportunities	2.2.1 Limited to whole-class lecture 2.2.2 No practical work 2.2.3 Passive learning 2.2.4 Inadequate learning in public health

Continues on next page...

Themes	Sub-themes	Categories
Continued...	2.3 integration	2.3.1 Not fitting with clinical disciplines
	2.4 Research training	2.3.1 Limited exposure /no research training in public health 2.3.2 Would write up reports 2.2.3 Would like to publish
3. Attitudes toward public health	3.1 Priorities	3.1.1 Relative perceived importance 3.1.2 Relative difficulty of public health compared to other courses
	3.2 Curriculum overload	3.2.1 Workload 3.2.1 Not essential

4.2.1 Theme 1: The practice of public health

The focus group participants began by describing the scope of public health practice. Two specific subthemes that emerged from this theme: the population intervention and prevention of disease, are shown in Figure 4.3.

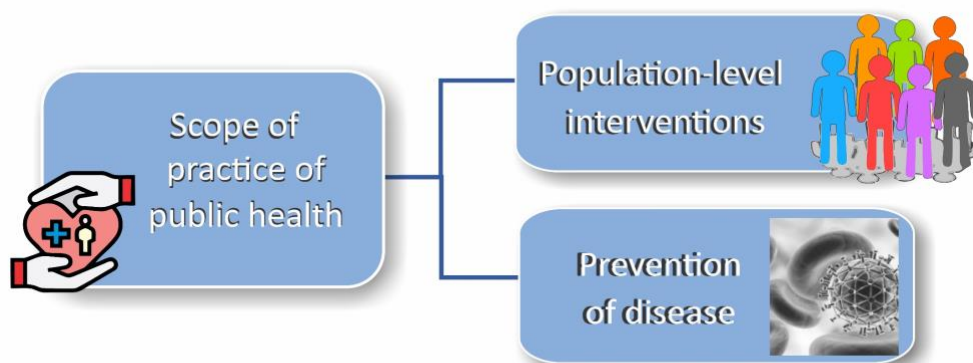


Figure 4.3 Subthemes of the scope of the practice of public health

POPULATION-LEVEL INTERVENTIONS

Participants of the focus group had similar perspectives regarding the scope of public health practice, that is, public health targets the population or communities regarding its interventions. Participants P 02 and P 01 stated that:

[P 02 p 3: 10-12]: *Public health deals with diseases or disorders that commonly affect the community at large instead of disorders that are just specific to just an individual.*

[P 01 p 2: 2-4]: *...my understanding of public health discipline is that it's a discipline in medicine which deals with eh! population, the health of a population rather than an individual.*

PREVENTION OF DISEASE

Participants of the focus group also presented perspectives on the disease prevention role of public health at the community level as opposed to the curative care aimed at individuals.

One participant contrasted the preventative role of public health to the curative medical model and the role of public health in alleviating the burden on the health system.

[P 01 p. 2: 4-5]: *... it's like community-based where it deals with prevention at a level of population that we do not have to burden the health system with curing.*

Some participants explained the role of health education in disease prevention at the community level.

[P 03, p 2:14-15]: *...it's all about looking at the prevention and treatment which they can use and also educating the community.*

[P 04 p 3: 1-4]: *it's like education that you give to the community that is simple and understanding for them to explain certain conditions that affect the whole community and then how they can even like get screened for these diseases and prevent them. So, ja, it's important for disease prevention.*

Some focus group participants further commented on the role of disease prevention and its impact on health outcomes.

[P 01 p 2: 5-7]: *If you can get the patients before they get sick and education in a population-based setting, then it's better for health outcomes.*

And another participant added.

[P02 p. 4: 2-7]: *let me give you a practical example with Malaria, which is endemic in some areas or cholera; because of public health and education and prevention, now people even who drink water from the river or from the streams they know that they must put jik [a detergent] in it first, for I think about seven days, or they must boil it first to prevent cholera that will also reduce the deaths because of that disease.*

4.2.2 Theme 2: Teaching and Learning experience

The second theme that emerged was the teaching and learning experience in the public health course. Four subthemes that emerged from this theme are depicted in Figure 4.4 below.

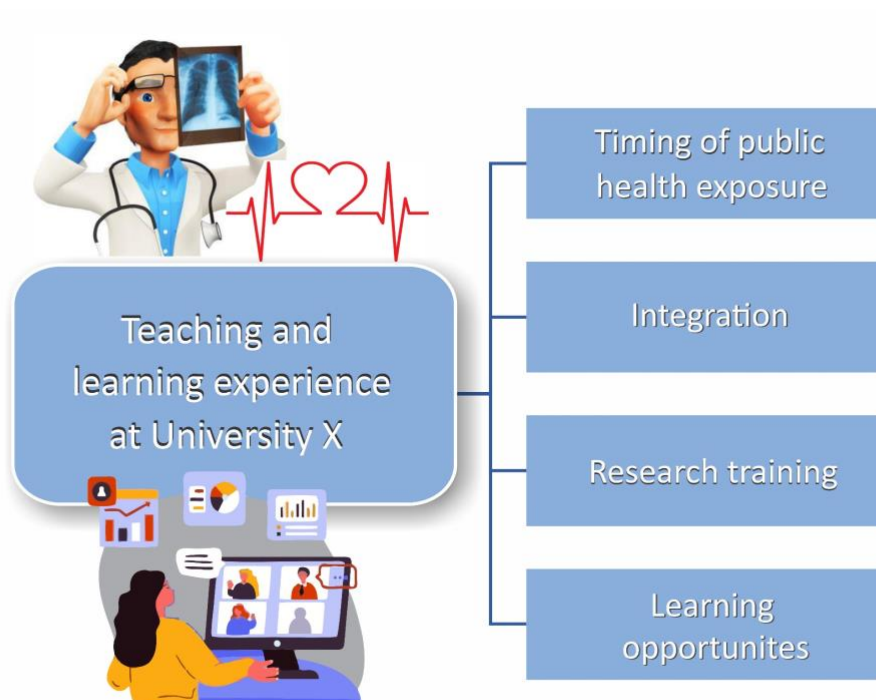


Figure 4.4 The teaching and learning experiences in public health

4.2.2.1 THE TIMING OF EXPOSURE TO PUBLIC HEALTH

The students expressed their views on timing of the public health course at the university. Some felt the PHM course should be offered in the first year of study to complement their community outreach course. The Community Outreach course entails students doing house visits and giving "health talks" to families and community

members. Some students advocated for early exposure to PHM to help prepare and integrate with their community outreach block.

[P 01 p. 6 22-26]: *...you come from high school where you were doing Biology, Maths and English and what...and you are expected to give a health talk on HIV, a health talk on TB, a health talk on you know,.... they ask you to choose a topic but, you have not had a lecture on anything because what you are doing in first year is Physics, Chemistry and all the non-clinical things.*

Another focus group participant also felt that exposure to public health in the fourth year comes too late in their MBChB programme.

[P 01 p. 5: 4-5]: *Eh! For me honestly, because I also like public health, I found it very it was important, but the only problem I have is the fact that we are only doing it in the fourth year.*

4.1.1.2 INTEGRATION WITH OTHER MODULES

The focus group participants P 04 and P01 felt that early exposure to public health would foster better integration with the MEHS block.

[P 04 p. 5: 12-15]: *And then another thing in first year there is a block ja [of] MEHS, Medical Humanities where we go out into the community neh! so a course like this will actually be beneficial because in one of the requirements of the MEHS block is to give a health talk to the community so, this could play a very big role into that.*

[P 01, p 6: 28, p7: 1- 2]: *.... in such cases where we could do Community Health and learn about these conditions that affect the public, then you will even do better health talks with better understanding also.*

4.2.2.3 RESEARCH TRAINING

The focus group participants felt they were not getting adequate training and exposure in research and that research coaching could be included in the public health course.

The focus group participants P04 and P 02 felt that there were insufficient research opportunities for undergraduates of University X.

