

https://dspace.org/

Barriers and facilitators of breastfeeding practices and their associations with infant growth at six months of age, a study in Soweto, South Africa

Moagi, Lutricia

2022

https://hdl.handle.net/10539/34371

Downloaded from a DSpace repository. https://dspace.org/

BARRIERS AND FACILITATORS OF BREASTFEEDING PRACTICES AND THEIR ASSOCIATIONS WITH INFANT GROWTH AT SIX MONTHS OF AGE, A STUDY IN SOWETO, SOUTH AFRICA

Lutricia Moagi

A Dissertation submitted to the Faculty of Science, University of Witwatersrand, in fulfilment of the requirements for the degree of Master of Science.

Johannesburg, 2022.

Declaration

I, Lutricia Moagi, declare that this dissertation is my own work. It is being submitted for the degree of Master of Science in Medicine at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any degree or examination at this or any other University.

Signed on the 22nd of June 2022

Signature 

Acknowledgements

I would like to acknowledge and thank the support of the DSI-NRF Centre of Excellence in Human Development, SAMRC/Wits Developmental Pathways for Health Research Unit and all my supervisors. I would also like to thank and acknowledge all the participants who participated in this research study. Your contribution is much appreciated. To my family and my husband Thabiso Rakgoale, I love you all and thank you for your unconditional love, support, and encouragement. Highest appreciation to my supervisors Dr. Sara Jewett Nieuwoudt, Dr. Rihlat Said Mohamed, and Dr Douglas Momberg for all their guidance and support.

Abstract

Introduction: Infant and young child feeding practices directly affect the nutritional status of children from 0-2 years postpartum and the World Health Organization recommends exclusive breastfeeding (EBF) for the first six months of life. Factors such as breastfeeding history, socio-economic status, cultural and individual factors may greatly influence a mother's choice of infant feeding method. Amongst other factors, infant weight, and length gain (Length-for-age Z-scores) in the first year of life are used to measure the outcome of infant feeding.

Aim: The aim of this study was to explore the different barriers and facilitators to breastfeeding practices amongst women in Soweto, South Africa and the association between infant feeding practices and infant linear growth at six months of age.

Methods: This study utilized a mixed-methods sequential design. The study began with secondary data analysis of a longitudinal quantitative dataset, followed by a qualitative component to expand on findings from the quantitative results. One-time in-depth interviews (IDIs) were done with mothers who participated in the quantitative survey, to collect qualitative insights on their infant feeding choices. Descriptive statistics were used to describe the feeding practices, and logistic regression was used to assess the association between breastfeeding practices and the determining factors. Finally, linear regression was used to determine the association between the described infant feeding practices, covariates, and infant linear growth (HAZ). Thematic analysis was used to explore the decision-making process of mothers regarding infant feeding methods.

Results: Of the 79 mother-infant dyads for whom there was data at six months, the majority (67.9%) reported mixed feeding, 29.5% predominantly breastfeeding and only 2.6% EBF. Having higher gestational age and maternal unemployment were the only factors that were significantly associated with exclusive and predominant breastfeeding. The sex of the infant was the only factor significantly associated with HAZ at 6 months (being female was associated with smaller height-for-age z-scores by -0.19). The twelve mothers who were interviewed, elaborated on factors that influenced their choice of infant feeding method, which included maternal and infant survival strategies, breastfeeding being incompatible with work, family practices and social norms, biomedical knowledge (breastfeeding knowledge), escaping judgement from the community and structural barriers (separation of the mother and infant). Perceived barriers to EBF far outweighed perceived facilitators for most mothers, explaining high rates of mixed feeding.

Conclusion

Even with the infant feeding policies and programmes put in place by the government, this study shows that the rate of EBF remains low. There are numerous factors that make it challenging for mothers to choose EBF, particularly in terms of family and social norms. Thus, new interventions that target families and the community to shift breastfeeding norms are needed outside of the healthcare setting. Educating mothers during pregnancy is not enough. 'It takes a village to raise a child', so everyone needs to be educated about age-appropriate infant feeding methods so they can make a more meaningful contribution to child development**.**

Definitions

Bottle feeding is defined as giving any liquid, including breast milk or semi-solid food from a bottle with nipple/teat. The infant can receive anything else, any food or liquid including non-human milk and formula (1).

Breastfeeding is defined as giving breast milk (including milk expressed or from a wet nurse), it allows any food or liquid including non-human milk and formula (1).

Exclusive breastfeeding is defined as giving the infant breast milk (including milk expressed or from a wet nurse), it allows the infant to receive Oral Rehydration Solution (ORS), drops, syrups (vitamins, minerals, medicines) and, does not allow the infant to receive anything else (1).

First 1000 days is referred to as the period from conception to two years of life (2).

Mixed feeding is when an infant younger than six months of age is given other liquids and/or foods together with breast milk. This could be water, other types of milk or any type of solid food (3).

Predominant breastfeeding is defined as giving breast milk (including milk expressed or from a wet nurse) as the predominant source of nourishment, certain liquids (water and water-based drinks, fruit juice), ritual fluids and ORS, drops, syrups (vitamins, minerals, medicines). Nothing else is allowed, in particular, non-human milk and food-based fluids (1).

Stunting is defined as children whose height-for-age is below minus two standard deviations from the median of the World Health Organisation (WHO) Child Growth Standards (4,5).

Underweight is defined as children whose weight-for-age is below the minus two standard deviations from the median of the World Health Organisation (WHO) Child Growth Standards (6).

Wasting is defined as children whose weight-for-length/height is below the minus two standard deviations from the median of the World Health Organisation (WHO) Child Growth Standards (6).

Abbreviations and acronyms

BFHI.....Baby Friendly Hospital Initiative

BWP.....Breastfeeding and Weaning Practices Questionnaire

CHW.....Community health worker

CHBAH.....Chris Hani Baragwanath Academic Hospital

DPHRU.....Developmental Pathways for Health Research Unit

DSTV.....Digital Satellite Television

DVD.....Digital Versatile Disc

EBF.....Exclusive Breastfeeding

HIV.....Human Immunodeficiency Virus

HAZ.....Height-for-age Z-score

IDI.....In-depth interview

IYCF.....Infant and Young Child Feeding

MBFI.....Mother Baby Friendly Initiative

MIA.....Maternal and infant illness, morbidity, and health care access

M-Net.....Music Network

LMICs.....Low- and Middle-income countries

ORS.....Oral Rehydration Solution

KZN.....KwaZulu-Natal

RDP.....Reconstruction and Development Programme

SA.....South Africa

SBW.....Soweto Baby Wash study

SES.....Socio-economic status

WASH.....Water, Sanitation and Hygiene

WHO.....World Health Organization

Table of contents

Declaration..... ii

Acknowledgement..... iii

Abstract..... iv

Definitions..... vi

Acronyms..... viii

Chapter 1.1

1.1 Introduction1

1.2 Problem statement3

1.3 Study justification4

1.4 Research question5

1.5 Aim of the study5

1.6 Study objectives5

1.7 Literature review6

1.7.1 Factors Influencing Breastfeeding6

1.7.2 Associations between Infant Feeding Practices and Growth9

Chapter 2 Methodology12

2.1 Study Design12

2.2 Study setting13

2.3 Study Population and Sample13

2.4 Data collection15

2.4.1 Quantitative component15

Outcome Variables19

Infant growth (stunting):19

Morbidity and Illness Assessment21

2.4.2 Qualitative component22

2.5 Data management and analysis23

2.5.1 Objective 1 analysis23

2.5.2 Objective 2 analysis24

2.5.3 Objective 3 analysis24

2.5.4 Objective 4 analysis25

2.6 Reflexivity26

2.7 Ethics Clearance26

Chapter 3. Results28

3.1 Sample socio-demographic characteristics28

3.2 Objective 1: Infant feeding practices at 6 months30

3.2.1 Infant feeding practices at 6 months30

3.2.2 Infant feeding influences31

3.3. Objective 2. Factors associated with exclusive/predominant breastfeeding32

3.4 Objective 4. Associations between height-for-age z-score at 6 months and exclusive/predominant breastfeeding37

3.5 Objective 3 Exploring infant feeding decision-making influences and processes for mothers of young infants in Soweto.49

3.5.1 Theme 1: Survival strategies55

3.5.2 Theme 2: Breastfeeding incompatible with work61

3.5.3 Theme 3: Family practices and social norms62

3.5.4 Theme 4: Biomedical knowledge67

3.5.5 Theme 5: Escaping judgement69

3.5.6 Theme 6. Structural barriers70

Chapter 4. Discussion72

4.1 Discussion of key findings72

4.1.1 Infant feeding practices72

4.1.2 Key factors associated with infant feeding decisions73

4.1.3 Associations between infant feeding practices and growth in height76

4.2 Study strengths and limitations79

Chapter 5 Recommendations and conclusion81

5.1 Recommendations81

5.1.1 Programmatic recommendation81

5.1.2 Policy recommendations82

5.1.3 Research recommendation83

5.2 Conclusion83

Reference85

Appendix 1102

Appendix 2103

Appendix 3106

Appendix 4121
Appendix 5131
Appendix 6140
Appendix 7148
Appendix 8152
Appendix 9153
Appendix 10154
Appendix 11161

Chapter 1.

1.1 Introduction

The World Health Organization (WHO) defines exclusive breastfeeding (EBF) as providing infants nothing other than breastmilk (including expressed or from a wet nurse), oral rehydration solution (ORS), drops, syrups (vitamins, minerals, medicines), and medication prescribed by a health care professional (1). Infants should be breastfed exclusively during the first six months of their lives, and breastfeeding should be continued until they are two years old (7) as it can improve infant nutrition and reduce illnesses together with infant mortality, by providing vital nutrients and antibodies through breastmilk (8).

Even with evidence of the benefits of EBF, a review done in low- and middle-income countries (LMICs), found that the rate of EBF was 37% (9). A survey of 20 developing countries in 2013, indicated that EBF was associated with greater length and weight in infants younger than six months and lower probability of wasting, stunting, and infectious disease (10). EBF benefits infants both in developed and developing countries (11), however, the majority of infants in both developing and developed countries are not fed in accordance with WHO recommendations (8). Despite high rates of breastfeeding initiation, early cessation and mixed feeding before the age of six months are prevalent practices among South African mothers (12). The South African Health Review in 2016 reported that the prevalence of EBF declined from 44% under one month to 24% at 4-5 months of age (13).

In 1990, South Africa signed the Innocenti Declaration, which was revised in 2005 which states that all mothers should be able to practice EBF, and all children should be fed exclusively on breastmilk until they are 4-6 months old, according to a global

goal for optimal maternal and child health and nutrition. The 1994 Baby Friendly Hospital Initiative (BFHI), which was retitled Mother Baby Friendly Initiative (MBFI) revised in 2007, is a global initiative to put in place policies that protect, promote, and support breastfeeding. The goal is for all maternity facilities to become breastfeeding support centres. The 2007 Infant and Young Child Feeding (IYCF) policy revised in 2013 intends to establish methods and activities to promote, support, and safeguard proper baby and early child feeding habits, including in the context of HIV (2). The Tshwane Declaration of Support for Breastfeeding by the Minister of Health (2011) declared South Africa as a country that will, regardless of the mother's HIV status, actively encourage, preserve, and promote the use of EBF as a health intervention to achieve maximize child survival. This declaration was made to lower child mortality and to better the health and the growth of young children and their mothers; .These are some of the government policies to promote successful EBF. Scaling up breastfeeding interventions, policies and programmes nationally may be able to bring about speedy change by creating an enabling environment that allows mothers to practice breastfeeding; this would be an investment in the mother's future health and the children's healthy life path (14).

Stunting (low height-for-age z-score below -2 SD), underweight (low weight-for-age z-score below -2 SD), and wasting (low weight-for-height z-score below -2 SD) are amongst the most widely used indicators of a child’s nutritional status (15,16). Infant weight and length gain in the first year of life are, amongst other factors, the outcome of infant feeding practices (17). Undernutrition caused about 1.0 million deaths, 3.9% of years of life lost, and 3.8% of disability-adjusted life years globally, as seen by

childhood stunting, wasting, and underweight (18). In 2018, a systematic review of 62 LMICs reported the overall prevalence of stunting was 28.4%, wasting was 5.4%, and underweight 12.3% (15). The factors associated with these forms of undernutrition were low parental education, infant sex and age, mothers' age, diarrhoea, and low household socio-economic status (SES), where the infant lives, and inadequate child feeding choices (19).

The 2015 Millennium Development Goals reported that sub-Saharan Africa accounts for one-third of all under-five malnourished children globally, with stunting at 39%, wasting at 10%, and 25% underweight (19). Stunting remains a public health issue in South Africa, affecting 26.9% of boys and 25.9% of girls between the ages of 0 and 3 years (20). In South Africa, poor socioeconomic position has been proven to be strongly connected to stunting (21).

Although there are health and developmental benefits of EBF for the infant, South Africa has a long-standing history of infant mixed-feeding practices, which are influenced by numerous factors that affect the mother's decision-making with regards to infant feeding during the first six months postpartum (22). Exploring these factors will help better understand a mother's decision-making process to promote breastfeeding, which could help improve infants' linear growth.

1.2 Problem statement

In South Africa, EBF is still not widely practiced (23). Despite widespread attempts to enhance the rate of EBF in the South African setting, efforts have been slow in increasing the uptake of EBF (13), alluding to knowledge gaps in this complex continuum of decision-making surrounding infant feeding practices (24).

The decisions surrounding infant feeding practices are influenced by a complex set of factors ranging from socio-economic and demographic factors to cultural and subjective norms (25–27), all of which require further exploration. Strict cultural beliefs and behaviours obstruct the quality of their children's feeding practices, such as the discarding of colostrum and the resulting sense of insufficient milk flow (28). Stunting remains a nationwide concern, according to the 2016 South African Demographic and Health Survey, with 27 percent of children aged 0 to 59 months falling below minus 2 standard deviations of the reference population (13).

1.3 Study justification

South Africa is prioritizing infant health and nutrition as demonstrated by multiple political commitments and policy developments. Even with these policies, EBF remains a challenge in the South African context (22), with low EBF rates. Understanding the prevalence of commonly used infant feeding methods and their impact on linear growth, as well as exploring the decision-making surrounding those practices is therefore integral to addressing these complex facilitators and barriers in the urban South African context.

Soweto is an important context to explore because of its large estimated population of 1.3 million and cultural diversity (29), proving different insights into the beliefs and practices in the community on infant feeding. A 2021 study of mothers in Soweto reported short periods of EBF even though they understood that breastfeeding was beneficial, and female household heads were found to greatly influence a mothers' feeding practices. However, their advice was often contradicting that of health

professionals (30). Exploring these factors will help in better understanding the mother's decision-making process to promote breastfeeding, which in turn has the potential to improve the infant's linear growth, among other benefits.

1.4 Research question

What are the factors associated with infant feeding decisions and how do infant feeding practices relate to infant growth at six months of age in Soweto?

1.5 Aim of the study

The aim of this study was to explore the barriers and facilitators to breastfeeding practices amongst women in Soweto and the association between infant feeding practices and infant linear growth (length/height-for-age which is further referred to as HAZ at six months of age in this study).

1.6 Study objectives

The objectives of this study were:

1.6.1 To describe infant feeding practices in mothers of young infants between 0-6 months in Soweto.

1.6.2 To identify factors associated with infant feeding practices between 0-6 months of age in Soweto.

1.6.3 To explore infant feeding decision-making influences and processes for mothers of young infants in Soweto.

1.6.4 To determine the association between infant feeding practices and Height-for-Age Z-score (HAZ) at six months of age in Soweto.

1.7 Literature review

The way children are fed for the first 1000 days of their lives, especially in the first six months, plays a part in setting them on certain health and development paths (14). It is of the highest significance to optimize infant nutrition and growth, particularly in the first two years of an infant's life (6). The mother's nutrition and the child's early life nutrition significantly influence the child's future physical and mental health (18). There is substantial documented evidence of the health benefits of EBF during the first six months (8,31), however, the rate of EBF in SA remains low (23).

In 2016 the Demographic and Health Survey of South Africa reported that the average rate of EBF increased to 32% among infants aged under six months of age, with 25% of the infants not breastfed at all (13). Although there are health and developmental benefits of EBF for the infant, South Africa has a long-standing history of infant mix-feeding practices which is influenced by numerous factors that affect the mother's decision-making with regards to infant feeding during the first six months after delivery (32).

1.7.1 Factors Influencing Breastfeeding

The decision to initiate breastfeeding and the duration of breastfeeding is shaped by a multitude of factors (33). A 2016 systematic review of global literature showed that breastfeeding practices are shaped by a multitude of factors such as historical, socioeconomic, cultural, and individual factors (14), which was reinforced by a systematic review of breastfeeding literature specific to South Africa conducted in 2019 (22). The 2019 systematic review mentioned some of the factors such as young mothers, unemployment, and HIV stigma around the community to be the reasons the mothers abandoned EBF; with mothers opting for formula in the context

of returning to school or to keep the fathers involved (22). A mother's feeding decision is influenced even more by feeding history, family and friends, and healthcare staff (21). The support and information that mothers get from healthcare providers, family and friends may have positive effects on breastfeeding practices. A systematic review in 2007 reported professional and peer support to be significant for the success of breastfeeding (34).

In 2016, the South African National Department of Health illustrated a range of factors that influence a mother's decision to use EBF for the first six months: Manufacturers' aggressive promotion of infant formula; workplace challenges to breastfeeding; teenage mothers separated from their babies to return to school; inadequate support from family and community members; men's lack of involvement in supporting breastfeeding; and misinformation about the risk of HIV transmission and breastfeeding (35).

In 2018, the main supporters of breastfeeding decision in South Africa were found to be friends, partners, family and, health workers (22). In Johannesburg, 83.6% of mothers assessed stated they select their feeding method based on what they learned at prenatal clinics (36). Supporting breastfeeding mothers may enable mothers to breastfeed longer and not introduce complementary foods too early to infants. However, a study in Soweto found that mothers believed that it was necessary to feed their babies solid food before 6 months of age. The mothers' perceptions that what babies eat is important for their health and that the baby's refusal to eat is a symptom of illness influenced their feeding methods (30).

There are maternal factors such as breastfeeding skill or technique, beliefs, culture, and knowledge, that all play a major role in successful breastfeeding. In the South African setting, data collected between November 2015 and October 2016 indicated the underlying factors associated with successful EBF were being HIV positive, breastfeeding competence, and cultural significance of breastfeeding (symbolizing breastfeeding as the meaning of motherhood) (37). Globally, a mother's subjective standards concerning infant feeding, such as breastfeeding experience, age, knowledge, attitudes, beliefs, and expectations about breastfeeding, have all been linked to successful EBF (14).

There are certain beliefs and perceptions attached to breastfeeding practices that can instil fear to breastfeed, which ultimately negatively affects breastfeeding and breastfeeding patterns. In KwaZulu Natal (KZN), a 2014 study found barriers to EBF to be the mother’s fear of losing weight, sagging breasts, breast leakages, breast milk-stained clothes and the ‘foul’ smell of breast milk (38). In 2001 at Hammanskraal in the North West province, mothers believed that introducing solid food early helps “baby to gain weight and strength”, and breast milk alone was not enough (28). Two studies in KZN found that the community's perspective of men's role as fathers was reflected through their provision of formula milk (38,39), influencing mothers to choose not to EBF.

EBF knowledge and understanding of EBF plays a vital role in ensuring successful breastfeeding. In South Africa, the slow increase in the rate of EBF could be attributed to: a misunderstanding of the EBF concept (40); perception of breastmilk production inadequacy (41). Due to a perceived insufficiency of breastmilk

production, complementary foods might be introduced as early as 48 hours after birth (27).

The high or low socio-economic status of mothers may serve as either a facilitator or barrier for successful breastfeeding. A 2009 study in the Cape Metropole conducted with women in high socio-economic status settings, reported that 80% of the women chose formula feeding immediately after birth because of convenience, while higher education was linked with less EBF (42). This finding was not consistent with a 2016 review done by Victora and colleagues that found that in high-income countries, women with a higher level of education breastfed more than low-income groups with fewer years of formal education (9). These two different findings shows that socio-economic status can be both barriers and facilitators of breastfeeding.

Lack of breastfeeding support at work and school and in the media (advertisement of formula) are other barriers to successful breastfeeding. In 2018, in KZN, returning to work or school was found to be strongly associated with less EBF (43). In a Soweto-based study of mothers attending public clinics, unemployed mothers had nearly twice the odds of EBF compared with working mothers (31). To better support mothers and their new-borns, health care providers and policy-makers need to grasp not only why a mother decides to initiate breastfeeding, but also why she could decide to cease breastfeeding before the recommended six months (44).

