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Integration of infant feeding in clinical undergraduate education: a case study of one South African university faculty

Pamela Maluleke

Supervisors:

Dr Sara Jewett (Nieuwoudt)

Prof Wiedaad Slemming

Research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for a Master of Public Health degree

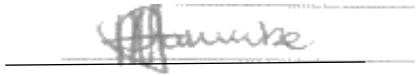
Johannesburg

September 2025

DECLARATION

I, Pamela Maluleke, hereby declare that this research report is my original work. It is being submitted for the degree of Master of Public Health (in the field of SBCC) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

Student signature



Student signature

Pamela Maluleke

Student number: 1634714

Johannesburg

September 2025

DEDICATION

To my beloved grandmother,

Another qualification, another milestone, yet another moment I wish I could share with you. Though you are no longer here to celebrate this achievement with me, your love, wisdom, and unwavering support continue to guide me every step of the way. I carry your lessons in my heart and dedicate this accomplishment to you, knowing that your pride and blessings remain with me always.

This is for you, with love and gratitude.

ABSTRACT

Background

Healthcare workers (HCW) have a significant influence on the infant feeding practices that parents choose to undertake, with options varying between breastfeeding and other alternative forms of feeding like formula milk or homemade foods. It is, therefore, important to know what and how healthcare workers are taught and trained on infant feeding. In South Africa, there is a paucity of data on how infant feeding education (IFE) is included in the undergraduate curricula for clinical health science students who are being trained for direct involvement in patient care. This study explored how infant feeding education was included in the curriculum of undergraduate clinical health science students at one university faculty. The study also explored what influenced how this education was structured and delivered, including the potential influence of commercial milk formula (CMF) companies.

Methods

This qualitative study comprised 13 in-depth key informant interviews with staff members involved in either teaching, developing, or curating the curriculum of undergraduate students in Medicine, Nursing, Clinical Medical Practice, and Dentistry at the University of the Witwatersrand, Johannesburg, South Africa. A smaller record review was embedded as part of the study to characterize the timing, duration, and delivery methods of the infant feeding education. The study was conducted between June and July 2024. We used thematic analysis to analyse the qualitative data.

Results

IFE is being included at varying levels across the degrees, with distinct reasons for inclusion and exclusion. Nursing students were receiving more in-depth lessons compared to the other degrees as there was a notion that infant feeding was meant to be a nurse's job. However, the lessons that were delivered across all degrees are based on the clinical evidence of the benefits of breastfeeding. Other influences of how IFE is structured were the coordinator's attributes, timetabling constraints, and the lack of prioritisation for IFE.

Conclusion

This study reveals gaps in IFE at Wits University's Faculty of Health Sciences across the different degrees, where nursing students receive thorough training, while other clinical degrees offer minimal, unstructured IFE. Most programs emphasise breastfeeding's biological benefits over a holistic biopsychosocial approach, limiting practical application. Though CMF companies did not directly influence the curriculum, their presence in faculty awards subtly shapes perceptions.

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To Dr. Sara, thank you for going above and beyond to make this journey a seamless one. You wear so many hats in my life, and I am deeply grateful to learn from your well of wisdom. Thank you being the calm in this entire journey. Your belief in me and constant encouragement have made this experience truly special.

To Prof. Wiedaad, thank you for pushing me beyond my comfort zone and guiding me with such grace. The lessons I have learned from you will have a lasting impact on my career, and I am truly grateful to have walked this journey with you.

I deeply appreciate the dedication and effort you have both invested in this journey.

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LIST OF ABBREVIATIONS

BCMP	Bachelor of Clinical Medical Practice
BHSc	Bachelor of Health Sciences
BFHI	Baby Friendly Hospital Initiative
BNurs	Bachelor of Nursing
BOHSc	Bachelor of Oral Health Sciences
BPharm	Bachelor of Pharmacy
CMF	Commercial Milk Formula
EBF	Exclusive breastfeeding
FHS	Faculty of Health Sciences
HCWs	Healthcare workers
IFE	Infant feeding education
IMCI	Integrated Management of Childhood Illnesses
MBBCh	Bachelor of Medicine and surgery
NDoH	National Department of Health
NICU	Neonatal Intensive Care Unit

DEFINITIONS

Biopsychosocial framework – a holistic and relevant framework for educating healthcare workers that accounts for not only the biological, but the psychological and social factors that mothers may encounter (1)

Clinical undergraduate healthcare students – students enrolled in degrees that have a direct involvement with patient care. These degrees have a combination of theoretical learning and practical hands-on clinical experience (2)

Commercial milk formula – Milk based products, or similar, that are marketed to be suitable for use as a partial or total replacement of breastmilk, specifically to feed children aged up to 3 years. These products can be either liquid or powder, including infant formula, follow-up formula, and growing-up milk, or toddler milk (3)

Exclusive breastfeeding – The act of giving infants only breastmilk. No other liquids or solids are given, including water with an exception of vitamins, minerals or medicines.

Infant feeding education – The act of teaching about infant feeding, this includes the anatomical, physiological, psychological, and social aspects of infant feeding (4,5)

CHAPTER 1: INTRODUCTION

1.1 Overview of the report

This research report is being submitted in the submissible report format. The structure of the report starts with the introduction, followed by the manuscript chapter. The manuscript chapter is made up of the introduction, methods, results, discussion, and conclusion sections according to the selected journal's format. It is followed by a short chapter that provides extended methods and results that are not included in the manuscript. The report is concluded with an overall discussion, conclusion, and a set of recommendations that align with the overall study aim and objectives.

The introduction chapter describes the importance of the study while highlighting the benefits of breastfeeding, the influence of infant feeding education at the undergraduate level in universities for clinical healthcare students, and the role this plays in increasing rates of breastfeeding initiation and continuation. The chapter is inclusive of a background section that details why the topic was researched, the literature review, a problem statement, a justification for conducting the study, the study aim and objectives.

1.2 Background

Poor infant feeding practices are a public health concern globally as they contribute to high infant mortality and morbidity rates through inadequate nutrition in infants and young children (6). Health Care Workers (HCWs) have a key role in encouraging breastfeeding initiation, promoting exclusive breastfeeding (EBF) for the first six months and the continuation of breastfeeding thereafter (7,8). For healthcare workers to do this effectively, they must be equipped with the requisite knowledge, skills and the competencies to promote and support breastfeeding (9), initially developed during their undergraduate or pre-service training. . Acquiring this knowledge, skills, and competencies is a crucial part of developing confidence in relation to providing care that is related to breastfeeding (10). However, limitations to breastfeeding are not limited to healthcare worker's capabilities.

There are numerous barriers to initiating and sustaining EBF. These can range from individual level factors where breastfeeding mothers lack knowledge or self-efficacy to properly breastfeed (6). There are also interpersonal factors where family belief systems shape norms that inform breastfeeding behaviours (6,11), or the lack of social support at home or at workplaces (12). There may also be institutional factors within the public health system where there are organisational constraints which prevent healthcare workers from providing effective breastfeeding support (13). In addition to these, commercial milk formula (CMF) marketing plays a huge influence on the feeding practices chosen (14–16). However, the relationship between HCWs and mothers remains a barrier that significantly impacts a mothers' infant feeding knowledge and choices (11,14,17,18). One attributing factor is that breastfeeding mothers generally perceive information that is received from HCWs or received in healthcare settings as trustworthy and accurate (6).

The information that HCWs share is often shaped and influenced by the communities they are a part of and their training institutions at undergraduate level (19). Universities play a huge role in equipping undergraduate clinical healthcare students with the necessary skills that are needed to support infant feeding, and this goes beyond anatomical biology lessons (19). In South Africa, there is sparse research on how curricula are developed and delivered to support undergraduate clinical teaching and training on infant feeding.

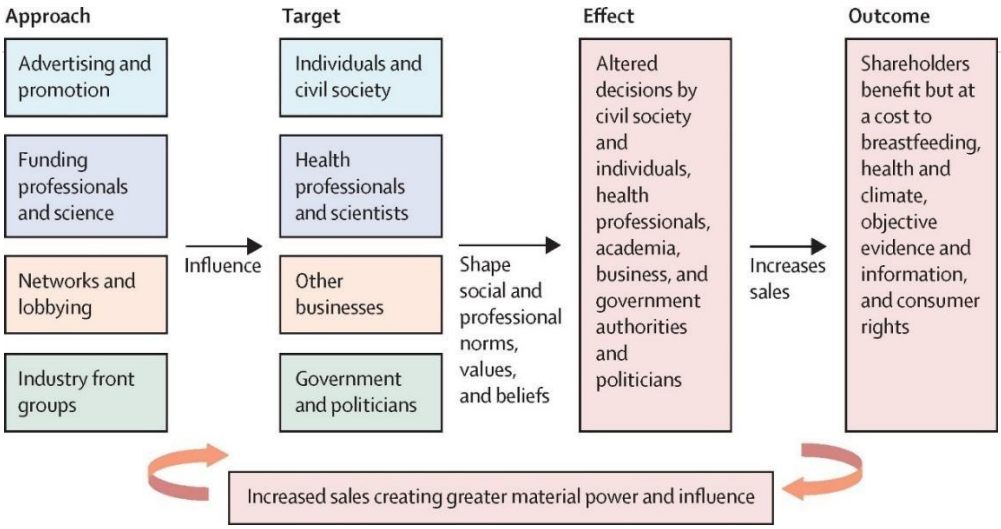
However, it is worth noting that there are broader debates about reforms in clinical education focusing on how higher education (HE) can fit into the changing global landscape (20). In South Africa and other countries, these debates are framed around decolonisation and social transformation, drawing special attention to how HE curricula prepares healthcare students to offer care that is inclusive and fits into society's current needs (21). While there is little information on how infant feeding is taught in HE, the entire health science curricula prioritises the medical approach with minimal inclusion of the psychosocial approach (22), which is not ideal for offering care to breastfeeding mothers. This highlights the need to ensure that infant feeding education (IFE), alongside other subjects, needs to have a holistic approach that pays special attention to how, what, and who shapes the curricula. This would also acknowledges that curricula globally is not standard for all types of healthcare workers, as they interact with breastfeeding mothers at different levels (23).

Breastfeeding care has often been left to midwives and nurses, who are often the first point of contact during childbirth and in some cases during the antenatal stage (24). The allocation of this task to nurses is also evident in the research that has been conducted on healthcare workers' attitudes and competency levels toward supporting breastfeeding. These studies were often conducted with nurses (17,24–26), and in some cases doctors (27). It is crucial to highlight that most of these studies showed even though infant feeding care is designated for nurses, or doctors, they report to not be adequately trained to support breastfeeding parents (28–30). This highlights the need to strengthen IFE for nurses and doctors, and other cadres that are directly linked to breastfeeding mothers.

CMF companies have been identified as an influence on HCWs perceived competency through their relationships with HCWs' learning and training institutions. These companies are known to market their CMF products, which are defined as "either liquid or powdered, milk-based or similar, marketed to be suitable for use as a partial or total replacement of breastmilk, specifically to feed children aged up to 3 years (including infant formula, follow-up formula -FUF-, and growing-up milk -GUM- or toddler milk)"(3, p2). This marketing takes place indirectly at training institutions, affecting how healthcare students perceive and interact with lessons on breastfeeding, ultimately undermining the unique properties and benefits of breastmilk.