[P 04 p 12: 2-3]: *...I don't feel like we are really, really prepared enough for research. So, it's something that if it can be incorporated in public health, I think it will be very useful.*

[P 02 p. 11: 23-25]: *And I also think that we as new graduates, we are not adequately prepared for research because we do not even have that platform to say if you wanted to choose to do research within the medical field you had that opportunity.*

One focus group participant felt that education in research would benefit their future career prospects when applying for a registrar post.

[P 02, p 11: 25-28]: *Because I remember the other time I was talking with colleagues, they wanted to have such an initiative where maybe students can write papers as students and then it also put us at an advantage when you apply for a registrar post.*

Some participants felt that research training should be incorporated into the public health course.

[P 04 p 11: 16-20]: *For example, ka [with] community health we can do research like you can go to the hospital or wherever and actually do the research by taking numbers taking ... surveys or questionnaires and filling that out and then come back and looking at the results and putting together like a "young" [small] paper about the research that we did. That could help in terms of research.*

4.2.2.4 LEARNING OPPORTUNITIES

Some focus group participants expressed concern about the teaching strategies that were not engaging or interactive since some lecturers simply read slides to them. They suggested adding group discussions and group presentations to make the course more interactive.

[P 02 p 10:24, p 11: 1- 3]: *You know you are gonna attend, and somebody is like maybe read the slides about Community Health neh! If you can incorporate like a group discussion where maybe you can give them an assignment to say, okay, if you guys were to go now to the community and to tell them about HIV, how would you present it? wa bona and go na le [you see and you have] like a*

small presentation and you can do it like groups come and present a condition or something. Uhm! That would make it more interactive, and you can actually remember from those presentations and good presentations or discussions.

Participants of the focus group stated they felt that experience in terms of learning exposure was not satisfactory.

[P 01 p 9: 21]: *For me I don't think the exposure is enough in all honesty.*

Participant P 01 felt that learning opportunities in public health were limited to whole lectures with no experiential learning.

[P 01 p 9: 24-26]: *I do not think it [public health training] is enough for an undergraduate who is coming into university for the first time to just have, like I say it is not even a practical component to just read on the units that are provided"*

[P01 p 10: 20-21]: *And then the fact that it's just like you reading theory, that doesn't do much for a person.*

Two focus group participants differed on whether contact classes should resume after the COVID-19 pandemic. One felt that public health should be offered as an online course, whereas the other focus group participant advocated for the blended learning approach.

[P 03 p 8: 15-16]: *During our term, we were having contact classes and now that there is an introduction of online courses, I believe that maybe you can continue [with] just online*

[P 04 p 8: 25]: *We want contact classes in addition [to online classes], and practical exposure too in public health".*

4.2.3 Theme 3: Attitudes towards public health

The third theme that emerged from the data was the students' attitudes towards public health, which had two subthemes (see Figure 4.5 on next page).

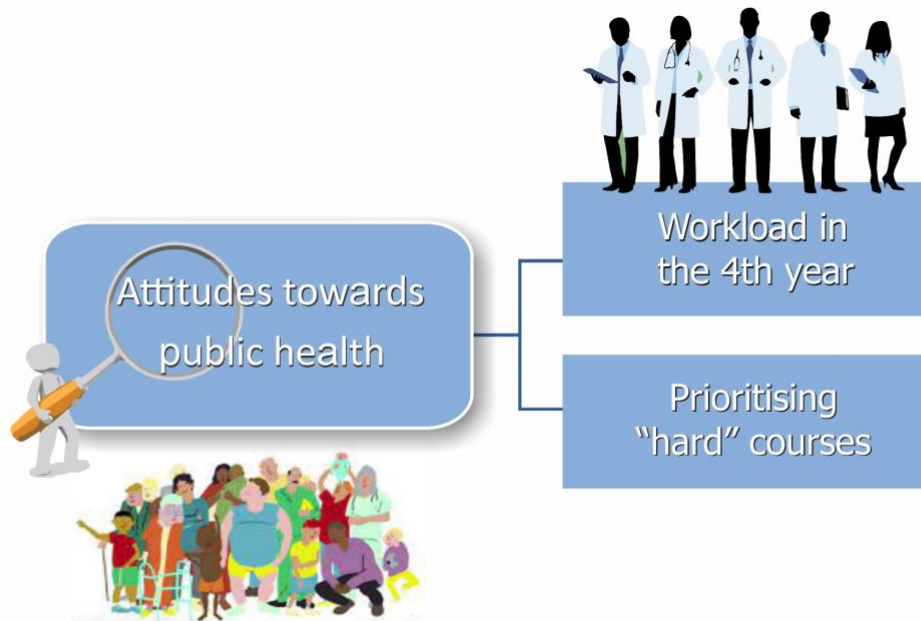


Figure 4.5 Students' attitudes towards public health

The focus group participants shared their attitudes towards the public health course. They felt they experienced negative attitudes because of the high workload in their fourth year of study and tended to prioritise "core" or difficult courses. The two subthemes that emerged from this theme were

- a) workload in the 4th year and
- b) prioritising "hard" courses.

One focus group participant felt that they needed to focus on "hard" (challenging) courses and could just read up on public health and still do well in assessments.

[P 01 p. 5:13-16]: *I can just read because it is not as difficult to read public health on your own, as much as it is important, but I can read about cholera and still answer a few questions in the exams. So, students will rather go and concentrate on a difficult course than, not that they are not the same, but I am failing pharmacology; I would rather concentrate on that.*

4.3 SUMMARY

The quantitative data was summarised into proportions/ratios and frequency tables for categorical data. Summary statistics were used to describe continuous variables. Tables and graphs displayed the data pictorially.

The themes and subthemes that emerged from the qualitative data were described in this chapter.

Three themes were identified from the focus interview:

- public health practice;
- the teaching; and
- the learning experience.

The results will further be discussed in Chapter 5, supported by the literature review.

CHAPTER 5 DISCUSSION

Overview

In Chapter 5, the results from Chapter 4 are discussed. Knowledge, attitudes and perceptions of participating students regarding their public health course are highlighted. The strengths and limitations of the study are also discussed.

5.1 INTRODUCTION

The study aimed to describe the students' knowledge, attitudes, and perceptions regarding their public health course.

The most significant study finding was

- that most respondents (participating students) indicated they were unsatisfied with their public health course. There was evidence in both the quantitative and qualitative results. Refer to Chapter 4 for findings and results.

Reasons included:

- o limited exposure to the reality of public health, and
 - o the entire course content was presented too late in their medical training at a time when the curriculum was overloaded.
 - o The lack of integration of public health with the clinical disciplines and
 - o limited or lack of research training at the university was some of the study participants' negative perceptions towards the public health course.
- The participants also raised concerns about the department's teaching strategies, which are currently limited to didactic lectures.

5.1.1 Learner experience

The study findings revealed that less than half of the survey participants indicated they were 'very satisfied' or 'satisfied' with the public health course. This was echoed by the focus group participants and reasons such as limited exposure to public health and that the full course content was presented too late in their medical training.

These findings are similar to those of a Canadian study where most students were not satisfied with the public health curriculum due to the lack of exposure to public health experts, an overemphasis on selected themes, and institutionalised negative views toward public health. The lack of practical, experiential learning and theoretical orientation of the course are some factors associated with poor satisfaction among medical students (Mukesh *et al.*, 2018). However, these findings contrast with that of Correll Keith *et al.* (2018), who showed a 69% satisfaction rate. The last-mentioned study revealed that central to students' high satisfaction rate with public health is integrating basic scientific public health concepts in the preclinical years and integrating more advanced public health concepts in the core curriculum (Correll Keith *et al.*, 2018).

5.1.2 The relevance of public health

Most participants strongly agreed that mother and child health, communicable or infectious diseases and health promotion are relevant public health topics that should be part of the public health course curriculum. These findings are comparable to the results of a study by Keith and colleagues (Correll Keith *et al.*, 2018). Participants of the focus group interview had a similar commendation where disease prevention through activities such as health promotion was identified as a critical function of public health (Detels and Chuan Tan, 2015). The finding was consistent with the views of several authors in public health (Detels and Chuan Tan, 2015; Skolnic, 2008). In addition, the participants strongly felt that health education could play a vital part in preventing and reducing disease and improving health outcomes, which is consistent with the findings of several other authors too (Naz *et al.*, 2018; Olyani and Peyman, 2021).