1.7.2 Associations between Infant Feeding Practices and Linear Growth

From the earliest stages of life, nutrition plays a critical role in growth and development (45). Breastfeeding has been shown to increase infant growth due to its nutritional benefits, as well as reducing the occurrence and severity of illnesses that might impact growth throughout infancy (9,46). The downside of mixed feeding over

EBF is the increased risk of infections, which are more common in infants under six months of age because any food or drink taken by the infant before six months of age may possibly injure the baby's undeveloped gut and may cause diarrhoea and allergies (47); which in the long run may lead to stunting through enteropathy (48). The introduction of formula and solid foods exposes the baby to a variety of dietary antigens and has an impact on the gut flora (49).

Stunting affects a vast number of children around the world, and it has been identified as one of the most common nutrition-related conditions in children under the age of three years in South Africa (8,50). Baseline data from a recently completed randomized controlled trial in South Africa show that 28.5 % of 6-month-old infants in the country were stunted (51), and according to data from the 2016 South African demographic and health survey, 27% of children under the age of five years were stunted, with 10% being severely stunted (13).

Mamabolo and colleagues reported associations between growth and infant feeding practices; exclusively breastfed babies were found to be growing faster in terms of length as compared to formula-fed babies in the first six months (17). Stunting is a major public health concern due to its link to adult health and the risk of diseases such as diabetes, hypertension, and cardiovascular disease, and it is also a predictor of physical growth, mental, and cognitive development in childhood (52–54). EBF and infant linear growth are affected by a wide range of factors; some of the factors (infant factors: sex, diarrhoea, vaccination, birthweight and gestational age; maternal factors: marital status, education and employment; and household factors: sanitation,

wealth index, hygiene index and water index) that affect EBF are the same as those that may cause risk of stunting, and those factors may either impact growth directly or affect growth by modifying infant feeding practices.

Chapter 2 Methodology

2.1 Study Design

This study used a mixed-method sequential design, beginning with secondary data analysis of a quantitative dataset, followed by a qualitative component to expand on findings from the quantitative results.

The quantitative component of the study was based on data drawn from a larger longitudinal prospective cohort study, entitled “Interaction between nutrition, infection, household environment and care practices and their impact on growth and development in infants between birth and one year of age” (Ethics Clearance Certificate: M170753). Colloquially referred to as the Soweto Baby WASH (SBW) study, the aim of the prospective study was to document household environment, maternal and infant morbidity and illness, and infant feeding and care practices, then assess the association between these factors and infant linear growth and development in the first year postpartum. All the participants were screened and recruited from January to April 2018 at the maternity services of the Chris Hani Baragwanath Academic Hospital (CHBAH) in Soweto, Johannesburg. They were followed-up from February 2018 until April 2019 with weekly home visits from birth to 6 months, with the 6-month visit conducted at the SAMRC/Wits Developmental Pathways for Health Research Unit facilities (DPHRU) at CHBAH. The qualitative component involved primary data collection with 12 SBW mothers which took place from the 14th -20th July 2021.

A quantitative method was used to determine the infant feeding practices, factors associated with the infant feeding practices and the association between infant

feeding practices and infant growth in length. Specifically, Objectives 1, 2 and, 4 involved secondary analysis of the longitudinal quantitative data from the SBW study; to describe infant feeding practices (Objective 1); to identify factors associated with breastfeeding practices (Objective 2) and assess the association between breastfeeding practices and height-for-age at 6 months of age (Objective 4).

The new component in my study was the qualitative component (Ethics Clearance Certificate: M210344), which involved in-depth interviews (IDIs) with 12 mothers, purposively sampled, from the 79 mother-infant pairs from the SBW study to explore infant feeding decision-making influences and processes (Objective 3).

2.2 Study setting

This study involved mother-infant pairs recruited at CHBAH situated in Soweto. Soweto is the largest township in South Africa with a population of approximately 1.3 million (55). The 2011 census reported that 97% of residents had access to portable water provided by the municipality, 55% had access to piped water inside the dwelling and 92% of residents used toilets that flush; there was an unemployment rate of 19% of households not receiving any set income (56). The prevalence of stunting was found to be significantly higher in black females than males and it peaked at 2 years of age; and was significantly higher in males than females at over 34% (57).

2.3 Study Population and Sample

For the SBW, mother-infant pairs were eligible for inclusion if the mothers were ≥18 years of age at the time of screening; maternal singleton pregnancy; infant birthweight between ≥2500g and <4000g, infant term pregnancy between ≥38 weeks

and <42 weeks gestational age, mother-infant pairs living in formal or informal dwellings and planning to stay in Soweto for the first 12 months after birth. Women were screened 1-3 days postpartum. If the infants had been diagnosed with physical, mental, or congenital abnormalities at delivery, or if the mother had HIV, the mother-infant pairs were not eligible for inclusion. As a result, the study identified infants who had an advantage in terms of physical growth and development from the start. This was to better identify determinants that affect linear growth, cognitive development, and the risk of stunting during the postpartum period.

A total of 1289 mothers were screened post-delivery at the maternity wards at CHBAH. Of those screened, 243 were eligible. Of these, 87 did not consent, leaving 156 mother-infant pairs to enrol in the study (See Appendix 1). Of these, data from the 79 mother-infant pairs from the SBW study who were still enrolled in the study and were seen for data collection at six months were used to address objectives 1, 2, and 4.

From the 79 mother-infant pairs drawn from the SBW study, 12 mothers were purposively sampled for objective 3. The predetermined minimum was based on the three predefined WHO infant feeding practices (EBF, predominant breastfeeding and mixed feeding). I approached the mothers who fit the criteria and consented to be part of the study, until I reached the pre-identified minimum sample from each type of infant feeding practices at six months described in objective 1 (4 exclusively/predominantly breastfed and 8 mixed fed at six months) to enable comparison between the groups. The initial plan was to have 4 participants from EBF, predominant breastfeeding and mixed feeding, however the low EBF results

from objective 1 forced us to combine EBF with predominant breastfeeding into a single category, which resulted in 4 EBF/predominant breastfeeding and 8 mixed feeding. In the interviews, mothers were asked to reflect on how they fed the SBW children and their other children for the period from birth until 6 months of age.

2.4 Data collection

2.4.1 Quantitative component

This study used secondary data from several SBW data collection tools, summarized in Table 2.4 below.

Table 2.4 Variables and source of data from the SBW

Variables	Variable details	Questionnaire name and time point
Main outcome variables		
Feeding practices (exclusive breastfeeding, predominant breastfeeding or mixed feeding; yes/no)	Categorical variable	BWP2, 24 hour dietary recall at 24 weeks
Infant length (in centimetres)	Continuous variable	Infant anthropometric, at delivery and 24 weeks
Infant age (in weeks)	Continuous variable	Contact Sheet (maternal date of birth), Delivery
Maternal age (in years)	Continuous variable	Date of birth (contact sheet)
Maternal height (in centimetres)	Continuous variable	Maternal anthropometric, at 24 weeks
Person looking after the child. (Mother, father, family members or nanny)	Categorical variable	SES, at 24 weeks
Maternal employment. (Yes/no)	Categorical variable	SES, at 24 Weeks
Maternal education (secondary education or tertiary education)	Categorical variable	SES, at 24 Weeks
Studying. (Yes/no)	Bivariate variable	SES, at 24 weeks

Marital status. (Married, not married or cohabiting)	Categorical variable	SES, at 24 weeks
Additional breastfeeding practice variables		
Breastfeeding initiation time. Immediately and hours (1-24 hours)	Categorical variable	BWP1, at week1
Variables about direct infant feeding influences		
Main supporter (Family, healthcare providers or nanny)	Categorical variable	BWP2, at week 24
Reasons for not initiating breastfeeding immediately (Health reasons, milk insufficient, milk not good, child refused or do not know/do not remember)	Categorical variable	BWP1, at week 1
Morbidity and Illness variables		
Vaccination in the last month (yes/no)	Categorical variable	MIA(Long format), at 24 weeks
Nutrition topic of sensitization (yes/no)	Categorical variable	MIA(Long format), at 24 weeks
Breastfeeding topic of sensitization (yes/no)	Categorical variable	MIA(Long format), at 24 weeks

Diarrhoea at 6 months(yes/no)	Categorical variable	MIA(Long format), at 24 weeks
Household factors		
Household wealth index Poor/rich	Categorical variable	SES, at 24 weeks
Water index	Continuous variable	WASH, at 24 weeks
Sanitation (yes/no)	Categorical variable	WASH, at 24 weeks
Hygiene index	Continuous variable	WASH, at 24 weeks

Objectives 1, 2 and 4 used secondary data from the SBW study. These objectives drew on data from the Infant Breastfeeding and Weaning Practices Questionnaire to measure infant feeding practices, infant feeding support, breastfeeding initiation, reasons for and reasons for not initiating breastfeeding immediately. The questionnaire was adapted from the WHO/UNICEF Infant and Young Child Feeding questionnaire (58,59) and has previously been used at the DPHRU in the Soweto setting (31). This questionnaire was administered weekly from week 1 until week 24 (about 6 months postpartum). Factors associated with infant feeding (Objective 2), including maternal employment, education, marital status, main person looking after the child, currently studying and household wealth index were drawn from two other SBW study tools, a household demographic, and a socio-economic interviewer-administered questionnaire. Data pertaining to diarrhoea, vaccination, nutrition and breastfeeding topics of sensitization were derived from the maternal and infant illness, morbidity, and health care access (MIA long format) questionnaire. Additional

data from the infant Anthropometry Questionnaire at six months was used for Objective 4, which recorded infant weight and infant length. Maternal height was recorded at 6 months using the maternal anthropometric form. The birthweight was measured at CHBAH maternity ward, while maternal birth date and gestational age were obtained using screening forms at birth and patient files at CHBAH maternity services during recruitment.

Outcome Variables

Infant linear growth (HAZ at 6 months):

Recumbent length was measured to the nearest 0.01cm using an infantometer (Seca) by trained research assistants from the SBW project. These measurements were taken from delivery to six months of age and recorded in the infant anthropometry form (IA) see Appendix 2. The WHO growth indicators were used to derive the change in Z-scores (length/height-for-age) at 6 months (60).

Exposures:

EBF (if they were giving their infants breastmilk only), predominant breastfeeding (if they were giving their infants breastmilk and liquids), and mixed feeding (if they were giving their infants breastmilk, liquids, and semisolids) were derived from the Breastfeeding and Weaning Practices Questionnaire (Appendix 3). These were measured using a 24 hour dietary recall and were analysed cross-sectionally at 6 months.

Covariates:

Socio-Economic Status

A household demographic and socio-economic questionnaire which was developed for the study integrating items of the National Income Dynamic Survey (NIDS) (61) as well as the Living Conditions Survey (LCS) (62). SES factors such as, employment, education and currently studying, socio-demographic factors such as maternal age and marital status and maternal factor such as main person looking after the child were extracted from this questionnaire (Appendix 4). The household wealth index (HWI) categorized as either poor or rich and, was derived from available assets, house ownership, type of house and WASH. HWI was calculated from the ownership of durable assets (electricity, bicycle, motorcycle or bike, refrigerator, microwave, washing machine, landline telephone, camera, cell phone, television, video machine or digital versatile disc (DVD) player, media network (M-net) or digital satellite television (DStv) or satellite, agricultural land, farm animals, computer or laptop and internet access), housing characteristics (shack, flat or cottage, house, room or garage, residence, hostel, RDP or government housing), house ownership and access to basic services (safe water, improved sanitation and improved hygiene conditions). Principal component analysis was used to build the Household Wealth Index Building on the household wealth index and based on the household index, the sample was divided into two categories (poor and rich).

Household Water, Sanitation and Hygiene (WASH)

Household WASH was assessed using questionnaires adjusted from the World Health Organisation/UNICEF (Core Questions on Drinking-Water and Sanitation for Household Surveys) (63), the WHO/UNICEF Joint Monitoring Programme (64,65) and the Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS)

(66). Household factors such as water index, sanitation and hygiene index were derived from this questionnaire (Appendix 5). Sanitation infrastructure was separated into two groups, safely managed, and not safely managed. Safely managed sanitation facilities were described as a basic sanitation facility (flush/pour to piped sewer system) where excreta are safely disposed in situ or treated off-site. To generate a composite hygiene index (scored 0–5: with 0 representing the lowest level of hygiene behaviours and infrastructure, and 5 the highest level of hygiene behaviours and infrastructure), three indices to assess hygiene behaviours and circumstances were created. Household hygiene index – scored 0–2, included type of house, and presence of animals on the property (coded 0 if there were animals on the property, and 1 if not), Personal hygiene index – scored 0–2 included handwashing, and handwashing detergent and food hygiene index – scored 0–1, cleaning of the breast and cleaning of utensils prior to feeding. The household hygiene index, personal hygiene index, and food hygiene index were calculated as the sum of the individual items and the overall hygiene index as the sum of the household hygiene index, personal hygiene index, and food hygiene index. Overall hygiene and water were used as index, while sanitation and household wealth were categorized.

Maternal and infant illness, morbidity, health care access (MIA)

Maternal and infant illness, morbidity, and health care access long format was assessed through an interviewer-administrated questionnaire. Infant factors such as infant sex, vaccination in the last month (captured whether the child vaccinated or not; if vaccinated we captured from birth, six weeks, 10 weeks and 14 weeks, topics

of sensitization (whether mothers were exposed to nutrition and breastfeeding topic in the last month at the clinic, hospital, community/church group, family/friends or others places), and whether the baby had diarrhoea were derived from the MIA (LF), which is in Appendix 6.

2.4.2 Qualitative component

For the qualitative component (Objective 3), I collected data through IDIs from 14-20 July 2021 using an interview guide (see Appendix 7). The interview guide was developed looking at the research question of the study, using open-ended questions and probes to answer the research question.

The interviews were done virtually via phone, where verbal consent was obtained before the commencement of the interview. The call was switched to the speaker, allowing me to take notes. The recording of the interview was done using a Microsoft sound recorder, where the cell phone was placed next to the laptop to ensure that both the researcher and interviewee were audible. The interviews took between 21-37 minutes and were conducted using both English and their preferred home language. We explored the mother's infant feeding method from birth until 6 months with the SBW child, other infant feeding experiences, what and who influenced their infant feeding decision, their family infant feeding practices and their experiences with the healthcare facilities from the time they gave birth until their infants were 6 months old.

Participants were later called to come to the Developmental Pathways for Health Research Unit (DPHRU) for written consent, to supplement the verbal consent provided prior to the IDIs. Covid-19 protocols were put in place to mitigate the risk of spreading the virus. Participants were pre-screened the day before they were

booked, on arrival they were screened at reception and their temperature was taken. They were provided with facemasks and sanitizers and social distancing was always observed when they came to affirm their consent to participate in the qualitative component through written documentation.

2.5 Data management and analysis

Secondary data for the quantitative component was stored on a secure server at the DPHRU, with all hard copy information and files kept in locked premises. Upon receiving permission, the researcher extracted the required data for variables and cleaned them before analysis. I did the quality checks on the extracted data through data cleaning (checking for errors, duplications, outliers), and addressed any discrepancies between captured data and what was on the physical files. STATA version 14 software was used to analyze the quantitative data.

For the qualitative component, all information and recordings were kept in folders in a locked cupboard and locked premises. I gave each participant a unique identifier number and thereafter I simultaneously transcribed and translated the audio recordings from vernacular into English. Quality checks were done by listening to the audios again after transcribing to ensure nothing valuable was missed.

2.5.1 Objective 1 analysis

Descriptive statistics were carried out to describe the feeding practices according to the WHO definitions. The data were analysed longitudinally from 0-1 months, 0-3 months and 0-6 moths; and cross-sectionally at 1 month, 3 months and 6 months to see which WHO feeding practises were practiced at what time point and by how many mothers. The data are described as frequencies and percentages, and a Chi-square test was used for comparisons of the categorical variables.

2.5.2 Objective 2 analysis

To investigate and explore the associations between infant, maternal and household factors and infant feeding practices (exclusive and predominant breastfeeding vs. not exclusive or predominant breastfeeding) at 6 months, binary logistic regression was used. I firstly ran the regression to check association between exclusive/predominant breastfeeding each infant factors and, the secondly checked the association between exclusive/predominant breastfeeding and each of the maternal factors and then finally checked the association between exclusive/predominant breastfeeding and household factors. The significance levels were set at p=0.05 with 95% Confidence Intervals. A multivariate analysis was conducted with variables that were significantly associated (p-value of less than 0.20) with the breastfeeding practices from the binary logistic regression. The factors that were included in the regression models were maternal education, employment, marital status, breastfeeding topic, and nutrition topic of sensitization, child vaccination and occurrence of diarrhoea.

2.5.3 Objective 3 analysis

After reading through the transcripts, I manually created a codebook, which was shared with my supervisor Dr Sara Nieuwoudt. This codebook went through several iterations, including Dr Nieuwoudt testing the codebook on some transcripts. We primarily used an inductive method of coding, from which we identified themes and sub-themes, including illustrative quotations. The codebook was further revised until a final codebook was created for a final review of the transcripts. These themes and quotations supported analysis and categorization of the facilitators and barriers of EBF, which were summarized in table form.

2.5.4 Objective 4 analysis

The associations between infant feeding practices and height-for-age Z-scores at 6 months of age were investigated using binary linear regression. I assessed association between height-for-age Z-scores with other cofounding variables such as infant, maternal, and household factors. I ran the binary linear regression between each infant factors and HAZ at 6 months, I then ran the regression between maternal factors and HAZ at 6 months and finally ran the regression between Household factors and HAZ at 6 months. The p-value, coefficient and 95% confidence intervals were reported for the respective regression coefficient and statistical significance was set at $p<0.05$. A hierarchical regression analysis informs the relative contribution of the different cluster of factors towards the variation of HAZ (67). A hierarchical model was hypothesized in order to assess the associations between exclusive/predominant breastfeeding practices and HAZ at 6 months postpartum. Model 1 (M1) investigated the independent association between exclusive/predominant breastfeeding practices and linear growth (length) outcome. Model 2 (M2) investigated the effect after controlling M1 for individual infant factors (sex, birthweight, gestational age, feeding method, vaccination and diarrhea), model 3 investigated the effect after controlling for maternal factors (marital status, education, employment, age and height) and model 4 investigated the effect after controlling for household factors (wealth index, water index, sanitation and hygiene index). Furthermore, I conducted multiple linear regression analysis of the association between HAZ at 6 months of age and exclusive/predominant breastfeeding, adjusted for maternal characteristics, and another multiple linear

regression analysis of the association between HAZ at 6 months of age and exclusive/predominant breastfeeding, adjusted for household characteristics.

2.6 Reflexivity

Reflexivity is defined as an awareness of the researcher's position in research practice and how it is influenced by the research object, allowing the researcher to perceive how he or she impacts both the research process and outcomes (68). The participants knew me as an employee of the SBW study, however they also related to me as a woman and a member of the community. The participants preferred mixing English and vernacular language. Most of the participants felt free to talk to me about their feeding practices because they knew me from the SBW study, as illustrated by the rich information shared. However, others were not free to open up because I used the word interview. There was social desirability at the beginning of the interviews when they would tell me what they thought I wanted to hear. In response I would rephrase the question and they would talk about what they actually fed their babies. Some of the answers I got contradicted the quantitative data, which suggests that through the IDIs I had established a stronger trust relationship.

2.7 Ethics Clearance

The SBW quantitative component of this study obtained Human Research Ethics Committee (HREC) approval (Ethic Clearance Certificate: M170753). A letter confirming my permission to use these data is appended (see Appendix 8). Furthermore, ethical approval from the HREC for all additional qualitative data collection in Objective 3 was provided (See Appendix 9 for Ethic Clearance Certificate: M210344). Informed consent was sought from all participants, with

separate written consent for the audio recording of interviews with the anonymity of personal identifiers ensured (see Appendices 10 and 11). Prior to the commencement of the interviews, I asked the mothers to find a quiet and private space where they could talk freely. I was also in a quiet and private space throughout the interviews to ensure that I was the only person who could hear the information they provided. There was a protocol in place for anyone who may have experienced emotional triggers, though this was never enacted.

Chapter 3. Results

This chapter starts by providing an overview of infant, maternal and household characteristics of the study sample and then presents results on whether these characteristics were associated with infant feeding practices. It furthermore presents whether infant growth in length was associated with infant exclusive/predominant feeding, accounting for infant, maternal and household characteristics. It concludes with a presentation of the qualitative results.

