# Complementary feeding knowledge and practices of health care personnel in Primary Health Care facilities in West Rand Health District


## CL van Rensburg

orcid.org 0000-0001-8903-3025


Dissertation submitted in partial fulfilment of the requirements for the degree *Master of Science in Dietetics* at the North-West University

Supervisor: Prof L Havemann-Nel

Co-Supervisor: Mrs Chantell Witten

Examination: November 2019

Student number: 21655626

# ACKNOWLEDGEMENTS

*"Never regard your study as a duty, but as the enviable opportunity to learn the liberating beauty of the intellect for your own personal joy and for the profit of the community to which your later work will belong."- Albert Einstein*

What a privilege it has been to start and finish this task as the ultimate opportunity to grow as a human being, a Dietitian and a student. I am honoured and grateful that I have been blessed to embark on this journey and successfully reach the end of a life-changing journey. This process has not been without its challenges and it gives me great pleasure to thank and show appreciation to all that supported me during these past few years.

To Prof. Lize Havemann-Nel: "Setting an example is not the main means of influencing another, it is the only means."- Albert Einstein. Thank you for setting the most inspirational example to me during this journey. You repeatedly showed me what it means to be a brilliant researcher and academic scholar. Your hard work, determination and perseverance left me in awe and motivated me on a constant basis. Thank you for understanding when challenges occurred and supporting me constantly throughout this process. I have acquired immense knowledge from you and in you I have found a role model to look up to when going forward onto new endeavours.

To Mrs. Chantell Witten: What an honour it has been to work with you and get to know you. Your energy and passion is infectious and you have challenged me on so many levels. Your knowledge and wisdom left me speechless at times, but your input was invaluable and I will never forget the skills and knowledge that you shared with me. Thank you for sharing your passion and amazing knowledge with me to make me a better student and Dietitian.

To the administrative team at the Subject group for Nutrition at North-West University (NWU) Potchefstroom Campus: Thank you for all the calls, e-mails, enquiries and support I received from you during this long journey. I truly appreciate your invaluable efforts.

To Prof. Marius Smuts: Thank you for signing off on all my extensions, interruptions and re-registrations. Without your support and understanding I would not have been able to finish this immense task. I thank you with sincere gratitude.

To West Rand Health District (WRHD) I would like to extend a special thank you for allowing me into your health district and Primary Health Care (PHC) facilities. WRHD has been my home for

seven years and I am immensely grateful for your support in conducting this research in your district and health facilities. Thank you.

To my colleagues at the Department of Human Nutrition at Leratong Hospital: Thank you for always understanding and for all your support. Thank you for your interest in my research and for constantly encouraging me and enquiring about my progress and lastly, thank you for understanding when I needed to take time off to complete this task.

To my uncle, J.P. van Rensburg, I would like to thank him for the financial support that he provided to me when I so desperately needed it. Thank you for never hesitating to help me. No request was ever too much or too big.

To my life partner and best friend, Wynand: There is no way that I would have been able to complete this task without your support. You supported me physically, emotionally and mentally. Always showing understanding, love and kindness. Being there, keeping the home fires burning and just being an ear and shoulder when I was frustrated or de-motivated. You are my knight in shining armour and no words would ever be enough to thank you. You and Charles have made this last stretch possible and I love you both to the ends of the earth.

To my brother, Kéan van Rensburg: You are a complete genius and an amazing brother. You spent hours and hours and hours helping me to finalise and format my final document and I will never be able to repay you for your help. You have been an integral part in the completion of this task and I sincerely thank you with all the love and gratitude in my heart. I am so proud of you and wish you all the success in the world with the next chapter in your life.

And lastly, my “Rent a crowd”: My biggests fans and biggest supporters, my family. Thank you for your financial support, physical support and emotional support. Thank you for always being there when I needed ANYTHING; your encouraging words, accepting my frustrations and impatience and providing me with the strength to complete this journey. I will never forget what you have done for me. The “Van Rensburgs” always stick together, because that is what family does.

To anybody that I did not mention, I apologise. This has been an intense journey for me and so many contributed to my success. I thank you all with all the gratitude in my heart.

Finally, I would like to dedicate my Masters degree to my aunt, Maryke Schoeman. The epitome of strength and perseverance, may your legacy live on in all our lives.

*“Were you brave?” – Suna Venter*

# ABSTRACT

**Background**

The United Nations Children's fund (UNICEF) regard the complementary feeding period (6 – 24 months of age) as critical to ensure optimal child health, growth and development (UNICEF, 2019:2). Inadequate and inappropriate complementary feeding practices are identified as one of the key determinants of the high rates of stunting as well as overweight and obesity that is currently prevalent among infants and young children in South Africa (NDoH, Statistics SA, SAMRC & ICF, 2017:27). The provision of adequate and appropriate complementary feeding education and counselling by health care personnel to mothers/caregivers of infants and young children in Primary Health Care (PHC) facilities is considered to be one of the key strategies to improve complementary feeding practices at household level (Mushaphi *et al.*, 2015:99). Even though there is limited recent studies on the knowledge and practices of health care personnel on complementary feeding practices, some resources have been able to identify selective provision of education and counselling on complementary feeding practices, and the communication of inaccurate and inconsistent complementary feeding messages to mothers/caregivers of infants and young children (Matlala, 2017:6). The aim of this study was to determine the knowledge and practices of health care personnel regarding the provision of adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in PHC facilities in West Rand Health District (WRHD).

**Objectives**

The objectives of this study were to determine the knowledge of health care personnel with regard to adequate and appropriate complementary feeding practices as stipulated in the Road to Health Booklet (RtHB)/Side-by-Side booklet. Secondly, to assess the current practices of health care personnel in providing adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children. The final objective was to compare the knowledge and practices of clinical and non-clinical health care personnel on the adequate and appropriate complementary feeding education and counselling provided to mothers/caregivers in line with the promotional messages in the RtHB/Side-by-Side booklet.

**Methods**

This study was an observational study with a descriptive cross-sectional design that employed a quantitative approach to determine and assess the knowledge and practices of health care personnel with regard to complementary feeding education and counselling in PHC facilities in WRHD. The study population included health care personnel who regularly engage with mothers/caregivers of infants and young children aged 6 – 24 months (complementary feeding period) in 23 PHC facilities in WRHD. Health care personnel included in the study were professional nurses (PNs), enrolled nurses (ENs), enrolled nursing assistants (ENAs) (clinical health care personnel), and community health care workers (CHWs), lay counsellors, health promoters (HPs) and mentor mother counsellors (MMCs) (non-clinical health care personnel). Health care personnel excluded from the study were community district dietitians and medical practitioners. Participants were required to complete a pre-tested knowledge and practices questionnaire (Only available in English) that was developed based on the complementary feeding promotional messages in the RtHB/Side-by-Side booklet.

**Main findings**

The total mean knowledge score on adequate and appropriate complementary feeding for health care personnel in the present study was only 44% (SD 18), despite the fact that the majority of them (77%; n=85) indicated that they have received some form of training on infant and young child feeding (IYCF). Clinical health care personnel achieved a higher knowledge score compared to non-clinical health care personnel [53 (46, 60)% vs. 33 (20, 47)%, $p<0.001$]. Knowledge regarding the correct age for the introduction of complementary foods, recognition that animal foods and mashed legumes are examples of appropriate complementary foods, identification of food sources rich in Vitamin C and food safety principles were good. However, knowledge regarding meal frequency, meal quantity, identification of food sources rich in Vitamin A, recommended drinks/milk in the complementary feeding period and responsive feeding practices was generally poor. Although the majority of health care personnel reported that they 'routinely' give complementary feeding advice (77%; n=86 ), complementary feeding education and counselling was mostly provided to pregnant women only (63%; n=70) and when baby is 6 months old (50%; n=56). Only 31% (n=34) of health care personnel reported that they utilise routine well-baby visits for the provision of complementary feeding education and counselling. The RtHB was the most common (67%; n=74) reported source of information on IYCF.

**Conclusion**

Although health care personnel working in PHC facilities in WRHD do provide education and counselling regarding complementary feeding, mostly during pregnancy and when the infant is six months old, the overall mean knowledge score in this study was low. The non-clinical health care personnel achieved the lowest scores and areas of particular concern included meal frequency, meal quantity, recommended drinks/milk from 12 months of age, Vitamin A rich sources of complementary foods and responsive feeding practices. This study highlights the need to improve the knowledge and practices of health care personnel pertaining to adequate complementary feeding. Capacity can be built by providing regular refresher trainings on adequate and appropriate complementary feeding practices, with emphasis on meal frequency, meal quantity, recommended drinks/milk from 12 months of age, Vitamin A rich sources of complementary foods and responsive feeding practices. Furthermore, routine provision of complementary feeding education and counselling, not only to pregnant women but also to mothers/caregivers with infants and young children up to two years of age should be emphasised, and the particular barriers for not providing routine education should be identified and addressed.

**Key words**

Complementary feeding, complementary feeding diet, health care personnel, knowledge, practices, infants, young children, South Africa.

# OPSOMMING


**Agtergrond**

Die komplementêre voedingsperiode is ‘n kritieke tydperk om te verseker dat babas en jong kinders optimale gesondheid, groei en ontwikkeling bereik (UNICEF, 2019:2). Onvoldoende en onvanpaste komplementêre voedingspraktyke word geïdentifiseer as een van die oorsake van die hoë voorkoms van dwerggroei, oorgewig en obesiteit wat huidiglik voorkom in babas en jong kinders in Suid Afrika (NDoH, Statistics SA, SAMRC & ICF, 2017:27). Die voorsiening van voldoende en toepaslike komplementêre voedingsberading aan moeders/versorgers van babas en jong kinders in primêre gesondheidsorgklinieke deur gesondheidspersoneel word beskou as ‘n sleutel strategie om komplementêre voedingspraktyke op huishoudelike vlak te verbeter (Mushaphi *et al.*, 2015:99). Alhoewel daar slegs ‘n beperkte hoeveelheid studies gepubliseer is aangaande die kennis en praktyke van gesondheidspersoneel met betrekking tot komplementêre voeding, is daar wel bronne wat bewys het dat gesondheidspersoneel uiters selektief is oor die voorsiening van komplementêre voedingsberading sowel as die feit dat onakkurate boodskappe oorgedra word ten opsigte van komplementêre voeding aan moeders/versorgers van babas en jong kinders (Matlala, 2017:6). Die hoofdoel van hierdie studie was om die kennis en praktyke van gesondheidspersoneel in primêre gesondheidsorgklinieke in die Wesrand gesondheidsdistrik ten opsigte van voldoende en toepaslike komplementêre voedingsberading aan moeders/versorgers van babas en jong kinders, te evalueer.

**Doelwitte**

Die doelwitte van die studie was om die komplementêre voedings kennis van gesondheidspersoneel in primêre gesondheidsorgklinieke in die Wesrand gesondheidsdistrik te evalueer na aanleiding van die komplementêre voedingsboodskappe wat in die “Road to Health Booklet” (RtHB)/”Side-by-Side booklet” aangedui is. Tweedens was dit om die praktyke van gesondheidspersoneel ten opsigte van die voorsiening van komplementêre voedingsberading aan moeders/versorgers, te evalueer. Laastens was dit om die kennis en praktyke van kliniese en nie-kliniese gesondheidspersoneel te vergelyk met betrekking to komplementêre voedingsberading.

**Metodes**

Hierdie studie was ‘n waarnemingstudie met ‘n beskrywende deursnit ontwerp wat ‘n kwantitatiewe benadering gevolg het om die kennis en praktyke van gesondheidspersoneel in

primêre gesondheidsorgklinieke in die Wesrand gesondheidsdistrik ten opsigte van komplementêre voedingsberading te evalueer. ‘n Kennis en praktyk vraelys wat vooraf getoets is en gebaseer is op die komplementêre voedingsboodskappe in die RtHB/”Side-by-Side booklet”, is voltooi deur gesondheidspersoneel wat in kontak kom met moeders/versorgers van babas en jong kinders (6 – 24 maande) in 23 primêre gesondheidsklinieke in die Wesrand gesondheidsdistrik. Kliniese gesondheidspersoneel wat ingesluit was in die studie sluit in Professionele verpleegsters en Assistent verpleegsters. Nie-kliniese gesondheidspersoneel sluit in gemeenskapsgesondheidswerkers, algemene gesondheidsberaders, gesondheidspromotors en moeder-tot moeder portuurberaders.

**Hoof bevindinge**

Die gemiddelde kennis telling van gesondheidspersoneel oor voldoende en toepaslike komplementêre voeding was 44% (SD 18), ten spyte van die feit dat die meerderheid (77%; n=85) van die gesondheidspersoneel aangedui het dat hul wel opleiding ontvang het in baba en jong kind voeding. Kliniese gesondheidspersoneel het ‘n hoër kennis telling bereik as nie-kliniese gesondheidspersoneel [53 (46, 60)% vs. 33 (20, 47)%, $p<0.001$]. Die kennis van gesondheidspersoneel ten opsigte van die inleiding van komplementêre voedsels, voortgesette borsvoeding (6 – 12 maande), die kwaliteit van die komplementêre voeding dieet (dierlike voedsels, peulgewasse, voedsels ryk in Yster, voedsels ryk in Vitamien C en ‘n verskeidenheid van voedselgroepe) sowel as voedsel veiligheidsbeginsels, was voldoende. Die gemiddelde kennis tellings vir die volgende kategorieë met betrekking to komplementêre voeding was egter swak: maaltyd frekwensie, voedsel hoeveelheid per maaltyd, gepaste vloeistowwe wat aanbeveel word vir babas en jong kinders om te drink, goeie bronne van Vitamien A en praktiese voedingspraktyke. ‘n Totaal van 77% (n=86) van die gesondheidspersoneel het aangedui dat hulle komplementêre voedingsberading aan moeders/versorgers verskaf op ‘n gereelde basis. Meeste van die komplementêre voedingsberading word tydens swangerskap (63%; n=70) gegee en wanneer die baba 6 maande (50%; n=56) oud word. Slegs 31% (n=70) van die gesondheidspersoneel het aangedui dat hul gereelde kliniek besoeke gebruik om komplementêre voedingsberading aan te bied aan moeders/versorgers van babas en jong kinders. Meer as die helfte (67%; n=74) van die gesondheidspersoneel het aangedui dat hulle die RtHB/”Side-by-Side booklet” as ‘n bron van informasie oor optimale komplementêre voeding gebruik.

**Gevolgtrekking**

Alhoewel gesondheidspersoneel aangedui het dat hul wel komplementêre voedingsberading aan moeders/versorgers van babas en jong kinders verskaf, het hierdie studie getoon dat gesondheidspersoneel in primêre gesondheidsorgklinieke in die Wesrand gesondheidsdistrik onvoldoende kennis het aangaande die komplementêre voedings boodskappe wat in die RtHB/"Side-by-Side booklet" voorkom. Kliniese gesondheidspersoneel se kennis aangaande die komplementêre voedingsboodskappe in die RtHB/"Side-by-Side booklet" was beter as die kennis van die nie-kliniese gesonheidspersoneel. Areas van komplementêre voeding wat spesiale aandag nodig het tydens opknappingskursusse sluit in maaltyd frekwensie, voedsel hoeveelheid per maaltyd, gepaste vloeistowwe wat aanbeveel word vir babas en jong kinders om te drink, voedsel bronne van Vitamien A en praktiese voedingspraktyke. Die lae kennis tellings van gesondheidspersoneel is kommerwekkend siende dat die meerderheid van die gesondheidspersoneel aangedui het dat hul wel opgelei is in baba en jong kind voeding. Ten einde, is dit nodig dat die hindernisse wat gesondheidspersoneel keer om gereelde, kwaliteit gedrewe inligting aan moeders/versorgers van babas en jong kinders te verskaf ten op sigte van optimale komplementêre voedingspraktyke, te evalueer.

**Sleutelterme**

Komplementêre voeding, komplementêre dieet, kennis, praktyke, Road to health booklet, Side-by-Side booklet, baba, jong kind, Suid Afrika.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# LIST OF ABBREVIATIONS

| | |
|---|---|
| CEN | Centre of Excellence for Nutrition |
| CFR | Case fatality rate |
| CHW | Community Health Care Worker |
| DOH | Department of Health |
| DPME | Department of Planning, Monitoring and Evaluation |
| DSD | Department of Social Development |
| ECD | Early childhood development |
| EN | Enrolled nurse |
| ENA | Enrolled nursing assistant |
| PFBDG | Paediatric Food Based Dietary Guidelines |
| HP | Health Promoter |
| HREC | Health Research Ethics Committee |
| IEC | Information, education and communication |
| IFPRI | International Food Policy Research Institute |
| IMCI | Integrated Management of Childhood Illnesses |
| INP | Integrated Nutrition Programme |
| IYCF | Infant and young child feeding |
| LMC | Lactation Management Course |
| MMC | Mentor Mother Counsellor |
| MNCWH | Maternal, Newborn, Child and Women's Health |
| NDoH | National Department of Health |
| NFCS | National Food Consumption Survey |
| NRF | National Research Foundation |
| NWU | North West University |
| PHC | Primary Health Care |

| | |
|---|---|
| PMTCT | Prevention of Mother to Child Transmission |
| PN | Professional nurse |
| RD | Registered Dietitian |
| RtHB | Road to Health Booklet |
| SA | South Africa |
| SADHS | South African Demographic Health Survey |
| SAM | Severe Acute Malnutrition |
| SAMRC | South African Medical Research Council |
| SANHANES | South African Health and Nutrition Examination Survey |
| SD | Standard deviation |
| UNICEF | United Nations Children's Fund |
| WBOT | Ward Based Outreach Team |
| WHO | World Health Organisation |
| WRHD | West Rand Health District |

# CHAPTER 1: INTRODUCTION

## 1.1. Background

According to the United Nations Children's Fund (UNICEF) and the World Health Organisation (WHO) optimal nutrition in the context of infant and young child feeding (IYCF), with further emphasis on the complementary feeding period (6 – 24 months of age), is critical to ensure optimal child health, growth and development, with global and national trends indicating that malnutrition is a leading cause of childhood morbidity and mortality (UNICEF, 2019:2).

Recent data published by the National Department of Health (NDoH) and Statistics South Africa (SA) in the South African Demographic and Health Survey (SADHS) indicated that although the prevalence of undernutrition has decreased during the last few years, the prevalence of stunting alongside that of overweight and obesity in infants and young children under the age of five years have increased (NDoH, Statistics SA, SAMRC & ICF, 2017:27). The SADHS reports that 27% of children under five years in South Africa are considered stunted. Furthermore, the prevalence of stunting generally increases with age from 8 months to 23 months, with a peak prevalence of 42.6% for stunting and 19.9% for severe stunting in this age group. The prevalence of overweight and obesity is reported at 6.7% and 13.8% respectively for the same age group of 8 – 23 months (NDoH, Statistics SA, SAMRC & ICF, 2017:28).

Inadequate and inappropriate complementary feeding practices are identified as one of the key determinants of the high rates of stunting as well as overweight and obesity that is currently prevalent among infants and young children in South Africa (NDoH, Statistics SA, SAMRC & ICF, 2017:27). Studies conducted in South Africa have reported significant inadequacies in the complementary feeding diets of infants and young children aged 6 – 24 months related to the early introduction of complementary foods, the poor quality of complementary foods, the sub-optimal consistency of complementary foods and the inadequate safety of complementary foods

(Faber & Spinnler-Benade, 2007:20; Van Der Merwe *et al.*, 2007:260; Labadarios *et al.*, 2008:253; Du Plessis *et al.*, 2013:131; Kassier & Veldman, 2013:21; Stewart *et al.*, 2013:29; Faber & Laubscher*,* 2014:1; Faber *et al.*, 2016:528; Rothman *et al*., 2018:2 & Swanepoel *et al*., 2018:41). Causes of inadequate and inappropriate complementary feeding practices can be related to underlying factors including household food insecurity, low socio-economic status of the household, inadequate care and feeding practices for infants and young children, low maternal education and inaccessible and often inadequate health care (Paul *et al*., 2011:151 & Du Plessis *et al.*, 2013:131 - 132).

Health care personnel are highly respected in South African communities with studies indicating that health care personnel remain a common source of information on adequate and appropriate complementary feeding practices to mothers/caregivers of infants and young children (Janse van Rensburg *et al.*, 2016:133). The provision of adequate and appropriate complementary feeding education and counselling by health care personnel to mothers/caregivers of infants and young children in primary health care (PHC) facilities is considered to be one of the strategies to improve complementary feeding practices at household level (Mushaphi *et al.*, 2015:99).