However, less than 50% of the participants 'Strongly Agreed' that epidemiology is an important public health topic. The apparent lack of clinical relevance of epidemiology to public health may play a role in the negative attitudes towards public health topics. This finding is consistent with research conducted in Canada, where medical students felt that there was an overemphasis on epidemiology and biostatistics in the undergraduate public health course (Tyler *et al.*, 2009).

The perceived lack of clinical relevance among the students may be symptomatic of the lack of integration public health with clinical disciplines. The lack of pedagogical

training among public health teachers and failure to connect with the current generation of students may be factors (Lyon *et al.*, 2016) associated with the lack of integration of public health with clinical courses and thus the perceived lack of clinical relevance of public health. For example, some studies revealed/perceived that public health is not a core course in medical schools, possibly contributing to negative attitudes and perceptions about public health (Navinan *et al.*, 2012; Mukesh *et al.*, 2018).

5.1.3 Public health is not a priority and curriculum overload

The study findings showed that most students had positive perceptions of the public health discipline, and felt it was an important aspect of clinical medicine and should be part of undergraduate medical training. This outcome is similar to the findings of studies conducted by Mukesh and colleagues and Thakur and colleagues (Thakur *et al.*, 2016; Mukesh *et al.*, 2018). In addition, most students agreed that doctors needed to learn about public health strategies to assist with disease prevention. This finding is consistent with the recommendations by the Institute of Medicine (Riegelman and Garr, 2008). Furthermore, the participants agreed that the medical and public health fields should work together to benefit patient care. For example, the focus group participants felt public health programmes such as disease screening could lead to early detection and management of disease and thus improve health outcomes (Streetly and Elhers, 2015).

However, this finding contrasted the views voiced by the focus group participants, who expressed negative attitudes towards public health because of the high workload in the fourth year of study and the need to prioritise 'hard' (challenging) courses. A similar finding was stated by Finkel (2012) and several other studies (Tyler *et al.*, 2009; Mukesh *et al.*, 2018). A high workload, often referred to as curriculum overload negatively impacts the students' ability to commit knowledge to long-term memory and thus a deep understanding of the main concepts. Furthermore, curriculum overload can lead to surface learning and strategic learning (Slavin and D'Eon, 2021), which may encourage prioritising the so-called core or 'hard' courses over public health.

5.1.4 Exposure to public health

The study participants generally felt that they preferred early exposure to public health in their formative years at medical school as it will equip them with the knowledge and skills they need for the Medical Humanities block. Early exposure to the discipline of public health will allow for integration with the MEHS block, which will empower students in other courses (Kiviniemi and Przybyla, 2019). For example, participants felt that early exposure would empower them to learn how to make better health promotion talks in their clinical years' rotation (Rao *et al.*, 2020).

Some participants stated that practical exposure to the discipline of public health was not enough. The participants felt that experiential learning would help them better grasp public health concepts, which they can use in clinical settings (Knight *et al.*, 2017; Dankner *et al.*, 2018). For example, in a study conducted in India, most of the study participants indicated that community-based learning was beneficial and enhanced their learning in public health (Mukesh *et al.*, 2018).

5.1.5 Teaching strategies

The focus group participants considered the department's teaching strategies not engaging or interactive enough, which aligns with similar work from other countries in the literature. Several authors (Chávez *et al.*, 2006; Vyas *et al.*, 2017) have stated that adopting pedagogic strategies such as using technology to enhance learning, case-based learning, and demonstrating the relevance of public health to clinical medicine can improve students' engagement. Furthermore, employing various teaching methods aids in retaining learner interest in the subject and allows for recall and reinforcement of knowledge (Lyon *et al.*, 2016; Thomas *et al.*, 2016; Thakur *et al.*, 2016; Mukesh *et al.*, 2018).

Participants had divergent views on how to proceed with public health training using the online or in-person teaching platform. However, they all agreed that the course should be interactive and engaging on whichever platform. Furthermore, the participants felt active and engaging teaching approaches might be more well-received than whole-class lectures (Navinan *et al.*, 2012).

This study revealed that lecturers' ineffective teaching and learning strategies play a critical role in students' attitudes towards public health (Correll Keith *et al.*, 2018). For example, most students preferred using tutorials and hands-on projects to enhance

teaching and learning in public health. Furthermore, the fact that the learning opportunities in public health in the fourth year of study are limited to whole class didactic lectures could have played a role in the negative perception and dissatisfaction (Zhou *et al.*, 2016) with the public health course at the university.

The participants felt that adopting more interactive teaching strategies would be beneficial and enhance their learning in public health (Lyon *et al.*, 2016). According to Thomas *et al.* (2016), interactive teaching methods that have been shown to improve learning are small group discussions, think pair share, flipped classroom, and peer teaching. However, their use in medical education remains varied (Alruthia *et al.*, 2019). Context-specific factors such as class sizes and financial and human resources play a role in adopting teaching methods.

5.1.6 Research training

The participants raised the issue of inadequate and limited research training and felt it should form part of public health training. The participants wanted more research exposure, a view similar to studies done elsewhere (Navinan *et al.*, 2012; Mukesh *et al.*, 2018). These findings may be attributed to previous research exposure and early exposure to research training (Adefolalu *et al.*, 2018), as well as the participants' belief that knowledge in research will help advance their careers. However, these findings contrast with the results of a study done in KwaZulu-Natal where the students reported positive learning experiences related to the research process, which included research ethics, protocol writing, data management, and dissemination of the research (Knight *et al.*, 2016).

5.2 LIMITATIONS AND STRENGTHS OF THE STUDY

One limitation of our study is that there was a low response rate among students for the quantitative phase of the study, which means that students' perceptions may be underrepresented. Furthermore, as the quantitative phase of the study was an online self-administered questionnaire, information bias may have occurred because of selection bias. These findings may not be generalisable to other public medical colleges and universities because the study was limited to one public medical university and one cohort of fifth-year medical students. Furthermore, using the former

class representatives, who may be more knowledgeable and opinionated about the curriculum might have introduced bias in the study.

The study's design as a mixed-methods study was one of its strengths. The qualitative phase of the study provided context and explanations for the quantitative phase of the study.

5.3 CONTRIBUTIONS OF THIS STUDY

The study findings have provided insight into students' knowledge, attitudes, and perceptions towards their public health course. Moreover, they have highlighted the importance of the students' voice in curriculum development. For example, the study provided evidence on how students prefer to be taught and learn public health. Furthermore, they have offered meaningful suggestions for improving the public health curriculum.

Given the increasing awareness of public health in medical education in the context of COVID-19, the researcher believes that these findings will form part of the evidence-based decision to improve the medical curriculum and implement teaching and learning strategies that will enhance learning.

5.4 SUMMARY

Chapter 5 has discussed fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course. The quantitative results, themes and subthemes that emerged from Chapter 4 were discussed, as the study's limitations and strengths. Chapter 6 presents detailed conclusions and recommendations.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

Overview

Chapter 6 comprises the conclusion and recommendations of the study. The conclusion of the study is based on the findings of the study.

Recommendations for future research are provided at the end this chapter.

6.1 CONCLUSION

This study aimed to gain insights into fifth-year medical students' knowledge, attitudes, and perceptions regarding their public health course. The researcher obtained the data through a self-administered online questionnaire and semi-structured focus group interview.

This study's significant findings are that most students are unsatisfied with the public health course. Participating students felt that public health and research learning opportunities were limited and inadequate.

The University X curriculum review committee should involve students in the curriculum review process. Students' perceptions can be obtained via surveys or formal research. The key to improving learner experience is employing interactive and experiential learning techniques.

Basic public health sciences such as epidemiology, biostatistics, health promotion and social determinants are some of the public health topics that the department of public health should consider teaching in the preclinical undergraduate curriculum. Furthermore, the curriculum assessors/reviewers should strive to develop a learner-focused curriculum that addresses local population health needs. A learner-focused curriculum will likely improve the overall learner experience and avoid surface and strategic learning among the students.