Rollins and colleagues illustrated how CMF marketing reinforces the use of formula milk using a conceptual framework (Figure 1.1), among HCWs, healthcare students, and other targets (14). The framework illustrates how the relationship is fostered over time through the marketing approaches that ultimately leads to gained trust of formula milk and therefore increased use (14). The final effect of CMF marketing is the altered decisions of HCWs, healthcare students and their training institutions at a cost to breastfeeding, which in turn results in poor health outcomes (14). There is a vast history dating back to the 19th century of how this industry used aggressive marketing tactics to infiltrate healthcare institutions, especially in middle and low income countries (14,31). These practices have always drawn criticism from civil society, most notably the 1977 Nestle boycott (32,33).

Figure 1: Conceptual framework of commercial milk formula marketing (14)



There have been numerous efforts to end the effects of this harmful marketing in South Africa. The National Department of Health (NDoH) published the Regulations Relating to Foodstuffs for Infants and Young Children (R991) on 6 December 2012 (34). These regulations prohibit the promotion of CMF at training institutions or at healthcare institutions; this includes the use of any CMF company branding or acceptance of any financial assistance or incentives from such companies, which would provide indirect marketing for these companies and nullify the goal to not promote any CMF products. In 2021, 220 academics raised concerns over conflicts of interest following the appointment of a university research director to Nestlé's Global Board, prompting South African medical schools to review policies on corporate influence in education and research (33). Even so, there are relationships that still persist in training institutions and healthcare institutions to date, where most healthcare workers are not aware of the implications of sustaining these relationships (14,29).

This study aimed to understand how infant feeding education was included in the curriculum for clinical undergraduate students in one South African Health Science university faculty. In addition, this study aims to understand the factors that influenced how curricula were structured and to explore the possible influence of CMF companies on curriculum design and delivery.

1.3 Literature Review

The following review provides information on what is known about infant feeding, the influence of infant feeding education on clinical students and how that shapes how they support and engage with breastfeeding parents. It further details the role of CMF companies in the design and delivery of curricula related to infant feeding.

1.3.1 Infant feeding

According to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), the most appropriate form of infant feeding is exclusive breastfeeding (EBF) for the first six months of life, which is followed by the incorporation of safe and appropriate complementary feeding and continued breastfeeding for at least two years (12,30). This period, from conception until the child's second birthday, also referred to as the first 1000 days, is labelled as the most important in shaping and programming one for their adult life (35). EBF within the first six months aids in achieving optimal growth and healthy development of children (36). Breastmilk supports postnatal development, the development of cognitive and brain function, and educational development (37). Its intake can also reduce the rates of mortality and morbidity in infants, therefore alleviating the burden this has on public health which is a common problem globally (38).

The benefits of breastfeeding are not only present for the infant, but there is evidence that breastfeeding is equally beneficial for the mother. One study shows that women who breastfeed have reduced anxiety and negative moods, better sleeping patterns, reduced blood pressure, reduced likelihood of postpartum depression, and positive interactions and relationships with those around them (39). The same study shows that there are also shared benefits that exist for the mother-child dyad, where breastfeeding facilitates maternal sensitivity and increases the likelihood of a secure attachment between mother and child (39). There is further evidence highlighting that breastfeeding decreases the likelihood of ovarian cancer, premenopausal breast cancer, type 2 diabetes, heart disease, and obesity for the breastfeeding woman (35). In addition to this, economic analyses on the cost of not breastfeeding showed that not breastfeeding leads to a global economic loss of US$302 billion annually (29).

EBF rates remain low globally despite the vast and well-documented benefits of breastfeeding. EBF rates are also low in South Africa due to suboptimal and poor feeding practices, despite the NDoH adopting the recommendation to exclusively breastfeed for six months after giving (11). The National food and nutrition security survey published in 2024 showed that only 22% of children under 6 months are exclusively breastfed (39), while the National District Barometer shows that 43.3% are exclusively breastfed at the their 14 week vaccine shot, this is a decrease from 2019/2020 period which was 48.8% (40). Additionally, the country's estimated future cost that is linked to not exclusively breastfeeding in the first five months is at 0.68% of the gross national income (29).

There have been many initiatives that have been implemented to scale up these numbers, including the Side-by-Side campaign by the NDoH (42). Which aims to ensure that all children under five receive the nurturing care they need to develop to the best of their abilities, drawing special attention on breastfeeding. The campaign relies on all stakeholders caring for caregivers and pregnant women to work alongside each other, including healthcare workers.

1.3.2 Infant feeding education in university

IFE in university is crucial for building and fostering relationships between HCWs and infant feeding. HCWs' knowledge of infant feeding can be a great tool to increase breastfeeding initiation and continuation rates (43). Yang and colleagues (44) assert that educational interventions focused on increasing knowledge about breastfeeding and how to support breastfeeding mothers are effective in changing healthcare students' behaviours and their understanding of challenges around infant feeding (44). They also aid in increasing students' self-efficacy to support breastfeeding mothers when they are facing challenges (44). Infant feeding education in universities can also help build the attitudes and beliefs that are needed among HCWs to provide compassionate support to breastfeeding mothers (4).

Even with evidence showing the necessity of formal teaching of infant feeding (45,46), one paper from the 2023 Lancet series showed that there is little funding and time in class that is committed to educating clinical healthcare students in their undergraduate studies on the skills that they need to support breastfeeding parents (14). The focus is often on condensed biology content as opposed to psychosocial issues that may affect how care in relation to infant feeding is delivered (4). Studies

included in a systematic review showed that clinical students' undergraduate curriculum often includes content about properties of breastmilk, benefits of breastmilk for mother and child and latching definitions (44). Another study in Asia showed that there is little time spent on teaching medical students how to support breastfeeding mothers when they encounter challenges (5).

To complement classroom teaching, students are placed in clinical settings as part of their training where they can learn from practicing healthcare workers; but in most cases, these healthcare workers have not received adequate training in psychosocial support to be able to transfer the necessary skills or mentor the upcoming HCWs (44). Additionally, teaching that takes place in the clinical setting is often ad hoc and cannot be held to a single standard. A systematic review by Yang and colleagues (44) reports that in order to have sufficient EBF knowledge on supporting breastfeeding mothers, students should at least have 20 hours of teaching, consisting of a minimum of eight hours theory and three hours practical (7). This method is derived from the *Baby Friendly Hospital Initiative* (BFHI), which is not accredited at all healthcare facilities globally, entailing that these requirements are not always met in training institutions (43).

South Africa adopted the BFHI and its ten steps, which was adapted to the *Mother and Baby Friendly Initiative* (MBFI) (47). This version also supports the notion that adequate time in practice complemented by a sufficient amount of theory are necessary to equip clinical students with the right level of knowledge and skills needed to support and care for breastfeeding mothers (47). However, reported barriers to implementation in South Africa include HCW's reluctance to implement the initiative within their practicing hospitals (25). A study conducted in Limpopo, South Africa, showed that nurses, despite having a positive attitude towards MBFI, feared that its implementation would result in increased work for them (25). The MBFI, considered a gold standard for educating healthcare students and healthcare workers about breastfeeding, is only implemented within certain health facilities and not always introduced with coursework at the undergraduate level (47,48).

1.3.3 Role of healthcare workers in breastfeeding promotion

HCWs are trusted when it comes to providing health information, therefore, they have a primary role in educating and giving trusted information about infant feeding to

mothers (14). A study in South Africa (30) showed that consistent care and support from HCWs can support in breaking down social norms that exist in communities that are against EBF. Similarly, when healthcare workers give false and misguided information, it may lead to suboptimal infant feeding practices (11,30).Often the role of offering care and support to breastfeeding parents is left to midwives as they are the main role players in offering antenatal and postnatal care (49). However, one study (50) has shown that to reach optimal EBF levels, we need more than one cadre of health workers actively promoting breastfeeding in their care of expectant and new mothers. The MBFI also stipulates that all healthcare workers involved in the clinical care of infants and children need in-depth education and training about infant and young child feeding (9,51). These clinical HCWs stationed in different health facilities are often nurses, midwives, doctors, dieticians, and in some cases speech and language therapists (50). However, there is a paucity of data on the role that some cadres of health professionals outside of nursing have in supporting breastfeeding.

There is, however, some data on the role that is played by doctors, midwives, and nurses, particularly through the specialties of gynaecology and paediatrics. Historically, the field of paediatrics focused on the child's wellbeing with breastfeeding far removed from it, which made room for the heavy consideration and promotion of formula (52). Over the years this has changed, where the specialties of gynaecology and paediatrics have a focus on the benefits of breastfeeding and the iteration that 'breastmilk is best' (49). Although there has been an increased focus on breastfeeding from these specialities, offering optimal care and support to breastfeeding mothers has been challenging, as HCWs report that they lack the skills and confidence to offer this care adequately. Doctors or paediatricians assert that they are not sufficiently prepared for this during their training (27,53) and nurses and midwives globally illustrate that there is a gap in evidence-based content in their curriculum that prepares them for this role (17,54).

One factor that reduced HCW confidence in South Africa to offer care related to breastfeeding were several changes in guidelines and policies due to the HIV pandemic.(55). These guidelines changed in efforts to prevent mother to child transmission (MTCT) of HIV according epidemiological findings (56). They were first updated in 2001, and then in 2008 (57), 2010 (58), 2015 (59), and in 2019 (60). With other developments like the South Africa's Department of Health proclaiming the 2011 Tshwane Declaration for the promotion of breastfeeding (61). These changes

would sometimes result in mixed messaging that in some cases was not supportive of exclusive breastfeeding for all mothers (62). Healthcare workers were expected to adapt with these policies but were not supported with proper policy implementation or ongoing training and education (13). This led to HCW confusion about infant feeding and the risks of HIV transmission through breastfeeding ultimately leading to poor counselling skills (56).

1.3.4 Influence of CMF marketing in universities

Formula milk marketing has grown over the years, with compromising effects on the health of infants and young children as it contributes to the global reduction in the use of breastmilk (14,15). The marketing ofCMF affects healthcare students' and HCW decision making(15). it is seen as a strategy to cast doubt on the quality of breastmilk, therefore positioning formula milk as a perfect medical alternative to breastmilk (14). This is done through the use of science and brand credibility, where research conducted by well-known and historically trusted brands is used to convince healthcare students and HCWs that the properties of formula milk are as good as breastmilk (15).

CMF marketing oversimplifies challenges that parents can go through by posing their product as a solution to the problems that may arise, therefore undermining parents' beliefs and norms (14). Significant to this study, these companies also target healthcare students through financial incentives and medicalisation of infant feeding (29). This is often done through training institutions by offering funding opportunities or formal learning materials to the institutions (14). This creates a phenomenon where HCWs or students may experience a conflict of interest, therefore compromising their integrity and impartiality (29).

The interaction between HCW and CMF companies undermines access to objective and truthful information and may lead to suboptimal advice regarding infant feeding methods (14). Even though there are cases where HCWs support EBF, their interactions with CMF marketing results in recommendations to use formula instead (18). This can be a result of the benefits that are marketed to HCW by the marketing companies, like milk that is suitable for children with allergies or milk that supports a certain kind of growth (29).