However, concerns have been raised regarding the knowledge and practices of health care personnel pertaining to the provision of education and counselling on adequate and appropriate complementary feeding practices in the South African PHC setting (NDoH, DSD & DPME, 2014:16). Although there is a limited base of recent studies in South Africa reporting on the knowledge and practices of health care personnel on adequate and appropriate complementary feeding education and counselling, some studies have been able to identify that inconsistent messages and selective communication of health care personnel with regard to complementary feeding has led to confusion amongst mothers/caregivers of infants and young children (NDoH, WHO & UNICEF, 2010:18 & Du Plessis *et al*., 2013:129).

It has been suggested that improved knowledge and practices of health care personnel pertaining to adequate and appropriate complementary feeding practices will lead to the communication of consistent, evidence based (Du Plessis *et al*., 2013:137) and food-related complementary feeding messages to mothers/caregivers of infants and young children (Faber & Spinnler-Benade, 2007:23), which will support adequate and appropriate complementary feeding practices at household level (Austin-Evelyn *et al.,* 2017:10 & Mfano *et al.,* 2017:28).

The purpose of this mini-dissertation is to determine the knowledge and practices of health care personnel pertaining to the provision of adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in PHC facilities in the West Rand Health District (WRHD). Determining the knowledge and practices of health care personnel in providing complementary feeding education and counselling will provide the opportunity for the health district to establish and implement mitigating interventions in the form of training, mentorship and skills development, in order to attempt to improve complementary feeding education and counselling provided to mothers/caregivers of infants and young children.

### 1.2. Aims and objectives

The aim of this study is to determine the knowledge and practices of health care personnel regarding the provision of adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in PHC facilities in WRHD.

The objectives of the study are:

- To determine the knowledge of health care personnel regarding adequate and appropriate complementary feeding practices when providing education and counselling to mothers/caregivers of infants and young children, as stipulated in the Road to Health Booklet (RtHB)/Side-by-Side booklet.
- To assess the current practices of health care personnel in providing adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children, in line with the RtHB/Side-by-Side booklet.
- To compare the knowledge and practices of clinical and non-clinical healthcare personnel on the adequate and appropriate complementary feeding education and counselling to mothers/caregivers, in line with the RtHB/Side-by-Side booklet.

### 1.3. Research team

The table below provides a summary of the research team, including the specific role and contribution of each team member towards the MSc mini-dissertation (See next page).

**Table 1-3-1: Summary of the research team**

| Team member | Affiliation | Role and responsibility |
|---|---|---|
| Prof. L. Havemann-Nel RD (SA) PhD. Exercise Science, BDietetics | Centre of Excellence for Nutrition (CEN), North West University (NWU), Potchefstroom Campus | Supervisor of the MSc mini-dissertation. Guidance regarding writing the protocol and ethics application, development of questionnaire, writing of the literature review, overview of data collection, assistance with statistical analysis, interpretation of results and writing up of data. |
| Mrs. C. Witten RD (SA) MSc Nutrition Management, BSc Dietetics | Centre of Excellence for Nutrition (CEN), North West University (NWU), Potchefstroom Campus | Co-supervisor of the MSc mini-dissertation. Guidance regarding writing the protocol and ethics application, development of questionnaire, writing of the literature review, overview of data collection, assistance with statistical analysis, interpretation of results and writing up of data. |
| Ms. C.L. van Rensburg RD (SA) BSc Dietetics | North West University (NWU), Potchefstroom Campus | Part-time MSc student. Writing of the protocol, ethics application and literature review. Involved in questionnaire development, quantitative data collection, writing up the data and final MSc mini-dissertation. |

### 1.4. Structure of dissertation

This MSc mini-dissertation is in article format and is presented in five chapters. Chapter one provides a short rationale for the study, outlines the aims and objectives, and gives an overview of the research team and the structure of the mini-dissertation. Chapter two

presents the literature review where the researcher provides a brief overview of the current status of complementary feeding in South Africa as well as a summary of the literature with regards to the knowledge and practices of health care personnel pertaining to adequate and appropriate complementary feeding education and counselling. Chapter 3 includes the manuscript entitled: “Complementary feeding knowledge and practices of health care personnel in Primary Health Care facilities in West Rand Health District.” This manuscript is written according to the specifications of the Public Health Nutrition Journal. In Chapter four, the researcher provides a short summary and conclusion of the most relevant and important findings of the MSc, acknowledges the limitations and makes recommendations based on the findings. The final chapter provides the bibliography for the references cited in chapters one, two and five. The references in chapter five are presented according to the North-West University Harvard style.

# CHAPTER 2: LITERATURE REVIEW

## 2.1. Introduction

According to the United Nations Children's Fund (UNICEF) optimal nutrition in the context of infant and young child feeding (IYCF), with emphasis on the complementary feeding period (6 – 24 months of age), is critical to ensure optimal child health, growth and development, with global and national trends indicating that malnutrition is a leading cause of childhood morbidity and mortality (UNICEF, 2019:2).

The period from conception to two years of age, known as the "first 1000 days of life", is considered a "critical window of opportunity" to ensure optimal child growth and development (Black *et al*., 2013:434). As early as 2002 the World Health Organisation (WHO) and UNICEF acknowledged the period of complementary feeding from 6 - 24 months of age as an integral part in achieving good nutrition and healthy growth during this period in the lifecycle of infants and young children (WHO, 2002:4). The complementary feeding period presents with rapid changes in growth as identified by the WHO in 2002 (cited by Cloete *et al.*, 2013:141) and requires changes in the diets of infants and young children where more often than not the complementary feeding diet lacks the ability to account for the shortfall of breast milk and the increase in requirements of macro-and micronutrients (Shrimpton *et al*., 2001:75).

Studies conducted in South Africa have reported significant inadequacies in the complementary feeding diets of infants and young children related to the early introduction of complementary foods, the poor quality of complementary foods, the sub-optimal consistency of complementary foods and the inadequate safety of complementary foods (Faber & Spinnler-Benade, 2007:20; Van Der Merwe *et al.*, 2007:260; Labadarios *et al.*, 2008:253; Du Plessis *et al.*, 2013:131; Kassier & Veldman, 2013:21; Stewart *et al.*, 2013:29; Faber & Laubscher, 2014:1; Faber *et al.*, 2016:528; Rothman *et al*., 2018:2 & Swanepoel *et al*., 2018:41). The South African Demographic and Health Survey (SADHS) reports that only 32% of infants under the age of six months are exclusively breastfed (NDoH, Statistics SA, SAMRC & ICF, 2017:27) with a study conducted by Budree *et al*. (2016:4) supporting the low exclusive breastfeeding rates stated in the SADHS. Swanepoel *et al.* (2018:1) reported poor dietary diversity in infants and young children with complementary feeding diets not meeting the criteria for a minimally acceptable diet. Furthermore, the South African complementary feeding diet is deficient in several

micronutrients including Iron, Zinc, Calcium, Selenium, Vitamin A, Vitamin D, Vitamin C, Vitamin E, Riboflavin, Niacin and Vitamin B6 (Swanepoel *et al*., 2018:41).

Inadequate and inappropriate complementary feeding practices are identified as one of the key determinants of the high rates of stunting as well as overweight and obesity that is currently prevalent among infants and young children in South Africa (NDoH, Statistics SA, SAMRC & ICF, 2017:27). Sub-optimal complementary feeding education and counselling related to inadequate knowledge and practices of health care personnel is one of the contributing factors to inadequate and inappropriate complementary feeding practices at household level in South Africa (NDoH, DSD & DPME, 2014:16). In turn, inadequate complementary feeding knowledge and practices of health care personnel leads to the provision of inappropriate and inaccurate complementary feeding messages to mothers/caregivers of infants and young children by health care personnel (Du Plessis *et al*., 2013:137 & Matlala, 2017:6).

This literature review provides an overview of the nutritional status of infants and young children under five years as well as an overview of policies focused on IYCF in South Africa. Furthermore, the literature review provides a profile of the complementary feeding practices of infants and young children in South Africa. In conclusion, the literature will review the knowledge and practices of health care personnel on the education and counselling provided on adequate and appropriate complementary feeding to mothers/caregivers of infants and young children.

### 2.2. Overview and nutritional status of infants and young children under five years in South Africa

In South Africa, child malnutrition remains a major challenge which has devastating outcomes for infants and young children (NDoH, Statistics SA, SAMRC & ICF, 2017:19). The prevalence of undernutrition as well as overnutrition remains unacceptably high in South African infants and young children (NDoH, Statistics SA, SAMRC & ICF, 2017:26). In 2016, 27% of children under five years in South Africa were stunted with 10% presenting with severe stunting, a 30% increased prevalence since the first-ever South African National Health and Examination Survey (SANHANES) (Shisana *et al.*, 2013:209 & NDoH, Statistics SA, SAMRC & ICF, 2017:26). Furthermore, this data showed that the prevalence of stunting generally increased with age from 8 months to 24 months of age before declining by the end of the third year of life. Children aged 18 – 24 months had the highest prevalence of stunting (42.6%) and severe stunting (19.9%) (NDoH, Statistics SA, SAMRC & ICF, 2017:27) in South Africa.

The results from the SADHS showed that 6% of all children under five years were underweight and 1% were severely underweight. The age group of 18 – 24 months of age showed the same trend as that of stunting and severe stunting, since the highest proportion of underweight (10.1%) presented in this age group (NDoH, Statistics SA, SAMRC & ICF, 2017:28). Overall, 3% of children under five years in South Africa were wasted. However, in contrast, 13% percent of children under five years were overweight. The prevalence of overweight in infants and young children in South Africa has increased from 10.6% in 2013 (Shisana *et al.*, 2013:209) to the current overweight prevalence of 13% (NDoH, Statistics SA, SAMRC & ICF, 2017:28). The International Food Policy Research Institute (IFPRI) reported the prevalence of overweight children in South Africa was more than twice the global average of 6.1% for children under five years (IFPRI, 2016:20).

When taking into account that the highest prevalence of stunting occurred during 6 – 24 months of age in a global context, it can be assumed that the increase in stunting prevalence can possibly be attributed to inadequate and inappropriate complementary feeding practices at household level, with the premise that even in the presence of optimal breastfeeding practices, infants and young children will become stunted if they do not receive adequate and appropriate complementary feeding diets in the period spanning from 6 – 24 months of age (Black *et al.,* 2013:434).

### 2.3. Nutrition-related policies focused on infant and young feeding in South Africa

Sayed & Schonfeldt (2018:2) have noted that over the past 25 years, infant and young child nutrition in South Africa has been prioritized as evidenced by the political commitment and policy development history in the country. South Africa has excellent nutrition policies in place and has shown political commitment to improve, among other, infant and young child nutrition (NDoH, 2013:1). Table 2-3-1 provides a summary of the South African policies, specifically referring to the outcomes stated for complementary feeding.

**Table 2-3-1: Summary of South Africa policies focussed on infant and young child feeding, including complementary feeding**

| Policy | Priority complementary feeding outcomes |
|---|---|
| **Integrated Nutrition Programme (INP) (NDoH, 1994:10)** | Improve complementary feeding knowledge, behaviour and perceptions through adequate and appropriate complementary feeding education and counselling. |

| | |
|---|---|
| **Roadmap for Nutrition in South Africa 2013 – 2017 (NDoH, 2013:19**) | • Improved complementary feeding practices through community nutrition programmes, outreaches and Primary Health Care (PHC) services.<br>• Provision of complementary feeding education and counselling through community nutrition programmes, outreaches and PHC services. |
| **Infant and Young Child Feeding Policy (NDoH, 2013; 2017:24)** | • Educate and counsel all mothers/caregivers on the following aspects of complementary feeding: timely introduction, appropriate foods, meal frequencies and quantities, food consistency, food safety and responsive feeding. |
| **Integrated Management of Childhood Illnesses (IMCI) (NDoH, 2014:18)** | • Provide complementary feeding education and counselling to mothers/caregivers of infants and young children 6 – 24 months of age. |
| **National Integrated Early Childhood Development (ECD) Policy 2015 (NDoH, 2015:26, 56)** | • Provide nutritional support to women from conception and during pregnancy and for infants and young children.<br>• Provide active support for breast feeding, especially exclusive breast feeding, in the first six months after birth and safe nutritional practices including, adequate and appropriate complementary feeding practices.<br>• Provide education and counselling to support adequate and appropriate complementary feeding.<br>• Encourage the full utilisation of the Road to Health Booklet (RtHB) to support, monitor and remedy, where needed, a child's healthy growth and development. The booklet has important promotional messages that capacitate mothers/caregivers on adequate and appropriate complementary feeding practices. |
| **Strategic plan for Maternal, Neonatal, Child and Women's Health (MNCWH) and Nutrition 2012 – 2016**<br>**(NDoH, 2012:19)** | • Promote adequate and appropriate complementary feeding practices for infants and young children under two years of age.<br>• Provision of a package of community-based complementary feeding services by generalist Community Health Care Workers (CHWs) working as part of ward-based PHC outreach teams.<br>• Provision of interventions to strengthen the knowledge and practices of health care personnel on complementary feeding at facility and community level. |
| **Strategy for the Prevention and Control of Obesity in South Africa 2015 – 2020 (NDoH, 2016:32)** | • Develop and implement a strategy to support the introduction of adequate and appropriate complementary feeding foods for infants and young children.<br>• Ensure adequate and appropriate complementary feeding practices to explicitly address obesity in infants and young children.<br>• Build capacity of healthcare providers to advise on adequate and appropriate complementary feeding.<br>• Develop educational material for adequate and appropriate complementary feeding. |
| **National Food and Nutrition Security Plan 2017 – 2022 (NDoH, 2017:15)** | • In line with the Sustainable Development Goal two, to end hunger in infants and young children under two years of age.<br>• Ensure the availability, accessibility and affordability of safe and nutritional complementary foods at household levels for infants and young children under the age of two years.<br>• Ensure optimal food security and enhanced nutritional status for infants and young children under the age of two years.<br>• Scale up of complementary feeding education and counselling provided to mothers/caregivers of infants and young children under two years of age.<br>• Develop and implement a strategy to support adequate and appropriate complementary feeding foods for infants and young children under two years of age. |

In addition to the policies that prioritise and provide a broad framework for outcomes to be targeted regarding complementary feeding practices in infants and young children, several documents exist providing specific recommendations on adequate and appropriate complementary feeding practices that act as guiding tools used in the primary health care setting by health care personnel. Table 2-3-2 provides a summary of recommendations in the RtHB, the Side-by-Side booklet, the IMCI guideline, the Standard Treatment Guidelines and Essential Medicines List for South Africa Primary Healthcare Level and the draft Paediatric Food Based Dietary Guidelines (PFBDG). These recommedations can be viewed as the minimum care package with regard to the provision of complementary feeding education and counselling to be provided to mothers/caregivers of infants and young children. Recommendations are based on WHO's Infant and Young Child Feeding Guidelines e.g. timely introduction of complementary foods, appropriate complementary foods, meal frequencies and quantities of complementary foods, food consistency, food safety and responsive feeding (WHO, 2003:1), similar to the recommendations in the IYCF Policy (NDoH, 2013; 2017: 15) (See next page).

**Table 2-3-2: Summary of recommendations for adequate and appropriate complementary feeding education and counselling as stated in the RtHB, the Side-by-Side booklet, the IMCI guideline, the Standard Treatment Guidelines and Essential Medicines List for South Africa Primary Healthcare Level and the draft PFBDG.**

| Document | Complementary feeding recommendations |
|---|---|
| **RtHB (NDoH, 2012: 10 - 12)** | **Feeding 6 – 12 months:**<br>• For all children start complementary foods at six months.<br>• Continue breastfeeding.<br>• Always breastfeed first before giving complementary foods.<br>• Start giving 2 – 3 teaspoons of mashed dried beans and/or locally available animal foods daily to supplement the Iron in the breast milk. Examples include egg (yolk), minced meat, fish, chicken/chicken livers, mopani worms. Give soft porridge, vegetables and then fruit.<br>• Gradually increase the amount and frequency of feeds.<br>• Children between 6 – 8 months should have two meals a day. By 12 months this should have increased to five small meals per day, whilst breastfeeding continues.<br>• Offer your baby safe, clean water regularly.<br>• If the baby is not breastfed, give formula or at least two cups of pasteurised full cream cow's milk (cow's milk can be given from nine months of age).<br><br>**Feeding 12 months up to five years:**<br>• If the child is breastfed, continue breastfeeding as often as the child wants until the child is two years and beyond.<br>• If not breastfeeding, give at least two cups of pasteurised full cream milk, which could be maas, every day.<br>• Encourage children to eat a variety of foods.<br>• Feed your child five small meals per day.<br>• Make starchy foods the basis of a child's main meals.<br>• Children need plenty of vegetables and fruit every day.<br>• Children can eat chicken, fish, eggs, beans, soya or peanut butter every day.<br>• Give foods rich in Iron and Vitamins A and C.<br>• Iron-rich foods: Liver, kidney, dark green leafy vegetables, egg yolk, dry beans, fortified cereal. Remember that tea interferes with the absorption of Iron. Iron is best absorbed in the presence of Vitamin C.<br>• Vitamin A-rich foods: Liver, dark green leafy vegetables, mango, paw paw, yellow sweet potato, full cream milk. |

| | |
|---|---|
| | • Vitamin C-rich foods: Citrus fruits (oranges, naartjies), guavas, tomatoes.<br>• If children have sweets, treats or drinks, offer small amounts with meals.<br>• Offer clean, safe water regularly. |
| **IMCI (NDoH, 2014: 18)** | **Feeding 6 – 12 months:**<br>• Continue to breastfeed as often as the child wants.<br>• If the baby is not breastfed, give formula. If the baby gets no milk, give five nutritionally adequate complementary feeds per day.<br>• Start giving foods rich in Iron and then soft porridge and mashed vegetables and fruit.<br>• Start with 1 – 2 teaspoons twice a day and gradually increase the amount and frequency of feeds.<br>• Children between 6 – 8 months should have two meals a day, by 12 months this should have increased to five meals per day.<br>• Give a variety of locally available food. Examples include egg (yolk), beans, dhal, meat, fish, chicken / chicken livers, mopani worms.<br>• For children who are not growing well, mix margarine or oil with porridge.<br>• Fruit juices, tea and sugary drinks should be avoided before nine months of age.<br>**Feeding 12 months up to two years:**<br>• Continue to breastfeed as often as the child wants.<br>• If no longer breastfeeding, give 2 - 3 cups of pasteurized full cream milk every day.<br>• Give at least five adequate nutritious family meals per day.<br>• Give locally available food rich in protein at least once a day. Examples include egg, beans, dhal, meat, fish, chicken / chicken livers, mopani worms.<br>• Give fresh fruit or vegetables twice every day.<br>• Give foods rich in Iron, and Vitamins A and C.<br>• Feed actively from the child's own bowl.<br>• Also give the child clean water to drink during the day (boil and cool the water if there is any doubt about the safety/cleanliness of the water). |
| **Side-by-Side booklet (NDoH, 2017)** | **Feeding 6 – 8 months:**<br>• Continue breastfeeding on demand.<br>• Give Iron rich foods: Dried beans, minced meat, boneless fish, chicken livers, ground mopani worms.<br>• Give mashed foods.<br>• Give your baby starches: Fortified maize meal, mashed sweet potatoes or mashed potatoes.<br>• Give your baby mashed vegetables and mashed fruits.<br>• Give your baby clean, safe to drink from a cup regularly. |

| | |
|---|---|
| | **Feeding 9 – 11 months:**<br>• Give Iron rich foods.<br>• Increase the amount and variety of foods.<br>• Food does not need to be smooth or mashed.<br>• Give your child small pieces of food they can hold.<br>• Avoid small, hard foods that might cause choking.<br>• Give five small meals a day.<br>• Give your baby clean, safe to drink from a cup regularly.<br><br>**Feeding 12 months up to five years:**<br>• Give a variety of foods.<br>• Give foods rich in Vitamin A, Iron and Vitamin C.<br>• Cut up food in small pieces so that your child can eat on their own.<br>• Stay next to your child and encourage them to eat.<br>• If not breastfeeding, you can start giving pasteurised full cream cow's milk/maas or yoghurt.<br>• Give your baby clean, safe to drink from a cup regularly. |
| **Standard Treatment Guidelines and Essential Medicines List for South Africa Primary Healthcare Level (DOH, 2018:5)** | **Feeding 6 – 12 months**<br>1. Continue breastfeeding (Breastfeeding before giving foods).<br>2. Introduce complementary foods at six months of age.<br>3. Start by giving 2 – 3 teaspoons of Iron rich foods such as mashed vegetables or cooked dried beans.<br>4. Children 6 – 8 months should be given two meals daily, gradually increasing the number of meals so that at 12 months the child is receiving five small meals.<br>**5.** For children who are not growing well, mix margarine, fat or oil with their porridge.<br><br>**Feeding 12 months up to two years:**<br>• Continue breastfeeding.<br>• If the child is not breastfeeding, give two cups of pasteurized full cream cow's milk every day.<br>• Make starchy foods the basis of the child's meals.<br>• Give locally available protein at least once a day and fresh fruit or vegetables twice every day. |

| | |
|---|---|
| **Draft PFBDG (Du Plessis *et al*., 2018; Samuels *et al,* 2018; Moller *et al,* 2018 & Rhors *et al,* 2018)** | **Feeding 6 – 12 months**<br><br>• At six months, start giving your baby small amounts of complementary foods, while continuing to breastfeed to two years and beyond.<br>• Gradually increase the amount of food, number of feeds and variety as your baby gets older.<br>• Start spoon-feeding your baby with thick foods, and gradually increase to the consistency of family food.<br>• Feed slowly and patiently and encourage your baby to eat, but do not force him or her.<br>• From six months of age, give your baby meat, chicken, fish or egg every day, or as often as possible.<br>• Give your baby dark-green leafy vegetables and orange-coloured vegetables and fruit every day.<br>• Start spoon-feeding your baby with thick foods, and gradually increase to the consistency of family food.<br>• Hands should be washed with soap and clean water before preparing or eating food.<br>• Avoid giving tea, coffee and sugary drinks and high-sugar, high-fat salty snacks to your baby.<br><br>**Feeding 12 – 36 months**<br><br>• Continue to breastfeed to two years and beyond.<br>• Gradually increase the amount of food, number of feedings and variety as your child gets older.<br>• Give your child meat, chicken, fish or egg every day, or as often as possible.<br>• Give your child dark-green leafy vegetables and orange-coloured vegetables and fruit every day.<br>• Avoid giving tea, coffee and sugary drinks and high-sugar, high-fat salty snacks to your child.<br>• Hands should be washed with soap and clean water before preparing or eating food.<br>• Encourage your child to be active.<br>• Feed your child five small meals during the day.<br>• Make starchy foods part of most meals.<br>• Give your child milk, maas or yoghurt every day. |