The department of public health medicine should explore other teaching methods and reduce reliance on the didactic teaching approach where possible. Group learning and

integrated case studies are some of the teaching strategies that can be employed in the School of Medicine (SOM) to integrate public health with clinical disciplines.

This study's findings highlight the importance of involving medical students in creating public health courses. Understanding their attitudes and perspectives and using this knowledge to help faculty build core curricula can help improve their public health learning experiences and training during medical school.

Methods for teaching and learning proposed by the students involved in this research in public health are discussed in the recommendations section below. Recommendations for future research are also debated.

6.2 RECOMMENDATIONS

The study findings contribute to enhancing teaching and learning for the public health curriculum at University X. The following points below are put forward as recommendations to the MBChB curriculum development committee to improve the public health programme and its teaching.

6.2.1 Teaching strategy

Improving the teaching strategy by employing more engaging and student-centred teaching methods such as flipped-classroom, group discussions, and experiential learning is likely to improve student engagement and enhance learning in public health. Public health lecturers must explore new ways of delivering public health lectures and minimise or avoid didactic lectures to improve students' satisfaction and overall learner experience in public health.

6.2.2 Early and consistent exposure

Early exposure and integrating public health in clinical modules are some of the study participants' improvement strategies. When students understand the role of public health in every clinical module, they will likely see it as a core module and put more effort into learning public health. The overcrowded medical curriculum is one factor that students highlighted as the cause for negative perceptions of public health. Curriculum planners at the university should consider developing a contextual

curriculum that addresses local/community health needs, and a health needs assessment (HNA) should inform curriculum content.

6.2.3 Integration of public health with clinical medicine

Curriculum developers should include the disciplinary underpinnings of public health in clinical disciplines. For example, incorporating the social determinants of health, epidemiology, access to health services, and equity in clinical teaching may lead to students appreciating the value of public health. These concepts can be taught in community-based teaching/training during primary health care rotations and clinical case scenarios. Furthermore, in clinical settings, disease-specific epidemiology and population-level preventative measures against such, should be clarified.

6.2.4 Raise the status of research and research training

Curriculum developers should consider exposure to research and research coaching as essential aspects of public health training. Developing research skills and publishing at an undergraduate level could play a vital role in the future career-pathing of the students. Furthermore, understanding research could help the future physician make evidence-based clinical decisions with individual patient care or when developing clinical guidelines.

6.2.5 Include students in curriculum development and review

The findings of this study have shown the necessity to include medical students in the development of public health curricula. Understanding their attitudes and perspectives and using this information to assist faculty in developing core curricula can improve public health learning experiences and training during medical school.

The researcher recommends that student knowledge, attitudes, and perceptions about public health courses be assessed regularly as part of course evaluation. Formal research is also crucial to aid in curriculum development.

6.3 SUMMARY

In Chapter 6 the study's conclusions and clear recommendations are made to inform curriculum development while taking the students' perspectives into account to improve teaching and learning in public health.

REFERENCES

- Adefolalu, A. O., Mogosetsi, N. J. and Mnguni, N. M. (2018) 'Knowledge and attitudes of undergraduate medical students with regard to medical research at a South African university', *African Journal of Health Professions Education*. South African Medical Association NPC, 10(4), p. 205. doi: 10.7196/ajhpe.2018.v10i4.1022.
- Ahmad, F. *et al.* (2009) 'Students' opinion regarding application of Epidemiology, Biostatistics and Survey Methodology Courses in Medical Research', *Journal of the Pakistan Medical Association*, 59(5), pp. 307–310.
- Alley, S. J. *et al.* (2021) 'As the pandemic progresses, how does willingness to vaccinate against COVID-19 evolve?', *International Journal of Environmental Research and Public Health*, 18(2), pp. 1–14. doi: 10.3390/ijerph18020797.
- Alruthia, Y., Alhawas, S., Alodaibi, F., Almutairi, L., Algasem, R., Haitham, K., Alrabiah, H.K., Sales, I., Alsobayel, H. and Ghawaa Y. (2019) 'The use of active learning strategies in healthcare colleges in the Middle East', *BMC Medical Education*, 19(1), pp. 1–10. doi: 10.1186/s12909-019-1580-4.
- Arja, S. (2017) 'Undergraduate Medical Education and Curricula.', *Immunotherapy Research Journal*, 1, 3. Retrieved from <http://www.imedpub.com/immunotherapy-research-journal/>
- Artino, A. R. *et al.* (2014) 'Developing questionnaires for educational research: AMEE Guide No. 87', *Medical Teacher*, 36(6), pp. 463–474. doi: 10.3109/0142159X.2014.889814.
- Barr, R. B. and Tagg, J. (1995) 'From Teaching to Learning — A New Paradigm For Undergraduate Education', *Change: The Magazine of Higher Learning*, 27(6), pp. 12–26. doi: 10.1080/00091383.1995.10544672.
- Bennett, C. J., & Walston, S. L. (2015) 'Improving the use of competencies in public health education'. *American Journal of Public Health*, 105, S65–S67. <https://doi.org/10.2105/AJPH.2014.302329>
- Boet, S., Sharma, S. and Goldman, J. (2012) 'Review article: Medical education research: an overview of methods Article', *Journal of Canadian Anaesthesiology*, 59, pp. 159–170.
- Bradford, P. *et al.* (2007) 'The Blackboard Learning System: The Be All and End All in Educational Instruction?', *Journal of Educational Technology Systems*, 35(3), pp. 301–314. doi: 10.2190/x137-x73l-5261-5656.
- Brauer, D. G. and Ferguson, K. J. (2015) 'The integrated curriculum in medical education: AMEE Guide No. 96', *Medical Teacher*, pp. 312–322. doi: 10.3109/0142159X.2014.970998.
- Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology: *Qualitative Research in Psychology*, 3 (2). pp., 77-101, doi: 10.1191/1478088706qp063oa

- Brisolara, K. F. and Smith, D. G. (2020) 'Preparing students for a more public health-aware market in response to COVID-19', *Preventing Chronic Disease*, 17(17), pp. 1–5. doi: 10.5888/PCD17.200251.
- Bucklin, Brenda A., Nancy L. Asdigian, Joy L. Hawkins, and Ulrich Klein. 2021. 'Making It Stick: Use of Active Learning Strategies in Continuing Medical Education', *BMC Medical Education* 21(1):1–9.
- Cashman, Suzanne B. and Sarena D. Seifer. 2008. 'Service-Learning. An Integral Part of Undergraduate Public Health', *American Journal of Preventive Medicine* 35(3):273–78.
- Challa, K. T., Sayed, A. and Acharya, Y. (2021) 'Modern techniques of teaching and learning in medical education: a descriptive literature review', *MedEdPublish*, 10(1), pp. 1–16. doi: 10.15694/mep.2021.000018.1.
- Chávez, V., Turalba, R. A. N. and Malik, S. (2006) 'Teaching public health through a pedagogy of collegiality', *American Journal of Public Health*, 96(7), pp. 1175–1180. doi: 10.2105/AJPH.2005.062950.
- Chorazy, M. L. and Klinedinst, K. S. (2019) 'Learn by doing: A model for incorporating high-impact experiential learning into an undergraduate public health curriculum', *Frontiers in Public Health*, 7, pp. 1–6. doi: 10.3389/fpubh.2019.00031.
- Cleland, J. and Durning, S. J. (2015) *Researching Medical Education*. 1st Ed. Oxford: Wiley Blackwell. Available at: www.wiley.com/wiley-blackwell.
- Correll Keith, K. *et al.* (2018) 'Student Perspectives on Public Health Education in Undergraduate Medical Education', *Diversity & Equality in Health and Care*. Scitechnol Biosoft Pvt. Ltd., 15(5), pp. 234–240. doi: 10.21767/2049-5471.1000181.
- Creswell, J. W. (2022) *A Concise Introduction to Mixed Methods Research*. Second Ed. Edited by J. W. Creswell. Thousand Oaks, Carlifina: SAGE.
- Creswell, J. W. and Creswell, J. D. (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th ed. Edited by J. W. Creswell and J. D. Creswell. SAGE.
- Creswell, J. W. and Miller, D. L. (2000) 'Determining Validity in Qualitative Inquiry', *Theory Into Practice*. Routledge, 39(3), pp. 124–130. doi: 10.1207/s15430421tip3903_2.
- Creswell, J. W. and Plano Clark, V. L. (2018) *Designing and Conducting Mixed Methods Research*. Third ed. Edited by J. W. Creswell and V. L. Plano Clark. London: SAGE.
- Daher, A. M. and Amin, F. (2010) 'Assessing the perceptions of a biostatistics and epidemiology module: Views of Year 2 medical students from a Malaysian university. A cross-sectional survey', *BMC Medical Education*, 10(1). doi: 10.1186/1472-6920-10-34.
- Dankner, R. *et al.* (2018) 'Implementation of a competency-based medical education approach in public health and epidemiology training of medical students', *Israel Journal of Health Policy Research*.