3.1 Sample socio-demographic characteristics

Overall, 156 mother-infant pairs were enrolled and followed up from birth, with only 79 pairs seen at 6 months (see Appendix 1). As shown in Table 3.1, on average, infants were born with normal birthweight ranges (mean = 3.09 kg and SD = 0.35) and normal gestational age (mean = 38.9 weeks and SD = 1.2). At birth, the prevalence of stunting was 9.3%, increasing to 10.1% at six months. There was missing data due to participants who withdrew consent, one infant died, and some moved out of the study site. The majority of the women (71.8%) were not married, with 16.7% married and 11.5% cohabitating. Unemployed women were 70.5%, while 29.5% were employed. Most of the women had secondary education (77.2%) and only 22.8% had tertiary education. There were 5.3% women who were still studying. The household wealth index shows that 50.7% were poorer and 49.3% were wealthier. Other household characteristics are reported in the table below. The water index sample mean was 3.11, with a score of 1 as the minimum to a score of 4 as a maximum (with 0 representing the lowest level of water infrastructure and behaviours, and 4 the highest). With regard to sanitation, 96.3% of the participants

had access to a safely managed sanitation facility and the hygiene sample mean was 3.38, with a minimum score of 2 and a maximum score of 5 (was scored 0–5: with, 0 representing the lowest level of hygiene behaviours and infrastructure, and 5 the highest). Household wealth and sanitation were categorized, while overall hygiene and water were used as index.

Table 3.1. Infant, maternal and household characteristics at delivery and at 6 months postpartum

Variables	Sample at birth (n=151)		6-month postpartum sample (n=79)	
	n	%	n	%
Infant characteristics				
Average gestational age (weeks) (mean. SD)	147	(38.9 (1.2)		
Sex				
Male	76	50.3	42	53.2
Weight in kilograms (mean, SD)	151	3.06 (0.36)	79	7.49 (1.0)
Length in cm (mean, SD)	151	48.3 (1.7)	79	64.74 (2.4)
Stunted (% yes)	14	9.3	8	10.1
Diarrhoea at 6 months				
Yes			6	8.3
Vaccination in the last month				
Yes			54	76.1
Maternal characteristics				
Age (mean, SD)	153	27.67(6.08)*		
Maternal height in cm (mean, SD)			77	157.8 (6.9)
Marital status				
Married			13	16.7
Not married			56	71.8
Cohabitation			9	11.5
Maternal education				

Variables	Sample at birth (n=151)		6-month postpartum sample (n=79)	
	n	%	n	%
Secondary			61	77.2
Maternal employment				
Yes			23	29.5
Currently studying				
Yes			4	5.3
Nutrition topic of sensitization				
Yes			33	47.8
Breastfeeding topic of sensitization				
Yes			27	39.7
Household characteristics				
Wealth index				
Wealthier			36	49.3
Water index (mean, SD)			80	3.11 (0 .84)
Sanitation index				
Yes			77	96.3
Hygiene index (mean, SD)			65	3.38 (0.90)

3.2 Objective 1: Infant feeding practices at 6 months

3.2.1 Infant feeding practices at 6 months

All mothers initiated breastfeeding, however, a slight majority of infants (52.6%) were breastfed immediately after birth and 47.4% did not receive breastmilk immediately (receiving breastmilk within 1 hour postpartum). Reasons for not initiating breastfeeding were reported as health reasons (70.0%), insufficient milk (11.7%), milk not good (3.3%), child refused (13.3%) and 1.7% did not know/did not remember why they did not provide breastmilk immediately (see Table 3.2 below). At six months, 26.9% of the infants were no longer receiving breastmilk. Most mothers

(67.9%) mixed fed their babies 29.5% were predominantly breastfeeding and only 2.6% were exclusively breastfed (Refer to the pie chart below).

Table 3.2. Breastfeeding initiation table

Breastfeeding factors	Variables	Total	
		n	%
Immediate breastfeeding initiation	Yes	30	52.6
	No	26	47.4
Reasons for not initiating breastfeeding immediately	Health reasons	42	70. 0
	Insufficient milk	7	11.7
	Milk not good	2	3.3
	Child Refused	8	13.3
	Do not know/Do not remember	1	1.7

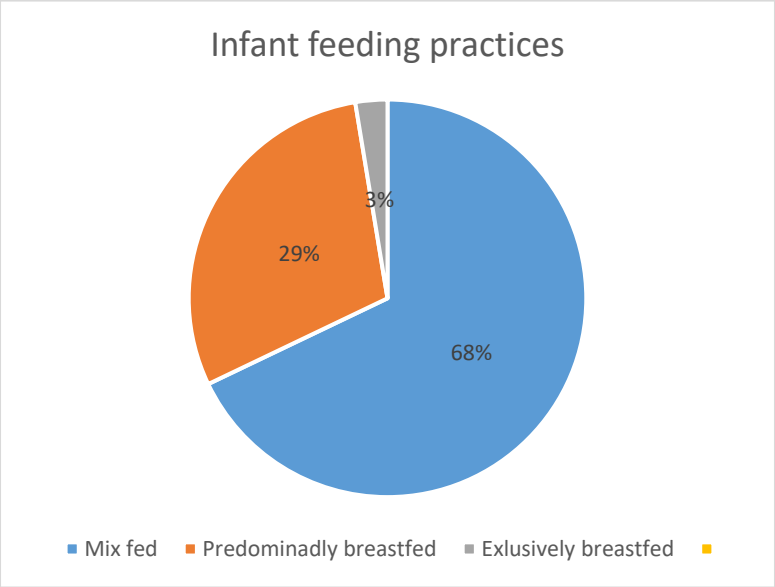


Figure 1. Feeding practices at six months

3.2.2 Infant feeding influences

With regard to the infant feeding factors, 76.3% of the mothers were looking after their infant, 18.4% were looked after by father and family members and 5.3% were looked after by the nanny. The majority (69.2%) of the mothers received feeding

support and advice from their families while 26.9% received support from healthcare workers and 3.9% received support from their nanny.

3.3. Objective 2. Factors associated with exclusive/predominant breastfeeding

Bivariate analyses were performed between infant characteristics at six months (sex, diarrhoea, vaccination, birthweight, and gestational age), maternal characteristics at six months (marital status, education, employment, age, nutrition topic of sensitization, and breastfeeding topic of sensitization), and household factors (sanitation, wealth, hygiene, and water) associated with exclusive/predominant breastfeeding at 6 months.

Table 3.3.1 shows that a week increase in gestational age is associated with a 1.71 odds increase of the likelihood for mother to exclusive/predominantly breastfeed (0.29; 0.65, p=0.01), and maternal employment is associated with a 0.14 odds decrease of the likelihood for mother to exclusively/predominantly breastfeed (1.12; 2.60, p=0.01). Infant birthweight, sex, diarrhoea, and vaccination, maternal age, maternal marital status, maternal education, nutrition topic of sensitization, breastfeeding topic of sensitization, and household wealth index, water index, sanitation index and hygiene index were not statistically associated with exclusive/predominant breastfeeding at 6 months of age.

Table 3.3.1. Bivariate analysis of the association between exclusive/predominant breastfeeding at 6 months and associated factors in the Soweto Baby WASH cohort study.

Variables	Exclusive/Predominant breastfeeding at 6 months		
	N	Odds ratios 95% Conf. Interval	p-value
Infant characteristics			
Birthweight (g)	78	2.58 (0.67; 9.91)	0.17
Gestational age (weeks)	77	1.71 (1.12; 2.60)	0.01*
Sex	78		
Male	REF	REF	REF
Female		0.90 (0.33; 2.29)	0.79
Diarrhoea at 6 months	68		
No	REF	REF	REF
Yes		2.2 (0.29; 16.75)	0.45
Vaccination at 6 months	66		
No	REF	REF	REF
Yes		0.86 (0.26; 2.86)	0.81
Maternal characteristics			
Age	73	0.99 (0.91; 1.07)	0.80
Marital status	75		
Married	REF	REF	REF
Not married		2.02 (0.50; 8.23)	0.33

Variables	Exclusive/Predominant breastfeeding at 6 months		
	N	Odds ratios 95% Conf. Interval	p-value
Cohabitation		0.95 (0.12; 7.28)	0.96
Education	77		
Secondary	REF	REF	REF
Tertiary		0.75 (0.23; 2.40)	0.63
Employment	74		
No	REF	REF	REF
Yes		0.14 (0.29; 0.65)	0.01*
Nutrition topic of sensitization	66		
No	REF	REF	REF
Yes		2.5 (0.88; 7.27)	0.09
Breastfeeding topic of sensitization	65		
No	REF	REF	REF
Yes		1.87 (0.66; 5.31)	0.24
Household characteristics			
Wealth index	71		
Poor	REF	REF	REF
Rich		0.72 (0.27; 1.92)	0.51
Water index	78	1.13 (0.64; 2.00)	0.68
Sanitation index	78		
No	REF	REF	REF
Yes		0.94 (0.08; 10.90)	0.96

Variables	Exclusive/Predominant breastfeeding at 6 months		
	N	Odds ratios 95% Conf. Interval	p-value
Hygiene index	65	1.33 (0.75; 2.35)	0.34

Significance p-value *<0.05 and **<0.001.

Multiple regression analysis of the association between exclusive/predominant breastfeeding and associated factors in bivariate analyses.

A multiple regression analysis was performed incorporating variables where bivariate analyses of associations between factors and exclusive/predominant breastfeeding resulted in a p-value of less than 0.20. This approach was taken because the small sample size may have limited the possibility to detect statistically significant associations at p-values less than 0.05 in bivariate analyses. Accordingly, the variables included in the multivariate analysis were birthweight, gestational age, maternal employment, and nutrition as a topic of sensitization. Maternal employment was the only factor found to be independently significantly and negatively associated with exclusive/predominant breastfeeding (0.03; 0.76, p=0.02). Birthweight, gestational age, and nutrition topic of sensitization were not significantly associated with exclusive/predominant breastfeeding in multiple regression analysis.

Table 3.3.2. Multiple regression analysis of the association between exclusive/predominant breastfeeding and associated factors in the Soweto Baby WASH cohort study.

Exposure variables	Exclusive/predominant breastfeeding		
	N=65	Odds ratios 95% Conf. Interval	P value
Infant characteristics			
Birthweight (g)		1.78 (0.32; 9.74)	0.51
Gestational age (weeks)		1.24 (0.75; 2.04)	0.40
Maternal characteristics			
Employment			
No	REF	REF	REF
Yes		0.15 (0.03; 0.76)	0.02*
Nutrition topic of sensitization			
No	REF	REF	REF
Yes		2.62 (0.82; 8.43)	0.10

* P-value < 0.05

3.4 Objective 4. Associations between height-for-age z-score at 6 months and exclusive/predominant breastfeeding

Bivariate analyses were performed to assess the association between height-for-age Z-scores at 6 months of age (as a continuous variable)and exclusive/predominant feeding practices, infant characteristics (sex, birthweight, gestational age, feeding method, vaccination, and diarrhoea), maternal, SES and socio-demographic characteristics (marital status, education, employment, age, and height), and household factors (wealth index, water, sanitation, and hygiene index). Exclusive/predominant feeding practices were not significantly associated with height-for-age Z-scores at 6 months. Sex was found to be significantly associated

with height-for-age Z-scores at 6 months of age (-0.32; -0.06, p=0.01); being female was associated with smaller height-for-age Z-scores at 6 months of age by -0.19. Other infant factors (birthweight, gestational age, feeding method, vaccination, and diarrhoea), maternal, SES and socio-demographic factors (marital status, education, employment, age, and height) and household characteristics (wealth index, water, sanitation, and hygiene index) considered were not significantly associated with height-for-age Z-scores at 6 months of age.

Table 3.4.1. Bivariate analysis of the associations between HAZ and associated factors in the Soweto Baby WASH cohort study.

Exposure variables	HAZ at 6 months		
	N	Coefficient 95% Conf. Interval]	P value
Infant feeding practices			
Exclusive/predominant feeding practice	78		
No	REF	REF	REF
Yes		-0.03 (-0.18; 0.12)	0.66
Infant characteristics			
Birth weight (g)	79	-0.11 (-0.30; 0.07)	0.23
Gestational age (weeks)	78	-0.01 (-0.06; 0.05)	0.84
Sex	79		
Male	REF	REF	REF
Female		-0.19 (-0.32; -0.06)	0.01*
Diarrhoea at 6 months	69		
No	REF	REF	REF
Yes		-0.09 (-0.36 – 0.17)	0.48
Vaccination at 6 months	67		
No	REF	REF	REF

Exposure variables	HAZ at 6 months		
	N	Coefficient 95% Conf. Interval]	P value
Yes		-0.04 (-0.20;0.12)	0.61
Maternal characteristics			
Age	73	0.00 (-0.01;0.01)	0.61
Marital status	76		
Married	REF	REF	REF
Not married		0.03 (-0.16 – 0.23)	0.73
Cohabitation		0.03 (-0.24 – 0.30)	0.80
Education	78		
Secondary	REF	REF	REF
Tertiary		0.01 (-0.15 – 0.18)	0.90
Employment	74		
No	REF	REF	REF
Yes		0.04 (-0.12;0.20)	0.60
Height (cm)	75	-0.01 (-0.02; 0.00)	0.20
Household characteristics			
Wealth index	72		
Poor	REF	REF	REF
Rich		-0.06 (-0.19;0.76)	0.40
Water index	79	0.02 (-0.06; 0.10)	0.60

Exposure variables	HAZ at 6 months		
	N	Coefficient 95% Conf. Interval]	P value
Sanitation	79		
No	REF	REF	REF
Yes		-0.24 (-0.60; 0.11)	0.18
Hygiene	65	0.01 (-0.08; 0.09)	0.89

Significance p-value *<0.05 and **<0.01

Multiple regression analyses were performed between HAZ and exclusive/predominant breastfeeding, infant, maternal and household characteristics. First, a hierarchical regression analysis was performed to explore the association between HAZ and exclusive/predominant breastfeeding (model 1), adjusting for infant characteristics (model 2), maternal, SES and socio-demographic characteristics (model 3), and household characteristics (model 4). Furthermore, in the 4 models, exclusive/predominant breastfeeding was not associated with HAZ at 6 months of age while sex was consistently and significantly associated with HAZ, with females being statistically and significantly associated with a smaller HAZ across models 2-4. The effect started from model 2 at 0.22 (-0.36;-0.02, p=0.004), then in model 3 decreased slightly to 0.21 (-0.36;-0.06, p=0.007) and, the effect increased in model 4 to 0.27(-0.44; 0.10, p=0.003), and birthweight was significantly associated with HAZ in model 4 (p=0.005).

Model 1 explained no variation between the exposure variable of interest and the outcome at 6 months, as there was no association between exclusive/predominant breastfeeding and HAZ (p=0.66, R^2=0.00). In model 2, breastfeeding practices and infant characteristics explained 6% of the variation in the HAZ (M2) (p=0.06; R^2=0.18). In model 3, breastfeeding practices with infant and maternal, SES and socio-demographic characteristics explained 20% of the variation in the HAZ (M3) (p-value=0.41; R^2=0.20). In model 4, breastfeeding practices with infant, maternal and household characteristics explained 34% of the variation in the HAZ (M4) (p-value=0.36; R^2=0.34). However, none of these associations were statistically significant.

Table 3.4.2. Hierarchical regression analysis of the associations between HAZ at 6 months and exclusive/predominant breastfeeding practices in the Soweto Baby.

Exposure variables	HAZ at 6 months											
	Model 1			Model 2			Model 3			Model 4		
	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95%CI	P value
Infant feeding practices												
Exclusive/predominant breastfeeding												
No	REF			REF			REF			REF		
Yes	-0.03	(-0.18;0.12)	0.66	-0.09	(-0.24;0.06)	0.22	-0.07	(-0.23;0.09)	0.40	-0.12	(-0.30;0.06)	0.20
R-squared	0.0026	-	-	-								
F value	0.66	-	-	-								
Infant characteristics		-										
Birthweight (g)	-	-	-	-0.20	(-0.42;0.02)	0.07	-0.15	(-0.38;0.07)	0.17	-0.27	(-0.54;0.01)	0.005*
Gestational age(weeks)	-	-	-	0.04	(-0.02;0.10)	0.20	0.04	(-0.03;0.10)	0.24	0.06	(-0.01;0.14)	0.11
Sex	-	-	-									
Male	-	-	-	REF			REF				REF	REF
Female	-	-	-	-0.22	(-0.36;-0.02)	0.004*	-0.21	(-0.36;-0.06)	0.007*	-0.27	(-0.44;0.10)	0.003*

Exposure variables	HAZ at 6 months											
	Model 1			Model 2			Model 3			Model 4		
	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95%CI	P value
Diarrhoea at 6 months	-	-	-									
No	-	-	-	REF	REF	REF	REF	REF		REF	REF	REF
Yes	-	-	-	-0.23	(-0.57;0.11)	0.18	-0.23	(-0.58;0.13)	0.21	-0.34	(-0.72;0.04)	0.08
Vaccination at 6 months	-	-	-									
No	-	-	-	REF	REF	REF	REF	REF		REF	REF	REF
Yes	-	-	-	0.03	(-0.14;0.19)	0.75	-0.02	(-0.22;0.19)	0.87	0.05	(-0.19;0.29)	0.65
R-squared	-	-	-	0.18								
F value	-	-	-	0.06								
Maternal characteristics												
Age	-	-	-	-	-	-	0.10	(-0.16;0.36)	0.44	0.01	(-0.01;0.02)	0.34
Marital status	-	-	-	-	-	-						
Married	-	-	-	-	-	-	REF	REF		REF	REF	
Not married	-	-	-	-	-	-	-0.02	(-0.15;0.20)	0.81	0.17	(-0.07;0.40)	0.17
Cohabitation	-		-	-	-	-	-0.08	(-0.21;0.25)	0.59	-0.00	(-0.36;0.35)	0.99
Education	-	-		-	-	-						
Secondary	-	-	-	-	-	-	REF	REF		REF	REF	
Tertiary	-	-	-	-	-	-	0.07	(-0.10;0.28)	0.49	0.08	(-0.13; 0.29)	0.46
Employment	-	-	-	-	-	-						
No	-	-	-	-	-	-	REF	REF		REF	REF	

Exposure variables	HAZ at 6 months											
	Model 1			Model 2			Model 3			Model 4		
	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95% CI	P value	Beta	95%CI	P value
Yes	-			-	-	-	0.09	(-0.10;0.28)	0.37	0.06	(-0.16;0.28)	0.59
Height		-	-		-	-	-0.26	(-1.33;0.80)	0.62	-0.41	(-1.57;0.75)	0.48
R-squared	-	-	-	-	-	-	0.20					
F value	-	-	-	-	-	-	0.41					
Household characteristics	-	-		-	-	-						
Wealth index	-	-	-	-	-	-						
Poor	-	-	-	-	-	-				RER	REF	
Rich	-	-	-	-	-	-				-0.12	(-0.31;0.07)	0.22
Water index	-	-	-	-	-	-				0.01	(-0.09;0.11)	0.81
Sanitation	-	-	-	-	-	-						
No	-	-		-	-	-				REF	REF	
Yes	-	-	-	-	-	-				-0.37	(-0.76;0.01)	0.06
Hygiene index	-	-	-	-	-	-				0.07	(-0.03;0.17)	0.16
R-squared	-	-	-	-	-	-				0.34		
F value	-	-	-		-	-				0.36		

Significance p-value *<0.05

Given the small sample size, two separate multivariate analysis were performed looking at the association between HAZ and breastfeeding practices adjusted for maternal, SES and socio-demographic characteristics (Table 3.4.2); and the association between HAZ and breastfeeding practices adjusted for household characteristics (Table 3.4.3). Exclusive/predominant breastfeeding was not significantly associated with HAZ in any of the analyses below.

Table 3.4.3. Multiple linear regression analysis of the association between HAZ at 6 months of age and exclusive/predominant breastfeeding, adjusted for maternal, SES and socio-demographic characteristics in the Soweto Baby WASH cohort study.

Exposure variables		**HAZ at 6 months of age**	
	N =64	**Coefficient 95% Conf. Interval]**	**P value**
Infant feeding practice			
Exclusive/predominant breastfeeding		-0.06 (-0.23; 0.09)	0.41
Maternal characteristics			
Age		0.00 (-0.01; 0.02)	0.54
Marital status			
Married		REF	REF
Not married		0.01 (-0.17; 0.20)	0.87
Cohabitation		0.09 (-0.19; 0.37)	0.53
Education			
Secondary		REF	REF
Tertiary		0.03 (-0.14; 0.21)	0.71
Employment			
No		REF	REF
Yes		0.03 (-0.140; 0.20)	0.71
Nutrition topic of sensitization			
No		REF	REF

Exposure variables		HAZ at 6 months of age	
	N =64	Coefficient 95% Conf. Interval]	P value
Yes		0.25 (0.03; 0.47)	0.03*
Breastfeeding topic of sensitization			
No		REF	REF
Yes		-0.18 (-0.40; 0.04)	0.11
Height		-0.00 (-0.01; 0.01)	0.10
R-squared	0.11		
F value	0.65		

Significance p-value *<0.05

Nutrition as topic of sensitization (0.03; 0.47, p=0.03) was found to be significantly associated with the HAZ at 6 months; infants whose mothers had been sensitized to infant nutrition had a greater HAZ score at 6 months of age (by 0.25) in comparison to infants whose mothers had not been sensitized to infant nutrition. Other maternal characteristics and breastfeeding practices were not significantly associated with HAZ.