The bulk of the literature reviewed in this section is from studies that were conducted in countries outside of Africa, but with some falling in the global South and majority in

the global North. While there are some studies conducted in South Africa in relation to breastfeeding promotion and HCW's beliefs and attitudes in relation to breastfeeding, there is a limited amount of research conducted in the country about how infant feeding is taught in universities. This highlights the need for further research to be conducted in the global South that will be cognisant of contextual factors.

1.4 Problem statement

HCWs have sufficient knowledge about the anatomy and physiology of lactation, but have limited knowledge on how to support breastfeeding parents and how to educate them on the possible challenges they may face (17,19). There is little evidence on how the physiology and the skills that they are taught and trained on are transferred to assist them to offer optimal support to breastfeeding mothers in healthcare or community settings (48). In addition to this, CMF company interactions with clinical students may influence them as practitioners to downplay the unique benefits of breastmilk, thus influencing mothers to opt away from breastmilk (14).

1.5 Justification

Healthcare workers carry the primary responsibility of educating expectant and new parents about breastmilk and all the factors around it (48). There is also evidence from South Africa that HCWs influence infant feeding choices (11). However, there is little evidence illustrating what and how clinical students are taught about infant feeding at undergraduate level in South African universities and clinical training institutions. This study will contribute to the limited available knowledge related to this issue in the South African context. Information generated in this study may contribute to further understanding the role that CMF companies play in South African healthcare training institutions. Understanding the formal methods of IFE and support within these training university settings can help pave ways for undergraduate clinical education to improve learning outcomes, specifically with alignment to the MBFI policy, medical practice, and ultimately health outcomes associated with exclusive breastfeeding for the first six months and continued breastfeeding thereafter.

1.6 Research question

How is infant feeding education taught to clinical health science students at the University of the Witwatersrand?

1.7 Aim

The aim of this study was to explore how infant feeding taught to clinical health science students at the University of the Witwatersrand during the 2024 academic year.

1.8 Objectives

1. To characterize the timing, duration, and delivery methods for infant feeding education to undergraduate clinical health science students from from different degree programmes.

2.To describe the contents of infant feeding education that are delivered to undergraduate clinical health science students.

3. To identify factors within the university that may influence how infant feeding education is taught to undergraduate clinical health science students, including the potential influence of the CMF industry.

CHAPTER 2: MANUSCRIPT

Manuscript preamble

This chapter has been formatted according to the BMC Medical Education Journal author guidelines. A detailed description of the author guidelines and the link to the journal can be found in Appendix 4. However, the spelling (South African) and referencing (Vancouver) for the manuscript is aligned to Wits research report requirements and page numbering is aligned to the overall report. These will be updated prior to submission to the journal in accordance with the journal guidelines. Finally, the references that would usually be found at the end of this manuscript are located at the end of the overall report.

Pamela Maluleke (corresponding author), pamela.maluleke@wits.ac.za, Health and Society Division, *School of Public Health, University of the Witwatersrand, 27 St Andrews Road, Parktown, 2193*

Wiedaad Slemming, wiedaad.slemming@uct.ac.za, Children's Institute, University of Cape Town, 46 Sawkins Road, Rondebosch, 7700

Sara Jewett, sara.nieuwoudt@wits.ac.za, Health and Society Division, School of Public Health, University of the Witwatersrand, 27 St Andrews Road, Parktown, 2193

Abstract

Background

Healthcare workers (HCWs) can have a significant influence on the infant feeding practices that parents choose to undertake, with options varying between breastfeeding and other alternative forms of feeding like formula milk or homemade foods. It is, therefore, important to know what and how healthcare workers are taught and trained on infant feeding. In South Africa, there is a paucity of data on how infant feeding education (IFE) is included in the undergraduate curricula for clinical healthcare students who are being trained to have a direct involvement in patient care. This study explored how IFE was included in the curriculum of undergraduate clinical health science students at one university faculty. The study also sought to understand what influenced how this education was structured and delivered.

Methods

This qualitative study comprised 13 in-depth key informant interviews with staff members involved in either teaching, developing, or curating the curriculum of undergraduate students in Medicine, Nursing, Clinical Medical Practice, and Dentistry at the University of the Witwatersrand, Johannesburg, South Africa. A smaller record review was embedded as part of the study to characterize the timing, duration, and delivery methods of the infant feeding education. The study was conducted between June and July 2024. This paper focuses on the findings from the key informant interviews. We used thematic analysis to analyse the qualitative data.

Results

IFE was included at varying levels across the degrees, with distinct reasons for inclusion and exclusion. Nursing students received more in-depth lessons compared to the other degrees as there was a notion that infant feeding was meant to be a nurse’s job. However, the lessons that were delivered across all degrees were based on the clinical evidence of the benefits of breastfeeding. Other influences of how IFE was structured were the coordinator’s attributes, timetabling constraints, and the lack of prioritisation for IFE.

Conclusion

This study reveals gaps in infant feeding education (IFE) at Wits University's Faculty of Health Sciences, where nursing students receive extensive training, while other clinical degrees offer minimal, unstructured IFE. Most programs emphasize breastfeeding's biological benefits over a holistic biopsychosocial approach, limiting practical application. Though CMF companies did not directly influence the curriculum, their presence in faculty awards subtly shapes perceptions

Key words

Infant feeding education, breastfeeding, clinical undergraduate curricula, South Africa, Commercial Milk Formula

Background

Breastfeeding rates remain sub-optimally low even with the well-documented evidence of its protective factor against mortality and morbidity among children, along with its positive contribution to child growth and development. Over the last decade South Africa was named the country with the lowest exclusive breastfeeding (EBF) rates in Africa (29). This was evidenced in the last Demographic and Health Survey (DHS) where the EBF rate in South Africa in 2016 was 32%, far from the 2025 goal of reaching 50% set by the World Health Assembly (57, p181).

Low breastfeeding rates in South Africa are influenced by a range of factors linked to social determinants of health, starting from the social norms that exist in different communities that shape what breastfeeding mothers and their interpersonal circles believe in and practice when it comes to breastfeeding, to the information that they receive from the healthcare workers (HCWs) that they engage with for advice and health assistance (11).

It is well documented that HCWs are a trusted source of information, as they play an important role in imparting knowledge about breastfeeding and offering support to breastfeeding mothers (18). This was illustrated by a Cochrane review conducted in Australia that found that mothers who had optimal and high-quality support from HCWs were less likely to stop EBF before the recommended six months and had a high sense of confidence in being able to exclusively breastfeed (64). This is also attributed to HCWs being a mother's first contact after giving birth thus offering an important opportunity to ensure new mothers' breastfeeding concerns are met (65).

Healthcare worker's knowledge about infant feeding is often shaped during their undergraduate level in university where they are introduced to anatomical and physiological concepts of the body, and the benefits of breastfeeding, in some cases the introduction of skills needed to engage with breastfeeding mothers (17). The knowledge that is shared with healthcare students at this stage influences their confidence and ability to support breastfeeding mothers more effectively. How this is achieved is fully dependent on how the curricula is set up. The report of the Global Independent Commission on the Education of Health Professionals for the 21st Century asserts that such a curriculum need not focus entirely on memorising and

transferring facts, but rather on the promotion of reasoning and communication skills that will enable students to become healthcare workers that are effective partners, facilitators, advisors and advocates in healthcare (66).

The role of IFE in university environments extends beyond strengthening future HCWs' biomedical knowledge (4). Content should not be limited to the physiology and anatomy of lactation; there is a need to incorporate the transfer of skills on how infant feeding methods can be supported by both families and healthcare workers (2). These skills need to be inclusive of psychosocial and technical skills that will allow HCWs to provide optimal infant feeding care to breastfeeding mothers. The skills include ways on how to effectively educate mothers about the most appropriate infant feeding methods for the best development of infants and children and offer any psychosocial support they may need, including counselling for challenges they may encounter. Research indicates that educating and training HCWs in technical skills related to breastfeeding has the potential to increase breastfeeding rates (28,65,67).

Evidence shows that healthcare workers do not have the self-efficacy that is needed to effectively engage with breastfeeding mothers (5,17,68,69). This phenomenon has been seen over the years and across different contexts. A hist study (23) in the early 2000s documented that HCWs had poor knowledge, low levels of confidence, and low clinical competence concerning breastfeeding. A similar study conducted years later in South Africa reported similar findings where healthcare workers were not comfortable with replicating what was detailed in the guidelines that they use for care, one reason being that the guidelines were frequently changing (30). While we do not cover the evidence of the correlation of how IFE is taught between the two countries, we see a trend where HCWs do not feel well equipped to offer care related to breastfeeding. The study in South Africa also highlighted the gaps that exist between practice and what was taught to HCWs and healthcare students. The persistence of these challenges over the years and in different contexts and settings shows a systematic failure to address the barriers that hinder HCWs from confidently supporting mothers or that hinder educators from sufficiently training students so that they are comfortable in this role.

The education shared with healthcare students is, in some instances, influenced by commercial milk formula (CMF) marketing through its involvement in the affairs of undergraduate training institutions (4,9). This is a growing phenomenon globally in universities where students interact with CMF companies; students develop a sense

of trust towards CMF products, thereby shaping their perceptions of exclusive breastfeeding (14). The same has been documented in South Africa, where healthcare students are exposed to CMF marketing representatives who provide training or sponsor educational activities (29). This has been proven to affect breastfeeding rates as healthcare students develop trust towards CMF products and often perceive them as equivalent to breastmilk. As a result, they are less likely to promote breastfeeding, which can translate to decreased breastfeeding rates thus having an impact on the health outcomes of infants and young children (18). t

It is clear that universities play a significant role in equipping healthcare students with the necessary skills that are needed to support and provide care related to infant feeding. However, there is limited evidence that shows how infant feeding education is framed at the undergraduate level in South Africa. This study aimed to explore how infant education was taught to clinical health science students at one university faculty and to explore the influences of how lessons about infant feeding were designed and delivered to the students.

Methods

Study aim

The aim of this study was to explore how infant feeding education is taught to clinical health science students at Wits University.

Study design

We followed a concurrent mixed method study design to generate this case study. The main component was qualitative, using key informant interviews (KIIs), with a nested record review of training materials, including quantitative elements. The findings reported in this paper will focus on the qualitative interviews.

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We conducted this study at the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa. At the time of the study, the faculty was made up of seven schools: School of Clinical Medicine, School of Therapeutic Sciences, School of Anatomy, School of Physiology, School of Oral Health Sciences, and School of Pathology, and School of Public Health. Six of the seven schools, except for Public Health, offer clinical undergraduate degrees.

These clinical degrees include Medicine and Surgery (MBBCh) where medical doctors are trained, Nursing (BNurs) for professional nurses and midwives, Occupational Therapy, Physiotherapy, Oral Health Sciences (BOHSc) where students are trained to be oral hygienists with a focus on prevention of oral disease and the maintenance of good oral hygiene, Biokinetics, Clinical Medical Practice (BCMP) which is a degree that aims to develop mid-level HCWs, called clinical associates. They have the knowledge, attitude and psychomotor skills to assist doctors and healthcare teams in improving patient care and especially in providing treatment in rural and disadvantaged communities, and Pharmacy (BPharm). The faculty registers approximately 6500 students every year, including postgraduate and undergraduate students.