- Israel Journal of Health Policy Research, 7(1), pp. 1–8. doi: 10.1186/s13584-017-0194-8.
- Detels, R. and Chuan Tan, C. (2015) 'The scope and concerns of public health', in Beaglehole, R. et al. (eds) *Oxford Textbook of Global Public Health*. 5th ed. Oxford: Oxford University Press., pp. 3–18. doi: 10.1093/med/9780199661756.003.0001.
- Dommissie, J. and Joubert, G. (2009) 'Profile of research methodology and statistics training of undergraduate medical students at South African universities', *South African Family Practice*, 51(2), pp. 158–161. doi: 10.1080/20786204.2009.10873833.
- Finkel, L. M. (2012) 'Integrating The Public Health Component into the medical curriculum', *Public Health Reports*, 127, pp. 145–6. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/22069345>
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC3204957>.
- Frambach, J. M., van der Vleuten, C. P. M. and Durning, S. J. (2013) 'AM Last Page: Quality Criteria in Qualitative and Quantitative Research', *Academic Medicine Am J Occup Ther. BMJ*, 88(337), pp. 214–222. doi: 10.1097/ACM.0b013e31828abf7f.
- Frank, J. R. et al. (2010) 'Toward a definition of competency-based education in medicine: A systematic review of published definitions', *Medical Teacher*, 32(8), pp. 631–637. doi: 10.3109/0142159X.2010.500898.
- Freeman, S. et al. (2014) 'Active learning increases student performance in Science, Engineering, and Mathematics', *Proceedings of the National Academy of Sciences of the United States of America*, 111(23), pp. 8410–8415. doi: 10.1073/pnas.1319030111.
- Genn, J. M. (2001) 'AMEE Medical Education Guide No. 23 (Part 2): Curriculum, environment, climate, quality and change in medical education – a unifying perspective', *Medical Teacher*, 23(4), pp. 337–344. doi: 10.1080/01421590120063330.
- Gillam, S., Rodrigues, V., & Myles, P. (2016) 'Public health education in UK medical schools - Towards consensus.' *Journal of Public Health (United Kingdom)*, 38(3), 522–525. <https://doi.org/10.1093/pubmed/fdv069>
- Giordano, J. and Reilly, M. O. (2007) 'Challenge (s) of Offering Research Participants a Choice of Disclosing Their Identity', *Quality Health Research*, 17(2), pp. 264–275.
- Goldman, R. H., Cohen, A. P. and Sheahan, F. (2008) 'Using seminar blogs to enhance student participation and learning in public health school classes', *American Journal of Public Health*, 98(9), pp. 1658–1663. doi: 10.2105/AJPH.2008.133694.
- Green, M. L. (2001). 'Identifying , Appraising , and Implementing Medical Education Curricula' *Annals of Internal Medicine*, 135(10), 889–896.

- Guba, E. (1990) *The paradigm dialog*. First Ed. Edited by E. Guba. SAGE.
- Harden, R. M. and Stamper, N. (1999) 'What is a spiral curriculum?', *Medical Teacher*, 21(2), pp. 141–143. doi: 10.1080/01421599979752.
- Hartley, D. M. and Perencevich, E. N. (2020) 'Public Health Interventions for COVID-19 Emerging Evidence and Implications for an Evolving Public Health Crisis', *Journal of the American Medical Association*, 172(9), pp. 1908–1909. doi: 10.7326/M20-0504.
- Hatfield, G. (2001) 'Perception: History of the Concept', in Smelser, J. N. and Balter, B. P. (eds) *International Encyclopedia of the Social & Behavioral Sciences*. Philadelphia, Pennsylvania, USA, pp. 11202–11205.
- Hennik, M., Hutter, I. and Bailey, A. (2011) *The Nature of Qualitative Research*. London: SAGE.
- Hilpinen, R. (1970) 'Knowing That One Knows and the Classical Definition of Knowledge' *Synthese*, 21(2), 109–132.
- Hodza-Beganovic R, Berggren P, Hugelius K, Edelbring S. Survey-based experiential learning - means of raising professional awareness in developing countries. *Eur J Public Health*. 2019;29(4):2019.
- Hunt, J. B., Bonham, C. and Jones, L. (2011) 'Understanding the goals of service learning and community-based medical education: A systematic review', *Academic Medicine*, 86(2), pp. 246–251. doi: 10.1097/ACM.0b013e3182046481.
- Institute of Medicine (1988) *The Future of Public Health*. Washington, DC: National Academies Press. doi: <https://doi.org/10.17226/1091>.
- Ivory, K., Bandler, L., Hawke, C., & Armstrong, B. (2013) 'A clinical approach to population medicine.' *Clinical Teacher*, 10(2), 94–98. <https://doi.org/10.1111/j.1743-498X.2012.00618.x>
- Jang, J. H. *et al.* (2013) 'Enhancing undergraduate public health education through public health interest groups', *Academic Medicine*, 88(7), pp. 1009–1014. doi: 10.1097/ACM.0b013e318295278f.
- Johnson, I. L. *et al.* (2011) 'Integration of community health teaching in the undergraduate medicine curriculum at the University of Toronto', *American Journal of Preventive Medicine*. Elsevier Inc., 41(4 SUPPL. 3), pp. S176–S180. doi: 10.1016/j.amepre.2011.06.003.
- Johnson, S. B. *et al.* (2020) 'Teaching Public and Population Health in Medical Education: An Evaluation Framework', *Academic Medicine*, 95(12), pp. 1853–1863. doi: 10.1097/ACM.0000000000003737.
- Kiviniemi, M. T. and Przybyla, S. M. (2019) 'Integrative approaches to the undergraduate public health major curriculum: Strengths, challenges, and examples', *Frontiers in Public Health*, 7(APR), pp. 1–10. doi: 10.3389/fpubh.2019.00106.