### 2.4. Complementary feeding practices in South Africa

Global estimates reported that the minimum acceptable meal frequency (50.3%), minimal diet diversity (28.2%) and the minimum acceptable diet (15.9%) of the global complementary feeding diet is inadequate (White *et al*., 2017:6), and the South African complementary feeding diet is not performing better than the overall global picture. Several studies have shown inadequate and inappropriate complementary feeding practices regarding the early introduction of complementary foods and the poor quality of complementary foods for children under five years in South Africa (Faber & Spinnler-Benade, 2007:20; Van Der Merwe *et al.*, 2007:260; Labadarios *et al.*, 2008:253; Du Plessis *et al.*, 2013:131; Kassier & Veldman, 2013:21; Stewart *et al.*, 2013:29; Faber & Laubscher*,* 2014:1; Faber *et al.*, 2016:528; Rothman *et al*., 2018:2 & Swanepoel *et al*., 2018:41).

In the following sections, selected aspects are used to critically appraise the situation in South Africa regarding complementary feeding practices in line with the guidelines for optimal complementary feeding practices presented in the South African (SA) Infant and Young Child Feeding Policy (NDoH, 2013; 2017:23).

#### 2.4.1. Timely introduction of complementary foods

The SA IYCF Policy recommends that complementary foods should be introduced at the age of six months. In South Africa, research studies have found that complementary foods are introduced at an average age of 2 – 3 months in infants (Du Plessis *et al*., 2013:131). A study conducted by Budree *et al*. (2016:4) corroborated the results stated by Du Plessis *et al*. (2013:131) and reported that exclusive breastfeeding for six months was low at only 13%; with 19% of infants being introduced to complementary foods before the age of four months. More recent statistics in the SADHS reported that complementary foods are introduced as early as 4 – 8 weeks of life where, 14% of infants consumed plain water, 1% consumed non-milk liquids, 11% consumed other milks and 18% consumed complementary foods in addition to breast milk under the age of six months (NDoH, Statistics SA, SAMRC & ICF, 2017:29).

Maize porridge is a common first food for infants, with a high reliance on commercial infant cereal (Swanepoel *et al*., 2018:77). Water and other liquids including tea, herbal mixtures and sugar water are commonly given to infants younger than six months of age (Sayed & Schonfeldt, 2018:9). The SANHANES also showed that the most common complementary first foods were commercial infant cereals (51.2%), homemade porridge (29%), pureed vegetables and/or fruit (4.4%), with the remaining 15.4% consisting of clinic-issued porridge, jarred baby foods and other foods (< 4% each) (Shisana *et al.,* 2013:5). These foods indicate a common trend of mostly ultra-processed foods provided to babies, which has not improved over time.

### 2.4.2. Quality of complementary foods

The SA IYCF Policy promotes a nutrient-dense complementary feeding diet that is diverse in a variety of foods with specific inclusion of Iron rich foods and foods rich in Vitamins A and C (NDoH, 2013; 2017:25). Poor food quality remains a challenge with regard to complementary feeding in the country. Significant concerns remain regarding the micronutrient sufficiency of the South African complementary diet with the majority of infants and young children being deficient in Iron, Zinc, Calcium, Selenium, Vitamin A, Vitamin D, Vitamin C, Vitamin E, Riboflavin, Niacin and Vitamin B6 (Swanepoel *et al*., 2018:41). Reliance on cereal-based watery porridges with low nutritional quality, often result in inadequate intakes of key micronutrients (Rothman *et al.,* 2018:2). Furthermore, anti-nutrient factors such as phytates and polyphenols found in grains and legumes further compromise the bio-availability of these essential micronutrients (Kruger *et al*., 2015:3).

Dietary diversity is poor in many infants and young children's diets in SA with the SADHS reporting that only 23% of children age 6 – 23 months have met the criteria for a minimum acceptable diet (NDoH, Statistics SA, SAMRC & ICF, 2017:30). The national results in the SADHS are supported by individual studies (Du Plessis *et al*., 2016:40; Sayed & Schonfeldt, 2018:9 & Swanepoel *et al*., 2018:41) with Swanepoel *et al.* (2018:1) stating that more than 70% of children did not consume a diverse diet.

In addition, an increasing trend in the consumption of inappropriate and nutritionally poor foods were identified in several studies (Budree *et al*., 2016:1; Sayed & Schonfeldt, 2018:9 & Swanepoel *et al*., 2018:42). Empty calorie foods such as processed meats, soft drinks, sweets and salty crisps are being given regularly to children in the complementary feeding period (Sayed & Schonfeldt, 2018:9). Rooibos tea was consumed by 27.7% of children aged six months and almost double to 52.1% at age 12 months and 56.5% at age 18 months (Swanepoel *et al*., 2018:42) which is contra-indicated for infants and young children by the IYCF Policy (NDoH, 2013; 2017:23). Carbonated drinks, cordials and fruit juice were a common occurrence in the complementary feeding diet of infants and young children aged 6 – 24 months (NDoH, Statistics SA, SAMRC & ICF, 2017:28).

## 2.5. The role of health care personnel in PHC facilities in providing complementary feeding education and counselling

An infant and young child's complementary feeding diet is affected by underlying factors including household food insecurity (lack of availability of, access to, and/or utilisation of a diverse diet), inadequate care and feeding practices for infants and young children, unhealthy household and surrounding environments and inaccessible and often inadequate health care (Paul *et al*., 2011:151). For this literature review the main focus is the role that health care personnel play in complementary feeding practices at household level. One of the strategies to improve complementary feeding practices at household level, is to ensure that health care personnel provide adequate and appropriate complementary feeding education and counselling to

mothers/caregivers of infants and young children in the PHC setting (Mushaphi *et al.*, 2015:99) as shown in the policies reflected in Table 2-3-1 and Table 2-3-2. Education and counselling on adequate and appropriate complementary feeding practices are important to ensure that mothers/caregivers are up to date with the most relevant and applicable information with regarding adequate and appropriate complementary feeding practices (NDoH, 2013; 2017:25). Improving maternal knowledge regarding complementary feeding and subsequently the knowledge and practices of health care personnel pertaining to the provision of complementary feeding education and counselling, will significantly aid in the prevention of inadequate and inappropriate complementary feeding practices at household level (Du Plessis *et al.,* 2017:167).

The WHOs health systems framework states that the ability of a country to meet its health goals depends largely on the knowledge, skills, motivation and deployment of the people responsible for organising and delivering health services (WHO, 2010:24). In South African communities, health care personnel are highly respected and often consulted for health and related information. Janse van Rensburg *et al.* (2016:133) stated that health care personnel remain a common source of information on adequate and appropriate complementary feeding practices to mothers/caregivers of infants and young children.

The health care system provides a public infrastructure in South Africa to reach the majority of children under two years of age on a regular basis, and health care encounters offer an ideal opportunity for health care personnel to have a positive impact on the complementary feeding practices of infants and young children during regular well-baby visits (WHO, 2010:24 & Slemming & Salojee, 2013:50). The best interface for the provision of adequate and appropriate complementary feeding education and counselling in SA would be within the public health sector and PHC services (NDoH, Statistics SA, SAMRC & ICF, 2017:5), as this is where the majority of the population encounters the health care system. In support of this statement, Viviers *et al.* (2013:35) reported that 85% of South African infants and young children rely on the public health sector.

Several studies have been conducted in different countries implementing complementary feeding education and counselling as an area of interest through the intervention of training health care personnel (Dewey & Adu-Afarwuah, 2008:26 – 29). There is strong evidence to suggest that training of health care personnel on adequate and appropriate complementary feeding practices improves energy intake, feeding frequency and dietary diversity of infants aged 6 – 24 months, by refreshing health care personnel's own knowledge and practices regarding complementary feeding (Sunguya *et al*., 2013:9). Lutter *et al.* (2013:1) encourages education and counselling of mothers/caregivers on complementary feeding practices as an active intervention to improve

household dietary intake, in line with the recommendations provided in the IYCF Policy (NDoH, 2013; 2017:23).

Results shared by Matlala (2017:6) from a study conducted in PHC facilities in SA, indicated that health care personnel have poor knowledge, lack skills and motivation with poor training coverage as the main reasons for not providing education and counselling to mothers/caregivers with regard to adequate and appropriate complementary feeding practices.

### 2.6. Knowledge of health care personnel on complementary feeding practices in PHC facilities in South Africa

Concerns have been raised about the knowledge of health care personnel, specifically in terms of adequate and appropriate complementary feeding practices in the South African health care setting (NDoH, DSD & DPME, 2014:16), with breastfeeding knowledge generally being stronger than knowledge pertaining to adequate and appropriate complementary feeding practices (Samuel *et al.*, 2016:5).

There is a limited database of recent studies in South Africa regarding the knowledge of health care personnel on adequate and appropriate complementary feeding education and counselling. The WHO Landscape Analysis conducted in SA reported that, at the time, only 39% of health care personnel had adequate IYCF knowledge and concluded that health care personnel's knowledge regarding complementary feeding practices was superficial due to a lack of training (NDoH, WHO & UNICEF, 2010:18). An evaluation for nutrition programmes for children less than five years of age found that only 55% of health care personnel, in selected study sites, have the necessary knowledge to educate mothers/caregivers on nutrient dense food, and only 42% of mothers/caregivers are educated on hygienic and safe preparation and serving of complementary foods (NDoH, DSD & DPME, 2014:17, 23).

A study conducted by Austin-Evelyn *et al*. (2017:10) in the Eastern Cape assessed the knowledge of CHWs regarding complementary feeding, and concluded that the complementary feeding knowledge of the CHWs were insufficient to provide mothers/caregivers with accurate education and counselling on adequate and appropriate complementary feeding practices. These results are concerning since CHWs and Ward Based Outreach Teams (WBOTs) can be used effectively in the PHC setting to bridge the gap between the PHC facilities and the community, and subsequently improve access to education and counselling on appropriate and adequate complementary feeding practices, as suggested by Naledi *et al*. (2011:45) (cited by Hendricks *et al.*, 2013:46).

In terms of food-related knowledge the picture stays bleak, with only 70% of health care personnel being able to provide adequate and appropriate information regarding the introduction of complementary foods at the age of six months (Heinen *et al.*, 2010:13). Furthermore, it has been

noted that the messages that are given during the provision of complementary feeding education and counselling are insufficient and lack structure with Du Plessis *et al*. (2013:137) reporting that 76% of mothers/caregivers reported that they were not taught about appropriate foods for their babies. Mfano (2017:28) reported similar findings where mothers/caregivers were only provided with generalised nutrition education and counselling which did not address specific recommendations regarding adequate and appropriate complementary feeding practices.

### 2.7. Practices of health care personnel in the provision of complementary feeding education and counselling in PHC facilities in South Africa

The complementary feeding knowledge of health care personnel is not the only concern in terms of the provision of complementary feeding education and counselling to mothers/caregivers. Even in the presence of adequate and appropriate complementary feeding knowledge of health care personnel, the practices of disseminating the knowledge to the mothers/caregivers of infants and young children are lacking in most PHC settings in SA (NDoH, WHO & UNICEF, 2010:18). The Landscape Analysis found that about a third (32.8%) of health care personnel spend less than 20% of their time educating mothers/caregivers on adequate and appropriate complementary feeding practices (NDoH, WHO & UNICEF, 2010:18). Furthermore, it has been reported that complementary feeding education and counselling is classified as a nutrition intervention that is in low supply in the South African health care system as well as of low uptake (NDoH, DSD & DPME, 2014:22). The provision of adequate and appropriate complementary feeding education and counselling is often lacking during routine well-baby visits, with the majority of mothers/caregivers only receiving complementary feeding education and counselling when the child is not growing well or at risk of malnutrition (NDoH, DSD & DPME, 2014:13,17). A South African study by Horwood *et al.* (2009:3) indicated that only 66.7% of IMCI trained health care personnel provided education and counselling on appropriate and adequate complementary feeding practices. In a study conducted in Sub-Saharan Africa (including South Africa) by George *et al*. (2012:89) only 88% of CHWs indicated that they provided education and counselling on adequate and appropriate complementary feeding practices to mothers/caregivers.

The lack of information, education and communication (IEC) material regarding complementary feeding has been cited as a determinant whether or not health care personnel provide complementary feeding education and counselling to mothers/caregivers (NDoH, DSD & DPME, 2014:26). Jonker & Stellenburg (2014:6) indicated that most mothers reported that the complementary feeding messages in the RtHB were never explained to them. It is of concern that few health care personnel associated the RtHB/Side-by-Side booklet with IEC material which can be used to educate and counsel mothers/caregivers on adequate and appropriate complementary feeding practices. A study conducted by Du Plessis *et al.* (2017:166) reported that only 50.8% of contact opportunities were used to communicate the complementary feeding messages in the

RtHB; additionally, only 46% of health care personnel indicated that they discussed the complementary feeding messages in the RtHB with the mothers/caregivers.

### 2.8. Training opportunities for capacity building of health care personnel on adequate and appropriate complementary feeding practices

An audit of the training curriculums in different provinces reported that adequate and appropriate complementary feeding practices are only covered in approximately 23.5% of curricula at the time of the audit (NDoH, WHO & UNICEF, 2010:18). In a study conducted by Malan *et al.* (2015:4) health care personnel reported that the training programmes with regard to IYCF do not meet the requirements for health care personnel to provide adequate and appropriate complementary feeding education and counselling. According to Matlala (2017:48), 19.7% of health care personnel reportedly required additional training in terms of adequate and appropriate complementary feeding practices. Thus, it is evident that the training regimes provided at PHC level are insufficient to address lack of complementary feeding education and counselling.

Even if the training curriculums relating to complementary feeding were sufficient, only 36.2% of health care personnel indicated that they have been trained on adequate and appropriate complementary feeding practices at the time in which the Landscape Analysis was conducted (NDoH, WHO & UNICEF, 2010:56, 84). Furthermore, it was found that at the time, the training coverage of health care personnel regarding complementary feeding was only 23.5% (NDoH, WHO & UNICEF, 2010:18). Viviers *et al.* (2013:39) suggests that the poor training coverage of health care personnel could be related to a lack of funding and training opportunities. Austin-Evelyn *et al*. (2017:4) reported that in the Eastern Cape, only 69% of CHWs received training on adequate and appropriate complementary feeding practices, with only 15% of CHWs reported to have received refresher courses in terms of appropriate and adequate complementary feeding practices.

### 2.9. Conclusion

A child‘s first two years of life is considered a “critical window of opportunity” for optimal child growth and development (Black *et al*., 2013:434). Inadequate and inappropriate complementary feeding practices is identified as one of the key determinants of the high rates of malnutrition prevalent among infants and young children in South Africa (NDoH, Statistics SA, SAMRC & ICF, 2017:27).

One of the central roles of health care personnel is to provide education and counselling related to adequate and appropriate complementary feeding practices in infants and young children 6 – 24 months of age (NDoH, 2013; 2017:20). Advice given by health care personnel in South Africa is highly respected and potential inadequacies in the knowledge and practices of health care

personnel can negatively impact the education and counselling provided to mothers/caregivers of infants and young children on adequate and appropriate complementary feeding practices (Janse Van Rensburg *et al.,* 2016:130), leading to the communication of inappropriate and incorrect complementary feeding messages to mothers/caregivers (Du Plessis *et al.*, 2013:137). The transfer as well as application of knowledge from health care personnel to mothers/caregivers of infants and young children is crucial (Matlala, 2017:45).

Even though there is limited evidence in the recent South African context regarding the knowledge and practices of health care personnel on appropriate and adequate complementary feeding practices, it has been re-emphasised that there is an urgent need to establish the quality as well as the frequency of complementary feeding education and counselling provided to mothers/caregivers of infants and young children, to ensure that this specific nutrition intervention can be evaluated and improved upon (Mfano, 2017:28). The provision of quality education and counselling on adequate and appropriate complementary feeding to mothers/caregivers is essential to improve complementary feeding practices at household level (Kassa *et al*., 2016:8). Du Plessis *et al.* (2017:168) emphasised that health promotion to mothers/caregivers by health care personnel is of critical importance to ensure optimal nutritional status of infants and young children under five years in South Africa. Continuous training as well as refresher training sessions of health care personnel in adequate and appropriate complementary feeding practices are essential. Furthermore, the barriers to the provision of consistent, quality and evidence-based complementary feeding education and counselling to mothers/caregivers by health care personnel should be addressed by all stakeholders involved.

# CHAPTER 3: ARTICLE 1

The article is written in the format required by the **Public Health Nutrition Journal.**

Complementary feeding knowledge and practices of health care personnel in Primary Health Care facilities in West Rand Health District.

Chené van Rensburg[1], Lize Havemann-Nel[1], Chantell Witten[1]

[1]Centre of Excellence for Nutrition (CEN), North-West University (NWU), Potchefstroom, South Africa.

**Corresponding author:**
Chené van Rensburg: chenevren@gmail.com
Lize Havemann-Nel: lize.havemannnel@nwu.ac.za
Chantell Witten: chantell.witten@nwu.ac.za

**Financial Support:** This research was supported by National Research Foundation (NRF) incentive funding. The NRF had no role in the design, analysis or writing of this article.

**Conflict of Interest:** None.

**Authorship:**

**Chené van Rensburg:** Part-time MSc student. Writing of the protocol, ethics application and literature review. Involved in questionnaire development, quantitative data collection, analysis and interpretation of data and writing up the data and final MSc mini-dissertation.

**Lize Havemann-Nel:** Supervisor of the MSc mini-dissertation. Guidance regarding writing the protocol and ethics application, development of questionnaire, writing of the literature review, overview of data collection, assistance with statistical analysis, interpretation of results and writing up of data.

**Chantell Witten:** Co-supervisor of the MSc mini-dissertation. Guidance regarding writing the protocol and ethics application, development of questionnaire, writing of the literature review, interpretation of results and writing up of data.

**Ethical Standards Disclosure:** This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Health Research Ethics Committee (HREC) of the Faculty of Health Sciences of the NWU,

Potchefstroom (NWU-00062-17-S1). Written informed consent was obtained from all subjects/patients.


## ABSTRACT

**Objective:**

To determine the knowledge and practices of health care personnel regarding the provision of adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in Primary Health Care (PHC) facilities in West Rand Health District (WRHD), Gauteng Province, South Africa.

**Design:**

An observational study with a descriptive cross-sectional design was employed. Participants were required to complete a pre-tested knowledge and practices questionnaire (Only available in English) that was developed based on the complementary feeding promotional messages in the Road to Health Booklet (RtHB)/Side-by-Side booklet.