Participants an

The faculty employs an estimated 330 staff members made up of academic, professional, administrative and support staff. Teaching for clinical students is conducted as a combination of clinical lessons taking place at the various health facilities, classrooms, or various labs, and non-clinical lessons taking place in classrooms as university lectures are carried out. Lessons at the health facilities are supported by 1100 dental and medical consultants and joint staff appointees. While the university has a high number and a great variation of staff members, we limited inclusion in this study to staff members involved directly in coordinating, designing and/or implementing content that is related to infant feeding at the undergraduate level. As such, they formed a very small subset of the entire population.

We used purposive sampling to invite eligible participants into the study. We sampled them based on their school affiliations and their level of involvement in infant feeding content design and delivery. We identified initial contacts from the university websites and faculty recommendations. We supported this sampling by also using respondent-driven sampling, where we asked the staff members that were invited into the study to identify other eligible staff members. The respondent-driven sampling took place after each interview or during the recruitment process for those that did not meet the inclusion criteria. We sent out emails as our initial recruitment to invite participants to form part of the study based on received contact details, we also added in-person recruitment where the author visited eligible participants in their offices. Lecturers and coordinators who taught in MBBCh, BNurs, BOHSc, and BCMP were included in this

study. Lecturers from other clinical degrees refused participation due to lack of content on infant feeding being covered in their curriculum.

Ethical considerations

Prior to the interviews, all participants were provided with an information sheet with details about the research and their role in the research. After this, we obtained their permissions to participate, for their responses to be recorded, and to provide learning material by signing of two consent forms, one being the main form and the other being the audio consent form. Participants were informed that consent could be withdrawn at any time. No data were collected prior to written consent, which was obtained electronically or in-person, depending on the preferred format of the interview.

Data collection procedures

All KIIs were conducted by PM, who was a Masters student within the faculty at the time. PM used a semi structured interview guide, which included questions about the participants' background within the faculty, how lessons on infant feeding are included in the curricula and how that was decided upon, and lastly the influence of CMF companies on the structure of the curricula. There was a combination of in-person and online interviews, which were conducted on Microsoft Teams. All interviews were recorded. For the in-person interview, only the participant and PM were present in the room to ensure confidentiality. All the interviews were conducted in English and ranged between 35 and 60 minutes. After each interview, PM recorded fieldnotes to reflect and record any thoughts, mannerisms of the participants and how the responses were given.

Data management and analysis

All KII audio recordings were transcribed verbatim by PM with the support of Otter.ai (2021). During the process of transcribing, PM created an initial codebook, which combined reoccurring concepts with the interview guide and existing literature, following a hybrid coding approach (70). After transcription, PM imported all the transcripts into MaxQDA (2022) for thematic analysis. The initial codebook was shared with the SJ for input and further development, which she then used to code one transcript, adding more nuanced codes using an inductive approach.(70) PM and

SJ then used MaxQDA to independently code two transcripts with the updated codebook to explore intercoder agreement. The use of both inductive and deductive methods allowed for a blend of data and theory driven codes, which leads to richer and more nuanced insights (71). After this, PM coded the rest of the transcripts with guidance from SJ. After all transcripts were coded, we started the process of summarising the data based on the codes. This process allowed the development of themes based on the data and guided by the research questions.

Positionality

At the time of this study, PM was a Master of Public Health candidate with an educational background in Health Systems Sciences and Bioethics. She has been involved in multiple research projects that were centred around children's health, including a study of institutional breastfeeding support at the same institution, co-led by her supervisors and co-authors on this manuscript. SJ is a qualitative researcher and trained behavioural scientist with specific interest in the social and commercial determinants of infant feeding, with over 10 years of experience in the field. WS is an associate professor with expertise in maternal and child health and nutrition. She has previously been involved in the undergraduate and postgraduate health science education, including curriculum development, in the university. The experience from the team offered depth in the analysis and interpretation of the data.

Results

Sociodemographic details of participants

The study recruited 12 full-time academic staff and one support staff from three of the six schools offering clinical undergraduate degrees in the faculty. Participants held positions as course coordinators, lecturers, heads of departments or heads of schools. There was an exception of one participant who was part of the faculty's Adler Museum, who supported lesson development for some degrees, specifically drawing in lessons about breastfeeding. There was a great variation on the time the participants had been involved in teaching in the faculty, ranging from 16 months to 20 years. Only one of the 12 participants was male.

From the schools which were included in the study, the participants were responsible for teaching, coordination or developing the curricula for the Bachelor of Medicine and Surgery (MBBCh), Bachelor of Clinical Medical Practice (BCMP), Bachelor of

Oral Health Sciences (BOHSc), and Bachelor of Nursing (BNurs) degrees. The duration of these degrees are6 years, 3 years, 3 years, and 4 years respectively. Within these degrees, the first few years are mainly non-clinical with most of the lessons taking place outside of clinical settings like healthcare facilities, but they students are exposed to lessons in laboratories and skills labs. Some of the students are exposed to clinical settings at healthcare facilities during the pre-clinical years, but at a smaller scale. The last year of study, or last two for MBBCh, is often referred to as the clinical years, where students are based in clinical settings full time as part of their curricula.

How IFE is taught to undergraduate clinical health science students

Five key themes were identified illustrating how infant feeding is taught to clinical undergraduate students and the factors that influenced the inclusion or exclusion of infant feeding.

Theme 1: Evidence supports breastfeeding promotion

No matter the form of delivery, which varied, the framing of infant feeding was based on evidence of the benefits of breastfeeding. Participants highlighted the importance of students knowing information that proves how and why breastmilk is best. The core benefits of breastfeeding areaways included in the lessons.

> *Our Department of Paediatrics is very strongly pro-breastfeeding... they [MBBCh students] are definitely told that breastfeeding is best, and the components of the breast milk and the benefits of breastfeeding. They were taught in physiology. - MBBCh KII2*

International and national guidelines ae used to inform the curriculum, which also offers evidence on the benefits of breastmilk. The adaptation of these guidelines is also informed by the science of child nutrition and how breastmilk can be used to improve child nutrition.

> *We adhere to the World Health Organization (WHO) recommendations regarding promotion of breastfeeding… We teach them how much fluid a child requires, what calories they need, how much... the nutritional requirements of a child, and obviously dealing with malnutrition and all of that stuff. The vitamins and all of that – MBBCh KII1*

A guideline that was used by all degrees was the Integrated Management of Childhood Illness (IMCI), which was adopted by the South African National Department of Health from WHO and UNICEF, to help guide HCWs on how to deal with childhood illnesses. This guide provides information about giving a breastfeeding assessment, how to position and attach the baby, how to express milk and cup feed, amounts of milk needed by the infant, information about replacement feeding, feeding recommendations and ways to deal with common breastfeeding problems. There is little information on how to adequately offer psychosocial support to a breastfeeding mother. The level of infant feeding education for the BCMP was based solely on this book.

> *We first start off with IMCI. It's almost like, would you say, a tool that we use in the clinics, mostly for clinicians there. … the nice thing about IMCI is that there's a big portion of just like nutrition. What should you advise the mom about infant feeding? So, we use that to teach the students in term three, so they know how to do that. We teach how to diagnose, we teach how to manage. And then patient education, vaccinations, vitamins that are necessary. And what should the infant feed* – BCMP KII2

However, the applicability of this guideline differed across the different degrees, even though it was intended to be used at the same level across all degrees. Only the nursing students covered it at an appropriate level which taught the students about the hard and soft skills that are necessary for infant feeding management, whereas the other degrees only focused on minimal parts of the guideline, especially knowledge transfer of the benefits of breastfeeding. This was done despite knowing that the IMCI is meant for all HCWs and should be applied uniformly.

> *And that is the thing, this IMCI is not an occupation specific intervention. It's perceived as a nurse's job because it's a primary care intervention… it's a simple strategy to be applied for people who are not comfortable or very well trained in managing sick children in a primary care setting, and sometimes that applies to doctors. … those preventive and promotive components apply to everyone. And so the training materials are the same, but the utilization of it is different, and the applicability of it again." MBBCh KII3*

In addition to this, there was little to no room for the consideration to teach the softer skills that could be needed to fully support parents to infants, especially with the

medicine and BCMP degrees where their training is more focused on clinical diagnoses.

> *They can often recite a list of the benefits of breastfeeding, right? Like what the benefits of breastfeeding are and why. But it's a very superficial academic level that they understand that, and then when it comes to actual implementation, when it comes to actually being able to assist a mother to attach her baby to the breast? It's not even a consideration, not my job, right? – MBBCh KII3*

Theme 2: Influence of educator's personal attributes

Regarding how the inclusion of IFE was informed, there were strong sentiments that the decision to include IFE and how it was included largely fell on those that designed and delivered the lessons. Participants shared how they had individual agency to determine how IFE was covered, with personal experience being an important motivation.

> *So, the division, as it stands, is mainly female run, in terms of the lecturers and the coordinators, and quite a few of them are mothers. So, I think that might increase the awareness, and so it allows for emphasis placed on something that might be forgotten in other degrees. – BCMP KII2*

They explained how the guidelines provided by the school often just stipulated that a certain subject must be covered, but not an in-depth explanation of what was required. In addition to direct experiences with breastfeeding, firsthand work experiences with patients in clinical spaces influenced what some wanted to give students when stationed in the hospitals.

> *So, with that, with the infant feeding, I really try and get somebody working with like a breastfeeding consultant. Then I think having myself being a private midwife before that, that brings that background as well and working in an obstetric unit. I think that brings that experience – BNurs KII3*

However, decisions about content falling completely on individual educators sometimes hindered IFE inclusion. For instance, one participant asserted that the field of IFE was ever-changing, most of which is attributed to the history of HIV and its relationship with infant feeding. The fluidity of the subject matter made it challenging for some educators to keep up and adapt their lessons as they go along.

This was in addition to the expectation that educators need to adapt as HCWs while adapting the curricula, making it overwhelming to include infant feeding education. As one explained:

> *My whole thing about the PMTCT [prevention of mother to child transmission] and then the EMTCT [elimination of mother to child transmission] is they make it very complicated, let's be honest… I understand why they do it, but it's difficult to internalize. It's difficult to learn. And they keep changing it every couple of years. So yes, it is something that we need to know. But quite frankly, knowing it off by heart, I find quite difficult... I think also, like some of the things that we're not absolutely clear -MBBCh KII1*

Theme 3: It is the nurse's job

A prevailing theme across the interviews was that IFE was meant for nursing students. This led to the minimal inclusion of IFE in the BCMP and MBBCh curricula, where their focus was on diagnosis of diseases:

> *So they [MBBCh students] are not taught how to latch and position and burp and how often you should feed, no, the nurses are better at that... We're not very good at it as doctors. So, it's more with the nurses where it is emphasized and taught in great depth. -MBBCh KII2*

Physiology and knowing the benefits of breastmilk was deemed by key informants to be enough for these two clinical degrees, as opposed to teaching skills that are related to the practical components of supporting breastfeeding mothers. One participant described the level of knowledge the students are expected to have:

> *…it's not something that's very much focused on. So just to give you a bit of an understanding; the clinical associates, when they graduate, they graduate to be primary health care generalist, sort of practitioners. So, they're not paediatricians or obstetricians or whatever it is. They are trained to treat overall conditions. And so, some areas they have novice level knowledge. So, with paediatrics in general, or even infant feeding, when they start their paediatrics block, they usually start off with just a very basic introduction - BCMP KII1*

In contrast, nursing students are taught softer skills on how to offer support to breastfeeding mothers in addition to what is stipulated in the IMCI. The study

participants reenforced the faculty position that infant feeding education is the nurses' job. Even a nursing educator did not think of it in any other place outside of their own degree: "*To tell the honest truth, I've never thought about infant feeding in line with other departments" – BNurs KII2*

Among non-nursing educators who were inclined to include IFE in their curricula, scheduling constraints and whether or not they saw the content as central to their degree guided curricular decisions. This was especially true for medicine students who were being trainedto prioritise saving lives or dealing with illnesses as opposed to preventative care. . Drawing on a perspective that healthcare consists of a number of healthcare professionals, one participant expressed that IFE was covered sufficiently in the nursing degree.