- Kjellgren, K. I. *et al.* (2008) 'Learning to learn and learning to teach - Introduction to studies in higher education', *Medical Teacher*, 30(8). doi: 10.1080/01421590802258896.
- Knight, S. E., Ross, A. J. and Mahomed, O. (2017) 'Developing primary health care and public health competencies in undergraduate medical students', *South African Family Practice*. Taylor and Francis Ltd., 59(3), pp. 103–109. doi: 10.1080/20786190.2016.1272229.
- Knight, S. E., Van Wyk, J. M. and Mahomed, S. (2016) 'Teaching research: A programme to develop research capacity in undergraduate medical students at the University of KwaZulu-Natal, South Africa', *BMC Medical Education*, 16(1), pp. 1–8. doi: 10.1186/s12909-016-0567-7.
- Kok, K. Y. Y., Idris, F. I. and Koh, D. S. Q. (2020) 'COVID-19: A reminder for medical curriculum review', *Advances in Medical Education and Practice*, 11, pp. 615–618. doi: 10.2147/AMEP.S267633.
- Kolb, D. A. 1984. 'Experiential learning: Experience as the source of learning and development'. Englewood Cliffs, NJ: Prentice-Hall.
- Leech, L. and Onwuegbuzie, A. L. (2007) 'An Array of Qualitative Data Analysis Tools: a call for data Analysis Triangulation', *School of Psychology Quarterly*, 22(4), pp. 557–548.
- Leon, J. S., Winskell, K., McFarland, D. A., & Del Rio, C. (2015) 'A case-based, problem-based learning approach to prepare master of public health candidates for the complexities of global health'. *American Journal of Public Health*, Vol. 105, pp. S92–S96. <https://doi.org/10.2105/AJPH.2014.302416>
- Lyon, A. K., Hothersall, E. J. and Gillam, S. (2016) 'Teaching public health in UK medical schools: "Things have improved: Teaching no longer feels like an expensive hobby"', *Journal of Public Health (United Kingdom)*, 38(3), pp. e309–e315. doi: 10.1093/pubmed/fdv127.
- Mackenzie, S. L. C., Hinchey, D. M. and Cornforth, K. P. (2019) 'A public health service-learning capstone: Ideal for students, academia and community', *Frontiers in Public Health*, 7(JAN), pp. 1–7. doi: 10.3389/fpubh.2019.00010.
- Martinez, I. L. *et al.* (2015) 'Twelve tips for teaching social determinants of health in medicine', *Medical Teacher*, 37(7), pp. 647–652. doi: 10.3109/0142159X.2014.975191.
- Mcleod, P. J. and Steinert, Y. (2015) 'Twelve tips for curriculum renewal', *Medical Teacher*, pp. 232–238. doi: 10.3109/0142159X.2014.932898.
- Muir, F. *et al.* (2014) 'Taking the learning beyond the individual: how reflection informs change in practice', *International journal of medical education*, 5, pp. 24–30. doi: 10.5116/ijme.52ec.d21f.
- Mukesh, B., Sarika, P., Amol, K., Borde, A. N. (2018) 'Medical students perceptions regarding the curriculum in community medicine: A cross sectional study', *Indian Journal of Forensic and Community Medicine*, 5(1), pp. 39–43. doi: 10.18231/2394-6776.2018.0009.
- Myles, P., Barna, S., Maudsley, G., Watson, K. and Gillam, S. (2014) *Undergraduate Public Health*

Curriculum for UK Medical Schools. Consensus Statement 2014. Available at:
[http://www.fph.org.uk/uploads/PHEMS booklet web.pdf](http://www.fph.org.uk/uploads/PHEMS_booklet_web.pdf).

Narayan, K. M. V., Curran, J. and Foege, W. H. (2021) 'The COVID-19 Pandemic as an Opportunity to Ensure a More Successful Future for Science and Public Health Opinion', *Journal of the American Medical Association*, 325(2), pp. 525–526. doi: 10.1001/jama.2020.8598.

Navinan, M. R., Wijayarathne, D. R. and Rajapakse, S. F. (2012) 'Final-year medical students' perceptions regarding the curriculum in public health', *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine*, 36(4), pp. 268–274. doi: 10.4103/0970-0218.91328.

Naz, M. S. G. *et al.* (2018) 'Educational interventions for cervical cancer screening behavior of women: A systematic review', *Asian Pacific Journal of Cancer Prevention*, 19(4), pp. 875–884. doi: 10.22034/APJCP.2018.19.4.875.

Neubauer, B. E., Witkop, C. T. and Varpio, L. (2019) 'How phenomenology can help us learn from the experiences of others', *Perspectives on Medical Education*, 8(2), pp. 90–97. doi: 10.1007/s40037-019-0509-2.

O'Brien, B. C. *et al.* (2014) 'Standards for reporting qualitative research: A synthesis of recommendations', *Academic Medicine*. doi: 10.1097/ACM.0000000000000388.

O'Byrne, L., Gavin, B. and McNicholas, F. (2020) 'Medical students and COVID-19: The need for pandemic preparedness', *Journal of Medical Ethics*, 46(9), pp. 623–626. doi: 10.1136/medethics-2020-106353.

Olyani, S. and Peyman, N. (2021) 'Health literacy and health outcomes in Iranian adolescents: A systematic review', *Journal of Health Literacy*, pp. 78–85. doi: 10.22038/JHL.2021.56218.1155.

Pan, A. *et al.* (2020) 'Association of Public Health Interventions with the Epidemiology of the COVID-19 Outbreak in Wuhan, China', *JAMA - Journal of the American Medical Association*, 323(19), pp. 1915–1923. doi: 10.1001/jama.2020.6130.

Plano-Clark, V. L. (2019) 'Meaningful integration within mixed methods studies: Identifying why, what, when, and how', *Contemporary Educational Psychology*. Elsevier, pp. 106–111. doi: 10.1016/j.cedpsych.2019.01.007.

Powers, M. (2020) 'How will COVID-19 reshape future of US public health?', *Nations Health*, 50(1), p. 1.

Ramani, S. and Mann, K. (2016) 'Introducing medical educators to qualitative study design: Twelve tips from inception to completion', *Medical Teacher*, 38, pp. 456–463. doi: 10.3109/0142159X.2015.1035244.

- Rao, R. *et al.* (2020) 'The Evolving Role of Public Health in Medical Education', *Frontiers in Public Health*, 8(June), pp. 1–5. doi: 10.3389/fpubh.2020.00251.
- Riegelman, R. K. and Garr, D. R. (2008) 'Evidence-based public health education as preparation for medical school', *Academic Medicine*, pp. 321–326. doi: 10.1097/ACM.0b013e318166abe7.
- Saleh, A. M. (2015) 'in Hawler College of Medicine, Iraq', *Zanco J. Med. Sci.*, 19(3). Available at: <http://zjms-hmu.org/files/articles/211215015336.pdf>.
- Shariati, K. *et al.* (2021) 'Application of Spiral Programming Model in Medical Education: A Review', *Medical Education Bulletin*, 2(1), pp. 79–87. doi: 10.22034/MEB.2021.293383.1007.
- Sharma, G. (2017) 'Pros and cons of different sampling techniques. Impact Factor: 5.2 IJAR', *International Journal of Applied Research*, 3(7), pp. 749–752. Available at: www.allresearchjournal.com.
- Slavin, S. and D'Eon, M. F. (2021) 'Overcrowded curriculum is an impediment to change (Part B)', *Canadian Medical Education Journal*, 12(15), pp. 16–22. Available at: <https://journalhosting.ucalgary.ca/index.php/cmej/article/view/36556>.
- Stalmeijer, R. E., McNaughton, N. and Van Mook, W. N. K. A. (2014) 'Using focus groups in medical education research: AMEE Guide No. 91', *Medical Teacher*, 36(11), pp. 923–939. doi: 10.3109/0142159X.2014.917165.
- StataCorp. 2011. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP
- Steckler, A. *et al.* (1992) 'Toward Integrating Qualitative and Quantitative Methods: An Introduction', *Health Education Quarterly*, 19(1), pp. 1–8. doi: 10.1177/109019819201900101.
- Stewart, T. and Wubbena, Z. (2014) 'An overview of infusing service-learning in medical education', *International journal of medical education*, 5, pp. 147–156. doi: 10.5116/ijme.53ae.c907.
- Streetly, A. and Elhers, L. (2015) 'Population screening and public health', in Detels, R. *et al.* (eds) *Oxford Textbook of Global Public Health*. Oxford.
- Sundler, A. J. *et al.* (2019) 'Qualitative thematic analysis based on descriptive phenomenology', *Nursing Open*, 6(3), pp. 733–739. doi: 10.1002/nop2.275.
- Sutton, J. and Austin, Z. (2015) 'Qualitative Research: Data Collection, Analysis, and Management.', *The Canadian journal of hospital pharmacy*, 68(3), pp. 226–31. doi: 10.1111/acem.12735.
- Teherani, A. *et al.* (2015) 'Choosing a Qualitative Research Approach', *Journal of graduate medical education*, 7(4), pp. 669–670. doi: 10.4300/JGME-D-15-00414.1.
- Thakur, A.B., Upadhyay, R. and Wavare, A. R. D. (2016) 'Perception Towards Community Medicine as a Subject and Career Option among Medical Students in a Medical College', *National Journal of*

Community Medicine, 7(5), pp. 430–434.