Table 3.4.4. Multiple linear regression analysis of the association between HAZ and exclusive/predominant breastfeeding, adjusting for household characteristics in the Soweto Baby WASH cohort study.

Exposure variables		HAZ at 6 months of age	
	N=62	Coefficient 95% Conf. Interval]	P value
Infant breastfeeding practices			
Exclusive/predominant breastfeeding		-0.04 (-0.20; 0.12)	0.59
Household characteristics			

Exposure variables		HAZ at 6 months of age	
	N=62	Coefficient 95% Conf. Interval]	P value
Wealth index			
Poor		REF	REF
Rich		-0.08 (-0.24; 0.08)	0.31
Water index		0.02 (-0.07; 0.11)	0.69
Sanitation			
No		REF	REF
Yes		-0.27 (-0.63; 0.10)	0.15
Hygiene index		0.04 (-0.06; 0.13)	0.43
R-squared	0.06		
F value	0.61		

Table 6 shows that none of the household characteristics were significantly associated with HAZ scores at 6 months.

3.5 Objective 3 Exploring infant feeding decision-making influences and processes for mothers of young infants in Soweto.

The qualitative component comprised 12 participants who were recruited from the SBW study. We recruited from infant feeding practices described in objective 1 (EBF/ predominant breastfeeding, and mix feeding), with participants between the ages of 19-35 years. Seven (58.3%) were working and 5 (41.7%) were unemployed.

Through analysis of the transcripts, we identified 6 main themes, theme 1 had six sub-themes, theme 2 had two sub-themes, theme 3 had four sub-themes, theme 4 had two sub-themes, theme 5 had two sub-themes and theme 6 had one sub-theme, each related to EBF barriers or facilitators. Table 3.5 below represents these themes and sub-themes under them.

Table 3.5. Themes and sub-themes related to facilitators and barriers of EBF

Facilitators of EBF	**Barriers of EBF**
THEME 1: SURVIVAL STRATEGIES Several themes emerged framed around how mothers made decisions about feeding in relation to surviving the first months with their babies.	
'The easier path' Mothers opted for whatever feeding option they thought would be easier to keep their babies healthy and happy	
"… Lucky he was a healthy baby and I breastfed him until six months of age". (Exclusive breastfeeding, IDI1)	*"The formula fed babies aren't troublesome, it's easy to care for them". (Mixed feeding, IDI10)*
Child-led feeding	

Some mothers' infant feeding choices were led by how their baby responded to feeding and their perceived demands	
If a baby was seen to be healthy, mothers continued exclusive breastfeeding (see above quote)	*"We don't have a choice because these babies want food. As a person when you haven't eaten you can't sleep or do anything. (Mixed feeding, IDI7)*
[redacted]	**'I am the one stuck with a crying baby'** *You are the one staying with the baby, so when the baby cries at night and you give him breastmilk and he is still not getting full that's when you decide to give him just two spoons and maybe he will stop crying. (Mix feeding, IDI12)*
	Breast milk insufficiency *……. If it happens that you do not have enough food, even though you want to give the baby just breastmilk, that become very stressful. Because the child is suckling and then little is coming out because the mother is hungry. (Mixed feeding, IDI4)*
	'A boy eats too much' *My second born was eating a lot because he is a boy. The first born is a girl. I was giving them the same food, but I was giving more food to the second born because he is boy. (Mixed feeding, IDI12)*
	'No one wants to care for a breastfeeding baby' *One thing about breastfeeding babies, is that they are very needy, needing the mother they constantly cry when they are with someone else and it's very stressful for other people who have to look after them. (Mixed feeding, IDI11)*
THEME 2: BREASTFEEDING INCOMPATIBLE WITH WORK The idea that returning to work was incompatible with breastfeeding and that breastfeeding pumps were too expensive was widely held.	
[redacted]	**Going back to work or looking for a job** *I had to go back to work so I had to put her on formula and take her off breastmilk. (Mixed feeding, IDI6)*

[redacted]	**Expensive pumps** *… at some point I was checking the breast pump and they were too expensive, so I was like nah, I would rather stick to what I know. (Mixed feeding, IDI9)*
THEME 3: FAMILY PRACTICES AND SOCIAL NORMS Family as well as community members influenced what mothers believed was normal.	
Family power dynamics For some mothers, their family history of infant feeding practices influenced their own choices.	
At home I got the advice from my mom. She even told me that my siblings and I were given breastmilk and that I should not listen to what other people are saying (babies don't get full with just breastmilk). She said my child will grow and I will give him food and water after six months. (Exclusive breastfeeding, IDI1)	*…. They would say, "Don't tell me what the nurses or doctors said. There is no doctor here, this is my house. This is how I raised you and you came out alright. This is how we were raised. They would also say "Look at you. Did you die?". (Mixed feeding, IDI6)*
[redacted]	**'The cord fell'** *As soon as the belly cord falls you start giving the baby two spoon of cream of maize. (Mixed feeding, IDI7)* *Yes, they usually say they introduce semisolids as soon as the cord falls, and in most cases it's after three days. (Mixed feeding, IDI11)*

	'We influence each other' *At the clinic we meet as mothers and we talk about what we are feeding our babies, and some will say my baby doesn't sleep and then other will say they are experiencing the same thing, then some mention cream of maize and we ask them who told them that cream of maize works and they mention that their mother told them that they should give them cream of maize so that she can also rest. We influence each other. (Mixed, IDI10)*
'Fresh babies' *What influence my decision was that my baby was not ill, she was growing very well with breastmilk. She was gaining weight properly with just breast milk only. She was not giving me problems and as I said, I have times on when I should feed her, and breastmilk was more than enough for her. (Exclusive breastfeeding, IDI3)*	**'Fresh babies'** *…….we believe that the baby should be fat and cute, and everybody will want to pick your baby. We are told you must also buy veggies and mash them and add butter. In this community we have overweight, cut and clean babies and big hair, and everybody will be like; your baby should be on the cover of magazines; "oh, your baby is so fresh". If you want to have a baby in our community, the first thing is to know is the baby needs to be fresh. (Mixed feeding, IDI6)*
THEME 4: BIOMEDICAL KNOWLEDGE In addition to local ways of understanding infant feeding that came from family, friends and the community, mothers also spoke about their exposure to biomedical or health information, often through health workers as well as other forms of communication.	

Role of health worker regarding feeding *Yes, they would say we should not mix feed the baby, because their intestines are still six months. I was told that I should breastfeed because it is important to breastfeed the baby and when they said that I decided to listen to them. So, with the second baby I decided that I want to see how it would be when you breastfeed the baby from 0-6 months. (Mixed feeding, IDI4)*	**Role of health worker regarding feeding** *…. They did not encourage much. They just ask you what you are feeding the baby, is it formula or breastmilk, that's all. I would not say they were encouraging that I must give the baby breastmilk. It did not come across that. (Mixed feeding, IDI5)*
Additional sources of information and support *I used to have MomConnect as well. (Mix feeding, IDI2)* *The booklet they give us at the clinic was very helpful. (Mix feeding, IDI2)* *It was also from reading those pregnancy books when I was pregnant. I would normally buy those magazines so that also encouraged me a lot. (Mixed feeding, IDI5)*	
THEME 5 ESCAPING JUDGEMENT In the context of inconsistent information about feeding, mothers described employing different strategies to avoid being judged, both by the healthcare community as well as the communities in which they lived. These included lying to health workers and their awareness of how some people in Soweto believe EBF is only practiced by HIV positive mothers.	
	We just lie *You just lie and say I am exclusively breastfeeding, so that they can get off your case and not ask you a lot of questions. (Mixed feeding, IDI6)* *They were going to yell at me and make noise hence I told them that I was only giving breastmilk. (Mixed feeding, IDI12)*

	HIV status *Some, we are giving breastmilk because of their HIV status, because they are HIV positive. That's why they managed, because they say it is too dangerous to give the baby a lot of things (food) at the same time. (Mixed feeding, IDI7)*
THEME 6. STRUCTURAL BARRIERS	
	Separating from the baby *I introduced formula after few weeks because she was admitted 3 weeks after birth, and I was not in the hospital 24/7 with her. I only introduced formula because she was admitted in the hospital. (Mixed feeding, IDI8)*

3.5.1 Theme 1: Infant and mother's survival strategies

Several sub-themes emerged framed around how mothers made decisions about feeding in relation to surviving the first months with their babies. Feeding formed part of these survival strategies, by choosing 'the easier path' and pointing out that 'I'm the one left with the crying baby.' The belief that their breastmilk was insufficient for their babies, particularly larger infants and boys, were other themes that contributed to their survival strategies. These themes were often intertwined, as highlighted in the following quote:

> *"It was as early as 3 days, because she would not be full with just breast milk. I don't know whether it was because I was not eating enough food, because immediately after I breastfed her, she would sleep, but for a short period of time and she would wake up. And I felt that my child was not growing enough, because the child grows when they sleep. So, I had to buy soft porridge and make it weak/more liquidly and give her 3 teaspoons and then breastfeed her. I started early because she was big, that why I choose to feed her that way". (Mixed feeding, IDI2)*

'The easier path'

Many mothers wanted the easier path of feeding their babies, which was explained as being the feeding options that kept their babies healthy, often equated with sleeping at night and not crying. For some the easier path was mixed feeding, and for some it was EBF. Those who reported EBF were also likely to report having an easier time, with happy and healthy babies, such as this mother:

"I was lucky he was a healthy baby and I breastfed him until six months of age, and after six months, that's when I was giving him light food, such as pumpkin and potatoes". (Exclusive breastfeeding, IDI1)

In contrast, mothers who experienced difficulty with breastfeeding chose mix feeding because it was the easier path.

"At first when I started to feed the baby it was difficult because milk was not coming out and the breasts were painful. As time went by the baby was crying and not sleeping and not full. Then I decided to give him formula because I had to go back to work. His nanny said the baby doesn't get full and she decided to give him cream of maize. It wasn't difficult when we started feeding him cream of maize. We gave him cream of maize, breastmilk and formula". (Mixed feeding, IDI10)

A crying and sleepless baby were other reasons mentioned as to why they mixed fed their babies.

"At first, she wasn't sleeping at night, she was always crying, and someone advised me to give her soft porridge/cereal and make it more liquidly. I tried it and that's when she started to sleep at night because I used to give her every day late, around 18:00". (Mixed feeding, IDI8)

Mothers believe that formula-fed babies are easy to care for hence they chose this kind of feeding, with statements like this: *"the formula-fed babies aren't troublesome, it's easy to care for them". (Mixed feeding, IDI10)*

Child-led feeding

Some mothers' infant feeding choices were led by their baby's health, baby's high feeding demand and babies not sleeping as expected. As quoted earlier, having a healthy baby was why some mothers chose EBF. However, if a baby did not appear to be satisfied with breastmilk alone, some mothers opted to mix feed: *"We don't have a choice because these babies want food. As a person when you haven't eaten you can't sleep or do anything. (Mixed feeding". IDI7)*

'I am the one stuck with a crying baby'

The anxiety of being stuck caring for a constantly crying baby was mentioned by some mothers as the reason why they chose mix feeding their babies. This was also mentioned in the context of feeling judged. In the following example, the mother clearly did not expect empathy from health workers about her choice to mix feed but wanted to explain her rationale to the interviewer.

> *"You are the one staying with the baby, so when the baby cries at night and you give him breastmilk and he is still not getting full that's when you decide to give him just two spoons and maybe he will stop crying. We are scared to ask help from the nurses because they will only tell you one thing that just give the baby breastmilk. They will just repeat what they said about breastmilk. (Mixed feeding". IDI12)*

Breast milk insufficiency

Mothers mentioned breast milk insufficiency in two ways, struggling to produce enough milk for the babies and the breast milk alone not being sufficient to make the baby full. For these reasons they choose to mix feed their infants.

Some mothers attributed their own inability to produce milk with not having enough to eat themselves, pointing to a connection between food insecurity and beliefs about breastmilk production.

> *"At the clinic they can tell us that we must breastfeed our babies until six months before we introduce food. But if it happens that you do not have enough food, even though you want to give the baby just breastmilk, that becomes very stressful. Because the child is suckling and then little is coming out because the mother is hungry". (Mix feeding, IDI4)*

When babies cried, this reinforced mothers' fears about milk insufficiency, leading them to follow family or community advice about mixed feeding and the early introduction of foods:

> *"I introduced formula because my breast was not producing milk. He was crying a lot and refusing formula, so my mother thought he was hungry and that's when we gave him the potatoes". (Mix feeding, IDI11)*

> *"Yes, I felt like he was hungry, and he won't grow properly, because the baby can't grow from breastmilk only. I also feel that when the baby eats, he will grow and gain weight. I felt like if I only give him breastmilk he was not going*

to grow as much as I want him to. I gave him solids so that he can grow and have a bit of weight". (Mix feeding, IDI6)

"She was not getting full with just breastmilk. When I give her breastmilk only, she would just cry and not sleeping at night, so I decided to give her cream of maize and she became alright; she wasn't crying as much as she used to and she was sleeping at night". (Mix feeding, IDI7)

'A boy eats too much'

The mothers also chose feeding methods based on the sex of their babies. A boy was presumed to eat more than a girl. Size was also used to determine feeding patterns; the bigger the baby the more food they fed the baby.

"A boy eats too much compared to a girl to tell the honest truth. Even how they grow is different. Even their road-to-health booklet is different. They may be of the same age, but their growth is different". (Mixed feeding, IDI2)

"My second born was eating a lot because he is a boy. The first born is a girl. I was giving them the same food, but I was giving more food to the second born because he is boy". (Mixed feeding, IDI12)

'No one wants to care for a breastfeeding baby'

The mothers expressed how straining it was to exclusively breastfeed, because they would have to carry the baby everywhere they go. EBF restricted their freedom of movement. They chose to mix feed or give formula because it meant that they could get other family members to care for their baby and have freedom of movement.

> *"It was straining because it meant I always had to be with him because I was only giving him breastmilk. It would affect my schedule workwise and my movement because I always had to be with him. It was tiring because he would want breastmilk constantly. I also had no plan on how I was going to leave him with someone, because he was refusing formula and I was not giving him solids in the first six months. It was pretty challenging. One thing about breastfeeding babies, is that they are very needy, needing the mother they constantly cry when they are with someone else and it's very stressful for other people who have to look after them". (Mixed feeding, IDI11)*

> *"As parents, the health workers do their job and tell us how we should bathe our babies and how we should give them breastmilk exclusively until six months. They told us but when we get to our homes, we make our own decision because the nurses aren't with you at home when you struggle with the baby". (Mixed feeding, IDI10)*

The idea that formula-fed babies were easier to care for was a common reason for mothers to abandon EBF, as part of a broader strategy to find balance in their lives.

3.5.2 Theme 2: Breastfeeding incompatible with work

Mixed feeding practices were presented as the only feeding option when weighing up the cost benefit of returning to work. Mothers felt pumps were too expensive to be a viable option.

Going back to work or looking for a job

The idea that returning to work was incompatible with breastfeeding was universal among the mothers in this sample. The need to earn an income was higher than their perceived benefits of EBF. As such, some of the mother chose to mix feed their babies because they had to go back to work. Other mothers successfully managed EBF because they were unemployed and could spend more time with their babies.

> *"With my first born I was not working; I gave him breastmilk for the first six months and then introduced solids after six months. With the second baby it was strictly breastmilk for a month and after a month that's when I introduced formula because I knew I had to go back to work". (Mixed feeding, IDI9)*

> *"My mother fed her the first week my child came back, and I breastfed her for only three months. I had to go back to work so I had to put her on formula and take her off breastmilk". (Mixed feeding, IDI6)*

Expensive pumps

A few mothers acknowledged that breastmilk pumps may make it possible to go to work or leave an infant in the care of others while maintaining EBF. However, in

these cases, they referred to pumps as being too expensive. This reinforced the narrative of breastfeeding being a challenge in their economic context.

Being unable to afford a breast pump with mothers choosing to mix feed their infant.

> *"It is very challenging, like I said breastfeeding can be straining as well and not everyone can afford to buy a pump if you have to go somewhere and leaving your child knowing that the only source of food is your breast is also limiting you when you have to go work or other places. And most women do want to exclusively breastfeed until six months but the challenge is when they have to go out or work, what will happen with the baby". (Mixed feeding, IDI11)*

> *"I have heard little bit about expressing breastmilk, because… at some point I was checking the breast pump and they were too expensive, so I was like nah, I would rather stick to what I know". (Mixed feeding, IDI9)*

3.5.3 Theme 3: Family practices and social norms

Family as well as community members influenced what mothers believed was normal. Mothers relied on traditions (this is how we do it) and infant cues ('the cord fell'), mediated by family power dynamics, as well as peer influences on their feeding practices.

'This is how we do it'

For some mothers, their family history of infant feeding practices influenced their own choices. Sometimes these practices were supportive of EBF, such as in the following case:

> *"At home I got the advice from my mom. She even told me that my siblings and I were given breastmilk and that I should not listen to what other people are saying (babies don't get full with just breastmilk). She said my child will grow and I will give him food and water after six months. (Exclusive breastfeeding". IDI1)*

More often, family practices were supportive of early and mixed feeding.

> *"My relatives and the community believe that the child must eat as soon as they come home from the hospital. That is how we were raised that when the child arrives from the hospital needs to eat. Yes, they would say, "Don't tell me what the nurses or doctors said. There is no doctor here, this is my house. This is how I raised you and you came out alright. This is how we were raised. They would also say "Look at you. Did you die?". (Mixed feeding, IDI6)*

Particularly when a mother was living with such family members, she would be under enormous pressure to continue these practices.

'The cord fell'

A specific practice emerged from the interviews in relation to the baby's cord among some mothers. They explained that a cord falling was an indication that the baby

was ready for semi-solids food. This is what was culturally practiced at home and by the community.

"As soon as the belly cord falls you start giving the baby two spoon of cream of maize." (Mixed feeding, IDI7)

"In my family as soon as the belly cord falls, the baby must start eating. It doesn't matter if the cord falls on 10th or the 11th day but, on that day, when it falls, it's time for the baby to start eating. That's what we believe in my family". (Mixed feeding, IDI9)

"Yes, they usually say they introduce semisolids as soon as the cord falls, and in most cases it's after three days. So, they say that it's how it has always been from a long time ago. And that's the only thing because even going out, you don't need to wait for three months, you just wait for the cord to fall and then you can be able to leave the house". (Mixed feeding, IDI11)

Family power dynamics

Staying with family has played a great role on the infant decision making of some mothers to either exclusively breastfeed or mix feed their babies. Some mothers were given little to no choice on how their babies should be fed. The decision was taken by the family members.

"After giving birth because I did not take the decision alone. At home I am staying with people who are nurses, so they have also been advising me to

give my baby breastmilk until she was six month. There was a time when I wanted to mix feed my baby and give her formula and breastmilk, and they said no, I should stick to breastmilk until six months and that is what I did. At home it was my two grandmothers and my mother also advised me to breastfeed until six months. My two grandmothers, because they are nurses, when it comes to babies, I listen to them the most". (Exclusive breastfeeding, IDI3)

"With my first born, you know when you raise your child at home; your parents are the ones who raise the baby for you. You will listen to everything that they tell you on how to raise a child; they push you aside. After birth I gave him breastmilk but as soon as the cord fell, they started giving him cream of maize. They give babies cream of maize and formula when you have places to go, and you leave your baby with them". (Mixed feeding, IDI10)

"My mother was still alive when I had my first born, and my mother did not believe in exclusive breastfeeding until six months before feeding the baby other food. On the second day after coming back from the hospital, my mother made cream of maize and gave one spoon". (Mixed feeding, IDI6)

'We influence each other'

In addition to family members, mothers from the same community also influenced one another. One mother mentioned that her mixed feeding choice was influenced

by mothers she met at the clinic when she went to immunize her baby. The mothers got to talk amongst themselves without the nurses about the challenges they were facing with feeding, and they advised each other about feeding the babies cream of maize, because the babies would be full and able to sleep better.