> *So, it's [infant feeding] the nurse's job. It's somebody else's job. It's not modelled, because in the department of paediatrics, we're busy teaching… we're like saving lives, dealing with sick children, dealing with illness, dealing with all these sorts of things. So sick childcare takes precedence to a large extent, whereas that very significant… preventive, promotive component of healthcare is often forgotten in a clinical setting,. – MBBCh KII3*

Theme 4: Is IFE really a priority?

Other than nursing, there was no consensus on whether IFE should be prioritised for undergraduate clinical degrees. For instance, one participant from dentistry felt that there was no reason for their students to learn more about infant feeding outside of how the practice related to teeth.

> *It's enough for them to know what causes ECC [early childhood caries], and the risk factors for ECC and how to teach around. But the details of breastfeeding, I didn't even internalize it myself, so maybe it's not much. – BOHSc KII1*

This approach often meant that students had to take initiative if they wanted to learn about infant feeding in the clinical setting, as illustrated by the following participant:

> *In the whole eight weeks, in Paediatrics that there wasn't necessarily a child that they had to give very detailed nutrition counselling for. They will take nutrition history for all their peads [Paediatrics] patients. …. But they never had a very clear learning opportunity where they were to counsel on infant*

feeding and child nutrition, although it's a deliverable on their logbook. Then they must self-direct, like, make a plan, Matron, please, can you call me, even if I'm not here, if you have a child this, like this? So that's self-directed. – BCMP KII2

Connecting to the sentiments above, the bulk of the teaching was supported by clinical based and experiential learning. Students were sent out in their final year(s) to be based full time in healthcare facilities to see in practice the theory that they had learned to that point. However, key informants felt there is sometimes a disconnect between what was taught as the ideal and what happens in practice, as evident in the following quote:

…in the clinical practice, there's not enough hands, because supporting a mom to breastfeed correctly and ensuring that the baby is latched, it takes a lot of time from a care provider. You need to sit and literally watch that feed. You see if there is milk transfer, you see how mom holds baby, and they don't see that happening in the clinical environment because there isn't enough time. The staff that are on duty don't have that time available. It's a luxury to actually support each and every mom with breastfeeding, so unfortunately, what they see in practice is not always in line with what we teach. – BNurs KII1

In addition, the educators expected that if lessons on infant feeding were covered in classes, even to a small degree, students should be well prepared to deal with it in real life. However, they expressed that because student do not get to see or practice this theory, students struggle with applying these ideas

… we've taught them that therefore they should know how to counsel. But in the clinical space, when you actually have to go and apply those skills, there's just, again, it's not prioritised. There's no time for it. -MBBCh KII3

In other instances, timetables made it difficult to schedule more in-depth IFE training. Key informants shared how undergraduate students were overburdened with their modules overall, and that there was always a need to prioritise some modules over others. In such cases, subjects that were mandatory took precedence over IFE.

There's already not enough room, but we must, we need to make it... you see the three years BCMP, we are even looking now to make it four years so that

we can fit in all of these critical components. Because there's so much, there's the anatomy, there's a physiology, pharmacology, they are bombarded. -BCMP KII3

Theme 5: Balancing Industry influence and student opportunities

There were inconsistencies with regards to accounts of the University's regulations towards CMF company presence across the different schools. In one instance, the school of clinical medicine terminated their relationship with Nestlè for prize giving ceremonies for medical students. One of the people who was involved in ending this relationship in the school explained:

So, one of the principles within the paediatric community is we do not collaborate, because our value systems are not aligned. We do not collaborate or associate in any way with breast milk substitute companies or people who promote that. So that's a policy standpoint nationally and internationally…. and it's not that we don't acknowledge that there is a role for formula. It's not that at all, it's just that we're not taking your money and we're not associating ourselves with you at all, ever… because our value systems are so different there cannot be any unity within those formula milk companies and the practice of Paediatrics – MBBCh KII3

In stark contrast, the nursing school still received funding from Nestlè, a CMF company, for best student awards. While the educators were aware of the conflict of interest, they spoke of a dilemma in wanting to channel funding to students, as follows:

Isn't it that we should not be seen to support companies that market infant feeding, now some of our prizes that we do give to students are financed by that same companies. So, it is a bit of an ethical dilemma in terms of contradicting what the code advises. … it's a difficult it's a sticky situation… -BNurs KII2

In other cases, distrust in industry was informed by the best interests of the patients as opposed to the University's regulations. Educators were not willing to expose students to brands that push products that put patients' lives at risk. A comparison

was made between a CMF and a sugar company that had been banished from working with the dentistry departments.

> *I would be worried for the same reason I would be worried if [sugar company] is sponsoring us, because I would ask myself, what is (in) it for them? Because for me, once they [sugar company] sponsor us, then we must acknowledge them, and that's promotion so they are gaining from funding dental students, and yet we are saying sugar is harmful to the teeth. So, I'm seeing a conflict of interest for me. I suppose it's which one is better for a student to get a degree against, what? You know, is it even worth it? It depends. It's like allowing smoking or those cigarette companies to sponsor us. It sounds like conflict, and I would be worried if management isn't frowning upon that…. That's what we advocate for. -BOHSc KII1*

This, however, was met with the ethical dilemma that students benefit greatly from funding. For some, the ends justify the means.

> *…The other side, raising funds for students and to support teaching activities is difficult. This creates a very thin line to allow the use of CMF sponsorship because at the end of the day students get what they need... -MBBCh KII2*

This view was reiterated below by a participant who asserted that cancelling the relationships completely was an extremist measure as there is no direct marketing of formula that takes place.

> *… I'm not certain that such an extreme view is correct, and I don't think that having a prize sponsored by* Nestlè *particularly affects the structure of the teaching of the curriculum, but the World Health Organization does not... They were not particularly advertising formula in the school and Nestle do have other products and things. So, my own personal opinion, is probably to be a little bit less extreme. –MBBCh KII1*

For our study, funding was only reportedly offered to mainstream clinical health sciences degrees like Medicine and Nursing. Other health science degrees that are not clinical (BHSc or Health Systems Sciences) or degrees that have just been introduced and deal with patients directly (Bachelor of Clinical Medical Practice) were often not approached with funding deals.

I am very happy to tell you that we don't have it in HSS [Degree called Health System Sciences], because they don't even really know we exist. I don't think the Nestle's of the world and the commercial milk producers…we can feel the presence of it in nurse training, in early infant support, in prizes in the faculty in research, prizes in the faculty, prizes for MBBCh and nursing students. Its presence is still lurking around the edge of the clinics that people go out to. - BCMP KII1

Discussion

The aim of the study was to explore how infant feeding education is taught to undergraduate clinical health science students at a health science faculty in a University in South Africa. We also explored the factors that influenced how the lessons about infant feeding were designed and delivered to the students, including the potential influence of CMF companies. We found that infant feeding education iss included at varying levels for the different degrees. The nursing degree provided more in-depth lessons and training that include the physiological and the social aspects of infant feeding as opposed to the other degrees. The rest of the degrees focus more on the physiological benefits of breastfeeding. A key finding that was consistent across all themes is that infant feeding education is regarded as the nurses' job.

Across all degrees, except the Bachelor of Oral Health Sciences, there is a salient belief that the scientific evidence that "breast is best" is the appropriate framing for infant feeding education. This is informed by the international and national guidelines that were used to structure some of the lessons. This framing in this university-specific curricula was different from other curricula, in other undergraduate programs, as shown from two studies where the findings show that clinical students in various clinical ungraduate programs were not receiving any evidence based education on infant feeding (4,10). This comparison is made with universities outside of South Africa, due to the lack of comparison literature in the country. The lessons in the

comparative r undergraduate programs, mostly focused on breastmilk being better than formula feeding, which is breast promotion but without the evidence or literature to support it (4). Notably, it has been proven that there is value in understanding the physiology and specific benefits of breastmilk, as it aids in healthcare workers knowing and understanding why it is important to support the drive for increased EBF (5). One study shows that the absence of evidence-based teaching is a contributor to healthcare workers' lack of competencies when it comes to infant feeding care and practices in health facilities (17). However, it is worth noting that students' own urgency to learn and build confidence are also key to developing these necessary skills; lessons alone are not enough to model this (48).

While the use of evidence to teach about breastmilk was modelled well in this university faculty, there was a gap in the transfer of technical skills needed to support and offer care to breastfeeding parents. This was only modelled well for the nursing degree where their lessons delved deep through a biopsychosocial approach. This phenomenon is a constant across different countries where midwives and lactation consultants receive a lot of in-depth training of breastfeeding education, while doctors and other allied healthcare workers receive little to no practical training (45). This fragmentation across the degrees poses a risk, where some students are not receiving the most refined level of education, which can ultimately influence the type of care that they will offer in relation to infant feeding care and practices (72).

This difference between nursing and other degrees can be linked to the history of nursing and its gendered construction as "an extension of women's domestic labour" (1, p2). In South Africa, there was always a hesitancy to add nursing degrees to the university curriculum due to it being viewed as an extension of a woman's domestic labour work (73). It was not seen as something that could fit in the formal academic space which was mostly seen as male male-dominated field (74). It is worth noting that this university was the first to include nursing education in its curricula in South Africa (73). Their efforts to move away from the idea that nursing is designated for women over the years is duly noted, but the after effects are still seen through female lecturers who currently feel they are more likely to include lessons on infant feeding because of their position as women. Such a perspective risks reinforcing the idea that breastfeeding is exclusively a woman's responsibility, overlooking the vital roles that all individuals and lecturers, regardless of gender, can play in advocating and educating about breastfeeding.

The level of care that the different healthcare workers are expected to give in relation to infant feeding education informs what levels of education they receive in their undergraduate studies. For this university faculty, the oral hygiene students received little to no education because they are not expected to give care related to infant feeding when they practice as dentists and oral hygienists. As illustrated by a case study on child oral health in South Africa, where they stated that it is rare for public service oral hygienists and dentists to treat expectant or breastfeeding mothers; rather they are treating children aged 6 years and under, but not infants (75). This differs greatly from other countries like the United Kingdom, where expectant and breastfeeding mothers receive free oral health services for 12 months, making this group of HCWs well-positioned to offer breastfeeding support to these mothers as they operate in settings where they can influence mothers (76). Such instances raise the question of whether standardisation of IFE is necessary across different clinical degrees, given the different global contexts, or if this is an opportunity to make space for interprofessional teaching.