Thomas, P. A., Kern D. E., Hughes, M. T., and Chen, B. (2016) *Curriculum Development for Medical Education*. Third Ed. Edited by P. A. Thomas et al. Baltimore: Johns Hopkins University Press.

Thorpe, A. *et al.* (2008) 'The three domains of public health: An internationally relevant basis for public health education?', *Public Health*, 122(2), pp. 201–210. doi: 10.1016/j.puhe.2007.05.013.

Trevena, L. J. (2007) 'Problem-based learning in public health workforce training: a discussion of educational principles and evidence.', *New South Wales public health bulletin*, 18(1–2), pp. 4–8. doi: 10.1071/nb07007.

Tulchinsky, T. H. and Varavikova, E. A. (2010) 'What is the "New Public Health"?', *Public Health Reviews*, 32(1), pp. 25–53. doi: 10.1007/BF03391592.

Tulchinsky, T., Jennings, B., & Viehbeck, S. (2015) 'Integrating ethics in public health education: The process of developing case studies.' *Public Health Reviews*, 36(1), 1–10.

<https://doi.org/10.1186/s40985-015-0002-3>

Tyler, I. V., Hau, M., Buxton, J. A. and Elliott L. J. (2009) 'Canadian medical students' perceptions of public health education in the undergraduate medical curriculum', *Academic Medicine*, 84(9), pp. 1307–1312. doi: 10.1097/ACM.0b013e3181b189b4.

Unger, Marianne and Susan D. Hanekom. 2014. 'Benefits of Curriculum Renewal: The Stellenbosch University Physiotherapy Experience', *African Journal of Health Professions Education* 6(2):222.

Vaismoradi, M., Turunen, H. and Bondas, T. (2013) 'Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study', *Nursing and Health Sciences*, 15(3), pp. 398–405. doi: 10.1111/nhs.12048.

Van der Vleuten, C. P. M. and Schuwirth, L. W. T. (2019) 'Assessment in the context of problem-based learning', *Advances in Health Sciences Education*. Springer, 24(5), pp. 903–914. doi: 10.1007/s10459-019-09909-1.

Vyas, A. *et al.* (2017) 'Public health matters: Innovative approaches for engaging medical students', *Medical Teacher*, 39(4), pp. 402–408. doi: 10.1080/0142159X.2017.1294753.

Wells, A. L. and Martinez, I. L. (2014) 'Community service learning in Florida undergraduate medical education', *Florida Fam Physician*, 63(1), pp. 12–14.

WHO (2021) *Considerations for implementing and adjusting public health and social measures in the context of COVID-19 - Interim guidance*. Geneva. Available at: <https://www.who.int/publications/i/item/considerations-in-adjusting-public-health-and-social-measures-in-the-context-of-COVID-19-interim-guidance>.

Winslow, C. (1920) 'The Untilled Fields of Public Health', *Science*, 51(1306), pp. 23–33.

Zahedi, L. *et al.* (2014) 'Knowledge, attitudes and practices regarding cervical cancer and screening among Haitian health care workers', *International Journal of Environmental Research and Public Health*, 11(11), pp. 11541–11552. doi: 10.3390/ijerph111111541.

Zeng, W. *et al.* (2020) 'Optimizing preventive medicine to bridge the gap between clinical medicine and public health for disease control in China: A lesson from COVID-19', *Preventive Medicine*, 143(2021).

Zhou, J. *et al.* (2016) 'Effectiveness of problem-based learning in Chinese pharmacy education: A meta-analysis Approaches to teaching and learning', *BMC Medical Education*. BMC Medical Education, 16(1). doi: 10.1186/s12909-016-0546-z.

Zweigenthal, V. E. M., Pick, W. M. and London, L. (2018) 'Motivations of South African physicians specialising in public health', *Global Health Action*, 11(1). doi: 10.1080/16549716.2018.1475039.

Zweigenthal, V. E. M., Pick, W. M. and London, L. (2019) 'Career paths of public health medicine specialists in South Africa', *Frontiers in Public Health*, 7(SEP), pp. 1–17. doi: 10.3389/fpubh.2019.00261.

Appendix A: Quantitative Phase Questionnaire

Knowledge, attitudes and perceptions of fifth-year medical students regarding their public health course

Section A: Demographic Data

A1: Sex: Male Female

A2: Age: _____years

A3: Previous degree: Yes No

A4: Former class rep: Yes No

Section B: Perceptions about Public Health Education

Please indicate how much you agree with the following statements. Please tick the box that best describes your answer.

General perception		Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
B1	Doctors play an important role in health education and disease prevention					
B2	It is important for doctors to learn about population health strategies					
B3	Doctors are part of the public health system					
B4	The medical & public health fields working together benefit patient care					
B5	Doctors play an important role in patient education					
B6	Public health education is relevant to your career as a doctor					

General perception		Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
B7	Public health education benefits clinical care					
B8	Public health education in medical school change/enforce policy					
B9	Physicians should be required to learn public health					
B10	Public health information is common sense knowledge					

Section C: Knowledge about Education in Public Health Topics

Please indicate how much you agree that the following topics in public health should be taught in medical school.

Perception		Strongly Agree	Agree	Don't know	Dis-agree	Strongly Disagree
C1	Health services administration					
C2	Epidemiology					
C3	Cultural competency diversity					
C4	Public health policy					
C5	Health promotion					
C6	Mother and Child Health					
C7	Communicable Diseases					
C8	Non-communicable diseases					
C9	Occupational medicine					
C10	Population health					

Section D: Public Health Teaching Methods

Which of the following teaching methods do you think are good for teaching public health?

Teaching Methods		Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
D1	Formal face-to-face lectures					
D2	Flipped classroom					
D3	Online teaching					
D4	Hands-on projects in public health					
D5	Assignments					
D6	Self-study method					
D7	Blended learning					
D8	Tutorial method					

Section E: Satisfaction with Public Health Course

How satisfied are you with the quality of the public health training you received in medical school?

E1	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied

Appendix B: Qualitative Phase Questionnaire Guide

Explain the purpose of the study to the students

Today's topic is the Public Health/ Community Health Course

1. What is your understanding of public Health/ community Health discipline?

Probe question: given what you have said, do you think Public Health/ Community Health should be included or excluded in the undergraduate curriculum?

Explore the responses provided by the students

2. What are your general feelings about it the public health/community course?

Explore the responses provided by the students

3. What do you think of the teaching methods used in the public health course?

Explore the responses provided by the students

4. How can we improve public health/ community Health course?

Explore the responses provided by the students

Appendix C: Quantitative Phase Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Dear student/participant

My name is Dr Tladi Ledibane, a lecturer in the Department of Community Health. I would like to invite you to participate in a research project entitled “**Knowledge, attitudes and perceptions of fifth-year medical students regarding their public health course**”. Please note that this study will be submitted in partial fulfilment of the requirements for the degree of Masters of Philosophy in Health Professions Education at the Faculty of Medicine and Health Sciences, Stellenbosch University. My supervisor is Professor MR de Villiers, affiliated with the Department of Family Medicine, Faculty of Medicine and Health Sciences at Stellenbosch.

Please take some time to read the information presented here, which will explain the details of this research project. You are welcome to contact me if you require further explanation or clarification of any aspect of the study. Also, your participation is entirely voluntary, and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you had agreed to take part.

The purpose of this study is to understand the knowledge, attitudes and perceptions (KAP) of fifth-year medical students regarding their public health course and to make recommendations towards improvements in the public health course and to improve students' awareness and understanding of public health. The evaluation study will explore whether the public health course is achieving its purpose, and look at how the public health course can be improved in future. The questionnaire will take no more than 20 minutes to complete and will contain a combination of questions covering the students' knowledge, attitudes and perceptions of the public health course.

RIGHTS OF RESEARCH PARTICIPANTS:

You have the right to decline to answer any questions, and you can exit the survey at any time without giving a reason. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Ms Lorato Phiri [lorato.phiri@smu.ac.za; 012 521 5617] at the Division for Research Support.

Your information and response to the survey will be accessed by a password and stored in a protected space to which only the principal researcher will have access. All data will be anonymized and coded to protect your identity.