> *"At the clinic we meet as mothers and we talk about what we are feeding our babies, and some will say my baby doesn't sleep and then other will same they are experiencing the same thing, then some mention cream of maize and we ask them who told them that cream of maize works and they mention that their mother told them that they should give them crema of maize so that she can also rest. We influence each other, some will make it too thick, and it will constipate the baby, that's the challenge that occurs. Yet, I have never experienced such a challenge". (Mixed feeding, IDI10)*

'Fresh babies'

Most mothers expressed a strong desire to have a healthy, chubby or 'fresh' baby that was accepted in the community. Often, this desire resulted in mothers introducing foods early. However, in cases when their baby was looking healthy with breastmilk only, the outward appearance of their baby reinforced decisions to exclusively breastfeed.

> *"In the community we raise our kids the same way, we believe that child should eat cream of maize, inkomazi so that the baby will be strong. We like strong babies. We believe that the baby should be fat and cute, and everybody will want to pick your baby. We are told you must also buy veggies*

and mash them and add butter. In this community we have overweight, cut and clean babies and big hair, and everybody will be like; your baby should be on the cover of magazines; "oh, your baby is so fresh". If you want to have a baby in our community, the first thing is to know is the baby needs to be fresh. (Mixed feeding". IDI6)

"What influence my decision was that my baby was not ill, she was growing very well with breastmilk. She was gaining weight properly with just breast milk only. She was not giving me problems and as I said, I have times when I should feed her, and breast milk was more than enough for her". (Exclusive breastfeeding, IDI3)

3.5.4 Theme 4: Biomedical knowledge

In addition to local ways of understanding infant feeding that came from family, friends and the community, mothers also spoke about their exposure to biomedical or health information, often through health workers as well as other forms of communication.

Role of health worker regarding feeding

Some of the mothers indicated that the community health workers played a major role when choosing an infant feeding method, and some mothers felt that they did not. Some mothers got very clear and directive advice from health workers.

"Yes, they would say we should not mix feed the baby, because their intestines are still six months. I was told that I should breastfeed because it is

important to breastfeed the baby and when they said that I decided to listen to them. So, with the second baby I decided that I want to see how it would be when you breastfeed the baby from 0-6 months". (Exclusive breastfeeding, IDI4)

Other mothers did not experience much pressure from health workers, suggesting that breastfeeding promotion is not uniform.

"No, they did not encourage much. They just ask you what you are feeding the baby, is it formula or breastmilk, that's all. I would not say they were encouraging that I must give the baby breastmilk. I did not come across that". (Mixed feeding, IDI5)

Additional sources of information and support

In addition to specific healthcare workers, the mothers also described the clinic, MomConnect, the Internet and pamphlets as additional sources of health information on how they should feed their babies.

"I used to have MomConnect as well, they would send SMS and advise us on what to do depending on the age of the baby (when your child is this old, do this) It was very helpful". (Mixed feeding, IDI2)

"The booklet they give us at the clinic was very helpful, I use to read them a lot; they were very helpful". (Mixed feeding, IDI2)

"It was also from reading those pregnancy books when I was pregnant. I would normally buy those magazines so that also encouraged me a lot. (Mixed feeding" IDI5)

3.5.5 Theme 5: Escaping judgement

In the context of inconsistent information about feeding, mothers described employing different strategies to avoid being judged, both by the healthcare community as well as the communities in which they lived. These including lying to health workers and their awareness of how some people in Soweto believe EBF is only practiced by HIV positive mothers.

'We just lie'

Some women chose to lie to the healthcare workers about what they were feeding their babies because they felt scared, didn't want to be asked a lot of questions and did not want to be yelled at. They told the healthcare workers what they wanted to hear, not what was happening.

"You just lie and say I am exclusively breastfeeding, so that they can get off your case and not ask you a lot of questions". (Mixed feeding, IDI6)

"No, I was not mentioning that I was also giving the baby cream of maize. I was only telling them that I was breastfeeding because they don't want us to give our babies food, and they say we must give them food after six months.

We lie because they will yell at us for giving the baby food before six months. (Mixed feeding". IDI7)

"They really tried and told us to breastfeed, but we hide the fact that we have started giving the baby semisolids". (Mixed feeding, IDI10)

"They were going to yell at me and make noise hence I told them that I was only giving breastmilk". (Mixed feeding, IDI12)

HIV status

Some communities associated EBF with a person's HIV positive status. As such, practicing EBF could unintentionally disclose one's status or lead to rumours. However, related to the fear of HIV transmission, some mothers also believed that being HIV positive helped mothers to stick to EBF.

Some were giving breastmilk because of their HIV status because they are HIV positive. That's why they managed, because they say it is too dangerous to give the baby a lot of things (food) at the same time. (Mixed feeding, IDI7)

The above quote suggests that had a mother not been HIV positive, she may have succumbed to either family or community pressures to mix feed her infant.

3.5.6 Theme 6. Structural barriers

Finally, some mothers were unwillingly separated from their infant due to illness which led to the introduction of formula. These barriers were structural, in that they were physically separated from their children.

“I introduced formula after few weeks because she was admitted 3 weeks after birth, and I was not in the hospital 24/7 with her. I only introduced formula because she was admitted in the hospital”. (Mixed feeding, IDI8)

Chapter 4. Discussion

4.1 Discussion of key findings

The purpose of this study was to describe infant feeding practices and the factors that influence them, explore the infant feeding decision-making influences and identify the association between infant feeding practices and HAZ scores at 6 months of age in Soweto, Johannesburg.

4.1.1 Infant feeding practices

We first tried to explore the infant feeding practices longitudinally from birth to one month, birth to three months, and birth to six months according to WHO definitions. The results showed no EBF because the mothers in this study introduced different feeding methods each week, making it hard to look at the feeding patterns longitudinally. Following this intriguing discovery, it was decided to take a cross-sectional approach, to try and characterize the varying patterns of infant feeding practices at the critical point of six months. These were in turn converted into simplified variables for statistical analysis. The results from the analysis indicated lack of EBF and predominant breastfeeding, with an overwhelming majority of mixed feeding mothers. The variation of mixed feeding practices found in this study were not well captured by the WHO definition. The results in this study indicated 6 different mixed feeding practice groups; group 1 (breastfeeding, formula feeding and liquids), group 2 (breastfeeding, liquids and semi-solids, group 3 (formula feeding, liquids and semi-solids), group 4 (breastfeeding, formula feeding, liquids and semi-solids), group 5 (breastfeeding and formula feeding) and group 6 (formula feeding and liquids).

According to the findings of this study, the majority of mothers were not feeding their infants in accordance with WHO recommendations. The EBF rates reported in this sample were substantially lower than other studies conducted in Soweto (22,36). This could be because the SBW study included only healthy babies, with normal birth weight, born from HIV-negative mothers, and with term pregnancy.. Infants born to HIV-positive mothers have greater EBF rates than those born to HIV-negative mothers, according to recent South African studies. (69–71). The high rates of mixed feeding were consistent with previous South African studies that found a high proportion of infants consuming semi-solid foods before the age of six months (17,72). However, the WHO definition for infant mixed feeding was too broad to get a sense of what the mothers were actually doing when it came to infant mixed feeding. Using the WHO definition, we identified low levels of infant feeding variation in the study, whereas in fact there were many variations of mixed feeding.

4.1.2 Key factors associated with infant feeding decisions

The reasons for the low rates of EBF were explored both quantitatively and qualitatively.

One set of factors explored was individual characteristics. In our study, no association was found between exclusive/predominant breastfeeding and infant sex. In contrast, the Norwegian Infant Nutrition Survey reported an association of EBF and sex, whereby female infants had a much better likelihood of being breastfed exclusively than male infants at 4 months ($p<0.01$), though this significance was not found at 6 months (73). Findings from a study in Bloemfontein reported that higher birth weight and gestational age of the baby were positively significantly associated with the mother's decision to exclusively breastfeed their infant (74). No significant

association was found with birth weight; however, a significant association between exclusive/predominant breastfeeding and gestational age was discovered in our study, where a week increase in gestational age was associated with increase of the likelihood for mother to exclusive/predominantly breastfeed. Nutrition is a key way in which mothers invest in babies in early life (75). There may be a collinear relationship between birthweight and gestational age. This collinear relationship confirms the hypothesis that states that from a life history perspective, maternal investment from pregnancy through to lactation, brings correlated levels of energy allocation to growth; which are expected to predict adult body size and body composition, as well as the children's risk of non-communicable diseases (75). Another set of factors explored were socio-demographic characteristics. There was no association between maternal education and EBF found in this study, contrary to the findings in the Bangladesh study where a binary multivariable logistic regression model showed that in comparison, higher educated mothers were less likely to EBF their children than less educated mothers (76). This study discovered that maternal employment was associated with a lower likelihood of EBF. This was corroborated in qualitative interviews, where mothers reported that looking for a job and going back to work were major factors in why they did not breastfeed exclusively for up to 6 months. A 2021 South African systematic scoping review reported that commitments to school and work were some of the reasons for the cessation of EBF (77) and experiencing difficulties in getting maternity leave was a barrier for EBF (78). While a 2018 KZN study discovered no association between EBF and returning to work

and/or school (43), our study findings were in line with the majority of studies on this topic.

Marital status was not significantly associated with EBF in our study. In contrast, in a 2020 study, Hamilton indicated that mothers are more likely to breastfeed because they receive support from their spouse and that helps overcome breastfeeding challenges (79). This was also in line with the 2010 study which indicated that marital status was positively significantly associated with breastfeeding at 6 months (80). There was no association between EBF and household factors (wealth index, water index, sanitation, and hygiene index). This could be because even though one is employed, one's household circumstances are unlikely to change; this was seen in the 2020 study, evaluating data from the SBW study, which indicated that from 6 months to 12 months employment rate moved from 70.5% to 34.7%, however, there was little variation in the household factors (81). Similar results were reported by a cross-sectional assessment study conducted in 19 African countries that having access to water supply and the time spent by mothers fetching water were not associated with EBF practice (82). In contrast, a 2019 study in China reported that mothers of higher average household income were more likely to practice EBF for the first six months of life (83).

In our qualitative component, some mothers outlined that they were not exclusively breastfeeding, not because they didn't know about it, but it was hard to exclusively breastfeed, and they strongly felt that breast milk alone was insufficient for the baby. Mothers' perceptions of milk insufficiency are a worldwide challenge, and their impact may differ depending on cultural factors (84). Some signs, such as infant

satiety cues or a crying infant, are often interpreted by mothers as a key indicator of insufficient milk supply (85). Crying and fussiness were some of the baby behaviours that affected feeding decisions by mothers (86). In this study, we found that the influencing factors in a mother's infant feeding method were survival strategies, the mothers also pointed out breastfeeding to be incompatible with work; returning to work or school, whether planned or unplanned, was the foremost reason for choosing to feed formula or mix feed their infant before 6 months (87).

Mother's infant feeding methods were also found to be influenced by family practices and social norms. Similar results were reported in the 2020 study stating that the adoption of EBF needs more socio-cultural processes, where extended family members including grandmothers play important roles in childcare, and they have a strong influence on changing decision-making regarding EBF (88), biomedical knowledge, and escaping judgement. Some of the findings in this study are comparable to the results of the 2017 KZN study that reported the barriers of EBF as the health system (advice from health workers to introduce liquid-based food), mother-baby factors (breast milk insufficiency, baby struggling to latch, and baby not getting full from breast milk alone), family pressure to introduce traditional medicine and semi-solid food and returning to work or school (37). Deciding on a method of infant feeding is a complicated decision that involves factors such as social, psychological, emotional, and environmental considerations (33).

4.1.3 Associations between infant feeding practices and linear growth

HAZ scores at 6 months were not significantly associated with infant feeding practices; this could be as a result of the small sample size for exclusive/predominant breastfeeding. These findings contrast with a 2013 study of

20 developing countries that reported significantly higher weight, length, and lower probability of stunting, wasting, and infections associated with EBF from birth until 6 months of age (11). However, this study's lack of association was similar to results reported in a 2014 cluster-randomized trial of EBF promotion done by Engebretsen which indicated that in three African countries, increased EBF was not associated with improved HAZ scores at six months (80). In that study, the total difference in EBF prevalence between the study arms were very small and it was challenging to point to any differences in growth patterns to the EBF promotion (89), suggesting that other pathways were at play. Literature suggests that adiposity is sensitive to variations that are steered by external environmental factors, such as food security, and frequency of infections, hence more likely to impact children over the course of months rather than in years (90–93). HAZ is a marker of chronic undernutrition continuing over years which may not be visible at six months. Markers such WAZ and WHZ may therefore have been more appropriate indicators during this stage of the life course to assess the effects of EBF. According to three DHS surveys conducted in Ethiopia, the onset of stunting is evident by 6–12 months of age and increases to 24 months of age (94). Issues with study design may also have come into play in our study, with too few people reporting EBF to even conduct an analysis, without also including predominant breastfeeding.

HAZ scores at 6 months were also compared with other factors. In this study, they were associated with infant sex, whereby being female was associated with lower HAZ scores. This finding was contrary to results reported in a 2020 systematic

review on children aged 0–59 months from 67 countries that reported stunting, indicating a stunting rate of 81% in boys and 19% of stunting in girls (95). The different findings in our study could be explained more by gendered behaviour than a true biological sex difference. In our qualitative component, the mothers mentioned that they believe boys need to be fed more food than girls, hence they introduced food earlier than 6 months and fed the infant boy more than they would an infant girl. There was no significant link discovered between HAZ and maternal height in our study, however, a cohort 2013 study of five countries reported that children's linear growth over the growing period is influenced by maternal height (96).

In this study, no significant relation was found between HAZ and household factors (water index, wealth, sanitation, and hygiene index), which is likely due to the fact that the effect of WASH variables on height may not be apparent until later in the course of childhood (81). Nutrition is a crucial requirement to combat stunting, but nutritional approaches, independently, are insufficient. Provision of dietary nutrients only partly solves growth failure in resource-poor settings (97). Interventions beyond traditional dietary approaches, interventions that target environmental factors, may be critical, for instance, the availability of basic sanitation and safe water, infection control, maternal education, and employment (98,99). A 2017 study in Ethiopia that explored stunting from 6-24 months, reported the prevalence of stunting to be 58.1%, where poor wealth status, and the absence of a latrine has been found to be strongly correlated to a higher odds of stunting (100). Poor household sanitary facilities were found to be significantly associated with undernutrition with 26.7% of

the infants being stunted at 6 months in the 2010 study in Ethiopia (101). The 2020 Soweto study indicated that the impact of WASH variables to the change in z-scores were found to be minimal for all the indices at 1 month, however, increased a little bit to 6–10% for HAZ between 6 and 12 months (81). Some of the major determinants of growth in the first two years of life are infant feeding practices, hygiene and sanitation, and infection recurrence (102).

4.2 Study strengths and limitations

In terms of study strengths, I collected the quantitative data as a research assistant in the SBW study and the qualitative data through this study. As such, I was familiar with the data and the participants. The study used mixed methods, which provided a broad range of ways to better understand the complexity of the topic and it provided the ability to triangulate the results.

The study also had several limitations. Potential collinearity between birthweight and gestational age was not tested in the analysis. When deriving household wealth index, agricultural land and farm animals were included, which may have limited relevance in the study given the study setting. Furthermore we categorised it into two (poor/ rich) which may have limited us in the study. Another limitation is selection bias in the quantitative study, which occurred due to the loss of participants to follow-up on because of change in contact details and relocation. As a result, the sample obtained potentially does not represent the intended population. Also, as cross-sectional data from six months was used to explore associations, causality cannot be inferred. For the qualitative component, the study also relied on participants to describe decision-making linked to their infant feeding practices. As the duration

between the interviews and the 0- 6 months visit period was 2-3 years back, this could have resulted in recall bias occurring when they did not remember the experience or omitted other information. To mitigate this, their responses to the 6-month questionnaires were used to support the recall.

Chapter 5 Recommendations and conclusion

5.1 Recommendations

5.1.1 Programmatic recommendation

Educating mothers alone about infant feeding is not enough. Community outreach programs/campaigns about infant feeding should be organized and implemented so that the information about infant feeding practices and benefits can reach the community at large; from the young to the old, reaching family members who influence the mother's infant feeding decision. Community support can take numerous forms such as health facility outreach, community mobilized programming, and national social marketing. Given the significance of optimal breastfeeding for child survival, health, nutrition, and development, it is essential that protection, promotion, and breastfeeding support be made available to all women everywhere and at all times (103). Supportive acts from partner or father of the infant and households a can play an important role in a mother's decision to begin, continue, or discontinue breastfeeding postnatally (104). Our qualitative findings indicated that family practices and norms, escaping judgement from the community and survival strategies influence a mother's infant feeding decision.

Healthcare providers perform a vital informative and supportive role to mothers regarding lactation and infant feeding (105,106). The healthcare workers need to have one on one counselling sessions post-delivery to address the challenges that mothers face with infant feeding, The support from the healthcare empowers women to gain confidence and abilities needed to breastfeed successfully and optimally (79). Such interventions can help improve breastfeeding practices and ultimately infant

growth. In order to optimize infant feeding practices, counselling and support are required (107). EBF is optimized when breastfeeding mothers get constant and correct information from healthcare practitioners, household members at home, peer supports, and society members about proper infant feeding during antenatal, intra-partum, postnatal and follow-up care (108–111). The success of breastfeeding programs can be encouraged by education as well as promotion of breastfeeding provided by healthcare providers (112).

5.1.2 Policy recommendations

Ensuring that mothers get maternity leave and have a workspace that supports, protects and promotes breastfeeding can encourage mothers to choose EBF. A 2021 systematic review indicated that having a lactation area at work, breastmilk express breaks, and organizational policy are all significant methods for increasing breastfeeding duration and preventing early introduction of breastmilk substitutes (113). Policies that support a woman's choice to breastfeed can help control employment barriers and help in the return of breastfeeding becoming a norm in the society and standard feeding practice (114). The reasons mentioned by some of the women who introduced mixed feeding before 6 months were; looking for a job or going back to work or school. Having work or school policies that support breastfeeding might minimize the number of women who choose to introduce mixed feeding or who discontinue breastfeeding.

5.1.3 Research recommendation

More research needs to be conducted regarding the association between infant feeding and infant growth, the data available is limited and this field needs to be explored with a big sample size that will enable variation for each feeding practice, and infant growth. There is a great need to describe the actual infant feeding practices that the mothers are practicing, understanding what the mothers are doing in conjunction with the insight into facilitators and barriers is needed to better understand how we can better support mothers and communities. Using a cross-sectional design that looks at different time points, WAZ and WHZ from birth to six months and then WAZ, WHZ, and HAZ from 6 months until 2 years, because even though commonly stunting, underweight and wasting are described separately they often co-exist (115,116).

5.2 Conclusion

EBF is still a challenge in South Africa in spite of the policies and programs put in place by the government. In this study the majority of women still chose to mix feed their infants before 6 months of age. The relationship between patients and healthcare workers seemed to be strained, making mothers feel like they cannot talk to the healthcare workers about their infant feeding challenges, ultimately leading to high numbers of mixed fed babies. The reason for no significant association between infant feeding practices could be due to the small sample size, which made it difficult to see variance between HAZ at 6 months and the feeding practices. There should be more research done to explore the different types of infant mix feeding methods that are practiced by the mothers. Exploring growth using HAZ, WAZ and WHZ

cross-sectionally at different time points could help to yield better results instead of looking at growth using one indicator at one time point.

References

1. World Health Organization. Indicators for assessing infant and young child feeding practices Part 1: Definitions. Geneva Switz World Heal Organ. 2008;2007(November):1–19.
2. Department of Health Republic of South Africa. Infant and Young Child Feeding Policy [Internet]. Health-E News. 2013. 1–78 p. Available from: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&cad=rja&uact=8&ved=0ahUKEwjhhK2d-fjPAhXhCsAKHQ2mBmcQFggxMAM&url=http://childhealthpriorities.co.za/conference-presentations/2014/Infant and Young Child Feeding Policy Change L
3. World Health Organization UNCF. Guideline: updates on HIV and infant feeding: the duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV [Internet]. Geneva: World Health; Organization. 2016. Available from: http://www.who.int/about/licensing/copyright_form/index.html
4. De Onis M, Dewey KG, Borghi E, Onyango AW, Blössner M, Daelmans B, et al. The world health organization's global target for reducing childhood stunting by 2025: Rationale and proposed actions. Matern Child Nutr. 2013;9(S2):6–26.
5. World Health Organisation. World Health Organization. (2006). WHO child growth standards: length/height for age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age, methods and development. Geneva: World Health Organization. Geneva World Heal Organ. 2006;51(12):1002–1002.
6. du Plessis LM, Herselman MG, McLachlan MH, Nel JH. Selected facets of

nutrition during the first 1 000 days of life in vulnerable South African communities. SAJCH South African J Child Heal. 2016;10(1):37–42.