Standardisation of IFE lessons is also an issue when the guidelines used to structure lessons are utilised at varying levels across the degrees, even though they are meant to be applied the same way across all those that use the guidelines. This is especially true in this university faculty, where the 3 (77) and MBFI (9) guidelines were applied at full scope for nursing students and a limited scope for the other degrees. The NDoH posits that these guidelines are meant to equip all health professionals who offer care to infants and children with the necessary skills they need to carry out this task (61,78). The contents of these guidelines are a pathway for effective breastfeeding promotion, which is the cornerstone of increased breastfeeding initiation and continuation, when all healthcare workers who care for infants are sufficiently trained in all necessary skills (45,50). However, given that healthcare professionals offer care to children at different points and in different ways, it may be more useful to have a prescribed level at which each healthcare worker needs to engage with the guidelines.

One approach to this is to establish a minimum standard that all healthcare professionals interact with IFE, to make it applicable in various settings, such as hospitals or clinics. This approach fosters an interdisciplinary approach (79). Although not reported in the literature, this university offers other courses that are shared among different degrees to facilitate interdisciplinary learning (80). One

participant highlighted in the findings that they teach one module across clinical and non-clinical degrees. From as early as the first year, different degrees are expected to have the same competence in certain subjects, such as Physics, Chemistry, Anatomy, or Physiology. IFE can adopt this method, which is already being used as part of the curriculum, rather than as a standalone subject. This task may prove to be difficult, but its applicability has been seen in other subjects and can therefore be applied to the inclusion of IFE.

Motivation for effective breastfeeding promotion is also affected by the gaps between theory in class and the lessons in clinical settings. The clinical-based teaching in this faculty was greatly affected by the shortage of adequate human resources and the constraints that were present in the public clinical facilities used. These challenges have been documented as a constant thing in South Africa where there is a shortage of human resources in the clinical facilities where students receive their clinical training (81) which can be a barrier to effective clinical training. This finding is consistent with a study conducted at a university hospital in Pakistan that shows that shortage of human resources was a barrier to maximising bedside learning as it resulted in time constraints, poor attitudes from the healthcare workers meant to teach, and ward rounds that were too short (82).

The human resource shortage is doubled up by the nature of the fast-paced and chaotic labour wards, where healthcare workers do not have the capacity to guide students step by step when they are teaching (83). In this study, this meant that students were expected to have the agency and the will to self-direct their learning to maximise what they take in within the clinical settings. This becomes problematic in cases where infant feeding care is already not being modelled due to the listed constraints, offering the students little to no room to be proactive in learning about the subject matter. This may act as a barrier to attaining the best education, as Mulcahy and colleagues posit that the best way to train and educate HCWs is through a combination of theory and practice (45).

The combination of theory and practice is also applicable to coordinators, where having coordinators that have worked extensively with infant feeding in clinical settings brings a different approach to the non-clinical teaching. This engages the students beyond the transfer of knowledge and skills and allows them to have a window into the lived experiences of the coordinator as a clinical healthcare worker. A study in Brazil is a good example of this; positive role modelling from the coordinators

who had previously worked with and taught about breastfeeding was proven to have a positive influence on the healthcare students and how they received the education (45). Similar to our study site, another university invited lactation specialists who introduced practical lessons that allowed the students to engage and gain a different outlook towards the lessons about infant feeding. This was proven to be very useful in equipping the students with technical and soft skills for infant feeding care (46).

Inviting specialists and clinically experienced HCWs to give lessons on aspects of infant feeding is particularly valuable as it promotes interdisciplinary teaching. Teaching across different professions promotes collaboration across the different health disciplines, which breaks down degree silos in the university space while enhancing non-hierarchical teams for when the students are now practicing as healthcare workers (66). This approach can also help to de-stigmatise the idea that IFE is only meant for nurses, by incorporating cases where experienced nurses teach students from other degrees or paediatric specialists teaching other degrees and vice versa. This would enforce the idea that infant feeding is a shared responsibility across all health workers. This would also offer an opportunity to ensure that the students are receiving uniform education across the different disciplines. These unique perspectives carry value and highlight the need for a collaborative curriculum design (79).

Collaboration is important because it reduces the likelihood of bias and other personal factors from negatively influencing how a single coordinator designs and delivers lessons about infant feeding care. The influence of the coordinator's personal attributes was highlighted in this study where coordinators were more likely to include IFE because they are female and have breastfed before. While this was an advantage in this university faculty, there may be cases where personal attributes lead to the decreased inclusion of IFE. Additionally, collaboration may also be beneficial in harnessing the different strengths present in a team. For this study some educators expressed a lack of confidence in understanding updates to infant feeding recommendations related to HIV. Frequent changes in national guidelines for HIV-positive mothers have made it challenging to teach using the most current materials.

A study conducted in a township in South Africa highlighted that adapting to these changes is particularly difficult for healthcare workers due to of the lack of ongoing training in most public health facilities (30). This makes it difficult to transfer knowledge and skills to students in the clinical setting. As highlighted by Horwood

and colleagues, shifts in infant feeding practices, especially concerning HIV, can decrease healthcare providers' confidence and lead to inconsistent or suboptimal care delivery or transfer of skills (62,84).

Turning to the matter of CMF companies' influence in this university, the lack of uniform rules in relation to CMF companies in the faculty led to inconsistencies in practice. While they did not have a direct influence on the curricula in this university, they gave awards to nursing students at that time. However, this relationship with Nestlè was terminated after the data collection phase of this study. The relationship between CMF companies and universities is described by Rollins and colleagues as the subconscious marketing of their products (14), as students are at a risk of a positively associating with CMF companies they receive a gift. This phenomenon is something that is seen across universities and healthcare settings whereby CMF companies fund research, studies, work materials, healthcare worker incentives, or training with the aim to gain loyalty from the beneficiaries toward their companies and products (85). This can be made worse when lessons on IFE do not cover normal newborn behaviours, as shown in the results. CMF companies use this gap to convince people that formula milk is a solution to some issues experienced by children(14) like not sleeping throughout the night or certain baby positions.

Some of the educators in this study sample did not see the conflict of interest that is presented by allowing this CMF companies to sponsor students. This is something that also was noted in a study in Mexico, where HCWs actively engaged with CMF companies for educational activities but did not see the harm in this as they believed they were not directly marketing the products or recommending that parents should use these products (16). Over time, this belief that engaging with CMF companies is not harmful can lead to the normalisation of the presence of CMF companies sponsored activities in universities (14,86).

Implications

This case study aimed to explore how infant feeding is taught to undergraduate clinical health science students in this university faculty and outline the factors that affect this. The findings show that IFEhas been stereotyped as a duty that is meant for nurses only. This study highlights the need for defining how each of the healthcare professionals who interface with new mothers and their infants can play a role in upscaling infant feeding. There is a need for collaboration across different degrees to

share teaching duties, given coordinators' unique perspectives and strengths in the subject matter. Furthermore, we highlight the need for continuous learning and training for healthcare workers and teachers, especially in relation to regulations for CMF products at institutions affiliated with HCWs and changes that were implemented to infant feeding guidelines that may have impacted HCWs and educators at the time of change and those impacts have spilled over to the years after .

Limitations

We recognise as a limitation that some key actors were not included as part of the study sample, like hospital-based consultants responsible for teaching, guest lecturers and the students engaging with the lessons. However, a strength is that some of the participants were the heads of schools and overall course coordinators for the degrees; their oversight of curriculum implementation for both clinical and non-clinical settings made them very valuable sources of information.

Additionally, we acknowledge that not all relevant degrees were included in this study. Other professions that are involved in infant and young children feeding, such as Dietetics and Speech and Language therapist, were not represented. The university currently does not offer a degree in Dietetics, and the Speech and Language therapy is housed in a faculty outside of Health Sciences. Despite these limitations, the findings from this study can also be used as the base to create similar case studies in other universities in the country to create an interdisciplinary and contextually informed curriculum.

Conclusion

In conclusion, we see that in this university faculty infant feeding education was classified as something that nurses are more suited to be extensively trained in. We also learn that not all HCWs who interact with children can offer infant and young child feeding related care. This highlights that there may be a need to define what is expected from different healthcare workers in relation to infant feeding and ensure that they are sufficiently taught and trained to carry out those tasks. Furthermore, it highlights that there is value in having clear and consistent sanctions against CMF products in universities so that all educators and students are aware of the implications of interacting with these companies.

List of abbreviations

List of abbreviations can be found at the beginning of this report, but will be located here for the actual manuscript.

Declarations

Ethics approval and consent to participate

Ethical approval was granted by the University of the Witwatersrand's Human Research Ethics Committee (Medical) (M231113). Approval to conduct the study was granted by the University of the Witwatersrand's office of the deputy registrar, and the University of Witwatersrand's Dean of Faculty of Health Sciences.

Prior to the interviews, all participants were provided with an information sheet with details about the research and their role in the research. After this, we obtained their permissions to participate, for their responses to be recorded, and to provide learning material by signing of two consent forms, one being the main form and the other being the audio consent form. Participants were informed that consent can be withdrawn at any time. No data were collected prior to written consent, which was obtained electronically or in-person, depending on the preferred format of the interview. There was no risk to participating in this study.

All personal details of the participants were anonymised by allocating a participant ID for each participant. All recordings, transcripts, and fieldnotes were stored securely on a password protected shared Google Drive, with access limited to the authors

Consent for publication

The information sheet and consent forms informed the participants that parts of their interviews may be quoted and used for publications. These documents were shared with the participants prior to the interviews.

Availability of data and materials

All data generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

PM contributed to all the data socio of the data. PM and SJ analysed and interpreted the data that was used in the study. PM led the write up of the manuscript. SJ and WS reviewed and provided editing support and approved the final manuscript.

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Authors' information (optional)

PM is a postgraduate student and an associate researcher at the University of the Witwatersrand in the School of Public Health in the field of Social and Behaviour Change Communication (SBCC). SJ is a senior lecturer and coordinator of PM's SBCC field of study at the University of the Witwatersrand, School of Public Health. WS is an associate professor and director at the Children's Institute at University of Cape Town. SJ and WS supervised PM's master's research.

References

List of references can be found at the end of this report but will be located here for the actual manuscript.

3. CHAPTER 3: EXTENDED METHODS

3.1 Introduction

This section of the report offers further information on the methods used to conduct the study, which were not included in the manuscript. The manuscript only focused on data that was collected for the qualitative component of the study. This section contains information for the record review's data collection, data management and analysis sections.

3.2 Data collection

After the interviews, detailed in Chapter 2, PM requested participants to provide teaching material that they used in their lessons, to conduct a record review that will support triangulation with interview responses about the content and structure of lessons. The learning materials they shared included links to textbooks, lecture slides, information guides, course outlines, timetables, and syllabus structures, either electronically or in hard copy. In the event that these materials were shared via hard copy, these were scanned and stored on a secure Google Drive folder together with the materials that were shared electronically. The hard copies were then stored in a secure storage space.

3.3 Data management and analysis

The teaching materials that were provided were analysed to quantify the time spent on infant feeding education and to describe the teaching methods used, including the guidelines that structured the lessons, the type of content covered, and the locations where the lessons took place and who was offering the lessons.

PM examined timetables and course outlines from various degree programs, to estimate the amount of time dedicated to infant feeding education. In some cases, the timetables did not specify the duration of these lessons, but participants provided details during the interviews. In instances where lessons on infant feeding were delivered by external guests, this information was also collected and included in the analysis.