If you have any questions or concerns about the research, please feel free to contact Dr Ledibane [tladi.ledibane@smu.ac.za]

ELECTRONIC CONSENT:

Please select your choice below. Clicking on the "agree" button below indicates that:

- You have read the above information
- You voluntarily agree to participate

I agree to take part in this study	YES	NO
I confirm that I have read and understood the information provided for the current study	YES	NO

Appendix D: Qualitative Phase Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

You are invited to participate in a study conducted by Dr Tladi Ledibane, from the Department of Community Health, UNIVERSITY X and MPhil in Health Professions Education (HPE) student at the Centre for Health Professions Education at Stellenbosch University at Stellenbosch University. You were approached as a possible participant because you were either a class representative or group leader in the Public Health Medicine course or related modules.

PURPOSE OF THE STUDY

The purpose of this study is to understand the knowledge, attitudes and perceptions (KAP) of fifth-year medical students regarding their public health course and to make recommendations towards improvements in the public health course and to improve students' awareness and understanding of public health. The study will explore the students' KAP of the public health course at UNIVERSITY X and look at how the public health course can be improved in future.

WHAT WILL BE ASKED OF ME?

If you agree to take part in this study, you will be expected to complete a questionnaire. You will be asked to provide feedback regarding your knowledge, views and understanding regarding the public health medicine course at University X. It will take you about **20 minutes to** complete the questionnaire.

POSSIBLE RISKS AND DISCOMFORTS

Psychological distress

You may feel that some of the questions we ask are stressful or upsetting. If you do not wish to answer a question, you may skip it and go to the next question, or you may stop immediately. If you become upset or distressed as a result of your participation in the research project, the researcher will arrange for counselling or other appropriate support. Any counselling or support will be provided by qualified staff who are not members of the research team. This counselling will be provided free of charge.

POSSIBLE BENEFITS TO PARTICIPANTS AND/OR TO THE SOCIETY

The findings of this study will be used to improve the Public Health Medicine course at UNIVERSITY X and will also inform the Curriculum renewal efforts at University X.

PAYMENT FOR PARTICIPATION

Participation in this study is voluntary and you will receive no compensation for your participation.

PROTECTION OF YOUR INFORMATION, CONFIDENTIALITY AND IDENTITY

Any information you share with me during this study and that could possibly identify you as a participant will be protected. This will be done by ensuring that your name as a participant in this study will not appear on the questionnaire. All hardcopy-records relating to the study will be kept in a lockable cabinet in the researcher's office. The cabinet will be locked-up at all times. The electronic data sets will be stored in the investigator's computer hard disk and will be password protected. Audio recordings will be anonymised before transcription and analysis. These records will not be handed over to any third parties. In the event of a publication or presenting the finding of this study at a medical conference, aliases (not real names) will be used.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you agree to take part in this study, you may withdraw at any time without any consequence. You may also refuse to answer any questions you don't want to answer and still remain in the study. The researcher may withdraw you from this study if the researcher observes that you are distressed and uncomfortable.

RESEARCHERS' CONTACT INFORMATION

If you have any questions or concerns about the research, please feel free to contact Dr Ledibane [X4257]

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because you are participating in this research study. If you have questions regarding your rights as a

research participant, contact Ms Lorato Phiri {012 521 5617} at the Division for Research Support.

DECLARATION OF CONSENT BY THE PARTICIPANT

As the participant, I confirm that:

- I have read the above information and it is written in a language I am comfortable with.
- I have had a chance to ask questions and all my questions have been answered.
- All issues related to privacy, and the confidentiality and use of the information I provide, have been explained.

By signing below, I _____ (*name of participant*)
agree to take part in this research study, as conducted by

Signature of Participant

Date

DECLARATION BY THE PRINCIPAL INVESTIGATOR

As the **principal investigator**, I hereby declare that the information contained in this document has been thoroughly explained to the participant. I also declare that the participant has been encouraged (and has been given ample time) to ask any questions. In addition, I would like to select the following option:

	The conversation with the participant was conducted in a language in which the participant is fluent.
	The conversation with the participant was conducted with the assistance of a translator (who has signed a non-disclosure agreement), and this “Consent Form” is available to the participant in a language in which the participant is fluent.

Signature of Principal Investigator

Date

Appendix E: Ethical clearance letter (S19/10/279), Stellenbosch University

Appendix 5



Approved with Stipulations

New Application

16/04/2020

Project ID: 11897

HREC Reference No: S19/10/279

Project Title: Knowledge, attitudes and perceptions of fifth-year medical students regarding their public health course

Dear Dr Tladi Ledibane

The New Application received on 24/02/2020 was reviewed by members of the Health Research Ethics Committee via Minimal Risk Review procedures on 16/04/2020 and was approved with stipulations.

Please note the following information about your approved research protocol:

Protocol Approval Period: 16-April-2020 – 15-April-2021.

The stipulations of your ethics approval are as follows:

1. Please indicate why basic demographic information need to be collected during the quantitative questionnaire – please consider not collecting any basic information.
 2. Informed Consent (Qualitative) – please indicate the following: 1) that the group will be recorded (they need to consent specifically for recording) 2) how long the session will be and 3) there is no payment but remuneration in form of refreshments.
 3. All consent and interviews would be in English, why the possible use of interpreter on the ICF.
- Kindly note that although the study has been granted ethics approval, the study may not proceed during the current national lockdown as an embargo has been placed on studies that require interaction with research participants in order to prevent potential harm to participants.
 - HREC will publish on the HREC website a date when the said embargo is to be lifted taking into consideration the best interest of participants and national interests around COVID-19.

Please remember to use your project ID 11897 and ethics reference number S19/10/279 on any documents or correspondence with the HREC/UREC concerning your research protocol.

Translation of the consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note that this decision will be ratified at the next HREC full committee meeting. HREC reserves the right to suspend approval and to request changes or clarifications from applicants. The coordinator will notify the applicant (and if applicable, the supervisor) of the changes or suspension within 1 day of receiving the notice of suspension from HREC. HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note you can submit your progress report through the online ethics application process, available at: <https://apply.ethics.sun.ac.za> and the application should be submitted to the Committee before the year has expired. Please see [Forms and Instructions](#) on our HREC website for guidance on how to submit a progress report.

The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: <https://www.westerncape.gov.za/general-publication/health-research-approval-process>. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: [Forms and Instructions](#) on our HREC website (www.sun.ac.za/healthresearchethics)

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Appendix E: (continued)

Mrs. Brightness Nxumalo

HREC 2 Coordinator

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)•REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372

Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0005240 (HREC1)•IRB0005239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the [World Medical Association \(2013\). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects](#); the [South African Department of Health \(2006\). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa \(2nd edition\)](#); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

Appendix F: Approval of study by University X

Research Ethics Committee

Appendix 6



Postgraduate Studies, Research Development, Integrity & Ethics Research Ethics Committee (REC)

Dr TD Ledibane
Department of Community Health (Public Health Medicine)

Dear Dr Ledibane

RE: DR TD LEDIBANE – PERMISSION TO CONDUCT A STUDY AT UNIVERSITY

SMUREC NOTED an e-mail dated 06 October 2020 from Dr Ledibane, requesting permission to conduct a study at REC NOTED that the researcher has already received ethical approval from University of Stellenbosch, Human Research Ethics Committee.

Study Title:	Knowledge, attitudes and perceptions of fifth-year medical students regarding their public health course
Principal Investigator:	Dr TD Ledibane
Supervisor:	Prof MR de Villiers
University:	University of Stellenbosch
Research Type:	MPhil in Health Professions Education (HPE)
Project ID:	11897
HREC Reference No:	S19/10/279
Approval letter date:	04 June 2020

SMUREC REQUESTED an amendment to exclude the University name from the title, and provide anonymity of the study setting before permission to conduct the study will be granted. Conditional to these amendments REC has APPROVED that the study be conducted at

REC provided reciprocal APPROVAL for the above mentioned study registered at Stellenbosch University.

Yours Sincerely,

PROF C BAKER
CHAIRPERSON

05 November 2020