7. World Health Organization. Indicators for assessing infant and young child feeding practices. World Heal Organ [Internet]. 2007;2007(November):1–19. Available from: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Indicators+for+assessing+infant+and+young+child+feeding+practices#0

8. World Health Organization. Global strategy for infant and young child feeding.The optimal duration of exclusive breastfeeding. Geneva, World Health Organization. 2001.

9. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong effect. Lancet [Internet]. 2016;387(10017):475–90. Available from: http://dx.doi.org/10.1016/S0140-6736(15)01024-7

10. Yarnoff BO, Allaire BT, Detzel P. Associations between infant feeding practices and length, weight, and disease in developing countries. Front Pediatr. 2013;1(SEP):1–7.

11. Haschke F, Haiden N, Detzel P, Yarnoff B, Allaire B, Haschke-Becher E. Feeding patterns during the first 2 years and health outcome. Ann Nutr Metab. 2013;62(SUPPL. 3):16–25.

12. Doherty T, Sanders D, Jackson D, Swanevelder S, Lombard C, Zembe W, et al. Early cessation of breastfeeding amongst women in South Africa: an area needing urgent attention to improve child health. BMC Pediatr. 2012;12.

13. Statistics South Africa. South Africa Demographic and Health Survey 2016: Key Indicator Report. 2016.
14. Rollins NC, Bhandari N, Hajeebhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? Lancet [Internet]. 2016;387(10017):491–504. Available from: http://dx.doi.org/10.1016/S0140-6736(15)01044-2
15. Schiff S, Ba DM. Pooled analysis of global , regional and country-level prevalence of childhood stunting , wasting and underweight in 62 low- and middle- income countries , 2006-2018. Lancet Glob Heal. 2018;2006–18.
16. Department of Health. Roadmap for Nutrition in South Africa 2013-2017. 2013. 1–46 p.
17. Mamabolo RL, Alberts M, Mbenyane GX, Steyn NP, Nthangeni NG, Delemarre-van De Waal HA, et al. Feeding practices and growth of infants from birth to 12 months in the central region of the Limpopo Province of South Africa. Nutrition. 2004;20(3):327–33.
18. Ssentongo P, Ssentongo AE, Ba DM, Ericson JE, Na M, Gao X, et al. Global, regional and national epidemiology and prevalence of child stunting, wasting and underweight in low- and middle-income countries, 2006–2018. Sci Rep [Internet]. 2021;11(1):1–12. Available from: https://doi.org/10.1038/s41598-021-84302-w
19. Akombi BJ, Agho KE, Hall JJ, Wali N, Renzaho AMN, Merom D. Stunting, wasting and underweight in Sub-Saharan Africa: A systematic review. Int J Environ Res Public Health. 2017;14(8):1–18.

20. 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. S-1 T. The South African National Health and Nutrition Examination Survey, 2012: SANHANES-1: the health and nutritional status of the nation. HSRC Press Cape Town, South Africa. 2014;232–47.
21. Zere E, McIntyre D. Inequities in under-five child malnutrition in South Africa. Int J Equity Health. 2003;2:1–10.
22. Nieuwoudt SJ, Ngandu CB, Manderson L, Norris SA. Exclusive breastfeeding policy, practice and influences in South Africa, 1980 to 2018: A mixed-methods systematic review. PLoS One. 2019;14(10):1–25.
23. Mhlanga RE. Maternal, Newborn and Child Health: 30 Years On. South African Heal Rev 2008. 2008;115–28.
24. Siziba L.P., Jerling J. Hanekom S.M. W-VE. Low rates of exclusive breastfeeding are still evident in four South African provinces. South African J Clin Nutr [Internet]. 2015;28(4):170–9. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L607814531%0Ahttp://dx.doi.org/10.1080/16070658.2015.11734557
25. Ghuman MR, Saloojee H, Morris G. Infant feeding practices in a high HIV prevalence rural district of KwaZulu-Natal, South Africa. South African J Clin Nutr. 2009;22(2):74–9.
26. Mushaphi, L.F., Mbhenyane X.G., Khoza L.B. AAK. Infant-feeding practices of

mothers and the nutritional status of infants in the Vhembe District of Limpopo Province [Internet]. Vol. 21, South African Journal of Clinical Nutrition. 2008. Available from: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed8&NEWS=N&AN=2008499703

27. Bland RM, Rollins NC, Coutsoudis A, Coovadia HM. Breastfeeding practices in an area of high HIV prevalence in rural South Africa. Acta Paediatr Int J Paediatr. 2002;91(6):704–11.
28. Kruger Rozanne and Gerda Gericke. Breast feeding practices of mothers with children (aged 0-36 months) in a rural area of South Africa A qualitative approach. J Fam Ecol Consum Sci. 2001;29(1):60–71.
29. Statistics South Africa. Census 2011 Municipal report Gauteng. 2011.
30. Wrottesley S V., Prioreschi A, Slemming W, Cohen E, Dennis CL, Norris SA. Maternal perspectives on infant feeding practices in Soweto, South Africa. Public Health Nutr. 2020;5.
31. Nieuwoudt S, Manderson L, Norris SA. Infant feeding practices in Soweto, South Africa: Implications for healthcare providers. South African Med J. 2018;108(9):756–62.
32. Nieuwoudt SJ,. Norris SA and ML. Starting well: infant feeding in the first six months, Soweto, South Africa. South African Med J [Internet]. 2018;756–62. Available from: https://repositorio.ufsc.br/bitstream/handle/123456789/186602/PPAU0156-D.pdf?sequence=-

1&isAllowed=y%0Ahttp://journal.stainkudus.ac.id/index.php/equilibrium/article/view/1268/1127%0Ahttp://www.scielo.br/pdf/rae/v45n1/v45n1a08%0Ahttp://dx.doi.org/10.1016/j

33. Arora S, McJunkin C, Wehrer J KP. Major Factors Influencing Breastfeeding Rates : Pediatrics. 2000;106(5):1–5.

34. Mcfadden A, Gavine A, Mj R, Wade A, Buchanan P, Jl T, et al. Support for healthy breastfeeding mothers with healthy term babies (Review). Cochrane Database Syst Rev Press. 2017;(2).

35. du Plessis L, Peer N, Honikman S, English R. Breastfeeding in South Africa: are we making progress? Sahr. 2016;109–23.

36. Mnyani CN, Tait CL, Armstrong J, Blaauw D, Chersich MF, Buchmann EJ, et al. Infant feeding knowledge, perceptions and practices among women with and without HIV in Johannesburg, South Africa: A survey in healthcare facilities. Int Breastfeed J. 2016;12(1):1–9.

37. Jama NA, Wilford A, Masango Z, Haskins L, Coutsoudis A, Spies L, et al. Enablers and barriers to success among mothers planning to exclusively breastfeed for six months: A qualitative prospective cohort study in KwaZulu-Natal, South Africa. Int Breastfeed J. 2017;12(1):1–13.

38. Ijumba P, Doherty T, Jackson D, Tomlinson M, Sanders D, Persson LÅ. Social circumstances that drive early introduction of formula milk: An exploratory qualitative study in a peri-urban South African community. Matern Child Nutr. 2014;10(1):102–11.

39. Thairu LN, Pelto GH, Rollins NC, Bland RM, Ntshangase N. Sociocultural

influences on infant feeding decisions among HIV-infected women in rural Kwa-Zulu Natal, South Africa. Matern Child Nutr. 2005;1(1):2–10.

40. Nor B, Ahlberg BM, Doherty T, Zembe Y, Jackson D, Ekström EC. Mother's perceptions and experiences of infant feeding within a community-based peer counselling intervention in South Africa. Matern Child Nutr. 2012;8(4):448–58.

41. Sibeko L, Dhansay MA, Charlton KE, Johns T, Gray-Donald K. Beliefs, attitudes, and practices of breastfeeding mothers from a periurban community in South Africa. J Hum Lact. 2005;21(1):31–8.

42. Sowden M, Nutrition M, Marais D, Nutrition B, Nutrition M, Beukes R, et al. Factors influencing high socio-economic class mothers' decision regarding formula-feeding practices in the Cape Metropole. South African J Clin Nutr. 2009;22(1):37–44.

43. Horwood C, Haskins L, Engebretsen I, Phakathi S, Connolly C, Coutsoudis A, et al. Improved rates of exclusive breastfeeding at 14 weeks of age in KwaZulu Natal, South Africa: What are the challenges now? BMC Public Health. 2018;18(1):1–11.

44. Brown MSc CRL, Dodds PhD L, Legge MD A, Bryanton RN, PhD J, Semenic RN, PhD S. Factors influencing the reasons why mothers stop breastfeeding. Can J Public Heal [Internet]. 2014;105(3):e179-85. Available from: http://oxfordbrookes.idm.oclc.org/login?url=http://search.proquest.com/docview/1548005146?accountid=13041%5Cnhttp://linksource.ebsco.com/linking.aspx?sid=ProQ%3Abritishnursingindexft&fmt=journal&genre=article&issn=00084263

&volume=105&issue=3&date=2014-05-

45. Flores-Barrantes P, Iguacel I, Iglesia-Altaba I, Moreno LA, Rodríguez G. Rapid weight gain, infant feeding practices, and subsequent body mass index trajectories: The calina study. Nutrients. 2020;12(10):1–14.

46. Giugliani ERJ, Horta BL, Loret De Mola C, Lisboa BO, Victora CG. Effect of breastfeeding promotion interventions on child growth: A systematic review and meta-analysis. Acta Paediatr Int J Paediatr. 2015;104:20–9.

47. Dr Hanifa Bachou, MwanaMigimu Nutrition Unit, Kampala and Dr Louis Danga J. F e e d i n g i n f a n t s w h o s e m o t h e r s a r e H I V - p o s i t i v e. South Sudan Med J. 2009;2(2):2–4.

48. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. Paediatr Int Child Health. 2014;34(4):250–65.

49. Calder PC, Krauss-Etschmann S, de Jong EC, Dupont C, Frick J-S, Frokiaer H, et al. Early nutrition and immunity - progress and perspectives. Br J Nutr [Internet]. 2006;96(4):774–90. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17010239

50. Onis M De, Branca F. Review Article Childhood stunting : a global perspective. Matern Child Nutr. 2016;12:12–26.

51. Matsungo TM, Kruger HS, Faber M, Rothman M, Smuts CM. The prevalence and factors associated with stunting among infants aged 6 months in a peri-urban South African community. Public Health Nutr. 2017;20(17):3209–18.

52. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition: consequences for adult health and human capital.

Lancet. 2008;371(9609):340–57.

53. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013;382(9890):427–51.

54. Adair LS, Fall CHD, Osmond C, Stein AD, Martorell R, Ramirez-Zea M, et al. Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: Findings from five birth cohort studies. Lancet. 2013;382(9891):525–34.

55. Harrison HP and, Kirsten. Soweto: A study in socio-spatial diff erentiation. In Wits University Press.(2014); 2014. p. 0–31.

56. Ngyende A. Statistical release (Revised) Census 2011. 2012;(October).

57. Nyati LH, Pettifor JM, Norris SA. The prevalence of malnutrition and growth percentiles for urban South African children. BMC Public Health. 2019;19(1):1–13.

58. WHO, UNICEF, IFPRI, UC Davis, FANTA A et al. Indicators for assessing infant and young child feeding practices. Part 1 Definitions. World Heal Organ [Internet]. 2008;2007(November):1–19. Available from: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Indicators+for+assessing+infant+and+young+child+feeding+practices#0

59. World Health Organization. Indicators for assessing infant and young child feeding practices. Part 2- Measurement. World Heal Organ Geneva, Switz. 2010;2007(November):1–26.

60. World Health Organization. WHO Child Growth Standards: Growth Velocity

Based on Weight, Length and Head Circumference: Methods and Development. Dev Med Child Neurol. 2009;51(12):1002–1002.

61. Finn A, Leibbrandt M. The Dynamics of Poverty in South Africa. South Africa Labour Dev Res Unit. 2017;(119).

62. Lehohla P. Tourism , 2010 ReportNo.03-51-02(2010) [Internet]. Vols. 03-51-02(2, Statistics South Africa. 2010. Available from: www.statssa.gov.za Copies

63. WHO/UNICEF. Ccore Questions on Drinking-Water and Sanitation for Household Surveys. World Heal Organ UNICEF. 2006;25.

64. WHO/UNICEF. WASH Post-2015: Proposed indicators for drinking water, sanitation and hygiene [Internet]. Geneva: WHO. 2007. Available from: http://www.wssinfo.org/%0Ahttp://www.unwater.org/gemi/en/%0Ahttp://www.wssinfo.org/post-2015-monitoring/

65. WHO/UNICEF. Progress on sanitation and drinking water: 2015 update and MDG assessment. 2015.

66. WHO. FINANCING UNIVERSAL WATER, SANITATION AND HYGIENE UNDER THE SUSTAINABLE DEVELOPMENT GOALS.UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water GLAAS 2017 Report. Geneva: WHO. 2017.

67. Jong PF De. Hierarchical regression analysis in structural equation modeling TEACHER ' S CORNER Hierarchical Regression Analysis in Structural Equation Modeling. 62, 198-211. 1999;5511.

68. Dodgson JE. Reflexivity in Qualitative Research. J Hum Lact. 2019;35(2):220–2.

69. Ramara NS, Cur M. Infant feeding and HIV positive mothers in the Capricorn District of Limpopo Province. 2010;(015).

70. Madiba S, Letsoalo R. HIV Disclosure to Partners and Family among Women Enrolled in Prevention of Mother to Child Transmission of HIV Program : Implications for Infant Feeding in Poor Resourced Communities in South Africa. 2013;5(4):1–13.

71. Nieuwoudt S, Manderson L, Norris SA. Infant feeding practices in Soweto, South Africa: Implications for healthcare providers. South African Med J. 2018;108(9):756–62.

72. Merwe J Van Der, Kluyts M, Bowley N, Marais D. Original Article Optimizing the introduction of complementary foods in the infant ' s diet : a unique challenge in developing countries. 2007;259–70.

73. Lande B, Andersen LF, Bærug A, Trygg KU, Lund-Larsen K, Veierød MB, et al. Infant feeding practices and associated factors in the first six months of life: The Norwegian infant nutrition survey. Acta Paediatr Int J Paediatr. 2003;92(2):152–61.

74. Hallbauer U, Grobler JM, Niemand I. Factors influencing a mother's choice of feeding after discharge of her baby from a neonatal unit. South African Med J. 2002;92(8 I):634–7.

75. Wells JCK. Life history trade-offs and the partitioning of maternal investment: Implications for health of mothers and offspring. Evol Med Public Heal. 2018;2018(1):153–66.

76. Hossain M, Islam A, Kamarul T, Hossain G. Exclusive breastfeeding practice

during first six months of an infant ' s life in Bangladesh : a country based cross-sectional study. 2018;1–9.

77. Vitalis D, Vilar-Compte M, Nyhan K, Pérez-Escamilla R. Breastfeeding inequities in South Africa: Can enforcement of the WHO Code help address them? – A systematic scoping review. Int J Equity Health. 2021;20(1):1–17.

78. Ratnayake HE. Prevalence of exclusive breastfeeding and barriers for its continuation up to six months in Kandy district , Sri Lanka. 2018;1–8.

79. Hamilton WN. Factors Influencing Maternal Decision-Making on Infant Feeding Practices [Internet]. Vol. 32, Intech. 2020. 137–144 p. Available from: http://www.intechopen.com/books/trends-in-telecommunications-technologies/gps-total-electron-content-tec- prediction-at-ionosphere-layer-over-the-equatorial-region%0AInTec

80. Kristiansen AL, Lande B, Øverby NC, Andersen LF. Factors associated with exclusive breast-feeding and breast- feeding in Norway. Public Heal Nutr. 2010;13(12):2087–2096.

81. Momberg DJ, Voth-Gaeddert LE, Ngandu BC, Richter L, May J, Norris AS, et al. Water, sanitation, and hygiene (WASH) factors associated with growth between birth and 1 year of age in children in Soweto, South Africa: results from the Soweto Baby WASH study. J Water Health. 2020;1–46.

82. Apanga PA, Weber AM, Darrow LA, Riddle MS, Tung W. The interrelationship between water access , exclusive breastfeeding and diarrhea in children : a cross-sectional assessment across 19 African countries. 2021;11.

83. Id YR, Zhang Q, Li J, Wan R, Bai J, Wang W, et al. Factors associated with

exclusive breast- feeding : A cross-sectional survey in Kaiyuan , Yunnan , Southwest China. 2019;1–11. Available from: http://dx.doi.org/10.1371/journal.pone.0223251

84. Gatti L. Maternal perceptions of insufficient milk supply in breastfeeding. J Nurs Scholarsh. 2008;40(4):355–63.

85. Sacco LM, Caulfield LE, Gittelsohn J, Martínez H. The conceptualization of Perceived Insufficient Milk among Mexican mothers. J Hum Lact. 2006;22(3):277–86.

86. Compte MV, Villalba VC, Escamilla RP, Pérez SS, Aleman DO, Nyhan K, et al. Impact of baby behaviour on caregiver ' s infant feeding decisions during the first 6 months of life : A systematic review. 2022;18(February):1–11.

87. Trafford Z, Jewett S, Swartz A, Lefevre AE, Winch PJ, Colvin CJ, et al. Reported infant feeding practices and contextual influences on breastfeeding : qualitative interviews with women registered to MomConnect in three South African provinces. 2020;7:1–13.

88. Oyelana O, Kamanzi J, Richter S. A critical look at exclusive breastfeeding in Africa: Through the lens of diffusion of innovation theory. Int J Africa Nurs Sci [Internet]. 2021;14:100267. Available from: https://doi.org/10.1016/j.ijans.2020.100267

89. Engebretsen IMS, Jackson D, Fadnes LT, Nankabirwa V, Diallo AH, Doherty T, et al. Growth effects of exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa: The cluster-randomised PROMISE EBF trial. BMC Public Health. 2014;14(1):1–12.

90. Victora CG, De Onis M, Hallal PC, Blössner M, Shrimpton R. Worldwide timing of growth faltering: Revisiting implications for interventions. Pediatrics. 2010;125(3).

91. Richard SA, Black RE, Gilman RH, Guerrant RL, Kang G, Lanata CF, et al. Diarrhea in early childhood: Short-Term association with weight and long-Term association with length. Am J Epidemiol. 2013;178(7):1129–38.

92. Richard SA, Black RE, Gilman RH, Guerrant RL, Kang G, Lanata CF, et al. Catch-up growth occurs after diarrhea in early childhood. J Nutr. 2014;144(6):965–71.

93. Osgood-Zimmerman A, Millear AI, Stubbs RW, Shields C, Pickering B V., Earl L, et al. Mapping child growth failure in Africa between 2000 and 2015. Nature. 2018;555(7694):41–7.

94. Institute MA and MTRIFPR. Progress in developing an infant and child feeding index. Addis Ababa Calvert Cent Stat Agency ICF Int [Internet]. 2002;(143). Available from: http://www.ifpri.org/pubs/misc/dt19d.asp

95. Thurstans S, Opondo C, Seal A, Wells J, Khara T, Dolan C, et al. Boys are more likely to be undernourished than girls: A systematic review and meta-analysis of sex differences in undernutrition. BMJ Glob Heal. 2020;5(12):1–17.

96. Addo OY, Stein AD, Fall CH, Gigante DP, Guntupalli AM, Horta BL, et al. Maternal height and child growth patterns. J Pediatr [Internet]. 2013;163(2):549-554.e1. Available from: http://dx.doi.org/10.1016/j.jpeds.2013.02.002

97. Dewey KG, Adu-Afarwuah S. Systematic review of the efficacy and

effectiveness of complementary feeding interventions in developing countries. Matern Child Nutr. 2008;4(SUPPL.1):24–85.

98. Remans R, Pronyk PM, Fanzo JC, Chen J, Palm CA, Nemser B, et al. Multisector intervention to accelerate reductions in child stunting: An observational study from 9 sub-Saharan African countries. Am J Clin Nutr. 2011;94(6):1632–42.

99. CW S. Beyond malnutrition: the role of sanitation in stunted growth. Environ Health Perspect. 2014;122(11):298–303.

100. Derso T, Tariku A, Biks GA, Wassie MM. Stunting , wasting and associated factors among children aged 6 – 24 months in Dabat health and demographic surveillance system site : A community based cross- sectional study in Ethiopia. 2017;1–9.