To assess the teaching methods used and the types of content, the provided materials were reviewed for text containing keywords such as "breastfeed," "replacement feeds," "infant feed," "counselling breastfeeding," "breastfeeding

promotion," "malnourished," "infants," "nutrition," "formula," and "breastmilk substitutes." This text was then used to categorize the content in the summary tables under the following headings: "content description," "guidelines," "who delivered the lessons," and "where the lessons took place." The findings were synthesized into a summary table.

4. CHAPTER 4: EXTENDED RESULTS

4.1 Introduction

This section of the report contains findings that were not included in the manuscripts, these results are from the record review that was conducted as a smaller component of the study to support the findings from the qualitative data collection.

4.2 Findings

4.2.1 Content description

Table 4.1 outlines the content that was being delivered to students, including the timing of the lessons, the sources used to structure the lessons, the individuals delivering the lessons, and the locations where the lessons took place. The amount of time allocated to IFE varied across the different degrees, depending on the perceived importance of the topic and timetabling constraints.

The differentiation of locations refers to lessons held in health facilities versus those held in classrooms. This distinction often influenced the uniformity of the lessons. Health facility-based lessons are typically ad hoc, occurring only when a patient is in need of infant feeding support presented at the . In contrast, classroom lessons are more structured and are guided by various international and national guidelines.

The guidelines used in these lessons differed across the degrees, though some were common to multiple programs. One guideline used by all the degrees is the IMCI, by the South African NDoH, created by the WHO and UNICEF (77,87). The IMCI guideline provides comprehensive information on managing childhood illnesses and emphasizes the benefits of breastfeeding, the recommended feeding practices at different infant stages, proper latching techniques, and how healthcare workers can assist mothers in initiating breastfeeding.

Another guideline used by multiple degrees was the MBFI, an adapted version of the Baby Friendly Hospital Initiative. This document outlines 10 key steps for healthcare workers to follow to promote and support successful breastfeeding.

A common feature across the degrees is the combination of in-house lectures and the invitation of guest speakers. While some lessons were taught by the program's educators, in other instances, organizations or experts in the field were invited to

deliver the lessons. Importantly, none of the degrees invited speakers who were directly affiliated with CMF companies.

Table 4.1: Summary of timing and methods used to deliver infant feeding education by degree

Degree and Year	Timing	Guidelines	Content	Location	Who is teaching
BCMP 2nd year of 3	Embedded in paediatric rotation (1 lecture in 6 weeks)	Integrated Management of Child Illness (IMCI)	Calculations of infant food requirements.	In class (They are introduced to clinical-based learning here for a week)	Course coordinators
		In-house seven-step pathology guideline	How to advice and counsel the primary caregiver according to pathologies presented.		Invited people: nurses and dieticians, Wits RHI (HIV organisation)
		Road to Health Book (RtH)	Breastfeeding promotion		
		Prevention of Mother to Child Transmission (PMTCT)	Formula differentiation		
			Biopsychosocial history taking		
BCMP 3rd year of 3	Embedded in paediatric rotation (as and when it comes up in the 4 weeks)		Experiential, based on conditions presenting in the clinical setting	Clinical-based learning	Anyone delivering care in their allocated clinical setting supported by their lecturers: Doctors, nurses, dieticians.
MBBCH 5th year of 6	Infection prevention control (IPC) and Community health (as and when it comes up in the 4 weeks)	IMCI	Tasks related to IMCI	Clinical-based learning was complimented by online self-directed learning.	Course coordinators lead the online stuff
		RtH	Nutrition counselling based on history taking (very surface level)		
MBBCH 5th year of 6	Paediatrics (8 weeks, IFE comes up in a few lectures during this time)	Mother Baby Friendly Initiative (MBFI)	Breastfeeding promotion	Clinical setting based	Healthcare workers in allocated health facilities
		Curriculum guides	Amount of fluid needed by infants	Clinical-based learning was complimented by	Course coordinators
					Aurum, Wits RHI

				online self-directed learning.	
MBBCH 3rd &4th of 6	IPC: 1 lesson (a portion of it)	N/A	Only comes in some instances when covering lessons on gastrointestinal tract (GIT) framed as the nutritional requirements for growth	In class	Course coordinators
BOHSc 1st year of 5	Community paediatrics: 1 lesson (a portion of it)	N/A	Included as one of the risk factors to ECC	In class	Course coordinators
BNurs 3rd and 4th year of 4	A standalone concept carried out for 2 weeks	IMCI	Breastfeeding promotion	In class and clinical-based settings.	Course coordinators
		South African Nursing council body	Formula measurement		Invited people: birth specialist, lactation people
		RtH	Latching and positioning		
		National Department of Health recommendations	Barriers and facilitators of IFE/Risk factors		
		World Health Organization and UNICEF documents	Physiology and anatomy		
		MBFI	Care of the newborn		
		Myles Textbook for Midwifery	Commercial Milk Formula		
			Counselling		

5. CHAPTER 5: OVERALL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the key findings from the study. It also includes conclusions and recommendation.

5.2 Discussion of key findings

A key finding of this study is that infant feeding education is integrated in more detail for nursing students as opposed to the other undergraduate clinical degrees included in the study. The literature validates this, as nurses and midwives are perceived as the cornerstone and most important healthcare workers in offering infant feeding care in healthcare facilities (64,84). Midwives are especially important because they are often the first point of contact during the birthing process and after the baby is born; they are often present to teach parents about the first latch and the baby's placement, among other things (49). Therefore, nurses and midwives play a crucial role in breastfeeding initiation. A study has shown that they are the most trusted sources of information regarding infant feeding advice (88).

However, research shows nurses and midwives are not the only clinicians interacting with breastfeeding or expectant mothers (89). General physicians and other allied health professionals interact with these parents at the antenatal or postnatal stages after the baby is discharged. Mulcahy and colleagues (45) showed this through a literature review to test healthcare workers' competence regarding breastfeeding the different roles that healthcare workers can play to support breastfeeding in their specialities.(45) Hookway and Brown further reiterate that breastfeeding is a public health concern that involves all healthcare workers (50).

Nevertheless, our findings show that lessons for medical doctors, dentists, and clinical medical associates did not include transferring skills that equip them for this role. The focus in these degrees was clinically inclined with the aim of saving lives in

critical situations. While this is the case, research shows that increased EBF is a mechanism to save lives and is a preventative measure that should be prioritised as it decreases child morbidity, thus reducing thelikelihood of critical health issues in children (35,38). Victora and colleagues (38) assert that increased breastfeeding could prevent 823,000 annual deaths in children younger than 5 years and 20,000 annual deaths from breast cancer.. This finding supports the mandate the degrees mentioned above hope to achieve, thus highlighting the need to reframe EBF as a life-saving mechanism for infants and young children, and to therefore increase its inclusion and prioritisation in the students' curriculum.

The first objective of the study was to characterise the timing, duration, and delivery methods for infant feeding education for clinical health science students from different schools. As shown in Table 4.1, there was a more structured approach to lessons that took place in class than lessons that took place in clinical settings. Lessons in clinical spaces only happened in an ad hoc manner, when they were presented with an infant feeding case. This finding is consistent with data from a study in the UK that showed that clinical lessons on breastfeeding for medical students were often unstructured and happened on an ad hoc basis.(27) The same study reported that the lessons were also carried out during the paediatrics module, just like in our sample (27). Clinical setting learning has been cited as an important tool for transferring learning for clinical students (2,82,90). Breastfeeding education not being modelled in this setting is a disadvantage for the students.

In addition to this, there was very little time allocated specifically for IFE across all degrees, except nursing, which had a standalone module. This finding contrasts with other research, where most curricula followed the MBFI recommendation that healthcare students receive a minimum of 20 hours of teaching on breastfeeding to be adequately trained.(7) Notably, even with these requirements being met, participants from other studies felt they required more lessons to effectively support breastfeeding (7,8). This highlights that a single or portion of a lesson cannot equip students with all the theory and skills needed to support breastfeeding effectively.

Another study objective was to describe the content of infant feeding delivered to the clinical students. A key finding here was that lessons were based on the foundations of the benefits of breastfeeding, except for the nursing and BCMP degrees that took into account the biopsychosocial aspects of giving care related to infant feeding. The

biopsychosocial approach appreciates that not only biological factors need to be taken into consideration when transferring skills and knowledge about infant feeding, this approach takes on a holistic and relevant framework for educating healthcare workers that accounts for psychological and social factors that mothers may encounter (23,91). This is in conjunction with what Moukarzel and colleagues assert, that lessons on breastfeeding need to be grounded in a biopsychosocial approach as opposed to just the transfer of biology lessons (4).

Participants in this case study noted a downside to focusing on biological content only, where medicine students were reported to be able to recite the components and benefits of breastmilk but unable to utilise that knowledge and have it transferred to actual skills when they were tested in clinical settings. Literature shows that this phenomenon is common across all health professionals, including nurses, where healthcare workers feel that they were trained inadequately using this approach to be able to support breastfeeding (7,24,27,69,89). This phenomenon has been seen for several years, with a study illustrating this from over 25 years ago (53). The persistence of this over the years highlights the need to act on it and prioritise the adequate training of healthcare workers in infant feeding care. There needs to be consideration for curriculum changes and upscaling, where IFE is framed in a way that students can gain the confidence that is needed to effectively practice. Finally, the third objective was to identify factors within the university that affected how IFE was included in the curriculum. Findings here showed that timetabling constraints, educators' personal attributes such as gender or prior working experiences, and prioritising other lessons predicted what would be included in the lessons.

Notably, in this case study, CMF companies did not directly influence the curricula of clinical students. This finding is in contrast to other research that shows that when CMF companies are connected with universities, they influence how breastfeeding is taught in those environments (14). However, one CMF company gave awards to one school in the faculty. This has been documented as a way to change students' and educators' attitudes toward breastmilk and formula milk (29,86,92). Partly as a result of a study interviews, the school has since decided to withdraw the CMF prize.

5.3 Conclusions

This study highlights significant gaps in how IFE is integrated into clinical healthcare curricula at Wits University's Faculty of Health Sciences. While nursing students receive extensive training, other clinical degrees provide minimal and often unstructured IFE. Additionally, most programs focus on the biological benefits of breastfeeding rather than a holistic biopsychosocial approach, limiting students' ability to apply their knowledge in clinical settings. Although CMF companies did not directly influence the curriculum, their presence in faculty awards highlights the subtle ways formula marketing can shape perceptions.

5.4 Recommendations

Implement the BFHI's recommendation that all healthcare workers need a minimum of 20 hours of breastfeeding teaching to be adequately trained

The Baby-Friendly Hospital Initiative(9) has 10 steps to successful breastfeeding and regulations to be followed by healthcare workers to improve breastfeeding rates. The World Health Organisation recommends that all health care workers need to be trained in this during their undergraduate training (93). Part of this is the recommendation that all healthcare workers need a minimum of 20 hours of lessons, 8 hours of which are practical, of breastfeeding to be adequately trained (9).In addition to this, the WHO offers a 40 hour breastfeeding course that is meant to equip HCWs with the skills needed to support mothers to breastfeed optimally. (94)

Given the state of academic hospitals, it is not always possible to have practical lessons in hospitals (95). However, recent research shows that simulation labs have been very effective in achieving the same goals (65). University institutions can consider this as an approach to model the skills that they need in settings that are similar to healthcare facilities, or adopt the WHO course which does not need to be a health facility.This approach will allow for educators to test the skills that they students have using practical methods.