**Setting:**

Data was collected in 23 randomly selected PHC facilities in WRHD.

**Participants:**

The participants included 111 health care personnel, including clinical (e.g. nurses) and non-clinical staff (e.g. community health care workers), who regularly engage with mothers/caregivers of infants and young children aged 6 – 24 months in PHC facilities in WRHD.

**Results:**

The total mean knowledge score on adequate and appropriate complementary feeding for health care personnel in the present study was 44% (SD 18), despite the fact that the majority (77%; n=85) indicated that they have received some form of training on infant and young child feeding (IYCF). Clinical health care personnel achieved a higher knowledge score compared to non-clinical health care personnel [53 (46, 60)% vs. 33 (20, 47)%, $p<0.001$]. Knowledge regarding the correct age for the introduction of complementary foods, recognition that animal foods and mashed legumes are examples of appropriate complementary foods, identification of food sources rich in Vitamin C and food safety principles were good. However, knowledge regarding meal frequency, meal quantity, identification of food sources rich in Vitamin A, recommended drinks/milk in the complementary feeding period and responsive feeding practices was generally poor. Although the majority of health care personnel reported that they 'routinely' give complementary feeding advice (77%; n=86), complementary feeding education and counselling was mostly provided to pregnant women only (63%; n=70) and when the baby is 6 months old (50%; n=56). Only 31% of health care personnel reported that they utilise routine well-baby visits for the provision of complementary feeding education and counselling. The RtHB was the most common (67%; n=74) reported source of information on infant and young child feeding.

**Conclusions:**

Although health care personnel working in PHC facilities in WRHD provide education and counselling relating to complementary feeding, mostly during pregnancy and when the infant is six months old, the overall mean knowledge score in this study was low. The non-clinical health care personnel achieved the lowest scores and areas of particular concern included meal frequency, meal quantity, recommended drinks/milk from 12 months of age, Vitamin A rich sources of complementary foods and responsive feeding practices. This study highlights the need to improve the knowledge and practices of health care personnel pertaining to adequate complementary feeding. Capacity can be built by providing regular refresher training sessions on adequate and appropriate complementary feeding practices as well as facility based in-service training sessions, with emphasis on aspects mentioned previously. Furthermore, routine provision of complementary feeding education and counselling, not only to pregnant women but also to mothers/caregivers with infants and young children up to two years of age should be emphasised, and the particular barriers for not providing routine education should be identified and addressed.

**Key words:** Complementary feeding, complementary feeding diet, health care personnel, knowledge, practices, infants, young children, South Africa.

## INTRODUCTION

Inadequate and inappropriate complementary feeding practices are identified as one of the key determinants of the high rates of stunting, as well as overweight and obesity that are currently prevalent among infants and young children in South Africa (SA)[1]. Studies have shown inadequate and inappropriate complementary feeding practices regarding the early introduction of complementary foods, poor quality and quantity of complementary foods, sub-optimal food consistency and inadequate food safety in children under five in SA[2,3]. A study conducted by Budree et al.[4] in the Western Cape of SA reported that 19% of infants were introduced to complementary foods before the age of four months. Water and other liquids including tea, herbal mixtures and sugar water were commonly given to infants younger than six months of age[5]. Dietary diversity is poor in many infants and young children in SA, and the inclusion of animal food sources appears to be low resulting in the diets of infants and young children not meeting the criteria for a minimally acceptable diet[5]. Swanepoel et al.[3] reported that more than 70% of infants and young children from a peri-urban community in North West province do not consume a diverse diet with poor intake of fresh fruit and vegetables and flesh foods other than chicken. Furthermore, the South African complementary feeding diet is deficient in several micronutrients including Iron, Zinc, Calcium, Selenium, Vitamin A, Vitamin D, Vitamin C, Vitamin E, Riboflavin, Niacin and Vitamin B6[,3].

A number of factors contribute to poor complementary feeding practices in SA, including sub-optimal education and counselling on adequate and appropriate complementary feeding practices by health care personnel who are in contact with mothers/caregivers[6]. Although a small number of nutrition experts, i.e. Dietitians and Nutritionists, are employed in the South African Primary Health Care (PHC) system, the nurses and community health care workers (CHWs) are regarded as the frontline workers who are in contact with the majority of mothers/caregivers in PHC facilities[7]. Health care personnel are highly respected in South African communities and remain a common source of information on complementary feeding practices to mothers/caregivers[8]. However, lack of time or commitment, limited resources, poor complementary feeding knowledge and inadequate dissemination of complementary feeding messages affect the quality and quantity of education and counselling provided by health care personnel to mothers/caregivers[7].

With regard to the practice of providing complementary feeding education and counselling to mothers/caregivers, George et al.[9] reported, in a study conducted in Sub-Saharan Africa (including SA), that 88% of CHWs indicated that they provide education and counselling on complementary feeding practices to mothers/caregivers. In addition, Horwood et al.[10] reported that only 66.7% of nursing staff who are trained in the Integrated Management of Childhood Illnesses (IMCI) provide education and counselling on complementary feeding practices. Du Plessis et al.[11] further conducted a study to assess the communication of the complementary

feeding messages in the Road to Health Booklet (RtHB) by health care personnel, who are responsible for the implementation of the RtHB in PHC facilities in the Western Cape of SA, to mothers/caregivers of infants and young children. This study reported that only 50.8% of contact opportunities were used to communicate the complementary feeding messages in the RtHB[11]. Furthermore, only 46% of health care personnel indicated that they discuss the complementary feeding messages in the RtHB with the mothers/caregivers[11]. The majority of health care personnel in the South African PHC setting only provide mothers/caregivers with complementary feeding education and counselling when the child is not growing well, therefore not integrating this practice into the routine well-baby visits[7].

In the South African health care setting, breastfeeding knowledge of health care personnel is generally stronger than knowledge pertaining to adequate and appropriate complementary feeding practices[12]. The Landscape Analysis, conducted in 2010, reported that at the time only 39% of health care personnel, both clinical and non-clinical, had adequate complementary feeding knowledge and concluded that health care personnel's knowledge was superficial due to a lack of training[13]. A more recent study conducted by Austin-Evelyn et al.[14] concluded that the complementary feeding knowledge of the CHWs was insufficient to provide mothers/caregivers with accurate education and counselling on adequate and appropriate complementary feeding practices with overall knowledge scores of 64.8%.

To our knowledge, there is a limited database of recent studies in SA on the specific knowledge and practices of health care personnel regarding adequate and appropriate complementary feeding. The aim of this study was therefore to determine the knowledge and practices of health care personnel regarding complementary feeding education and counselling in PHC facilities in West Rand Health District (WRHD). WRHD carries a great burden of disease related to undernutrition in infants and young children under five years[15]. Severe Acute Malnutrition (SAM) is regarded as one of the five leading causes of death in children under five in WRHD[15]. Even though the SAM incidence is low (1.4/1000), the Case Fatality Rate (CFR) of SAM is 2.9%[15].

## METHODS

### Study design

This study was an observational study with a descriptive cross-sectional design that employed a quantitative approach to determine the knowledge and assess practices of health care personnel regarding complementary feeding education and counselling in Primary Health Care (PHC) facilities in West Rand Health District (WRHD).

**Study participants**

The study population for this study comprised of 111 health care personnel who regularly engage with mothers/caregivers of infants and young children aged 6 – 24 months (complementary feeding period) in PHC facilities in WRHD, and who volunteered to participate in the study. One of their roles is to provide mothers/caregivers with education and counselling on adequate and appropriate complementary feeding practices. Health care personnel included in the study were professional nurses (PNs), enrolled nurses (ENs) enrolled nursing assistants (ENAs) (clinical health care personnel), community health care workers (CHWs), lay counsellors, health promoters (HPs) and mentor mother counsellors (MMCs) (non-clinical health care personnel). Health care personnel excluded from the study included community district dietitians and medical practitioners.

A total of 27 PHC facilities were randomly selected from a total of 47 PHC facilities in WRHD, equating to 60% of PHC facilities in WRHD. The facilities were grouped/stratified into large, medium and small facilities according to under five head counts [large facilities (>750), medium facilities (200 – 750) and small facilities (<200)]. Nine facilities were randomly selected from each group to ensure equal inclusion of health care personnel from small, medium and large facilities.

**Data collection**

A knowledge and practices questionnaire (Only available in English) was developed by researchers working in infant and young child nutrition and was subsequently circulated to two subject experts for input. The knowledge questions were based on the complementary feeding promotional messages provided in the Road to Health Booklet (RtHB) (Please refer to Annexure A for questionnaire). The questionnaire was pre-tested for face validity by administering it to five health care personnel who did not form part of the sample size, but who fitted the inclusion criteria. The wording of three questions were subsequently adjusted to ensure clarity of questions.

The researcher visited the respective clinics, introduced the study objectives and explained the methodology. Study participants, who consented to participation, completed the English research questionnaire (not translated into other languages). Although the questionnaires were completed in a group setting, each participant individually completed a questionnaire in an “exam” style in a suitable venue (i.e. the board room) at each of the PHC facilities.

**Statistical analyses**

Data processing and statistical analysis of data were performed using Excel Windows XP (Microsoft, Seattle, WA, USA) and SPSS Inc (Chicago, IL, USA). Data was tested for normality by means of Q-Q plots, histograms and Shapiro-Wilk tests. Normally distributed data was expressed as means ± SD and non-normally distributed data was expressed as medians (25th percentile, 75th percentile). Data on knowledge and practices was presented as knowledge scores (total out of 15) and percentages (%). Group comparisons between clinical vs. non-clinical health personnel were performed with independent T-tests or Mann-Whitney U tests. Spearman rank correlations

were performed to explore the association between age and duration in current position, with knowledge score respectively. The level of significance was set at $p < 0.05$.

### Ethical considerations

Ethical approval was granted for the present study by the Health Research Ethics Committee (HREC) of the North-West University (NWU) (NWU-00062-17-S1). The study was reviewed by the National Department of Health (NDoH) and registered with the Directorate for Policy, Planning and Research. WRHD as well as individual sub-district managers and clinic-based operational managers granted permission for the study to be conducted in the PHC facilities of WRHD. Recruitment of participants was done at the PHC facilities and written informed consent was obtained prior to data collection from each participant who volunteered to participate in the study.

## RESULTS

### Socio-demographic information of participants

A total of 111 health care personnel, mean age 43 years (SD 10) from 23 Primary Health Care (PHC) facilities participated in the study. The average duration of functioning in the role of providing PHC services to mothers and children was 9 years (SD 7). Table 3-1 provides a summary of the participant characteristics.

**Table 3-1: Summary of participant characteristics (n=111)**

| Characteristic | n (%) |
|---|---|
| **Gender** | |
| Female | 103 (93) |
| Male | 8 (7) |
| **Classification and designation** | |
| **Clinical** | **54 (49)** |
| Professional nurses (PNs) | 42 (38) |
| Enrolled nurses (ENs) | 12 (11) |
| **Non-clinical** | **57 (51)** |
| Community Health Care Workers (CHWs) | 38 (34) |
| Health Promoter (HP) | 1 (0.1) |
| Lay Counsellors | 13 (12) |
| Mentor Mother Counsellors (MMCs) | 5 (5) |
| **Highest qualification (non-clinical staff)** | |
| < Grade 12 education | 39 (68) |
| Grade 12 education | 14 (25) |
| Tertiary education | 4 (7) |

The majority (93%; n=103) of the study participants were female, with an almost equal representation from clinical (49%, n=54) and non-clinical (51%; n=57) health care personnel. PNs accounted for the majority (38%, n=42) of study participants, followed by CHWs (34%; n=38), Lay Counsellors (12%, n=13), ENs (11%, n=12) and MMCs (5%, n=5) (Table 3-1).

The clinical staff (PNs and ENs) all hold a tertiary qualification, as required. However, only 7% (n=4) of the non-clinical staff obtained a tertiary qualification, 25% (n=14) indicated Grade 12 as highest qualification and 68% (n=39) do not have Grade 12. Table 3-2 summarizes the infant and young child feeding (IYCF) training history of the study participants.

**Table 3-2: Reported IYCF training history (n=111)**

| | **Total n=111 (%)** | **Clinical n=54 (%)** | **Non-clinical n=57 (%)** |
|---|---|---|---|
| **Training** | | | |
| Trained | 85 (77) | 43 (80) | 42 (74) |
| Not trained | 26 (23) | 11 (20) | 15 (26) |
| **Type of IYCF training attended** | | | |
| Lactation Management Course | 20 (18) | 5 (9) | 15 (26) |
| Prevention of Mother to Child Transmission | 56 (50) | 23 (43) | 33 (58) |
| Severe Acute Malnutrition | 26 (23) | 18 (33) | 11 (19) |
| Road to Health Booklet/Side-by-Side booklet | 28 (25) | 13 (24) | 15 (26) |
| Integrated Management of Childhood Illnesses* | 27 (24) | 27 (50) | NA* |
| Community Health Care Worker training | 30 (27) | 3 (6) | 27 (47) |
| Ward Based Outreach Team training | 35 (32) | 9 (17) | 26 (46) |
| Mentor Mother Counselling training | 10 (9) | 0 (0) | 10 (18) |
| **Timeline since last IYCF training** | | | |
| < 6 months | 28 (25) | 15 (28) | 13 (23) |
| 6 – 12 months | 10 (9) | 5 (9) | 5 (9) |
| >12 months | 3 (3) | 2 (4) | 1 (2) |
| >24 months | 44 (40) | 21 (39) | 23 (40) |

*Only clinical health care personnel

With regards to training, 77% (n=85) of the study participants reported to attend some form of training that include IYCF practices. Prevention of Mother to Child Transmission (PMTCT) training was attended by the majority of health care personnel and particularly by a high percentage of non-clinical personnel (50%; n=56). As expected, a higher percentage of clinical compared to non-clinical health care personnel reported attending Integrated Management of Childhood Illnesses (IMCI) and Severe Acute Malnutrition (SAM) training, whilst more non-clinical personnel attended CHW, Ward Based Outreach Team (WBOT) and MMC programme training compared to their clinical counterparts. A low percentage of both clinical and non-clinical health care personnel

attended Road to Health Booklet (RtHB)/Side-by-Side booklet training. Even though a high percentage of health care personnel attended some form of training, in almost 40% (n=44) of the cases, the training had taken place more than 24 months prior to the research (Table 3-2).

**Current knowledge of health care personnel on complementary feeding in PHC facilities**

The total mean knowledge score on adequate and appropriate complementary feeding is 44% (SD 18). Clinical health care personnel achieved a higher knowledge score compared to non-clinical health care personnel [53 (46, 60)% vs. 33 (20, 47)%, p<0.001]. Health care personnel who indicated that they were trained on IYCF tend to achieve a higher knowledge score compared to health care personnel who did not undergo any training (p=0.073, data not shown).

Total knowledge score was not correlated with age (r = 0.024, p = 0.799). There was a negative weak correlation between knowledge score and duration in current designation (r = -0.193 p=0.042, Figure 1).

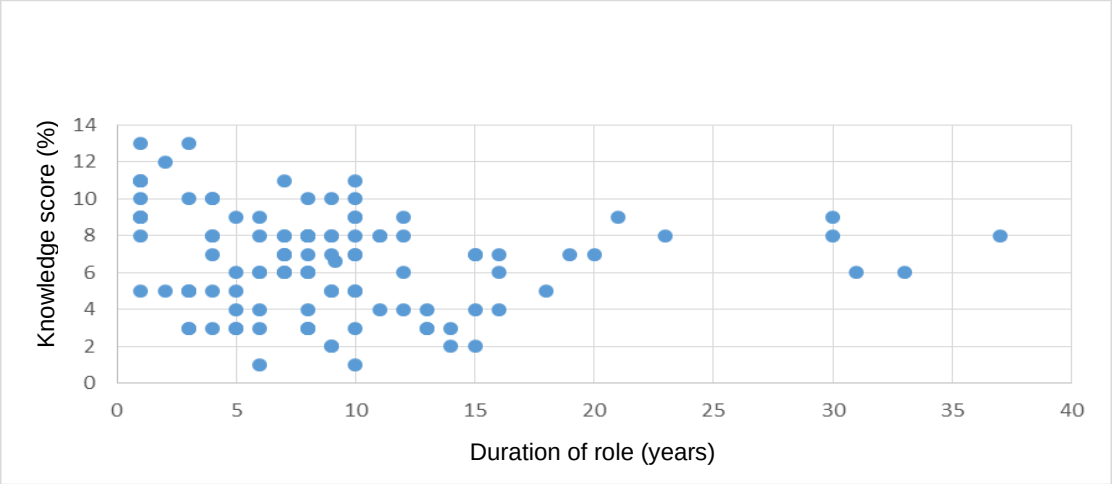


**Figure 3-1: The association between duration of current role and knowledge score achieved.**

When exploring knowledge regarding specific complementary feeding aspects (e.g. food quantity, meal frequency, food consistency, examples of appropriate foods etc.), health care personnel in general were more knowledgeable regarding certain aspects compared to other aspects (e.g. in general a question was either answered correctly by the majority of participants or incorrectly by the majority of participants). Table 3-3 provides a summary of the individual question responses (percentage of correct answers).

**Table 3-3: Summary of correct responses to individual questions (n=111)**

| Question as per questionnaire | Overall (n=111) % correct | Clinical (n=54) % correct | Non-clinical (n=57) % correct |
|---|---|---|---|
| 1. What is the recommended age to introduce/start complementary (solid foods)? | 60 | 70 | 53 |
| 2. If a mother is still breastfeeding her baby aged 6 – 12 months, is it recommended that the mother also give another source of milk (e.g. infant formula or cow's milk)? | 54 | 63 | 46 |
| 3. If the mother is <u>not</u> breastfeeding her baby aged 12 – 24 months, what is the recommended milk to give to her baby? | 15 | 22 | 7 |
| 4. How many meals per day is recommended when a baby starts with complementary foods (solid foods)? | 24 | 24 | 23 |
| 5. What is the recommended amount of food to feed your baby aged 9 – 11 months per meal? | 14 | 15 | 11 |
| 6. Are animal foods like chicken, liver, egg yolk, fish and minced meat appropriate complementary foods? | 85 | 89 | 81 |
| 7. What type of foods should the complementary feeding diet contain every day? | 64 | 80 | 49 |
| 8. How many meals per day is recommended for a baby aged 12 months or older? | 21 | 35 | 16 |
| 9. Are mashed beans, lentils and chickpeas appropriate for complementary feeding? | 76 | 82 | 70 |
| 10. Which option is a good example of a food that is rich Iron? | 57 | 76 | 39 |
| 11. Which option is a good example of a food that is rich in Vitamin A? | 29 | 34 | 25 |
| 12. Which option is a good example of a food that is rich in Vitamin C? | 64 | 78 | 51 |
| 13. Which drink is recommended for babies aged 12 – 24 months? | 22 | 32 | 12 |
| 14. Which one of the following practices is not recommended when feeding a baby aged 12 – 24 months? | 11 | 17 | 5 |
| 15. What are good food safety practices to protect your baby child from developing diarrhea? | 68 | 87 | 49 |

Aspects relating to complementary feeding that were answered correctly by 60% or more of the healthcare personnel, included correct age for the introduction of complementary foods (60%; n=67), recognition that animal foods and mashed legumes are examples of appropriate complementary foods (Answer to these questions entailed a yes or no answer) [(85%; n=94) and 76%; n=84), respectively] and identification of food sources rich in Vitamin C (64%; n=71). The majority of health care personnel could also correctly identify the different types/variety of complementary foods to include on a daily basis (64%; n=71), and good food safety practices (68%; n=76). However, more clinical staff compared to non-clinical staff identified the appropriate age of introducing complementary foods [(70%; n=78) vs. (53%; n=59)], type/variety of food to include daily [(80%; n=89) vs. [49%; n=54)], example of Vitamin C rich food [(78%; n=87) vs. (51%;

n=57)], and good food safety practices [(87%; n=97) vs.(49%; n=54)]. The clinical staff were also more knowledgeable regarding examples of Iron rich food compared to the non-clinical staff [(76%; n=84) vs. (39%; n=43)] (Table 3-3). Non-clinical health care personnel incorrectly identified egg white (11%; n=6), carrots (16%; n=9) and mabele porridge (5%; n =3) instead of chicken livers as good examples of foods rich in Iron (Data not shown).