101. Medhin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Worku B, et al. Prevalence and predictors of undernutrition among infants aged six and twelve months in Butajira , Ethiopia : The P-MaMiE Birth Cohort. BMC Public Health. 2010;

102. Martorell R, Zongrone A. Intergenerational influences on child growth and undernutrition. Paediatr Perinat Epidemiol. 2012;26(SUPPL. 1):302–14.

103. Labbok DM. Community interventions to promote optimal breastfeeding EV I DENCE ON EARLY I N I T I AT I ON , ANY BREASTF E ED I NG , EXCLUSIVE BREASTFEEDING, AND CONTINUED BREASTFEEDING. Infant Young Child Nutr Proj. 2012;(January).

104. Ogbo FA, Akombi BJ, Ahmed KY, Rwabilimbo AG, Ogbo AO, Uwaibi NE, et al.

Breastfeeding in the community—how can partners/fathers help? A systematic review. Int J Environ Res Public Health. 2020;17(2).

105. Dykes F. The education of health practitioners supporting breastfeeding women: Time for critical reflection. Matern Child Nutr. 2006;2(4):204–16.

106. Wallace LM, Kosmala-Anderson J. Training needs survey of midwives, health visitors and voluntary-sector breastfeeding support staff in England. Matern Child Nutr. 2007;3(1):25–39.

107. Health OW. Infant and young child feeding. Model Chapter for textbooks for medical students and allied health professionals. WHO Press. 2009;624–36.

108. Coutsoudis A, Pillay K, Kuhn L. Method of feeding and transmission of HIV-1 from mothers to children by 15 months of age : prospective cohort study from Durban , South Africa. 2001;(August 2000):379–87.

109. Coovadia HM, Rollins NC, Bland RM, Little K, Coutsoudis A, Bennish ML, et al. Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the fi rst 6 months of life : an intervention cohort study. 2006;1107–16.

110. Haider R, Ashworth A, Kabir I, Huttly SRA. Effect of community-based peer counsellors on exclusive breastfeeding practices in Dhaka , Bangladesh : a randomised controlled trial. 2000;356:1643–7.

111. Morrow AL, Guerrero ML, Shults J, Calva JJ, Lutter C, Bravo J. E fficacy of home-based peer counselling to promote exclusive b reastfeeding : a randomised controlled trial. 1999;353.

112. Awaliyah SN, Rachmawati IN, Rahmah H. Breastfeeding self-efficacy as a

dominant factor affecting maternal breastfeeding satisfaction. 2019;18(Suppl 1):1–7.

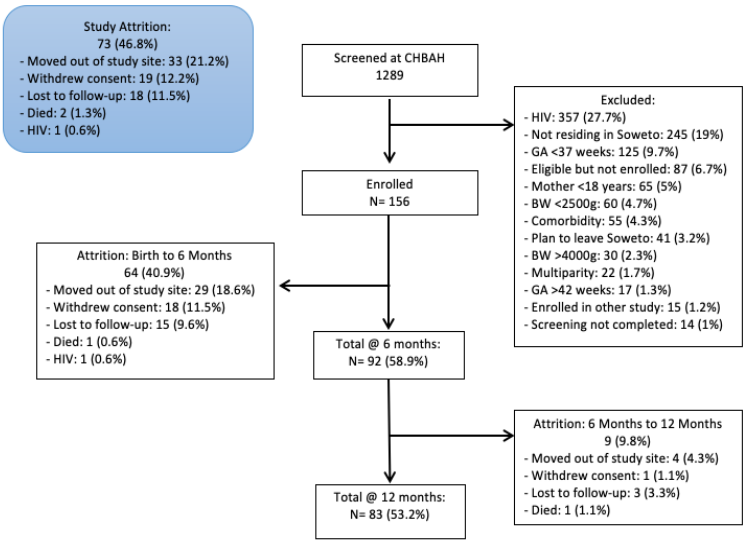
113. Vilar-Compte M, Hernández-Cordero S, Ancira-Moreno M, Burrola-Méndez S, Ferre-Eguiluz I, Omaña I, et al. Breastfeeding at the workplace: a systematic review of interventions to improve workplace environments to facilitate breastfeeding among working women. Int J Equity Health. 2021;20(1).

114. U.S. Department of Health and Human Services. The Surgeon General's Call to Action to Support Breastfeeding. Vol. 37, Washington, DC: U.S. Department of Health and Human Services, Office of the Surgeon General. 2011. 64 p.

115. Nandy S, Irving M, Gordon D, Subramanian S V., Davey Smith G. Poverty, child undernutrition and morbidity: New evidence from india. Bull World Health Organ. 2005;011650(04):309–15.

116. McDonald CM, Olofin I, Flaxman S, Fawzi WW, Spiegelman D, Caulfield LE, et al. The effect of multiple anthropometric deficits on child mortality: Meta-analysis of individual data in 10 prospective studies from developing countries. Am J Clin Nutr. 2013;97(4):896–901.

Appendix 1


Study Attrition:
73 (46.8%)
- Moved out of study site: 33 (21.2%)
- Withdrew consent: 19 (12.2%)
- Lost to follow-up: 18 (11.5%)
- Died: 2 (1.3%)
- HIV: 1 (0.6%)
Screened at CHBAH
1289
Excluded:
- HIV: 357 (27.7%)
- Not residing in Soweto: 245 (19%)
- GA <37 weeks: 125 (9.7%)
- Eligible but not enrolled: 87 (6.7%)
- Mother <18 years: 65 (5%)
- BW <2500g: 60 (4.7%)
- Comorbidity: 55 (4.3%)
- Plan to leave Soweto: 41 (3.2%)
- BW >4000g: 30 (2.3%)
- Multiparity: 22 (1.7%)
- GA >42 weeks: 17 (1.3%)
- Enrolled in other study: 15 (1.2%)
- Screening not completed: 14 (1%)
Enrolled
N= 156
Attrition: Birth to 6 Months
64 (40.9%)
- Moved out of study site: 29 (18.6%)
- Withdrew consent: 18 (11.5%)
- Lost to follow-up: 15 (9.6%)
- Died: 1 (0.6%)
- HIV: 1 (0.6%)
Total @ 6 months:
N= 92 (58.9%)
Attrition: 6 Months to 12 Months
9 (9.8%)
- Moved out of study site: 4 (4.3%)
- Withdrew consent: 1 (1.1%)
- Lost to follow-up: 3 (3.3%)
- Died: 1 (1.1%)
Total @ 12 months:
N= 83 (53.2%)

Appendix 2



IA

University of the Witwatersrand, Johannesburg
Developmental Pathways for Health Research Unit
Department of Paediatrics and Child Health

Soweto Baby WASH Study
Infant Anthropometry (IA)

SBWID: **(Mother)**	**SBW**					
SBWID: **(Infant)**	**SBW**					

Timepoint:			**Month**
Visit Location:	Home	DPHRU	Other:
If other, specify:			

Any other enrolment or ID:	**No**		**Yes**		**Specify,**

Researcher Name:			**Researcher Signature:**							
Researcher Code:			**Date:**	D	D	M	M	Y	Y	

Infant Weight 1: (Every Visit)			•				**Kg**
Infant Weight 2: (Every Visit)			•				**Kg**

Infant Length 1: (Every Visit)				•		**Cm**
Infant Length 2: (Every Visit)				•		**Cm**
Infant Length 3: (Every Visit)				•		**Cm**

Infant Temperature 1: (Every Visit)			•		**Cm**
Infant Temperature 2: (Every Visit)			•		**° C**
Mid-Upper Arm Circumference 1: (Every Visit)					
Mid-Upper Arm Circumference 2: (Every Visit)			•		**Cm**
Mid-Upper Arm Circumference 3: (Every Visit)			•		**Cm**

Head Circumference 1: (Every Visit)			•		**Cm**
Head Circumference 2: (Every Visit)			•		**Cm**
Head Circumference 3: (Every Visit)			•		**Cm**

Infant Road to Health Card: (Every Visit)	**YES**		**NO**	

Infection Diary: (Every Visit)	**YES**		**NO**	

Infant Bicep Skinfolds 1: (Monthly)			•		**mm**
Infant Bicep Skinfolds 2: (Monthly)			•		**mm**
Infant Bicep Skinfolds 3: (Monthly)			•		**mm**

Infant Tricep Skinfolds 1: (Monthly)			•		**mm**
Infant Tricep Skinfolds 2: (Monthly)			•		**mm**
Infant Tricep Skinfolds 3: (Monthly)			•		**mm**

Infant Subscapular Skinfolds 1: (Monthly)			•		**mm**
Infant Subscapular Skinfolds 2: (Monthly)			•		**mm**
Infant Subscapular Skinfolds 3: (Monthly)			•		**mm**

Infant DXA: (12 Months)	**YES**		**NO**	

Comments:

_____
_____

_____
_____

_____
_____

_____
_____

Appendix 3

BWP2

University of the Witwatersrand, Johannesburg
Developmental Pathways for Health Research Unit
Department of Paediatrics and Child Health

Soweto Baby WASH Study

BREASTFEEDING AND WEANING PRACTICES QUESTIONNAIRE VISIT 2 TO 12 MONTHS OLD

SBWID: **(Mother)**	**SBW**					
SBWID: **(Infant)**	**SBW**					

Timepoint:			**Month**
Visit Location:	Home	DPHRU	Other:
If other, specify:			

Any other enrolment or ID:	**No**		**Yes**		**Specify,**

Researcher Name:			**Researcher Signature:**						
Researcher Code:			**Date:**	D	D	M	M	Y	Y

Comments:

_____
_____

_____
_____

_____
_____

_____

MODULE I. GENERAL

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Do you receive support or advice on how to feed (*NAME*)?** *Food includes anything that the infant eats.*	Yes _____ __ 1 No _____ ___ 0	If YES, Ask 2 If NO, Ask 3
2	**Who mainly gives you support or advice on how to feed *(NAME)*?** *One possible response.* *Food includes anything that the infant eats.*	My spouse/boyfriend _____ 0 My mother, mother-in-law, grandmother _____ 1 My sister or my husband's sister _____ 2 My friend/neighbour _____ 3 Doctor _____ 4 Health workers (other than a doctor) at the Health Centre_____ _____ 5 Community Health Workers _____ 6 Other _____ 7 Other, specify_____ Do not know _____99	Ask 3
3	**Since our last visit, did you ever give *(NAME)* breastmilk, whether it is your own or from another woman?**	Yes _____ __ 1 No _____ ___ 0	If YES, Ask 4 If NO, Ask 8
4	**Are you still giving breastmilk to *(NAME)*?**	Yes _____ __ 1 No _____ ___ 0	If YES, Ask 7 If NO, Ask 5

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
5	**How old was *(NAME)* when you stopped giving them breast milk?**	|___|___| day(s) |___|___| week(s) |___|___| month(s)	Ask 6
6	**What was the main reason for stopping to give (NAME) your own breast milk?** *Only one response*	Mother ill/Weak _____ 0 Child ill/Weak _____ _ 1 Nipple/Breast Problem _____ 2 Insufficient Milk_____ 3 Milk not good _____ _ 4 Mother Working/at School (Or Planning to) _____ 5 Child Refused _____ __ 6 Worried About HIV and AIDS _____7 Chose to formula feed _____ 8 Doctor/health provider's Advice _____ 9 Advice of Family Member/Friend _____ 10 Other _____ 11 Other, specify_____ Do not know/Do not remember _____ 99	Ask 8
7	**In the last 7 days, how did you give breastmilk to (NAME)?** *Multiple responses possible.*	Breast (your own) _____ 0 Breast (from another woman) _____ 1 Spoon _____ 2 Cup _____ __ 3 Bottle _____ 4 Other _____ 5 Other, specify _____ Don't know _____ 99	Ask 8

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
8	**Do you clean your breasts or nipples before feeding *(NAME)*?**	Yes, always _____ _____ 1 Yes, sometimes _____ __ 2 No _____ _____ 0	Ask 9 if the response is Yes Ask 10 if the response in No
9	**How do you clean the breasts or nipples?**		Ask 10
10	**Is *(NAME)* fed by** *Food includes breast milk, formula milk, solid food…*	Demand? _____ 0 Schedule? _____ 1	Ask 11
11	**Is *(NAME)* following any special diet?** *Do not read the list* *Multiple responses possible*	Vegetarian _____- _____ 0 Gluten-free _____ 1 Low-lactose _____ 2 Low-phenylalanine _____ 3 Other _____ 4 Other, specify _____ None _____ 5 Don't know - _____ 99	Ask 12
12	**Where is most of *(NAME)*'s food prepared?**	No preparation – breastfeeding _____ 0 At home _____ 1 Family/friend _____ 2 Restaurant _____ 3 Shop _____ _ 4 Crèche_____ _____ 5 Don't know _____ 99	Ask 13
13	**In the last 7 days, were you with *(NAME)*?**	Yes _____ __ 1	Ask 14

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
		No _____ __ 0	
14	**Yesterday, were you with *(NAME)*?**	Yes _____ __ 1 No _____ __ 0	Go to Module 2

MODULE 2. INFANT FEEDING: 24 HOURS AND 7 DAYS DIETARY RECALL

I would like to ask you about some liquids that ***(NAME)*** may have had in the last 7 days during the day or at night.

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		15 Yesterday, Did ***(NAME)*** have any (***ITEM FROM LIST***)?			16 Yesterday, how many times during the day or at night did ***(NAME)*** consume any (***ITEM FROM LIST)***? *Record '99' for Don't Know.*	17 During the past 7 days, did ***(NAME)*** consume any *Read **only** item that were not eaten yesterday?*
		YES	NO	DK		
A	Breast milk (own, when applicable)?	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
B	Breast milk (another woman)?	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
C	Plain water (tap water, mineral/bottled water)?	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
D	Water with sugar	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
E	ORS (Oral Rehydration Solution)? Like the Sorol etc..	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		15 Yesterday, Did *(NAME)* have any (*ITEM FROM LIST*)?			16 Yesterday, how many times during the day or at night did *(NAME)* consume any (*ITEM FROM LIST*)? *Record '99' for Don't Know.*	17 During the past 7 days, did *(NAME)* consume any *Read **only** item that were not eaten yesterday?*
		YES	NO	DK		
						No _____ 0 Don't know _____ 99
F	Infant formula or Soya milk such as Nan, Infacare, Isomil or any other formula milk…?	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
G	Infant cereals such as Nestum, Purity, Cerelac…?	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
H	Fruit or vegetable juice?	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
I	Clear broth (clear salty soup)?	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
J	Cow's milk (including powdered milk for adults, liquid milk from shops, fresh milk from cows, long life milk)?	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		15 Yesterday, Did *(NAME)* have any (*ITEM FROM LIST*)?			16 Yesterday, how many times during the day or at night did *(NAME)* consume any (*ITEM FROM LIST)*? *Record '99' for Don't Know.*	17 During the past 7 days, did *(NAME)* consume any *Read **only** item that were not eaten yesterday?*
		YES	NO	DK		
K	Yogurt (Danone…)?	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
L	Thin porridge (Mabele, Ace, Iwisa, Impala…)?	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
M	Cold drinks or squash (coke, crème-soda, OROS…)	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
N	Any other water-based liquids such as tea/coffee without milk, traditional herbal drinks, rooibos tea…? Specify _____ _____	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
O	Any other liquids Specify _____ _____	**1**	**0**	**99**	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99

I would like to ask you about some solid or semi-solid foods that ***(NAME)*** may have had in the last 7 days during the day or at night.

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		18 I would like to ask you about some solid or semi-solid foods that *(NAME)* may had yesterday during the day or at night.			19 How many times yesterday during the day or at night did *(NAME)* consume any (*ITEM FROM LIST*)? *Record '99' for Don't Know.*	20 During the past 7 days, did *(NAME)* consume any (*READ ONLY ITEMS THAT WERE NOT EATEN YESTERDAY*)?
		YES	NO	DK		
A	Porridge, bread, rice, noodles, or other foods made from grains	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
B	Pumpkin, carrots, Herbert squash, or sweet potatoes that are yellow or orange inside	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
C	Potatoes or sweet potatoes, white yams, cassava, or any other root that is white	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
D	Any dark green leafy vegetables (spinach, cabbage, broccoli, maroggo…)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
E	Ripe mangoes, ripe papayas, pineapples, peach (or other local vitamin A-rich fruits)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
F	Any other fruits or vegetables (bananas, apples, avocado, grapefruit, grape, cucumbers, red tomato, garlic, lettuce light green, baby marrows…)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
G	Liver, kidney, heart, or other organ meats	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		18 I would like to ask you about some solid or semi-solid foods that ***(NAME)*** may had yesterday during the day or at night.			19 How many times yesterday during the day or at night did ***(NAME)*** consume any (***ITEM FROM LIST***)? *Record '99' for Don't Know.*	20 During the past 7 days, did ***(NAME)*** consume any (***READ ONLY ITEMS THAT WERE NOT EATEN YESTERDAY***)?
		YES	NO	DK		
H	Any meat, such as beef, pork, lamb, goat,	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
I	Eggs	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
J	Poultry (chicken, duck etc..)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
K	Fresh or dried fish, shellfish, tin fish or seafood	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
L	Any foods made from beans, peas, lentils, nuts, or seeds	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
M	Cheese, yogurt, or other milk products	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
N	Any oil, fats, or butter, or foods made with any of these (margarine/Rama, peanut butter, fish oil, ghee, mayonnaise, sour cream, avocado, olive, coconut…)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99

N0.	FOOD ITEMS	YESTERDAY QUESTIONS AND CATEGORIES				PAST 7 DAYS QUESTIONS AND CATEGORIES
		18 I would like to ask you about some solid or semi-solid foods that *(NAME)* may had yesterday during the day or at night.			19 How many times yesterday during the day or at night did *(NAME)* consume any (*ITEM FROM LIST*)? *Record '99' for Don't Know.*	20 During the past 7 days, did *(NAME)* consume any (*READ ONLY ITEMS THAT WERE NOT EATEN YESTERDAY*)?
		YES	NO	DK		
O	High-sugar foods (Biscuits, cakes, candies, chocolates, honey, jam, marmalade, condensed milk added to tea…)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
P	Crisps, savoury snacks	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
Q	Condiments for flavour, such as chilies, spices, herbs, salt, pepper, or fish powder	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
R	Insects (Mopani worms, termites, locust, grasshopper…)	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
S	Other items cited: _____	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99
T	_____	1	0	99	|___|___| TIMES	Yes _____ 1 No _____ 0 Don't know _____ 99

If the mother reported that she gave infant formula, go to Module 3: INFANT FORMULA
If the mother did not give infant formula, go Module 4: INFANT SLEEPING AND FEEDING PRACTICES AT NIGHT

MODULE 3: INFANT FORMULA

21. We are going to talk about the preparation of ***(NAME)*** formula. **Please show me the container of the formula you currently use to feed *(NAME)*.**

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
A	***Report the brand of the formula you are currently using*** *Brand is the name on package, report that name.*	_____	**Go to B**
B	***Circle in which form is the formula***	Liquid – ready to use? _____ 0 Powder form? _____ 1 Concentrated form? _____ 2 Other _____ 3 Other specify _____	**IF *Liquid*, *Powder form, Concentrated form* , Go to C** **IF *Other*, Ask M**
C	***Report the size of the container*** *Report the number written in the container.* *Circle whether it is grams (g), kilograms (kg), litre (l), millilitres (ml).*	|___|___|___|___| **gram(s)/ kilogram(s)/ litre(s)/ millilitre(s)**	**Ask D**
D	**For how long does the formula container last?** *Write the number.* *Circle whether it is day(s), week(s) or month(s).*	|___|___| **Day(s) /Week(s) /Month(s)**	**Ask E**
E	**Do you <u>mainly</u> feed *(NAME)* with?** *Only one possible response* *Circle the response given*	Bottle …….. 0 Cup …….. 1 Spoon ……..2	**IF *Bottle* Ask F** **IF ELSE and the infant has formula in liquid form, Ask M** **IF ELSE and the infant has formula in powder or concentrated form, Ask H**
F	**How many bottles do you own?** *Ask to see the bottles*	|___|___| bottles	**Ask G**
G	**What is the size of the bottle that you <u>MAINLY</u> use CURRENTLY?** *Ask to see the bottle mainly used* *Report the maximum volume of the bottle used in ml.*	|___|___|___| ml	**Please look at response B** **IF the infant has *Liquid formula,* Ask M** **IF the infant has *Powder or Concentrated formula* Ask H**

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
H	**In which order do you usually incorporate the formula and the water?**	Water then formula _____ 0 Formula then water _____ 1	**Ask I**
I	**What type of water do you <u>mainly</u> use?** *Only one possible response.* *Circle the response given.*	Tap water <u>not</u> boiled _____ 0 Tap water boiled _____ 1 Mineral water (bottled water) <u>not</u> boiled _____ 2 Mineral water (bottled water) boiled _____ 3 Other _____ 4 Other, specify _____	**Ask J**
J	**How much water do you put in the mix?** *Ask her to show you in the bottle.* *Report the volume.* *Circle whether the unit is litre (l) millilitres (ml), cups etc…*	|___|___|___|___| **litre(s)/ millilitre(s)/ cups**	**Ask K**
K	**How much powder/concentrated formula do you put in the mix?** *If liquid or concentrated formula ask her to show you with the bottle* *Circle whether the unit is scoops, litre (l) millilitres (ml), cups etc…*	|___|___|___|___| **scoops/ cups/ litre(s)/** **millilitre(s)/**	**Please look at response B** **IF the respondent use powder, Ask L** **IF the respondent use concentrated formula, Ask M**
L	**Are the scoops usually:** *Only one possible response* *Circle the response given*	Rounded (heaped) _____ 0 Flat (levelled) _____ 1 Other _____ 2 Other, specify _____	**Ask M**
M	**Do you add anything else in the formula milk?**	Yes _____ 1 No _____ 0	**IF YES, Ask N** **IF NO, Ask P**
N	**Please describe what is (are) the ingredient(s) you add to the formula.** *Multiple responses possible*	_____ _____ _____	**Ask O**
O	**How many times <u>a day</u> do you add this (these) ingredient(s) to the formula?**	Every time _____ 000 *OR* Number of times _____ |___|___| *OR* Every number of feeds _____ |___|___|	**Ask P**
P	**Before preparing food for *<u>(NAME)</u>*, do you wash your hands?**	Yes _____ 1 No _____ 0	**IF YES, Ask Q** **IF NO, Go to Module 4: INFANT SLEEPING AND FEEDING PRACTICES AT NIGHT**

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
Q	**How do you usually clean the utensils used for feeding *(NAME)*?** *Including bottles, cups, spoons etc…*	With cold water _____ 0 With cold water and soap _____1 With boiled water _____ 2 With boiled water and soap _____ 3 With sterilization solution _____ 4 Other _____ 5 Other, specify _____	**Go to Module 4: INFANT SLEEPING AND FEEDING PRACTICES AT NIGHT**

MODULE 4: INFANT SLEEPING, FEEDING AT NIGHT AND MATERNITY LEAVE

We are going to talk about how ***(NAME)*** sleeps at night.