Provide ongoing and relevant training for all educators

Most educators in this sample were healthcare workers who have either practiced in their relevant fields or transitioned into academia directly. Given the role that they play in educating future healthcare workers it is important that remain up to date with

the latest development in the relevant fields. The National Department of Health asserts that continuous training is mandated for all healthcare workers to ensure that they are well equipped to to provide high-quality care in breastfeeding and infant care.(96) This highlights the importance of ongoing learning and training for the development of educators as well.

University institutions should therefore have a responsibility to create structured mechanisms that facilitate and encourage this ongoing training. This could include regular workshops, seminars or training programs tailored specifically for infant care. In addition to this, educators should take it upon themselves to upskill and make sure the content they give is relevant to current state of health (93). This can be done through participation in conferences, symposia or collaborative research initiatives in the field of infant care.

Incorporate interdisciplinary perspectives to enrich course development and foster collaboration across all schools in health science faculties

Frenk and colleagues assert that promoting interdisciplinary and trans-professional education breaks down professional silos and enhances collaborative and non-hierarchical relationships between the different degrees (66). As such, the notion that infant feeding is meant for one profession could be broken down through the joining of the different schools in institutions. They further illustrate that there is a dire need to move away from the idea that the “lessor” jobs belong to the “lessor” degrees, just like the difference between medical and nursing students (66).

This idea joins together all schools and departments with the common goal of training healthcare workers that will be able to provide the best care in all avenues that they are a part of. This interdisciplinary approach includes sharing teaching tasks across different schools and harnessing different individual strengths that may exist within the different departments.

Develop institutional policies and regulations that align with global health standards to prevent conflicts of interest with CMF companies.

The aims to protect and promote breastfeeding in institutions affiliated with healthcare workers by regulating the inappropriate marketing of CMF products. That is to remove any commercial pressures, avoid creating any conflicts of interest or

incentives for health professionals, and to ensure that there is no financial support for health professionals working with infant feeding care that can create conflicts of interest (97).

CMF companies often use sponsorship as a form of advertising which may seem like it does not directly go against the regulation. As such, university institutions need to raise awareness on conflict of interest and develop policies and regulations that are in alignment with this code so that CMF companies do not have the grounding to be affiliated with the universities. In this way, healthcare students are aware from early on in their careers of the conflict of interest that may arise from collaborating with such companies.

Conduct further research with students and early-career career clinical HCWs

To carry forward the vision of decolonising higher education and ensuring that curricula are designed to suit the needs of society, the people who are being taught need to form part of this conversation (20). A valuable direction for research would be to explore the perspectives of students and early-career HCWs. Such research has been conducted at great lengths in order countries and captured student's lack of self-efficacy was provide some recommendations on how to carry this forward in their contexts (8,17,44,98).

Their perspectives could give insights into how theory and the skills taught are internalised and how this translates to preparedness for clinical work related to infant feeding. These insights will also be valuable in ensuring that the way curricula are designed achieves its intended purpose, while contributing to the broader conversation that is transforming health science higher education.

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APPENDICES

Appendix 1: Plagiarism declaration

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Pamela Maluleke (Student number: 1634714) am a student registered for the degree of Master of Publich Health (SBCC) in the academic year 2025.

I hereby declare the following:

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

Signature: _____ Date: 11/09/2025

Appendix 2: Turnitin cover page



Note that full report was checked and similarity relates to student's own protocol that was submitted as an assignment, standard forms (declaration) and references. I'm satisfied there was not plagiarism.

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Appendix 3: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research and Innovation)

TO: Ms P Maluleke
School of Public Health
Medical School
University

E-mail: 1634714@students.wits.ac.za

CC: Supervisor: Professor W Slemming and Dr S Nieuwoudt
Wiedaad.Slemming@uct.ac.za
and <HREC-Medical Research Office@wits.ac.za>

FROM: Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 7 March 2024

REF: R14/49

PROTOCOL NO: **M231113** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

PROJECT TITLE: *Integration of infant feeding in clinical undergraduate education: a case study of one South African university faculty*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.



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Appendix 4: Journal guidelines for authors

BMC Medical Journal

Link to Journal: https://bmcmededuc.biomedcentral.com

Title page

The title page should:

- present a title that includes, if appropriate, the study design e.g.:
    - "A versus B in the treatment of C: a randomized controlled trial", "X is a risk factor for Y: a case control study", "What is the impact of factor X on subject Y: A systematic review"
    - or for non-clinical or non-research studies a description of what the article reports
- list the full names and institutional addresses for all authors
    - if a collaboration group should be listed as an author, please list the Group name as an author. If you would like the names of the individual members of the Group to be searchable through their individual PubMed records, please include this information in the "Acknowledgements" section in accordance with the instructions below
    - Large Language Models (LLMs), such as ChatGPT, do not currently satisfy our authorship criteria. Notably an attribution of authorship carries with it accountability for the work, which cannot be effectively applied to LLMs. Use of an LLM should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript.
- indicate the corresponding author

Abstract

The Abstract should not exceed 350 words. Please minimize the use of abbreviations and do not cite references in the abstract. Reports of randomized controlled trials should follow the CONSORT extension for abstracts. The abstract must include the following separate sections:

- Background: the context and purpose of the study
- Methods: how the study was performed and statistical tests used
- Results: the main findings
- Conclusions: brief summary and potential implications
- Trial registration: If your article reports the results of a health care intervention on human participants, it must be registered in an appropriate registry and the

registration number and date of registration should be stated in this section. If it was not registered prospectively (before enrollment of the first participant), you should include the words 'retrospectively registered'. See our editorial policies for more information on trial registration

Keywords

Three to ten keywords representing the main content of the article.

Background

The Background section should explain the background to the study, its aims, a summary of the existing literature and why this study was necessary or its contribution to the field.

Methods

The methods section should include:

- the aim, design and setting of the study
- the characteristics of participants or description of materials
- a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses
- the type of statistical analysis used, including a power calculation if appropriate

Results

This should include the findings of the study including, if appropriate, results of statistical analysis which must be included either in the text or as tables and figures.

Discussion

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study.

Conclusions

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported.

List of abbreviations

If abbreviations are used in the text they should be defined in the text at first use, and a list of abbreviations should be provided.

Declarations

All manuscripts must contain the following sections under the heading 'Declarations':

- Ethics approval and consent to participate

- Consent for publication
- Availability of data and materials
- Competing interests
- Funding
- Authors' contributions
- Acknowledgements
- Authors' information (optional)

Please see below for details on the information to be included in these sections.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

Ethics approval and consent to participate

Manuscripts reporting studies involving human participants, human data or human tissue must:

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- include the name of the ethics committee that approved the study and the committee's reference number if appropriate

Studies involving animals must include a statement on ethics approval and for experimental studies involving client-owned animals, authors must also include a statement on informed consent from the client or owner.

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If your manuscript contains any individual person's data in any form (including any individual details, images or videos), consent for publication must be obtained from that person, or in the case of children, their parent or legal guardian. All presentations of case reports must have consent for publication.

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- The datasets generated and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS]

- All data generated or analysed during this study are included in this published article [and its supplementary information files].
- The datasets generated and/or analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.
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The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].[Reference number]

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Acknowledgements

Please acknowledge anyone who contributed towards the article who does not meet the criteria for authorship including anyone who provided professional writing services or materials.

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Always use footnotes instead of endnotes.

References

Vancouver reference style

Appendix 5: Signed letter stating the contribution of the candidate to the manuscript

Pamela Maluleke
141 Brushwood Complex
505 West Avenue
Ferndale, 2194
11 March 2025

Wits University
School of Public Health
27 St Andrews
Parktown
2193

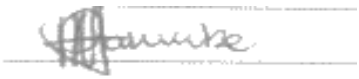
To Whom It May Concern:
Dear Sir/ Madam

RE: Contribution of candidate to the manuscript

This letter serves to highlight the contribution by Pamela Maluleke to the manuscript. Pamela led the collection of data. She also led the analysis and interpretation of the data that was used in the study, with support from her supervisors, Dr Sara Jewett (Nieuwoudt) and Prof Wiedaad Slemming. Pamela also led the write up of the manuscript.

Sincerely,
Pamela
Maluleke
pamela.maluleke@wits.ac.za

+27 (71) 795 0715



Appendix 6: Key Informant Interview Guide

Introductory text

To begin with, I would like to get some background context about your position and role within the faculty, after which we will discuss in greater depth the actual teaching content and delivery of infant feeding education.

Section A. Background:

1. Which school(s) do you work under in FHS? _____
2. What is your role and position? _____
3. How long have you been working in your present position? _____
4. Which module(s)/degree(s) are you involved with coordinating? _____
5. Any additional details to share around your experience in this role?
6. What is your involvement in the delivery of infant feeding education, e.g. coordination, preparing and/or delivering content?

Section B: Current content and delivery (NB: Probe for differences/similarities between courses if they are involved in more than one)

1. How is the topic of infant feeding currently included in the curriculum? Probe for which aspects of infant feeding are covered during the lessons, e.g. breastfeeding, formula feeding, physiology and/or anatomy
2. When are students exposed to topics related to infant feeding for different modules/degrees or the one you work with? Probe academic year(s) and timing of exposure.
3. How is the content and delivery of lessons monitored and regulated?
4. Who delivers lesson content and how is that decided? Probe on how external individuals or organizations are identified, if relevant.
5. What are the current approaches for delivering infant feeding education to students?
   Probe for methods used to deliver lessons, e.g. interactive lectures, tutorials, practicals, PPT (voice/no voice), etc.
6. To your knowledge, how does infant feeding education delivery vary cross the different schools/degrees in the faculty?

Section B: Factors influencing how content is structured and delivered

1. What factors within the faculty influence how infant feeding education is structured and delivered? Probe for any policies or guidelines. Also probe on availability of resources, funding, faculty experience, teaching material, if it hasn't come up organically before.
2. How much does collaboration or external support contribute to infant feeding education? Ask them to elaborate if this is taking place.

3. How do you see the role of commercial milk formula companies, such as Nestle or others, in relation to infant feeding education? Probe if they think such companies have any influence on how lessons are structured and delivered.
4. How do you see the role of CMF companies in relation to supporting other efforts in the university space, such as student bursaries or university funding? Probe their understanding of conflict of interest.

Section C: Closing questions

1. How could the university improve its infant feeding education for the students with whom you work?
2. Is there anything else you would like to share?

As part of this study, I'm also seeking to characterise in a more quantitative way what is taking place. If you can provide me with details (now or later via email), that would be helpful. I am also seeking access to the actual teaching materials, such as textbooks, lecture slides such as PowerPoint presentations (or any format used), articles, timetables, syllabus structure and information guides.

Details being sought:

1. What is the total amount of time dedicated to infant feeding with the clinical courses?
2. How many hours/weeks over the course of a semester?
3. Who is delivering the lessons on infant feeding?
4. What kind of learning materials are used to support the delivery of infant feeding education?

Finally, is there anyone else you from this Faculty who you think I should talk to about this topic?

Thank you!