The questions regarding Vitamin C and Iron rich food sources were answered better than the question regarding Vitamin A rich sources. Less than one third of the health care personnel could correctly identify all food sources high in Vitamin A, with both the clinical and non-clinical staff performing poorly. In fact, only 29% (n=32) of health care personnel correctly identified all the food sources listed in the questionnaire as good sources of Vitamin A (Table 3-3), whilst liver (16%; n=18), mango (23%; n=26), yellow sweet potato (29%; n=32) and full cream milk (11%; n=12) were selected individually as good sources of Vitamin A (Data not shown). Knowledge in terms of meal frequency and quantity was also generally poor. In fact, only 24% (n=27) and 21% (n=23) of health care personnel, could identify the correct meal frequency for 6 – 8 month olds and 12 month olds, respectively (Table 3-3). Rather, 41% (n=46) thought that infants require three meals per day during 6 – 8 months and 45% (n=50) thought that they should receive only three meals per day from 12 months (Data not shown). The quantity of food to be provided per meal during the age range of 9 – 11 months was also answered incorrectly by the majority of health care personnel. A high percentage (36%; n=40) of the health care personnel selected the incorrect option of 2 – 3 teaspoons of complementary foods per meal at the age of 9 – 11 months, and possibly got confused with the message provided in the RtHB that states infants should be given 2 – 3 teaspoons when complementary foods are introduced at six months of age (Data not shown).

Knowledge was poor, in particular the non-clinical personnel, regarding the source of milk that should/should not be recommended for infants and young children during the complementary feeding period. In 54% (n=60) of the cases, health care personnel recommended that breastfed infants receive another source of milk in addition to breast milk during the age of 6 – 12 months. Furthermore, only 15% (n=17) of health care personnel could correctly identify that pasteurised full cream cow's milk is the recommended milk for a non-breastfed 12 – 24 month old (Table 3-3). Approximately half (48%; n=53) of health care personnel incorrectly selected the option of infant formula, and 32% (n=36) motivated the use of follow-up infant formula (Data not shown).

Very few health care personnel (only 11%; n=12) could identify the incorrect responsive feeding practice when feeding young children which is ensuring that all complementary foods are mashed at all times (Table 3-3). Rather, 27% (n=30) of health care personnel thought that providing finger foods is not correct and 14% (n=16) indicated that staying next to your child during a meal is not the correct practice (Data not shown).

**Current practices of health care personnel with regards to complementary feeding education and counselling in PHC facilities**

The majority of health care personnel (67%; n=74) reported that they used the RtHB/Side-by-Side booklet as a source of information with regard to complementary feeding practices. Furthermore, 45% (n=50) of health care personnel utilise the knowledge provided by Dietitians working at district level as a source of information regarding complementary feeding practices. More clinical health care personnel than non-clinical health care make use of the RtHB/Side-by-Side booklet as a source of information with regard to complementary feeding practices. Similarly the IMCI booklet is more often used by clinical health care personeel as a source of information (Table 3-4). However, the IMCI booklet is primarily a tool used by clinical health care personnel.

Although 77% (n=85) of the health care personnel indicated that they routinely give complementary feeding advice, 63% (n=70) of health care personnel reported in follow-on sections of the questionnaire that they only provide mothers/caregivers with complementary feeding education and counselling during pregnancy, and only 31% (n=34) of health care personnel reported that they utilise routine well-baby visits for the provision of complementary feeding education and counselling. Non-clinical health care staff rather provide complementary feeding education and counselling during pregnancy with clinical health care personnel indicating that they provide complementary feeding education and counselling from six month of age and beyond. In all instances, the provision of complementary feeding education and counselling is lower in non-clinical health care personnel than clinical health care personnel. A high percentage of non-clinical health care personnel advise mothers/caregivers to start complementary foods before the recommended age of six months, with only 65% (n=37) of non-clinical health care personnel advising the introduction of complementary foods at the age of six months, which is in stark contrast with 89% (n=48) of clinical health care personnel (Table 3-4).

Health care personnel reported that they routinely give complementary feeding advice to mothers/caregivers of infants and young children with clinical (80%; n=43) and non-clinical staff (75%; n=43) performing similar regarding the provision of complementary feeding education and counselling. Table 3-4 provides information on the practices of health care personnel in PHC facilities in West Rand Health District (WRHD) regarding the provision of complementary feeding education and counselling to mothers/caregivers (See next page).

**Table 3-4: Information on the practices of health care personnel in PHC facilities in WRHD with regards to the provision of complementary feeding advice to mothers/caregivers (n=111)**

| Health care personnel practices | Overall (%) | Clinical (%) | Non-clinical (%) |
|---|---|---|---|
| **Do you give complementary feeding advice to mothers/caregivers (advice about solid food)? *(Select only one option)*** | | | |
| No, it is not part of my responsibility | 8 | 2 | 14 |
| Yes, I routinely give complementary feeding advice | 77 | 80 | 75 |
| Yes, but only if a mother ask/caregiver asks | 6 | 7 | 5 |
| Yes, but only if I have time | 2 | 4 | 0 |
| Yes, but only if mother/caregiver is referred | 3 | 2 | 4 |
| **Where do you get your information regarding complementary feeding? *(You can select more than one option)*** | | | |
| RtHB/Side-by-Side booklet | 67 | 83 | 51 |
| IMCI booklet | 29 | 48 | 0 |
| Departmental/facility-based trainings | 30 | 25 | 35 |
| Dietitian | 45 | 48 | 42 |
| Internet | 5 | 7 | 4 |
| **During what time periods do you generally advise mothers/caregivers on complementary feeding? (*You can select more than one option*)** | | | |
| Never | 3 | 0 | 5 |
| During pregnancy | 63 | 49 | 73 |
| When the baby is between 0 – 6 months old | 38 | 43 | 33 |
| When the baby is 6 – months old | 50 | 76 | 37 |
| When the baby is not growing well | 39 | 56 | 23 |
| When the baby is putting on too much weight | 26 | 41 | 12 |
| When the mother/caregiver asks | 16 | 28 | 5 |
| Every time the mother/caregiver visit the clinic | 31 | 35 | 26 |
| **At what age do you advise mothers/caregivers to start with complementary food? (*You can select more than one option*)** | | | |
| When the mother complains her breast milk is not enough | 7 | 0 | 14 |
| Between birth – 3 months | 7 | 0 | 14 |
| Between 3 – 6 months | 7 | 4 | 11 |
| At 6 months | 71 | 89 | 65 |
| After 6 months | 26 | 24 | 28 |
| **What do you recommend to a mother/caregiver as a first food to her baby? (*You can select more than one option*)** | | | |
| Soft or diluted maize meal | 62 | 67 | 58 |
| Mashed fruit | 50 | 63 | 37 |
| Mashed chicken liver | 41 | 50 | 33 |
| Commercial infant cereal | 26 | 22 | 30 |
| Jarred baby food (e.g. Purity) | 26 | 26 | 26 |

Regarding the recommendation of what food to give as first food, soft or diluted maize meal porridge was advised by 62% (n=69) of health care personnel. Iron rich protein foods such as mashed chicken liver was cited as a good first food in 41% (n=46) of cases with mashed fruit supported by 50% (n=56) of health care personnel. A high percentage of health care personnel suggest commercial baby foods such as commercial infant cereal (26%; n=29) and jarred baby food (26%; n=29) as a first complementary food. A significantly lower percentage of non-clinical health care personnel advised mashed fruit and mashed chicken livers as a recommended first complementary food (Table 3-4).

**DISCUSSION**

The aim of this study was to determine the knowledge and practices of health care personnel regarding complementary feeding education and counselling to mothers/caregivers of young children in Primary Health Care (PHC) facilities in West Rand Health District (WRHD). The mean overall knowledge score for health care personnel regarding complementary feeding in the present study was poor; only 44% (SD 18), particularly for the non-clinical health care personnel. The poor knowledge scores reported in the present study are of concern, especially since the majority of the health care personnel reported that they routinely give complementary feeding advice, which is indeed part of the responsibility of these health care personnel who come in contact with mothers/caregivers of infants and young children in PHC settings. An evaluation of nutrition programmes for children less than five years of age found that only 55% of health care personnel in selected study sites have the necessary knowledge to educate and counsel mothers/caregivers on nutrient dense food, and only 42% of mothers/caregivers are educated on hygienic and safe preparation and serving of complementary foods[7].

Although the majority of the participants indicated that they attended some form of training on IYCF, the poor knowledge scores may be attributed to the time since last training more than 24 months ago. Austin-Evelyn et al.[14] emphasise that regular training is necessary to sustain the knowledge of non-clinical health care personnel on adequate and appropriate complementary feeding. Although most of the health care personnel reported that they use the Road to Health Booklet (RtHB)/Side-by-Side booklet as a source of information, only a quarter reported receiving training on the RtHB/Side-by-Side booklet per se. A study conducted by Du Plessis et al.[11] also reported that only 66.3% of health care personnel had read the health promotion messages in the RtHB, including the messages provided on adequate and appropriate complementary feeding practices. Malan et al.[16] suggest, in addition to insufficient change skills of health care personnel, that the current training programmes, e.g. Lactation Management Course (LMC), Integrated Management of Childhood Illnesses (IMCI), Prevention of Mother to Child Transmission (PMTCT), Community Health Care Worker (CHW) training, Ward Based Outreach Team (WBOT) training, Mentor Mother Counsellor (MMC) training, Severe Acute Malnutrition (SAM) training and

RtHB/Side-by-Side booklet training; do not meet the requirements for health care personnel to provide adequate and appropriate complementary feeding education and counselling.

The higher knowledge scores achieved by the clinical health care personnel, particularly the PNs, who hold a tertiary degree, unlike the majority of their non-clinical counterparts who do not have Grade 12, could also be explained by various factors. The majority of clinical health care personnel refer to the RtHB for information on IYCF compared to only half the of non-clinical staff. Clinical staff also receive training on the IMCI booklet, which include extensive guidance on IYCF. The poor results of specifically non-clinical health care personnel in this study is supported by a study conducted by Austin-Evelyn et al.[14] who assessed the knowledge of CHWs regarding complementary feeding. The study concluded that the complementary feeding knowledge of the CHWs was insufficient to provide mothers/caregivers with education and counselling on adequate and appropriate complementary feeding practices with average knowledge scores of 64.8%[14]. Furthermore, Du Plessis et al.[17] have raised concerns regarding the messages that are given during the provision of complementary feeding education and counselling by health care personnel, reporting that the messages are insufficient and lack structure. This was further corroborated by Mfano[18] who reported that mothers/caregivers were only provided with generalised nutrition education and counselling which did not address more specific topics on complementary feeding practices such as which foods to include in the complementary feeding diet, meal frequencies and meal quantities of the complementary feeding diet.

Of interest in the present study was the negative correlation between duration in current role and knowledge score. This may partly be explained by the fact that the clinical personnel, who had significantly higher knowledge scores compared to the non-clinical personnel, reported a shorter duration in current role compared to the non-clinical personnel [7 (3, 10) years vs 9 (6, 12) years, p=0.038]. Perhaps, the health care personnel who have been in the role for a shorter duration, received more recent training and was not exposed to previous or outdated information regarding complementary feeding. Furthermore, certain facility based policies stipulate that new health care personnel should be trained within six months of commencement in the facility[19]. Training content should include adequate and appropriate complementary feeding practices and examples of relevant trainings include the LMC, IMCI, PMTCT, CHW training, WBOT training, MMC training, SAM training and RtHB/Side-by-Side booklet training.

Although mean overall knowledge scores were poor, the participants were knowledgeable regarding certain aspects. Aspects such as the correct age for the introduction of complementary foods, continued breastfeeding (6 – 12 months), the quality of the complementary feeding diet (inclusion of animal foods, legumes, Iron-rich foods, Vitamin C rich foods and a variety of food groups) as well as the food safety principles were answered correctly by the majority of health care

personnel. However, again the non-clinical staff were less knowledgeable regarding the appropriate age of introducing complementary foods, type/variety of food to include daily, examples of Vitamin C rich food, food sources rich in Iron and good food safety practices. In terms of meal frequency and meal quantity, the results were poor with less than one third of health care personnel being able to correctly identify the amount of complementary feeding meals required during the introduction phase, as well as at the age of 12 months. Knowledge pertaining to appropriate fluid intake during the complementary feeding period as well as responsive feeding practices were poor. The National Department of Health (NDoH) rely on non-clinical health care personnel to educate mothers/caregivers on IYCF, thus it is of paramount importance that the non-clinical health care personnel be targeted during IYCF trainings.

It is of concern that the health care personnel could not identify adequate meal frequencies and meal quantities as stipulated in the recommendations made in the RtHB/Side-by-Side booklet. Studies have shown that South African complementary feeding diets is inadequate in terms of quantities and meal frequencies with mothers/caregivers reporting that three meals per day are sufficient to meet their infant and young child's macro-and micronutrient needs[20]. A study conducted by Du Plessis et al.[21] indicated that only 70% of infants and young children aged 6 – 24 months of age receive solid or semi-solid foods the minimum number of times per day. Recent statistics in the South African Demographic and Health Survey (SADHS) reported that only 52% of infants and young children (6 – 23 months) met the criteria for minimum meal frequency[1].

Even though knowledge of health care personnel in this study was adequate relating to a type/variety of food groups to be included in the complementary feeding diet, studies have shown that food-based guidance is not provided to mothers/caregivers with the majority of mothers/caregivers (76%) stating that they were not informed of which foods to provide to their infants and young children[18]. In fact, the majority of health care personnel in the present study indicated that they mostly only counsel pregnant women on IYCF. Only one third indicated that they routinely counsel mothers during well-baby visits. This can further compromise the quality of the complementary feeding diet that is provided to infants and young children by mothers/caregivers. Possible barriers to the provision of adequate and appropriate complementary feeding guidance and counselling includes health care system structures, human resource constraints, lack of a supportive environment in PHC facilities and inadequate knowledge and practices of health care personnel regarding adequate and appropriate complementary feeding practices[7,13].

Furthermore, dietary diversity is poor in many infants and young children's diets in South Africa with the SADHS reporting that only 23% of children aged 6 – 24 months have met the criteria for a minimum acceptable diet, with only 49% meeting the criteria for minimum dietary diversity[1]. The

national results in the SADHS are supported by individual studies[21,5,3] with Swanepoel et al.[3] stating that more than 70% of children did not consume a diverse diet.

As mentioned previously, regarding micronutrient rich complementary food sources, the majority of health care personnel were able to accurately identify complementary foods that are a good example of an Iron rich food as well as foods rich in Vitamin C. In contrast, Vitamin A rich complementary food sources were only identified by one third of health care personnel. This is a concern provided the high prevalence of Vitamin A deficiency in South Africa. The South African National Health and Nutrition Examination Survey (SANHANES) reported a 43.6% incidence of Vitamin A deficiency in the South African population[22]. Significant concerns remain with regard to the micronutrient sufficiency of the South African complementary diet as a whole with the many infants and young children being deficient in a range of micronutrients[2,3].

Soft or diluted maize meal porridge was advised by more than half of health care personnel in the present study, supporting literature which shows that complementary foods of inadequate nutrient density[23,21] is often given as first complementary foods with a reliance on cereal-based watery porridges with low nutritional quality, often resulting in inadequate intakes of key micronutrients[2]. Of concern is the high percentage of health care personnel suggesting commercial baby foods such as commercial infant cereal and jarred baby food as a first complementary food, with a study conducted in the Western Cape citing that more than 80% of infants and young children consume commercial infant cereal and jarred baby foods[4]. According to data published by Swanepoel et al.[3] commercial infant products were consumed by 83% of infants at age six months and by 46% of infants at age 12 months.

Less than half of the non-clinical health care personnel were able to identify continued breastfeeding alongside adequate and appropriate complementary feeding practices. With breast milk continuing to provide half of an infant's requirements during ages 6 – 12 months, it is important for health care personnel to be able to educate mothers/caregivers of infants and young children on continued breastfeeding, with data by Swanepoel et al.[3] reporting only 35% of infants receiving continued breast milk. The majority of health care personnel indicated that infant formula should be given to young children aged 12 – 24 months, an alarmingly high number. Only 21% of health care personnel could identify clean, safe water as the appropriate drink to provide to young children aged 12 – 24 months with one quarter of health care personnel identifying rooibos tea as an adequate drink for this age group. In a study conducted by Swanepoel et al.[3] rooibos tea was consumed by 27.7% of children at age six months and almost double to 52.1% at age 12 months, and 56.5% at age 18 months. A small percentage of health care personnel could identify pasteurised full cream cow's milk as an appropriate drink for the age group 12 – 24 months. The provision of low nutrient value drinks other than pasteurised full cream cow's milk such as sugary drinks, tea and coffee to young children are not recommended, since the consumption of these

drinks could lead to dental caries, displacement of nutrient dense foods and increasing the risk of overnutrition[24].

In terms of strengths for this study, the sample size was sufficient to provide an overall picture of the knowledge and practices of health care personnel regarding adequate and appropriate complementary feeding education and counselling provided to mothers/caregivers of infants and young children in PHC facilities in WRHD. More than half of the PHC facilities in the health district were included in the study and small, medium and large PHC facilities were represented in all sub-districts of WRHD. Furthermore, the different categories of health care personnel were well represented with a variety of both clinical and non-clinical health care personnel participating in the study, with health care personnel that function primarily in the PHC facilities as well as primarily in the community, both forming part of the sample size. This enabled the researchers to assess the knowledge and practices of health care personnel regarding complementary feeding in the PHC facilities as well as in the community that is serviced by those PHC facilities. Additionally, the PHC facilities that were included in the study represented both urban and rural areas of WRHD. Lastly, the knowledge and practices questionnaire that was used to collect the data, was developed by researchers in the field of IYCF as well as complementary feeding and the questionnaire was tested for face validity. Furthermore, the knowledge and practices questionnaire was based on the complementary feeding promotional messages found in the RtHB/Side-by-Side booklet.

A limitation for this study includes the fact that it was only conducted in WRHD in Gauteng, which implies that the results may not be generalized to other health districts and provinces in South Africa. However, although the results have local application, it has broader relevance, since the same RtHB/Side-by-side booklet is used throughout the country.

## CONCLUSION

Although health care personnel working in PHC facilities in WRHD provide education and counselling related to complementary feeding, particularly during pregnancy and when the infant is six months old, the overall mean knowledge score pertaining to complementary feeding in this study was low. The non-clinical health care personnel achieved the lowest scores and areas of particular concern included meal frequency, meal quantity, recommended drinks/milk during the complementary feeding period, Vitamin A rich sources of complementary foods and responsive feeding practices. The poor knowledge scores are concerning since the majority of health care personnel indicated that they are trained in IYCF; however, the majority of health care personnel were trained more than 24 months ago. The fact that health care personnel who have been in their role for longer periods of time presented with lower knowledge scores could indicate a fall-off in knowledge over time and suggests the need for ongoing refresher training sessions in IYCF and adequate and appropriate complementary feeding practices. Another concern is the low percentage of health care personnel providing routine education and counselling on complementary feeding practices during well-baby visits, and only focussing on providing

education and counselling on adequate and appropriate complementary feeding practices to mothers/caregivers during pregnancy or when the child turns six months old. PHC personnel are deployed in low-resource settings as a means of providing effective and appropriate services including the education and counselling of mothers/caregivers on adequate and appropriate complementary feeding practices, in order to increase the exposure of these services in PHC facilities and the community. As a recommendation, it is imperative to build the capacity of PHC and community health care structures to optimise adequate targeting of households and mothers/caregivers with appropriate and adequate complementary feeding education and counselling. Current curriculums of training provided with regard to IYCF as well as the component of complementary feeding practices included in the various training curriculums should be assessed and reviewed, with possible revision of training curriculums provided at tertiary level for clinical health care personnel. Furthermore, the barriers to the provision of consistent, quality and evidence-based complementary feeding education and counselling to mothers/caregivers by health care personnel in PHC facilities in WRHD should be addressed by all stakeholders involved.

**REFERENCES**


1. National Department of Health (ZA), Statistics South Africa (ZA), South African Medical Research Council (ZA), ICF (US). South Africa Demographic and Health Survey 2016: Key Indicators. South Africa: Statistics South Africa (ZA); 2017. 1 - 76.

2. Rothman M, Faber M, Covic, N et al. (2018) Infant development at the age of 6 months in relation to feeding practices, iron status and growth in a peri-urban community of South Africa. *Nutrients* 10, 1 – 13.

3. Swanepoel E, Havemann-Nel L, Rothman M et al. (2018) Contribution of commercial infant products and fortified staple foods to nutrient intake at ages 6, 12, and 18 months in a cohort of children from a low socio-economic community in South Africa. *Matern Child Nutr* 15, 1 – 10.

4. Budree S, Goddard E, Brittain K et al. (2016) Infant feeding practices in a South African birth cohort – A longitudinal study*. Matern Child Nutr* 13, 1 - 9.

5. Sayed N & Schonfeldt HC (2018). A review of complementary feeding practices in South Africa. *South Afr J Clin Nutr* 0, 1 – 8.

6. Matlala DB. Development of strategies for caregivers on feeding practices of children aged 6 – 24 months in a township in Gauteng [Dissertation]. Pretoria: University of Pretoria; 2017.

7. Department of Health (ZA), Department of Social Development (ZA), Department of Planning Monitoring and Evaluation (ZA). Summary evaluation report: diagnostic/implementation evaluation of nutrition interventions for children from conception to age 5. South Africa: Department of Health (ZA); 2014. 1 - 203.

8. Janse van Rensburg L, Nel R, Walsh CM (2016) Knowledge, opinions and practices of healthcare workers related to infant feeding in the context of HIV. *Health SA Gesondheid* 21, 129 – 136.

9. George A, Young M, Nefdt R et al. (2012) Community health workers providing government community case management for child survival in Sub-Saharan Africa: who are they and what are they expected to do? *Am J Trop Med Hyg* 87, 85–91.

10. Horwood C, Vermaak K, Rollins N et al. (2009) An evaluation of the quality of IMCI assessments among IMCI trained health workers in South Africa. *PLoS One* 4, 1 – 6.

11. Du Plessis LM, Koornhof HE, Marais ML et al. (2017) Implementation of the road-to-health-booklet health promotion messages at primary health care facilities, Western Cape Province, South Africa. *S Af j child health* 11, 164 – 169.

12. National Department of Health (ZA), World Health Organisation (CH), United Nations Children's Fund (US). Landscape analysis on countries' readiness to accelerate action to reduce maternal and child undernutrition: nationwide country assessment in South Africa. South Africa: Department of Heatlh (ZA), 2010. 1 - 151.

13. Austin-Evelyn K, Rabkin M, Macheka T et al. (2017) Community health worker perspectives on a new primary health care initiative in the Eastern Cape of South Africa. *PLoS One* 12, 1 – 13.

14. Massyn N, Pillay Y, Padarath A. District Health Barometer 2017/18. Durban: Health Systems Trust; 2019. 1 - 407.

15. Malan Z, Mash B, Everett-Murphy K (2015) A situational analysis of training for behaviour change counselling for primary care providers, South Africa. *Afr J Prim Health Care Fam Med* 7, 1 – 10.

16. Du Plessis LM, Kruger HS, Sweet L (2013) Complementary feeding: a critical window of opportunity from six months onwards. *South Afr J Clin Nutr* 26, 129 – 140.

17. Mfano ZH. A description of growth monitoring and promotion activities at primary care level in Grahamstown, Makana sub-district, Eastern Cape [Dissertation]. Durban: University of Kwa-Zulu Natal; 2017.

18. South Africa. (2014). A breastfeeding course for health care providers. South Africa: Department of Health (ZA), 2014. 1 - 257.

19. Van der Merwe J, Kluyts M, Bowley N et al. (2007) Optimising the introduction of complementary foods in the infant's diet: a unique challenge in developing countries. *Matern Child Nutr* 3, 259 – 270.

20. Du Plessis LM, Herselman MG, McLachlan MH et al. (2016) Selected facets of nutrition during the first 1000 days of life in vulnerable South African communities. *S Af j child health* 10, 37 – 42.

21. Shisana O, Labadarios D, Rehle T et al. South African national health and nutrition examination survey (SANHANES-1). Cape Town: HSRC Press; 2013. 1 - 423.

22. Labadarios D, Swart R, Maunder EMW et al. (2008) Executive summary of the national food consumption survey fortification baseline (NFCS-FB-1) South Africa, 2005. *South Afr J Clin Nutr* 21, 245 – 300.

23. World Health Organisation (CH). Global Strategy for Infant and Young Child Feeding. Singapore: World Health Organisation (CH), 2003. 1 - 34.

# CHAPTER 4: GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

## 4.1. Introduction

This final chapter summarises and concludes the main findings of the research study in relation to the aims and objectives of the mini-dissertation and makes recommendations on the subject at hand, based on the current findings and existing literature reviewed. The strengths and limitations are also discussed in order to provide guidance for future research.

## 4.2. Summary of main findings

The aim of this study was to determine the knowledge and practices of health care personnel regarding the provision of adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in primary health care (PHC) facilities in West Rand Health District (WRHD).

The specific objectives of the study were:

- To determine the knowledge of health care personnel regarding adequate and appropriate complementary feeding practices when providing education and counselling to mothers/caregivers of infants and young children as stipulated in the Road to Health Booklet (RtHB)/Side-by-Side booklet.
- To assess the current practices of health care personnel in providing adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in line with the RtHB/Side-by-Side booklet.
- To compare the knowledge and practices of clinical and non-clinical healthcare personnel on the adequate and appropriate complementary feeding education and counselling to mothers/caregivers in line with the RtHB/Side-by-Side booklet.

### 4.2.1. Objective 1: To determine the knowledge of health care personnel regarding adequate and appropriate complementary feeding practices when providing education and counselling to mothers/caregivers of infants and young children as stipulated in RtHB/Side-by-Side booklet.

The knowledge of health care personnel on adequate and appropriate complementary feeding practices was determined through the completion of a pre-tested knowledge and practices questionnaire (Only available in English) that was developed based on the complementary feeding promotional messages in the RtHB/Side-by-Side booklet by both clinical and non-clinical health care personnel in PHC facilities in WRHD. The total mean knowledge score on adequate and appropriate complementary feeding for health care personnel was only 44% (SD 18). Health care personnel who indicated that they were trained on infant and young child feeding (IYCF) tended to achieve a higher knowledge score compared to health care personnel that did not undergo any

training (p=0.073). Knowledge regarding the correct age for the introduction of complementary foods, recognition that animal foods and mashed legumes are examples of appropriate complementary foods, identification of food sources rich in Vitamin C and food safety principles were good; however knowledge with regarding meal frequency, meal quantity, identification of food sources rich in Vitamin A, recommended drinks/milk in the complementary feeding period and responsive feeding practices were generally poor.

### 4.2.2. Objective 2: To assess the current practices of health care personnel in providing adequate and appropriate complementary feeding education and counselling to mothers/caregivers of infants and young children in line with the RtHB/Side-by-Side booklet.

The majority of health care personnel (77%; n=85), reported that they routinely give complementary feeding advice to mothers/caregivers of infants and young children. In most cases, the time period during which health care personnel advise mothers/caregivers on complementary feeding was during pregnancy (63%; n=70) and when the infant turns six months old (50%; n=56). Only 31% (n=34) of health care personnel reported that they provide education and counselling on complementary feeding practices during routine well-baby visits. Most of the health care personnel (67%; n=74) selected the RtHB/Side-by-Side booklet as a source of information pertaining to complementary feeding practices. Furthermore, 45% (n=50) of health care personnel utilise the knowledge provided by dietitians working at district level as a source of information regarding complementary feeding practices. More than half of the health care personnel (71%; n=79) reported that they advise mothers/caregivers to introduce complementary foods at the age of six months. Soft or diluted maize meal porridge was advised by 62% (n=69) of health care personnel as a first food, Iron rich protein foods such as mashed chicken liver was cited as a good first food in 41% (n=46) of cases with mashed fruit supported by 50% (n=56) of health care personnel. A quarter of health care personnel suggested commercial baby foods such as commercial infant cereal (26%; n=29) and jarred baby food (26%; n=29) as a first complementary food.

### 4.2.3. Objective 3: To compare the knowledge and practices of clinical and non-clinical healthcare personnel on the adequate and appropriate complementary feeding education and counselling to mothers/caregivers in line with the RtHB/Side-by-Side booklet.

Clinical health care personnel achieved a higher knowledge score compared to non-clinical health care personnel [53 (46, 60)% vs. 33 (20, 47)%, p<0.001]. More clinical staff compared to non-clinical staff correctly identified the appropriate age of introducing complementary foods, type/variety of food to include daily, examples of Vitamin C rich food, examples of Iron rich food and good food safety practices.

Clinical (80%; n=43) and non-clinical health care personnel (75%; n=43) performed similar regarding the provision of complementary feeding education and counselling to mothers/caregivers of infants and young children. More clinical health care personnel than non-clinical health care personnel make use of the RtHB/Side-by-Side booklet as a source of information regarding complementary feeding practices. Non-clinical health care staff rather provide complementary feeding education and counselling during pregnancy with clinical health care personnel indicating that they provide complementary feeding education and counselling at a later stage of the lifecycle. A high percentage of non-clinical health care personnel advise mothers/caregivers to start complementary foods before the recommended age of six months with only 65% (n=37) of non-clinical health care personnel advising the introduction of complementary foods at the age of six months compared to 89% (n=48) of clinical health care personnel

### 4.3. Conclusion

In conclusion, this study illustrated that health care personnel in PHC facilities in WRHD do not have sufficient knowledge on the adequate and appropriate complementary feeding practices that are communicated in the RtHB/Side-by-Side booklet. The non-clinical health care personnel achieved the lowest scores and areas of particular concern included: meal frequency, meal quantity, recommended drinks/milk during the complementary feeding period, Vitamin A rich sources of complementary foods and responsive feeding practices. Another concern is the reported time periods when education and conselling is provided, with particular reference to the low percentage of health care personnel who indicated that they use well-baby visits for counselling. Exposure to IYCF training improved the overall knowledge score of health care personnel; however the majority of health care personnel were trained more than 24 months ago. Health care personnel reported that they do routinely provide education and counselling on complementary feeding practices to mothers/caregivers.

### 4.4. Strengths and limitations

Strengths of this study include:

- The sample size of this study represented the study population of WRHD and was sufficient to provide an overall picture of the knowledge and practices of health care personnel regarding adequate and appropriate complementary feeding education and counselling provided to mothers/caregivers of infants and young children in PHC facilities in WRHD.

- More than half of the PHC facilities in the health district were included in the study and small, medium and large PHC facilities were represented in all sub-districts of WRHD.

- The different categories of health care personnel were well represented with a variety of both clinical and non-clinical health care personnel participating in the study, with health care

personnel that function primarily in the PHC facilities as well as primarily in the community both forming part of the sample size. This enabled the researchers to assess the knowledge and practices of health care personnel regarding complementary feeding in the PHC facilities as well as in the community that is serviced by those PHC facilities.

- PHC facilities that were included in the study represented both urban and rural areas of WRHD.

- The knowledge and practices questionnaire that was used to collect the data was developed by researchers in the field of IYCF as well as complementary feeding and the questionnaire was tested for face validity.

- The knowledge and practices questionnaire that used during this study was developed based on the complementary feeding promotional messages in the RtHB/Side-by-Side booklet.

A limitation of this study includes:

This study was only conducted in WRHD in Gauteng, which implies that the results may not be generalized to other health districts and provinces in South Africa. However, although the results have local application, it has broader relevance, since the same RtHB/Side-by-side booklet is used throughout the country.

**4.5. Recommendations**

- Even though certain aspects of the complementary practices noted in the RtHB/Side-by-Side booklet were generally answered well, more emphasis should be placed on the aspects of complementary feeding in which health care personnel performed poorly e.g. meal frequency, meal quantity, recommended drinks/milk for infants and young children during the complementary feeding period, Vitamin A rich sources of complementary foods and responsive feeding practices.

- Targeted and specific interventions should be explored to capacitate health care personnel more effectively in terms of adequate and appropriate complementary feeding practices to ensure quality education and counselling pertaining to complementary feeding practices to mothers/caregivers; with specific emphasis on non-clinical health care personnel. Specific time frames should be established in which health care personnel should be trained and refresher training sessions should be conducted routinely in order to sustain the knowledge of health care personnel on adequate and appropriate complementary feeding practices. Furthermore,

barriers for why health care personnel do not have adequate knowledge regarding the promotional messages in the RtHB/Side-by-Side booklet should be established.

- It would be valuable to assess the current training curriculums provided to health care personnel regarding complementary feeding practices. Possible development and testing of training curriculums which sufficiently address adequate and appropriate complementary feeding practices could assist in standardising the information provided to health care personnel on adequate and appropriate complementary feeding practices.

- Even though the standardised trainings (Lactation Management Course, Integrated Management of Childhood Illnesses, Prevention of Mother to Child Transmission, Community Health Care Worker training, Ward Based Outreach Team training, Mentor Mother Counsellor training, Severe Acute Malnutrition training and RtHB/Side-by-Side booklet training) developed by the National Department of Health (NDoH) include some messages on complementary feeding practices, the majority of the content of these trainings are targeted at general child health, with special emphasis on specifically breastfeeding practices. Integration of more extensive and specific messages on adequate and appropriate complementary feeding practices into these trainings could increase the exposure of health care personnel to the knowledge that is needed to adequately and appropriately educate and counsel mothers and caregivers on optimal complementary feeding practices. Consistent and regular refresher training sessions should be conducted in order to ensure that health care personnel maintain sufficient knowledge on adequate and appropriate complementary feeding practices.

- It is essential that the barriers to the provision of consistent, quality and evidence-based complementary feeding education and counselling to mothers/caregivers by health care personnel be evaluated in order to support health care personnel in the practice of providing mothers/caregivers with complementary feeding education and counselling. Future research can focus on the specific reasons for why health care personnel do not routinely provide education and counselling on adequate and appropriate complementary feeding practices to mothers/caregivers of infants and young children.

- It is imperative that the draft Paediatric Food Based Dietary Guidelines (PBFDGs) are accepted by the National Department of Health (NDoH) for nationwide dissemination. The messages stipulated in the RtTHB/Side-by-side booklet correlate with the proposed PFBDGs regarding messages such as exclusive breastfeeding for the first six months of life, continued breastfeeding (6 – 24 months of age), the timing of introduction to complementary foods, the provision of a variety of complementary foods, food safety, responsive feeding principles and avoidance of empty caloric complementary foods. Furthermore, the inclusion of the graphic

images/tools included in the draft PFBDG’s should be considered with urgency.

# CHAPTER 5 BIBLIOGRAPHY


Black, R.E., Victora, C.G., Walker, S.P., Bhutta, Z.A., Christian, P., De Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., Uauy, R. & the Maternal and child nutrition study group. 2013. Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet,* 382(9890):427 – 451.

Budree, S., Goddard, E., Brittain, K., Cader, S., Myer, L. & Zar, H.J. 2016. Infant feeding practices in a South African birth cohort – A longitudinal study*. Maternal & child nutrition*, 13(3):1 – 9.

Cloete, I., Daniels, L., Jordaan, J., Derbyshire, C., Volmink, L. & Schubl, C. 2013. Knowledge and perceptions of nursing staff on the new road to health booklet growth charts in primary healthcare clinics in the Tygerberg sub district of the Cape Town metropole district. *South African journal of clinical nutrition,* 26(3):141 – 146.

Department of Health South Africa. 1994. Integrated nutrition programme. Government Press: Pretoria.

Department of Health (ZA), World Health Organisation (CH) & United Nations Children's Fund (US). 2010. Landscape analysis on countries' readiness to accelerate action to reduce maternal and child undernutrition: nationwide country assessment in South Africa. Government Press: Pretoria. http://www.who.int/nutrition/landscape_analysis/SouthAfricaLandscapeAnalysisCountryAssessmentReport.pdf. Date of access: 2 Sept. 2015.

Department of Health South Africa. 2012. Road to health booklet. Government Press: Pretoria.

Department of Health South Africa. 2012. Strategic plan for maternal, newborn, child and women's health (MNCWH) and nutrition in South Africa. Government Press: Pretoria.

Department of Health South Africa. 2013. Infant and young child feeding policy. Government Press: Pretoria.

Department of Health South Africa. 2013. Roadmap for nutrition in South Africa 2013 – 2017. Government Press: Pretoria.

Department of Health South Africa. 2014. A breastfeeding course for health care providers. Government Press: Pretoria.

Department of Health South Africa. 2014. Integrated management of childhood illnesses. Government Press: Pretoria.

Department of Health, Department of Social Development & Department of Planning, Monitoring and Evaluation South Africa. 2014. Summary evaluation report: diagnostic/implementation evaluation of nutrition interventions for children from conception to age 5. Government Press: Pretoria. http://www.nutritionsociety.co.za/attachments/article/76/Summary-Evaluation-of-Nutritional-Interventions-for-Children-from-Conception-to-Age-5-.pdf. Date of access: 25 Aug. 2015.

Department of Health South Africa. 2015. National integrated early childhood development policy. Government Press: Pretoria.

Department of Health South Africa. 2016. Strategy for the prevention and control of obesity in South Africa 2015 – 2020. Government Press: Pretoria.

Department of Health South Africa. 2017. Amendment of the 2013 infant and young child feeding policy. Government Press: Pretoria.

Department of Health South Africa. 2017. National food and nutrition security plan for South Africa 2017-2022. Government Press: Pretoria.

Department of Health South Africa. 2017. Side-by-Side booklet. Government Press: Pretoria.

Department of Health, Statistics South Africa, South African Medical Research Council & ICF. 2017. South Africa demographic and health survey 2016: key indicators. Government Press: Pretoria.

Department of Health South Africa. 2018. Standard treatment guidelines and essential medicines list for South Africa primary healthcare level. Government Press: Pretoria.

Dewey, K.G. & Adu-Afarwuah, S. 2008. Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. *Maternal and child nutrition*, 4(1):S24 – 85.

Du Plessis, L.M. & Pereira, C. 2013. Commitment and capacity for the support of breastfeeding in South Africa: a paediatric food-based dietary guideline. *South African journal of clinical nutrition*, 26(3):S120 - 128.

Du Plessis, L.M., Kruger, H.S. & Sweet, L. 2013. Complementary feeding: a critical window of opportunity from six months onwards. *South African journal of clinical nutrition*, 26(3):S129 – 140.

Du Plessis, L.M., Herselman, M.G., McLachlan, M.H. & Nel, J.H. 2016. Selected facets of nutrition during the first 1000 days of life in vulnerable South African communities. *South African journal of child health*, 10(1):37 – 42.

Du Plessis, L.M., Koornhof, H.E., Marais, M.L. & Blaauw, R. 2017. Implementation of the road-to-health-booklet health promotion messages at primary health care facilities, Western Cape Province, South Africa. *South African journal of child health*, 11(4):164 – 169.

Du Plessis, L.M., Daniels, L.C. & Koornhof, H.E. 2018. Field-testing of the revised Paediatric Food-Based Dietary Guidelines amongst mothers/caregivers of children aged 0-12 months in the Western Cape Province, South Africa. Biennial Nutrition Congress 2018, Johannesburg, South Africa. 5-7 September 2018.

Austin-Evelyn, K., Rabkin, M., Macheka, T., Mutiti, A., Mwansa-Kambfwile, J., Dlamini, T. & El-Sadr, W.M. 2017. Community health worker perspectives on a new primary health care initiative in the Eastern Cape of South Africa. *Public library of science*, 12(3):1 – 13.

Faber, M. & Spinnler-Benadé, A.J. 2007. Breastfeeding, complementary feeding and nutritional status of 6 – 12 – month – old infants in rural KwaZulu Natal. *South African journal of clinical nutrition,* 20(1):16 – 24.

Faber, M. & Laubscher, R. 2014. Nutrient density of the complementary diet for 6 to 24 month old children in urban and rural Kwazulu-Natal, South Africa. *European journal of nutrition and food safety,* 5(5):842 – 843.

Faber, M., Laubscher, R. & Berti, C. 2016. Poor dietary diversity and low nutrient density of the complementary diet for 6 – 24 month – old children in urban and rural KwaZulu-Natal, South Africa. *Maternal and child nutrition*, 12(3):528 – 545.

George, A., Young, M., Nefdt, R., Basu, R., Sylla, M., Clarysse, G., Bannicq, M.Y., De Sousa, A., Binkin, N. & Diaz, T. 2012. Community health workers providing government community case management for child survival in Sub-Saharan Africa: who are they and what are they expected to do? *American journal of tropical medicine and hygiene*, 87(5):S85 – 91.

Heinen, M. 2010. Assessment of training needs of health care professionals who provide foetal, maternal and infant nutrition advice. National Nutrition Surveillance Centre: Ireland.

Hendricks, M., Goeiman, H. & Hawkridge, A. 2013. Promoting healthy growth: strengthening nutritional support for mothers, infants and children. *South African child gauge 2013*. Cape Town: Children's Institute, University of Cape Town.

Horwood, C., Vermaak, K., Rollins, N., Haskins, L., Nkosi, P. & Qazi, Shamim. 2009. An evaluation of the quality of IMCI assessments among IMCI trained health workers in South Africa. *Public library of science*, 4(6):1 – 6.

International Food Policy Research Institute. 2016. Global food policy report. Washington, DC: USA.

Janse van Rensburg, L., Nel, R. & Walsh, C.M. 2016. Knowledge, opinions and practices of healthcare workers related to infant feeding in the context of HIV. *Health SA gesondheid,* 21(1):129 – 136.

Jonker, L. & Stellenberg, E. 2014. Missed opportunities in child healthcare. *African journal of primary healthcare*, 6(1):1 – 7.

Kassa, T., Meshesha, B., Haji, Y. & Ebrahim, J. 2016. Appropriate complementary feeding practices and associated factors among mothers of children age 6 – 23 months in Southern Ethiopia. *Biomedical paediatrics journal*, 16(131):1 – 10.

Kassier, S.M. & Veldman, F.J. 2013. Cry, the beloved bottle: infant - feeding knowledge and the practices of mothers and caregivers in an urban township outside Bloemfontein, Free State province. *South African journal of clinical nutrition*, 26(1):17 – 22.

Kruger, J., Mongwaketse, T., Faber, M., van der Hoeven, M. & Smuts, C.M. 2015. Potential contribution of African green leafy vegetables and maize porridge composite meals to iron and zinc nutrition. *Nutrition,* 31(9):1117 – 1123.

Labadarios, D., Swart, R., Maunder, E.M.W., Kruger, H.S., Gericke, G.J., Kuzwayo, P.M.N., Ntsie, P.R., Steyn, N.P., Schloss, I., Dhansay, M.A., Jooste, P.L., Dannhauser, A., Nel, J.H., Molefe, D. & Kotze, T.J.V.W. 2008. Executive summary of the national food consumption survey fortification baseline (NFCS-FB-1) South Africa, 2005. *South African journal of clinical nutrition*, 21(3):S245 – 300.

Lutter, C.K., Ianotti, L., Creed-Kanashiro, H., Guyan, A., Daelmans, B., Robert, R. & Haider, R. 2013. Key principles to improve programmes and interventions in complementary feeding. *Maternal and child nutrition*, 9(2):S101 – 115.

Malan, Z., Mash, B. & Everett-Murphy, K. 2015. A situational analysis of training for behaviour change counselling for primary care providers, South Africa. *African journal of primary health care and family medicine*, 7(1):1 – 10.

Matlala, D.B. 2017. Development of strategies for caregivers on feeding practices of children aged 6 – 24 months in a township in Gauteng. Pretoria: UP (Dissertation – MsC).

Mfano, Z.H. 2017. A description of growth monitoring and promotion activities at primary care level in Grahamstown, Makana sub-district, Eastern Cape. Durban: UKZN (Dissertation – MsC).

Massyn, N., Pillay, Y. & Padarath, A. 2019. District Health Barometer 2017/18. Durban: Health Systems Trust.

Moller, I., Du Plessis, L.M. & Daniels, L.C. 2018. Field-testing of the revised Paediatric Food-Based Dietary Guidelines amongst mothers/caregivers of children aged 0-36 months in Kabokweni, Mpumalanga in the Western Cape Province, South Africa.Biennial Nutrition Congress 2018, Johannesburg, South Africa. 5-7 September 2018.

Mushaphi, L.F., Dannhauser, A., Walsh, C.M., Mbehnyane, X.G. & Van Rooyen, F.C. 2015. Effect of a nutrition education programme on nutritional status of children aged 3 - 5 years in Limpopo Province, South Africa. *South African journal of child health*, 9(3):98 – 102.

Naledi, T., Barron, P. & Schneider, H. 2011. Primary health care in South Africa since 1994 and implications of the new vision for PHC re-engineering. South African Health Review 2011. Durban: Health Systems Trust.

Paul, K.H., Muti, M., Khalfan, S.S., Humphrey, J.H., Caffarella, R. & Stoltzfus, R.J. 2011. Beyond food insecurity: how context can improve complementary feeding intervention. *Food and nutrition bulletin,* 32(3):244 – 252.

Rhors, S. & Du Plessis, L.M. 2018. Field-testing of the revised Paediatric Food-Based Dietary Guidelines amongst mothers/caregivers of children aged 3-5 years in the Northern Metropole, Western Cape Province, South Africa.Biennial Nutrition Congress 2018, Johannesburg, South Africa. 5-7 September 2018.

Rothman, M., Faber, M., Covic, N., Matsungo, T.M., Cockeran, M., Kvalsvig, J.D. & Smuts, C.M. 2018. Infant development at the age of 6 months in relation to feeding practices, iron status and growth in a peri-urban community of South Africa. *Nutrients,* 10(73):1 – 13.

Samuel, F.O., Olaolorun, F.M. & Adeniyi, J.D. 2016. A training intervention on child feeding among primary healthcare workers in Ibadan Municipality. *African journal of primary health care & family medicine*, 8(1):1 – 6.

Samuels, S., Du Plessis, L.M. & Daniels, LC. 2018. Field-testing of the revised Paediatric Food-Based Dietary Guidelines amongst mothers/caregivers of children aged 12-36 months in the Stellenbosch Municipality, Western Cape Province, South Africa.Biennial Nutrition Congress 2018, Johannesburg, South Africa. 5-7 September 2018.

Sayed, N. & Schonfeldt, H.C. 2018. A review of complementary feeding practices in South Africa. *South African journal of clinical nutrition,* 0(0):1 – 8.

Shisana, O., Labadarios, D., Rehle, T., Simbayi L., Zuma, K., Dhansay, A., Reddy, P., Parker, W., Hoosain, E., Naidoo, P., Hongoro, C., Mchiza, Z., Steyn, N.P., Dwane, N., Makoae, M., Maluleke, T., Ramlagan, S., Zungu, N., Evans, M.G., Jacobs, L., Faber, M., & SANHANES-1 Team. 2013. South African national health and nutrition examination survey (SANHANES-1). Cape Town: HSRC Press.

Shrimpton R., Victora C.G., de Onis M., Lima R.C., Blossner M. & Clugston G. 2001. Worldwide timing of growth faltering: implications for nutritional interventions. *Pediatrics*, 107(5):1 – 7.

Slemming W. & Saloojee, H. 2013. Beyond survival: the role of health care in promoting ECD. *South African child gauge 2013*. Cape Town: Children's Institute, University of Cape Town.

Stewart, C.P., Iannotti, L., Dewey, K.G., Michaelsen, K.F. & Onyango, A.W. 2013. Contextualising complementary feeding in a broader framework for stunting prevention. *Maternal and child nutrition*, 9(2):27 – 45.

Swanepoel, E., Havemann-Nel, L., Rothman, M., Laubscher, R., Matsungo, T.M., Smuts, C.M. & Faber, M. 2018. Contribution of commercial infant products and fortified staple foods to nutrient intake at ages 6, 12, and 18 months in a cohort of children from a low socio-economic community in South Africa. *Maternal and child nutrition,* 15(2):1 – 10.

Sunguya, B.F., Poudel, K.C., Mlunde, L.B., Shakya, P., Urassa, D.P., Jimba, M. & Yasuoka, J. 2013. Effectiveness of nutrition training of health workers toward improving caregivers' feeding practices for children aged six months to two years: a systematic review. *Nutrition journal,* 12(66):1 – 14.

United Nations Children's Fund, World Health Organisation & The World Bank. 2018. Levels and trends in child malnutrition. New York: USA

United Nations Children's Fund. 2019. The state of the world's children 2019. Children, food and nutrition: growing well in a changing world. New York: USA.

Van der Merwe, J., Kluyts, M., Bowley, N. & Marais, D. 2007. Optimising the introduction of complementary foods in the infant's diet: a unique challenge in developing countries. *Maternal and child nutrition*, 3(4):259 – 270.

Viviers, A., Biersteker, L. & Moruane, S. 2013. Strengthening ECD service delivery: addressing systemic challenges. *South African child gauge*. Cape Town: Children's Institute, University of Cape Town.

White, J.M., Bégin, F., Kumaplay, R., Murray, C. & Krasevec, J. 2017. Complementary feeding practices: global and regional estimates. *Maternal and child nutrition*, 13(2):S1 – 12.

World Health Organisation. 2002. Complementary feeding: report of the global consultation, and summary of guiding principles for complementary feeding of the breastfed child. Geneva: Switzerland.

World Health Organisation. 2003. Global strategy for infant and young child feeding. Geneva: Switzerland.

World Health Organisation. 2010. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: Switzerland.

# ANNEXURE A: DEMOGRAPHIC AND COMPLEMENTARY FEEDING PRACTICES QUESTIONNAIRE

**Demographic and complementary feeding (solid foods) practices questionnaire**

Date of interview (DD/MM/YY): _____/_____/_____ Participant number:_____

Sub-district name: _____ Clinic name: _____

**Thank you very much for taking the time to complete this questionnaire. Your answers will remain confidential. Please tick to indicate your answer. For some of the questions in Section 1 and 2, more than one answer can be selected. HOWEVER, for the questions in section 3, ONLY ONE answer should be selected. If you have selected "other", please specify in the space provided.**

| **Section 1: Demographic information of participant** | | |
|---|---|---|
| | What is your designation at the facility? | Professional nurse ☐<br>Enrolled nurse/Enrolled nursing assistant ☐<br>Community Health Worker/Health Promoter ☐<br>Lay Counsellor ☐<br>Mentor Mother Counsellor ☐<br>Other:_____ |
| | How long have you been working in your present role? | _____years |
| | What is your gender? | Female ☐ Male ☐ |
| | What is your age? | _____years old |
| | What is your highest formal education qualification? | < Grade 12 ☐ Grade 12 ☐ Tertiary qualification ☐<br>If you have a tertiary qualification, please name your qualification:_____ |
| | Have you been trained on infant feeding or child feeding (IYCF)? (**You can select more than one option**) | Yes ☐ No ☐<br>**If yes**, what training did you attend?<br>☐ 18-hour, 20-hour or 24-hour Breastfeeding Course<br>☐ Integrated Management of Childhood Ilnesses training<br>☐ Prevention of Mother to Child Transmission of HIV training<br>☐ Community Health Care Worker training<br>☐ Ward Based Outreach Team training<br>☐ Mentor Mother Programme training<br>☐ Severe Acute Malnutrition training<br>☐ Road-to-Health and/or Side-by-Side booklet<br>Other:_____<br>_____ |
| | How long ago did this training take place? | < 6 months ☐ 6 - 12 months ☐<br>>12 months ☐ > 24 months ☐ |

| Section 2: Complementary feeding practices | | |
|---|---|---|
| 2.1 | Do you give complementary feeding advice to mothers/caregivers? (advice about solid foods) | ☐ No, it is not part of my responsibility<br>☐ Yes, I routinely give complementary feeding advice<br>☐ Yes, but only if a mother/caregiver asks<br>☐ Yes, but only if I have time<br>☐ Yes, but only if the mother/caregiver is referred to me for complementary feeding guidance<br>☐ Other (please specify): _____ |
| 2.2 | Where do get your information on complementary feeding?<br><br>(**You can select more than one option**) | ☐ Road-to-Health and/or Side-by-Side booklet<br>☐ IMCI booklet<br>☐ Department/facility-based trainings<br>☐ Dietitian<br>☐ Internet<br>☐ Other (please specify): _____ |
| 2.3 | During what time periods do you generally advise mothers/caregivers on complementary feeding?<br><br>(**You can select more than one option**) | ☐ Never<br>☐ During pregnancy<br>☐ When the baby is between 0-6 months old<br>☐ When the baby is 6-months old<br>☐ When the baby is not growing well<br>☐ When the baby is putting on too much weight<br>☐ When the mother/caregiver asks<br>☐ Every time the mother/caregiver visit the clinic (routinely)<br>☐ Other (please specify):_____ |
| 2.4 | At what age do you advise mothers/caregivers to start with complementary food?<br><br>(**You can select more than one option**) | ☐ When the mom complains her breast milk is not enough<br>☐ Between birth – 3 months<br>☐ Between 3 – 6 months<br>☐ At 6 months<br>☐ After 6 months<br>☐ Other (please specify):_____ |
| 2.5 | What do you recommend to a mother/caregiver as a first food to her baby?<br>(**You can select more than one option**) | ☐ Soft or diluted maize meal<br>☐ Mashed fruit<br>☐ Mashed chicken liver<br>☐ Commercial infant cereal<br>☐ Jarred baby food (e.g. Purity)<br>☐ Other (please specify):_____ |

**Complementary feeding knowledge questionnaire – please <u>choose ONLY ONE answer</u>**

Participant number: _____

| Section 3: Knowledge on complementary feeding | | |
|---|---|---|
| **3.1** | What is the recommended age to introduce/start with complementary foods (solid foods)? | ☐ Before age 4 months<br>☐ 4 – 6 months<br>☐ At 6 months<br>☐ After 6 months<br>☐ I don't know |
| **3.2** | If a mother <u>is still breastfeeding</u> her baby aged 6 – 12 months, is it recommended that the mother also give another source of milk (e.g. infant formula or cow's milk)? | ☐ Yes<br>☐ No<br>☐ I don't know |
| **3.3** | If the mother <u>is not breastfeeding her</u> baby aged 12 – 24 months, what is the recommended milk to give to her baby? | ☐ Infant formula<br>☐ Follow-up infant formula<br>☐ Pasteurised full cream cow's milk<br>☐ Pasteurised low fat cow's milk<br>☐ I don't know |
| **3.4** | How many meals per day is recommended when a baby start with complementary foods (solid foods)? | ☐ 1 Meal per day<br>☐ 2 Meals per day<br>☐ 3 Meals per day<br>☐ 4 Meals per day<br>☐ 5 Meals per day<br>☐ I don't know |
| **3.5** | What is the recommended amount of food to feed your baby aged 9 – 11 months per meal? | ☐ 2 – 3 teaspoons<br>☐ 1/8 – ¼ Cup<br>☐ ¼ - ½ Cup<br>☐ ½ - 1 Cup<br>☐ 1 Cup<br>☐ I don't know |
| **3.6** | Are animal foods like chicken, liver, egg yolk, fish and minced meat appropriate complementary foods? | ☐ Yes<br>☐ No<br>☐ I don't know |

| | |
|---|---|
| What type of foods should the complementary feeding diet contain every day? | ☐ Protein and Iron rich foods<br>☐ Starches<br>☐ Fruits and vegetables<br>☐ All of the above<br>☐ None of the above<br>☐ I don't know |
| How many meals per day is recommended for a baby aged 12 months or older? | ☐ 1 Meal per day<br>☐ 2 Meals per day<br>☐ 3 Meals per day<br>☐ 4 Meals per day<br>☐ 5 Meals per day<br>☐ I don't know |
| Is mashed beans, lentils and chickpeas appropriate for complementary feeding? | ☐ Yes<br>☐ No<br>☐ I don't know |
| Which option is a good example of a food that is rich in Iron? | ☐ Chicken livers<br>☐ Egg white<br>☐ Carrots<br>☐ Mabele<br>☐ All of the above<br>☐ I don't know |
| Which option is a good example of a food that is rich in Vitamin A? | ☐ Liver<br>☐ Mango<br>☐ Yellow sweet potato<br>☐ Full cream milk<br>☐ All of the above<br>☐ I don't know |
| Which option is a good example of a food that is rich in Vitamin C? | ☐ Bananas<br>☐ Milk<br>☐ Naartjies<br>☐ Pilchards<br>☐ None of the above<br>☐ I don't know |

| | | |
|---|---|---|
| **3.13** | Which drink is recommended for babies aged 12 – 24 months? | ☐ Rooibos tea<br>☐ Fruit juice<br>☐ Clean safe water<br>☐ Follow-up formula<br>☐ All of the above<br>☐ I don't know |
| **3.14** | Which one of the following practices is not recommended when feeding a baby aged 12 – 24 months? | ☐ Stay next to your baby when they are eating<br>☐ Give your baby small pieces of food that they can hold.<br>☐ Give your baby clean, safe water<br>☐ Make sure all the food is mashed<br>☐ All of the above<br>☐ I don't know |
| **3.15** | What are good food safety practices to protect your baby child from developing diarrhoea? | ☐ Boil water and cool down<br>☐ Keep foods and cooking utensils very clean<br>☐ Always wash your and your child's hands<br>☐ Use a cup instead of a bottle<br>☐ All of the above<br>☐ I don't know |

**THANK YOU FOR COMPLETING THE QUESTIONNAIRE**

# ANNEXURE B: AUTHOR GUIDELINES FOR THE PUBLIC HEALTH NUTRITION JOURNAL

## SCOPE

The scope of Public Health Nutrition (PHN) includes multi-level determinants of dietary intake and patterns, anthropometry, food systems and their effects on health-related outcomes. We welcome papers that:

1. Address monitoring and surveillance of nutritional status and nutritional environments in communities or populations at risk.
2. Identify and analyse behavioral, sociocultural, economic, political and environmental determinants of nutrition-related public health.
3. Develop methodology needed for assessment and monitoring.
4. Inform efforts to improve communication of nutrition-related information.
5. Build workforce capacity for effective public health nutrition action.
6. Evaluate or discuss the effectiveness of food and nutrition policies.
7. Describe the development, implementation and evaluation of innovative interventions and programs to address nutrition-related problems.
8. Relate diet and nutrition to sustainability of the environment and food systems.

## SUBMISSION AND REVIEW PROCESS

PHN uses ScholarOne Manuscripts for online submission and peer review. As part of the online submission process, authors are asked to affirm that the submission represents original work that has not been published previously; that it is not currently being considered by another journal; and that each author has seen and approved the contents of the submitted manuscript.

At submission, authors must nominate at least four potential referees who may be asked by the Editorial Board to help review the work. Where possible, authors should provide the email address and institution of their recommended referees. Please ensure that these potential referees are not located at the same affiliation as any of the co-authors. PHN uses a double-blind review process, and manuscripts are normally reviewed by two external peer reviewers and a member of the Editorial Board.

Authors may submit a paper that has previously been posted on a preprint server, however please note that the journal operates a double-blind peer review process and therefore your paper may not be fully blinded as a result.

Revisions must be resubmitted within two months or they will be deemed a new paper. When substantial revisions are required after review, authors are normally given the opportunity to do this once only; the need for any further changes should reflect only minor issues

Appeals against an editorial decision will only be considered under exceptional circumstances. To have an appeal considered, please submit an appeal letter by responding to the decision letter directly, or directly to the Editorial Office at phn.edoffice@cambridge.org. Decisions on appeals are made by the Editor-in-Chief. If over six months has passed between the original decision and a successful appeal, your paper may be subject to further peer review at the Editor's discretion.

If you have any other concerns about the handling of a manuscript or editorial processes of the journal, please contact phn.edoffice@cambridge.org or the journal's publisher, Cambridge University Press, on publishingethics@cambridge.org.

## PUBLISHING ETHICS

PHN adheres to the Committee on Publication Ethics (COPE) guidelines on research and publications ethics. The Journal considers all manuscripts on the strict condition that:

1. The manuscript is your own original work, and does not duplicate any previously published work.

2. The manuscript has been submitted only to the journal - it is not under consideration or peer review or accepted for publication or in press or published elsewhere.
3. All listed authors know of and agree to the manuscript being submitted to the journal.
4. The manuscript contains nothing abusive, defamatory, fraudulent, illegal, libellous, or obscene.

Text taken directly or closely paraphrased from earlier published work that has not been acknowledged or referenced will be considered plagiarism. Submitted manuscripts in which such text is identified will be withdrawn from the editorial process. Any concerns raised about possible plagiarism or other violations of ethical guidelines in an article submitted to or published in PHN will be investigated fully and dealt with in accordance with the COPE guidelines. The Nutrition Society, as the owner of PHN, endorses the Publication Ethics outlined by Cambridge University Press.

## DETAILED MANUSCRIPT PREPARATION INSTRUCTIONS

### Language

Papers submitted for publication must be written in English and should be as concise as possible. We recommend that authors have their manuscript checked by an English language native speaker before submission, to ensure that submissions are judged at peer review exclusively on academic merit. Spelling should generally be that of the Concise Oxford Dictionary (1995), 9th ed. Oxford: Clarendon Press. Authors are advised to consult a current issue in order to make themselves familiar with PHN as to typographical and other conventions, layout of tables etc.

### Authorship

The Journal conforms to the International Committee of Medical Journal Editors (ICMJE) definition of authorship. Authorship credit should be based on:

24. Substantial contributions to conception and design, data acquisition, analysis and/or interpretation.
25. Drafting the article or revising it critically for important intellectual content.
26. Final approval of the version to be published.

The contribution of individuals who were involved in the study but do not meet these criteria should be described in the Acknowledgements section.

### Ethical standards

All submissions must abide by the guidelines in the World Medical Association (2000) Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects, with notes of clarification of 2002 and 2004 (https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/), the Guidelines on the Practice of Ethics Committees Involved in Medical Research Involving Human Subjects (3rd ed., 1996; London: The Royal College of Physicians) and the Guidelines for the Ethical Conduct of Medical Research Involving Children, revised in 2000 by the Royal College of Paediatrics and Child Health: Ethics Advisory Committee (Arch Dis Child (2000) 82, 177–182).

### Cover Letter

Authors are invited to submit a cover letter including a short explanation of how the article advances the field of public health nutrition in terms of research, practice, or policy, and of its relevance to an international readership. The text for the cover letter should be entered in the appropriate box as part of the online submission process.

### Title Page

Authors must submit a title page online as a separate file to their manuscript, to enable double-blind reviewing. For the same reason, the information on the title page should not be included in the manuscript itself.

The title page should include:

- The title of the article.
- Authors' names, given without titles or degrees.
- Name and address of department(s) and institution(s) to which the work should be attributed for each author, with each author's institution(s) identified by a superscript number (e.g. A.B. Smith1).
- Name, mailing address, email address, telephone and fax numbers of the author responsible for correspondence about the manuscript.
- A shortened version of the title, not exceeding 45 characters (including letters and spaces) in length.
- Disclosure statements, as outlined below. These must be included on the title page and not in the manuscript file, to enable double-blind reviewing; if the paper is accepted, they will be inserted into the manuscript during production.

**Acknowledgements**

Here you may acknowledge individuals or organizations that provided advice and/or support (non-financial). Formal financial support and funding should be listed in the following section.

**Financial Support**

Please provide details of the sources of financial support for all authors, including grant numbers. For example, "This work was supported by the Medical research Council (grant number XXXXXXX)". Multiple grant numbers should be separated by a comma and space, and where research was funded by more than one agency the different agencies should be separated by a semi-colon, with "and" before the final funder. Grants held by different authors should be identified as belonging to individual authors by the authors' initials. For example, "This work was supported by the Wellcome Trust (A.B., grant numbers XXXX, YYYY), (C.D., grant number ZZZZ); the Natural Environment Research Council (E.F., grant number FFFF); and the National Institutes of Health (A.B., grant number GGGG), (E.F., grant number HHHH)".

This disclosure is particularly important in the case of research supported by industry, including not only direct financial support for the study but also support in kind such as provision of medications, equipment, kits or reagents without charge or at reduced cost and provision of services such as statistical analysis. All such support, financial and in kind, should be disclosed here.

Where no specific funding has been provided for research, please provide the following statement: "This research received no specific grant from any funding agency, commercial or not-for-profit sectors."

In addition to the source of financial support, please state whether the funder contributed to the study design, conduct of the study, analysis of samples or data, interpretation of findings or the preparation of the manuscript. If the funder made no such contribution, please provide the following statement: "[Funder's name] had no role in the design, analysis or writing of this article."

**Conflict of Interest**

The Journal adheres to the definition of conflicts of interest given by the ICMJE guidelines. A conflict of interest exists when an author has interests that might inappropriately influence his or her judgement, even if that judgement is not influenced. Financial relationships such as employment, consultancies, or honoraria, are the most easily identifiable conflicts of interest. However, non-financial conflicts can also exist as a result of personal relationships, academic competition and personal or intellectual beliefs.

Having a conflict of interest is not in itself wrong, and not all relationships may lead to an actual conflict of interest. However, PHN requires full disclosure about any relevant relationships, even if the author or reviewer does not believe it affects their judgment. These disclosures can then be used as a basis for editorial decisions. One question that provides some guidance in deciding which relationships merit declaration as potential conflicts of interest is this: if a relationship is not disclosed, would a reasonable reader feel misled? When in doubt, full transparency is the best course of action. Perceived conflicts of interest are as important as actual conflicts of interest, and undeclared conflicts (perceived as well as actual) can undermine the credibility of both the journal and the authors.

So that others can make judgements about potential conflicts, please provide details of all known financial and non-financial (professional and personal) relationships with the potential to bias the work. Where no known conflicts of interest exist, please include the following statement: "None."

**Authorship**

Please provide a very brief description of the contribution of each author to the research. Their roles in formulating the research question(s), designing the study, carrying it out, analysing the data and writing the article should be made plain.

**Ethical Standards Disclosure**

Manuscripts describing research involving human participants must include the following statement: "This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the [name of the ethics committee]. Written [or Verbal] informed consent was obtained from all subjects/patients." Where verbal consent was obtained, this must be followed by a statement such as: "Verbal consent was witnessed and formally recorded."

**MANUSCRIPT FORMAT**

The requirements of PHN are in accordance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals produced by the ICMJE, and authors are encouraged to consult the latest guidelines, which contain useful, general information about preparing scientific papers. Authors should also consult the CONSORT guidelines for reporting results of randomised trials.

Typescripts should be prepared with 1.5 line spacing and wide margins (2 cm), the preferred font being Times New Roman size 12. At the ends of lines, words should not be hyphenated unless hyphens are to be printed. Continuous line and page numbering is required.

**Manuscripts should be organised as follows:**

**Abstract**

Each paper must open with a structured abstract of not more than 250 words. The abstract should consist of the following headings: Objective, Design, Setting, Participants, Results, and Conclusions. All the headings should be used, and there should be a separate paragraph for each one. The abstract should be intelligible without reference to text or figures.

**Keywords**

Authors should list at least four keywords or phrases (each containing up to three words).

**Introduction**

It is not necessary to introduce a paper with a full account of the relevant literature, but the introduction should indicate briefly the nature of the question asked and the reasons for asking it.

**Methods**

For manuscripts describing experiments involving human subjects, the required ethical standards disclosure statement must be included on the title page only as described above. It will then be inserted into this section of the manuscript during production.

**Results**

These should be given as concisely as possible, using figures or tables as appropriate. Data should not be duplicated in tables and figures.

**Discussion**

While it is generally desirable that the presentation of the results and the discussion of their significance should be presented separately, there may be occasions when combining these sections may be beneficial. Authors may also find that additional or alternative sections such as 'conclusions' may be useful.

**References**

References should be numbered consecutively in the order in which they first appear in the text using superscript Arabic numerals in parentheses, e.g. 'The conceptual difficulty of this approach has recently been highlighted[1,2]'. If a reference is cited more than once, the same number should be used each time. References cited only in tables and figure legends should be numbered in sequence from the last number used in the text and in the order of mention of the individual tables and figures in the text.

Names and initials of authors of unpublished work should be given in the text as 'unpublished results' and not included in the References. References that have been published online only but not yet in an issue should include the online publication date and the Digital Object Identifier (doi) reference, as per the example below.

At the end of the paper, on a page(s) separate from the text, references should be listed in numerical order using the Vancouver system. When an article has more than three authors only the names of the first three authors should be given followed by 'et al.' The issue number should be omitted if there is continuous pagination throughout a volume. Titles of journals should appear in their abbreviated form using the NCBI LinkOut page. References to books and monographs should include the town of publication and the number of the edition to which reference is made. References to material available on websites should follow a similar style, with the full URL included at the end of the reference, as well as the date of the version cited and the date of access.

Examples of correct forms of references are given below.

**Journal articles**

- Rebello SA, Koh H, Chen C et al. (2014) Amount, type, and sources of carbohydrates in relation to ischemic heart disease mortality in a Chinese population: a prospective cohort study. Am J Clin Nutr 100, 53-64.
- Villar J, Ismail LC, Victora CG et al. (2014) International standards for newborn weight, length, and head circumference by gestational age and sex: the Newborn Cross-Sectional Study of the INTERGROWTH-21st Project.Lancet 384, 857-868.
- Alonso VR & Guarner F (2013) Linking the gut microbiota to human health. Br J Nutr 109, Suppl. 2, S21–S26.
- Bauserman M, Lokangaka A, Gado J et al. A cluster-randomized trial determining the efficacy of caterpillar cereal as a locally available and sustainable complementary food to prevent stunting and anaemia. Public Health Nutr. Published online: 29 January 2015. doi: 10.1017/S1368980014003334.

**Books and monographs**

1. Bradbury J (2002) Dietary intervention in edentulous patients. PhD Thesis, University of Newcastle.
2. Ailhaud G & Hauner H (2004) Development of white adipose tissue. In Handbook of Obesity. Etiology and Pathophysiology, 2nd ed., pp. 481–514 [GA Bray and C Bouchard, editors]. New York: Marcel Dekker.
3. Bruinsma J (editor) (2003) World Agriculture towards 2015/2030: An FAO Perspective. London: Earthscan Publications.
4. World Health Organization (2003) Diet, Nutrition and the Prevention of Chronic Diseases. Joint WHO/FAO Expert Consultation. WHO Technical Report Series no. 916. Geneva: WHO.
5. Keiding L (1997) Astma, Allergi og Anden Overfølsomhed i Danmark – Og Udviklingen 1987–199I (Asthma, Allergy and Other Hypersensitivities in Denmark, 1987–1991). Copenhagen, Denmark: Dansk Institut for Klinisk Epidemiologi.

**Sources from the internet**

1. Nationmaster (2005) HIV AIDS – Adult prevalence rate. http://www.nationmaster.com/country-info/stats/Health/HIV-AIDS/Adult-prevalence-rate (accessed June 2013).

**Tables**

Tables should be placed in the main manuscript file at the end of the document, not within the main text. Be sure that each table is cited in the text. Tables should carry headings describing their content and should be comprehensible without reference to the text.

The dimensions of the values, e.g. mg/kg, should be given at the top of each column. Separate columns should be used for measures of variance (SD, SE etc.), the ± sign should not be used. The number of decimal places used should be standardized; for whole numbers 1.0, 2.0 etc. should be used. Shortened forms of the words weight (wt) and height (ht) may be used to save space in tables.

Footnotes are given in the following order: (1) abbreviations, (2) superscript letters, (3) symbols. Abbreviations are given in the format: RS, resistant starch. Abbreviations in tables must be defined in footnotes in the order that they appear in the table (reading from left to right across the table, then down each column). Symbols for footnotes should be used in the sequence: *†‡§||¶, then ** etc. (omit * or †, or both, from the sequence if they are used to indicate levels of significance).

For indicating statistical significance, superscript letters or symbols may be used. Superscript letters are useful where comparisons are within a row or column and the level of significance is uniform, e.g. 'a,b,cMean values within a column with unlike superscript letters were significantly different (P<0•05)'. Symbols are useful for indicating significant differences between rows or columns, especially where different levels of significance are found, e.g. 'Mean values were significantly different from those of the control group: *P<0•05, **P<0•01, ***P<0•001'. The symbols used for P values in the tables must be consistent.

**Figures**

Figures should be supplied as separate electronic files. Figure legends should be grouped in a section at the end of the manuscript text. Each figure should be clearly marked with its number and separate panels within figures should be clearly marked (a), (b), (c) etc. so that they are easily identifiable when the article and figure files are merged for review. Each figure, with its legend, should be comprehensible without reference to the text and should include definitions of abbreviations.

We recommend that only TIFF, EPS or PDF formats are used for electronic artwork. Other formats (e.g., JPG, PPT and GIF files and images created in Microsoft Word) are usable but generally NOT suitable for conversion to print reproduction. For further information about how to prepare your figures, including sizing and resolution requirements, please see our artwork guide.

In curves presenting experimental results the determined points should be clearly shown, the symbols used being, in order of preference, ○, ●, △, ▲, □, ■, ×, +. Curves and symbols should not extend beyond the experimental points. Scale-marks on the axes should be on the inner side of each axis and should extend beyond the last experimental point. Ensure that lines and symbols used in graphs and shading used in histograms are large enough to be easily identified when the figure size is reduced to fit the printed page.

Colour figures will be published online free of charge, and there is a fee of £250 per figure for colour figures in the printed version. If you request colour figures in the printed version, you will be contacted by CCC-Rightslink who are acting on our behalf to collect colour charges. Please follow their instructions in order to avoid any delay in the publication of your article.

**Supplementary material**

Additional data (e.g. data sets, large tables) relevant to the paper can be submitted for publication online only, where they are made available via a link from the paper. The paper should stand alone without these data. Supplementary Material must be cited in a relevant place in the text of the paper.

Although Supplementary Material is peer reviewed, it is not checked, copyedited or typeset after acceptance and it is loaded onto the journal's website exactly as supplied. You should check your Supplementary Material carefully to ensure that it adheres to journal styles. Corrections cannot be made to the Supplementary Material after acceptance of the manuscript. Please bear this in mind when deciding what content to include as Supplementary Material.

**PUBLICATION AGREEMENT FORM**

Authors or their institutions retain copyright of papers published in PHN. The corresponding author is asked to complete a Publication Agreement form on behalf of all authors, and upload this with the manuscript files at the time of submission. The form includes confirmation that permission for all appropriate uses has been obtained from the copyright holder for any figures or other material not in the authors' copyright, and that the appropriate acknowledgement has been made to the original source. If the manuscript is not accepted, the form will be destroyed.

**ACCEPTED MANUSCRIPTS**

PDF proofs are sent to authors in order to make sure that the paper has been correctly set up in type. Only changes to errors induced by typesetting/copy-editing or typographical errors will be accepted. Corrected proofs should be returned within 2 days by email to Gill Watling at gillwatling@btinternet.com. If corrected proofs are not received from authors within 7 days the paper may be published as it stands.

**OFFPRINTS**

A PDF file of the paper will be supplied free of charge to the corresponding author of each paper, and offprints may be ordered on the order form sent with the proofs.

**CONTACT**

Prospective authors may contact the Editorial Office directly on +44 (0) 1223 327954 (telephone) or phn.edoffice@cambridge.org.

## ANNEXURE C: INFORMED CONSENT FORM


Private Bag X1290, Potchefstroom
South Africa 2520

Tel: +2718 299-1111/2222
Fax: +2718 299-4910
Web: http://www.nwu.ac.za

**HREC Stamp**

**INFORMED CONSENT DOCUMENTATION FOR HEALTH CARE PERSONNEL**

**PRINCIPAL INVESTIGATOR**: Prof Lize Havemann-Nel

**TITLE OF THE RESEARCH STUDY:** Complementary feeding knowledge and practices of health care personnel in Primary Health Care facilities in West Rand Health District.

**ETHICS REFERENCE NUMBERS:** NWU-00062-17-S1

**POST GRADUATE STUDENT:** Ms. Chené Lorraine van Rensburg

**ADDRESS:** 11 Hoffman Street, North-West University, Building G16, room 146, Potchefstroom, 2531

**CONTACT NUMBER:** 018 299 2399

You are being invited to take part in a research project that forms part of my Masters in Dietetics. Please take some time to read the information presented here, which will explain the details of this study. Please ask the researcher or person explaining the research to you any questions about any part of this study that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you might be involved. Also, your participation is **entirely voluntary** and you are free to say no to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part now.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00062-17-S1)** and will be conducted according to the ethical guidelines and principles of Ethics in Health Research: Principles, Processes and Structures (DoH, 2015) and other international ethical guidelines applicable to this study. It might be necessary for the research ethics committee members or other relevant people to inspect the research records.

**What is this research study all about?**

Health care personnel working in primary health care (PHC) facilities have a responsibility to promote health, including optimal infant and young child nutrition. The aim of this study is to determine the knowledge and practices of health care personnel specifically with regard to complementary feeding in PHC facilities in West Rand Health District (WRHD).

**Why have you been invited to participate?**

You have been invited since you are part of the health care personnel who regularly engage with mothers/caregivers of infants and young children aged 6 – 24 months (complementary feeding period) in PHC facilities in WRHD. You were chosen because the researcher trusts that you can make a contribution towards a better understanding, but also to identify gaps with regard to complementary feeding knowledge and practices of health care personnel. You also have complied with the inclusion criteria if you are a Professional nurse, Enrolled nurse, Enrolled nursing assistant, Community Health Care Worker, Health Promoter, Lay Counsellor, Mentor Mother Counsellor or Ward Based Outreach Team. All of the above mentioned health care personnel is expected as part of the minimum care package provided to infants and young children to education mothers/caregivers on complementary feeding practices and presents with a proficiency of Grade 10 English. You will be excluded if you have not completed your undergraduate studies, if you have been working in the PHC facility for less than six months and if you are a Dietitian or Medical Practitioner.

**What will be expected of you?**

If you decide to participate in the study, the following will be expected of you as a participant:

- Completion of a written informed consent form which will be done with you and a witness of your choice in the presence of the research admin. This process will take approximately 15 minutes of your time.
- After the informed consent, you will be asked to complete a once off validated knowledge and practices questionnaire which will take approximately 30 minutes of your time.

**Will you gain anything from taking part in this research?**

Although you will not benefit directly with this study, you will contribute to a better understanding of the knowledge and practices of heatlh care personnel with regard to complementary feeding. The indirect benefit of this study include the improved implementation of child health care services, specifically complementary feeding guidance, provided in WRHD PHC facilities through recommendations made by the study outcomes.

**Are there risks involved in you taking part in this research and what will be done to prevent them?**

The estimated risk level for this study is minimal. The risk or harm anticipated in this study is negligible and the only forseeable risk is one of minimal discomfort and inconvenience through the completion of the questionnaire (20 – 30 minutes). However, completion of the questionnaire will be conducted in a private, comfortable room in the PHC facility and refreshments will be made available to the study participant.

**How will we protect your confidentiality and who will see your findings?**

Privacy and anonymity will be ensured by the allocation of unique study identification numbers. This unique number is used in all stages of data collection and interpretation. Your results will be kept confidential by not displaying any names at any time during the study. Only the researchers will have access to your responses and they will sign confidentiality agreements to keep the data confidential. After the data has been coded and recorded it will be taken to the North-West University (Potchefstroom) where it will be kept in a locked steel cabinet in a storage room for seven years by the study supervisor where after it will be shredded. Electronic data will be safe guarded with the use of a password that only the primary researcher, study supervisor and study co-supervisor will know. This will be deleted from all members' computers after seven

years. Only the primary researcher, the study supervisor and study co-supervisor will have access to the data.

**What will happen with the findings or samples?**

The findings of this study will only be used for this study, shared with the participating health personnel at the respective facilities and used in scientific articles and presentations.

**How will you know about the results of this research?**

The findings of the research will be shared with you through a mini-dissertation which will be published on the North West University (Potchefstroom Campus) website and thus in the public domain. Results of the study will also be presented to the WRHD management team, management teams of each sub-district as well as to health care personnel involved with the provision of complementary feeding education to mothers/caregivers of infants and young children in the form of a written report as well as a power point presentation.

**Will you be paid to take part in this study and are there any costs for you?**

No, you will not be paid or receive any remuneration to take part in the study but refreshments will be provided to you by the primary researcher. Furthermore, there will be no monetary costs involved for you, if you do take part in this study.

**Is there anything else that you should know or do?**

You can contact Professor Lize Havemann-Nel at 018 299 2399 / 084 338 8221 or Ms. C.L. van Rensburg at 011 411 3698/082 349 6885 if you have any further queries or encounter any problems during the course of the study.

You can also contact the Health Research Ethics Committee at the North West University (Potchefstroom Campus) via Mrs Carolien van Zyl at 018 299 2094; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the primary researcher. You will receive a copy of this information and consent from for your own purposes.

**Declaration by participant**

**By signing below, I …….. agree to take part in the research study titled:** Complementary feeding knowledge and practices of health care personnel in Primary Health Care (PHC) facilities in West Rand Health District (WRHD).

I declare that:

- I have read this information/it was explained to me by a trusted person in a language with which I am fluent and comfortable.
- The research was clearly explained to me.
- I have had a chance to ask questions to both the person getting the consent from me, as well as the researcher and all my questions have been answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be handled in a negative way if I do so.
- I may be asked to leave the study before it has finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) …….. 20....

..... .....

**Signature of participant** **Signature of witness**

**Declaration by person obtaining consent**

I *(name)* ……..…… declare that:

- I clearly and in detail explained the information in this document to.....
- I did/did not use an interpreter.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I gave him/her time to discuss it with others if he/she wished to do so.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 20....

.....
**Signature of person obtaining consent**

**Declaration by researcher**

I *(name)* ……..…… declare that:

- I had it explained by the research assistant who I trained for this purpose.
- I did not use an interpreter

  I was available should he/she want to ask any further questions.
- The informed consent was obtained by an independent person.
- I am satisfied that he/she adequately understands all aspects of the research, as described above.
- I am satisfied that he/she had time to discuss it with others if he/she wished to do so.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 20....

.....
**Signature of researcher**