N0.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
22	Does ***(NAME)*** sleep with you?	Yes _____ 1 No _____ 0	**Ask 23**
23	Are you aware how many times ***(NAME)*** wakes up?	Yes _____ 1 No _____ 0	**Ask 24**
24	Are you being woken-up by ***(NAME)***?	Yes _____ 1 No _____ 0	**Ask 25**
25	Is ***(NAME)*** breastfeeding when he/she wakes?	Yes _____ 1 No _____ 0	**Ask 26**
26	Do you have a job? (by job we mean any activity that you may do on a regular basis and for which you earn money)	Yes _____ 1 No _____ 0	**If response is No, end the Breastfeeding and weaning practices questionnaire here** **Ask 27 if response is Yes**
27	Are you currently working?	Yes _____ 1 No _____ 0	**Ask 28**
28	Are you or were you on maternity leave?	Yes _____ 1 No _____ 0	**Ask 29**
29	When are you planning to go back to work?	_ _ / _ _ / _ _ _ _ DD MM YYYY	**End the Breastfeeding and weaning practices questionnaire here**

Appendix 4



SES

University of the Witwatersrand, Johannesburg
Developmental Pathways for Health Research Unit
Department of Paediatrics and Child Health

Soweto Baby WASH Study
Socioeconomic Status In Growth (SES GROWTH)

SBWID: **(Mother)**	**SBW**					
SBWID: **(Infant)**	**SBW**					

Timepoint:			**Month**
Visit Location:	Home	DPHRU	Other:
If other, specify:			

Any other enrolment or ID:	**No**		**Yes**		**Specify,**

Researcher Name:			**Researcher Signature:**							
Researcher Code:			**Date:**	D	D	M	M	Y	Y	

Comments:

_____

_____

_____

_____

SECTION I: MATERNAL GENERAL INFORMATION

1. How many people have been living in your home over the past 3 months?	NUMBER

2. Can you please list the other people who have stayed in your household and say for each adult if they currently have a job or not?
(*On average at least four nights a week over the last 3 months. Do not forget to include babies, the bedridden and elderly people, also include your partner but not yourself*)

Children (≤to 18 years of age)				**Adults (>18 years of age)**				
Age	Sex	Highest level of education	Relationship to yourself	Age	Sex	Highest education level	Relationship to yourself	Job
	M/F	CODE EDUCATION	CODE RELATIONSHIP		M/F	CODE EDUCATION	CODE RELATIONSHIP	CODE
	M/F	CODE EDUCATION	CODE RELATIONSHIP		M/F	CODE EDUCATION	CODE RELATIONSHIP	CODE
	M/F	CODE EDUCATION	CODE RELATIONSHIP		M/F	CODE EDUCATION	CODE RELATIONSHIP	CODE
	M/F	CODE EDUCATION	CODE RELATIONSHIP		M/F	CODE EDUCATION	CODE RELATIONSHIP	CODE
	M/F	CODE EDUCATION	CODE RELATIONSHIP		M/F	CODE EDUCATION	CODE RELATIONSHIP	CODE

CODES EDUCATION	0= No formal schooling 1= Grade R to Grade 3 2= Grade 4 to Grade 7	3= Grade 8 to Grade 12 4= Tertiary/College 5= Undergraduate 6= Postgraduate
CODES RELATIONSHIP	0= Parent 1= Grandparent 2= Your own child 3= Sibling 4= Other relative (including other children, in laws, etc)	5= Spouse 6=Partner 7= Friend 8= Housemate/flatmate/roommate 9= Other: Specify
CODES JOB (for only adults)	0= Not job 1=Job 99= Don't know	

3. Who was the main person looking after the child in the past three months?	CODE

CODES	0= Mother 1= Father	4= Uncle/Ant 5= Neighbour

	2=Grandparent 3=Sibling	6=Creche 7=Other (Specify)

SECTION II : MARITAL STATUS		
4. What is your current marital status? (Legal Status)		CODE
CODES	0= Married with certificate (by home affairs) 1= Married traditionally 2= Widowed	3= Divorced or Separated 4= Single 5= Cohabitation
If the response is Widowed, Divorced or Separated or Single, go to question 8 *Otherwise, go to question 5*		
5. What has you and your partner living situation been the past 3 months?		CODE
CODES	0= Living together 1= Not living together	90= Refused to respond
6. What is your marital situation regarding the number of spouses?		CODE
CODES	0= Polygamous 1= Monogamous	
If the response is Polygamous, go to question 7 *Otherwise, go to question 8*		
7. How many spouses does your partner have?		NUMBER
CODES	99= Don't know Number of co spouses, if known.	
SECTION III: MATERNAL OCCUPATION		
8. Have you ever had a job? *By job we mean any work done to earn money or to gain skills. This includes casual/informal & volunteer work*		YES/NO
If the response is No, go to question 9 *Otherwise, go to question 10*		
9. What is the MAIN reason you have never had a job? *Only one possible response*		CODE
CODES	0= Family responsibilities 1= Lacking information about job 2=Lack of job opportunities	3= Not looking or not interested in job 4= Other (Specify)
Go to question 17		
10. Do you currently have a job?		YES/NO
*If the response is **Yes,** go to 11* *If the response is **No**, go to 17*		

11. What is your current job?		
12.How would you classify your current job?		CODE
CODES	0= Occasional Part time 1= Occasional Full time 2= Permanent Full time	3= Permanent Part time 99= Don't know
13. Is your current job on contract or casual (informal)?		CODE
CODES	0= Contract 1= Casual	99= Don't know
14. When did you start your current job? (Month & Year)		MM/YY
15. Who is your employer?		CODE
CODES	0= Self 1= Family 2= Government 3= Non-governmental/community-based organisation 4= Private company 5= Other: Specify	
16. If you resumed work during in the last 3 months, when did you go back to work?		YY/MM/DD or Not applicable
CODES	0= Not applicable	
17. If you have stopped working in the past 3 months, why did you stop?		CODE
CODES	0= Resigned 1= Fired 2= Retrenched 3= Health reasons 4= Maternity leave 5=No transport 6=Others	
18. If you currently don't have a job, what is your source(s) of income?		CODE

CODES	0= Inheritance 1= Pension 2= Support from family or friend (grandparents, parent, sibling, friend, etc.) 3= Community support (other than family: anonymous donation, church...) 4= Partner 5= Grant (child support, disability) 6= Profit 7= Own loan 8= Other: Specify

SECTION IV : MATERNAL EDUCATION

19. What is your highest level of education?	**CODE**
CODES	0= No formal schooling 1= Grade R to Grade 3 2= Grade 4 to Grade 7 3= Grade 8 to Grade 12 4= Tertiary/College 5= Undergraduate 6= Postgraduate
20. Are you still studying?	**YES/NO**
*If the response is **No**, go to question 21* *Otherwise, go to question 22*	
21. Why did you stop studying?	**CODE**
CODES	0= Schooling sufficient 1= Lack of books 2= Poor quality of teaching 3= Lack of teachers 4= Facilities in bad condition 5= Fees too high 6= No space available 7= Crime at school 8= Poor discipline 9= Too many learners in class 10= Other: Specify

22. Did you do the following in the past 3 months?	Listening to radio	**CODE**
CODES 0= less than once a week 1= At least once a week 99= Don't know	Watching TV	**CODE**
	Reading newspapers	**CODE**
	Using cell phone for internet	**CODE**

	Using cell phone for transaction	CODE

SECTION V: INCOME, ASSETS, HOUSING AND HOUSEHOLD CHARACTERISTICS

A household is considered as one or more people habitually living in the same dwelling, sharing a meal and having a joint budget.

23. On average, how much money have you earned in your household per month during the past 3 months?				CODE
CODES	0= less than 900	4= 3600-4500	8= 7200-8100	12= 20700-30600
	1= 900-1800	5= 4500-5400	9= 8100-9000	13= > 30600
	2= 1800-2700	6= 5400-6300	10= 9000-9900	90= Refused
	3= 2700-3600	7= 6300-7200	11= 10800-20700	99= Don't know

24. How many sources of funding have you had in the 3 past months in your household? (*Sources of money could be social grant, salary/income, maintenance, family allowance…)*	NUMBER
25. What is your home ownership situation?	CODE

CODES	0= Owner 1= Renting 2= Squatting 3= Not renting, not owner, but family property 90= Refused to respond

*If the response is **Owner**, go to question 26*
Otherwise, go to question 27

26. Where did you find funding for your house?	CODE

CODES	0= Inheritance 1= Mortgage from bank 2= Own funding 3= Government 4= Other (Specify)

27. What is the total number of rooms for currently used for sleeping in your home? *Include outside bedrooms if they are used by household members, and exclude if rented out, kitchen and bathroom.*	NUMBER

28. Which of the following do you have in your current home? *Place where you spent most nights in the past 3 months* *It does not matter who owns/pays for these things. (answer all questions)*	Electricity	YES/NO
	Bicycle	YES/NO
	Motorcycle/Bike	YES/NO
	Motor vehicle/Car	YES/NO
	Fridge	YES/NO
	Microwave oven	YES/NO
	Washing machine	YES/NO
	Landline telephone	YES/NO
	Camera	YES/NO
	Cell phone	YES/NO
	Television	YES/NO
	Video machine/DVD player	YES/NO
	MNet/DSTV/Satellite	YES/NO
	Agricultural land	YES/NO
	Farm animals	YES/NO
	Computer/laptop	YES/NO
	Internet access	YES/NO
29. Do you have any debts?	Money owed to banks or financial institutions (legal and documented loans)	YES/NO
	Money owed to money lenders (loan sharks, community money-lenders)	YES/NO
	Money owed to family or friends	YES/NO
	Money owed to shops/private companies/ municipality/unpaid bills/accounts/store accounts (e.g., Jet or Edgars)	YES/NO
30. Who has usually paid for the following expenses for you during the past 3 months? *(Please answer all questions)*	Food	CODE
	Transport	CODE
	Housing & utilities	CODE
	Education	CODE
	Clothing	CODE
	Cell phone airtime or contract	CODE
CODES	0= I pay for this with my own funds (Myself) 1= Family members pay for this 2= Partner pays for this 3= Someone else pays for this: Specify	
		CODE

31. How would you describe the home you are living in?	
CODES	0= Shack/Zozo 1= Flat/Cottage 2= House 3= Room/Garage 4= Residence (attached to education or employment) 5= Hostel 6= RDP/Government Housing 7= Other: Specify

32. What are the main walls in your current home made of?		**CODE**
CODES	0= No walls 1= Mud 2= Plaster finished 3= Corrugated Zinc 4= Prefab 5= Bare brick or cement block 6= Cement 7= Other: specify	
33. What is the main floor material in your current home?		**CODE**
CODES	0= Ceramic tiles 1= Cement 2= Carpet 3= Earth/sand/mud 4= Wood planks 5= Parquet or finished wood 6= Vinyl/linoleum 7= Other: Specify	
34. Which of the following types of energy do you use the most for cooking in your current home?		**CODE**
CODES	0= Electricity 1= Egoli gas 2= Grass/ Shrubs 3= Kerosene 4= Charcoal 5= Liquid Propane 6= Wood 7= Animal Dung 8= Paraffin 9= Solar Panel 10= Generator 11= No Cooking facilitates 12= Other: Specify	
35. Which of the following types of material does the roof of your current house have the most?		**CODE**
CODES	0= Poured concrete 1=Metal 2=Wood 3=Thatch 4= Other: Specify	

Appendix 5



WASH (LF)

University of the Witwatersrand, Johannesburg
Developmental Pathways for Health Research Unit
Department of Paediatrics and Child Health

Soweto Baby WASH Study
WASH (LF)

SBWID: **(Mother)**	**SBW**					
SBWID: **(Infant)**	**SBW**					

Timepoint:			**Month**
Visit Location:	Home	DPHRU	Other:
If other, specify:			

Any other enrolment or ID:	**No**		**Yes**		**Specify,**

Researcher Name:			**Researcher Signature:**						
Researcher Code:			**Date:**	D	D	M	M	Y	Y

Comments:

_____
_____

_____
_____

_____
_____

SECTION A: Water Supply (Quantity and Quality)

1. What are the most common (within past 2 weeks) sources of water you have access to and what do you use the water for?
Multiple responses possible, please report all appropriate answer(s)
Coding: 1 = Yes 0 = No

	Drinking	Domestic	Cooking		Drinking	Domestic	Cooking
Bottled Water				Public Tap			
Piped into dwelling				Tanker/Cart with small tank			
Piped into yard/plot				Unprotected dug well			
Protected dug well				Surface water			
Rainwater				Unprotected spring			
Protected spring				Borehole			
Other Specify:							

2. How long does it take to collect water, get there and come back?
If water is on the premises, skip to Question 7. If water is collected outside the house complete Questions 3, 4, 5, and 6.

Water on Premises		Number of Minutes	

3. If water is collected outside the house, who usually goes to collect water for the household?

(0) Adult Man		(1) Adult Woman	
(2) Male Child (under 15 years)		(3) Female Child (under 15 years)	

4. If water is collected outside the house, what do you use to transport water?

(0) Bucket		(1) Pot		(2) Bottle		(3) Tub/Basin	
(4) Water Can		(5) Other, Specify					

5. If water is collected outside the house, what do you use to store water?

(0) Bucket		(1) Pot		(2) Bottle		(3) Tub/Basin	
(4) Water Can		(5) Other, Specify					

6. If water is collected outside the house, how do you take water out of where it stored?						
(0) Cup		(1) Ladle/Jug		(2) Bowl		
(3) Tap		(4) Pour		(5) Other, specify		

7. What type of infrastructure do you have access to? incl. Number of points and location of infrastructure
Multiple responses possible, please tick appropriate answer(s)
Coding: (0) No and (1) Yes

	Wash Room	Kitchen	Communal	Other, specify:
Taps				
Sink				
Bath				
Shower				
Tub/Bucket				
Toilet				

8. How often do you have interruptions to your water supply?
Please tick only one response

(0) Daily		(3) Rarely/Never	
(1) Once a Week		(99) Don't know	
(2) Once a Month			

9. Do you have enough water for all your needs?
Please tick only one response

(1) Yes		(0) No	

10. Who is your water service provider?
Please tick only one response

(0) Johannesburg Water		(2) Other, specify:	
(1) Private		(99) Don't know	

11. Do you pay for water?
Please tick only one response
If YES, ask Question 12 and 13, If NO skip to Question 14

(1) Yes		(0) No		(99) Don't know	
12. If yes, who pays? Please tick only one response					
(0) Participant			(2) Home Owner		
(1) Partner			(3) Other, specify:		
13. How much do you spend on average a month for water Please tick only one response					
(0) R0 - R100		(1) R100 - R200		(2) R200 - R300	
(3) R300 - R400		(4) > R400		(99) Don't know	
14. What methods do you use to treat your water? Multiple responses possible, please tick appropriate answer(s)					
(0) None		(1) Add Bleach/Chlorine		(2) Boiling	
(3) Strain it through a cloth		(4) Use a water filter		(5) Solar Disinfection	
(6) Let it Stand/Settle		(7) Other, specify:			

SECTION B: Sanitation					
15. Type of Toilet facilities available Multiple responses possible, please tick appropriate answer(s) Coding: (0) No and (1) Yes					
	Household	Communal		Household	Communal
Flush/Pour to piped Sewer System			Ventilated Improved pit latrine		
Flush/Pour to Septic Tank			Pit Latrine with Slab		
Flush/Pour to Pit Latrine			Pit Latrine without Slab (Open Pit)		
Flush/Pour to Elsewhere			Composting Toilet		
Bucket			No facilities (bush or Field)		

Portable Toilet			Other Specify:		
If Portable Toilet, how often are the facilities serviced per week?					
16. If applicable, how many households share the communal toilet facilities?					
17. How often do you have interruptions to your sanitation supply? Please tick only one response					

(0) Daily		(1) Never		(2) Once a Week		(3) Once a Month	

SECTION C: Hygiene					
Waste Disposal					
18. How is waste stored prior to disposal? Please tick only one response					
(0) Plastic Bags		(1) 'Black' bins		(2) Bucket	
(3) Other, specify:					
19. Where is waste stored prior to disposal? Please tick only one response					
(0) Inside the house		(1) Outside the house		(2) Off the property	
(3) Other, specify:					
20. How is waste disposed of? Please tick only one response					

(0) Around or outside the house		(1) Bush/Open plot		(2) Waste pit	

(3) Municipal removal		(4) Burning		(5) Dumping	
(6) Other, specify:					

21. How often is waste disposed of? Multiple responses possible, please tick appropriate answer(s)

(0) Weekly		(1) Fortnightly		(2) Monthly	

22. How are infant faeces disposed of? Please tick only one response

(0) Put/Rinsed into Toilet/Latrine		(1) Put/Rinsed into Drain/Ditch		(2) Buried	
(3) Throw into Garbage		(4) Left in the Open		(5) Child used Latrine/Toilet	
(6) Other, specify:					

Personal Hygiene: Household

23. How often do you clean the house? Please tick only one response

(0) Everyday		(1) 3-4 times per week		(2) 1-2 times per week	
(3) Other, specify:					

24. What do you use to clean your house? (detergent) Multiple responses possible, please tick appropriate answer(s)

(0) Only Water		(1) Multi-purpose Cleaner (e.g., Handy Andy)		(2) Bleach (e.g., Jik)	
(3) Other, specify:					

25. Do you have problems with any of the following in your house? Multiple responses possible, please tick appropriate answer(s)

(0) Damp/mould		(1) Cockroaches		(2) Flies		(3) Rodents	
(4) Bed lice		(5) Other, specify:					

26. Do you have any animals on the property? Multiple responses possible, please tick appropriate answer(s) **If NO Skip to Question 27**

(1) Yes		(0) No	

A: Domestic:

(0) Cats		(1) Dogs		(2) Other, specify:	

B: Livestock:

(0) Chickens		(1) Goats		(4) Other, specify:	

(2) Sheep		(3) Cattle		

Personal Hygiene: Handwashing and Ablutions					
27. When do you wash your hands? Multiple responses possible, please tick appropriate answer(s)					
(0) Before and after eating		(1) When hands are dirty		(2) After using toilet	
(3) Before preparing food		(4) Before and after feeding		(5) After changing diaper	
(6) Never/Rarely		(7) Other, specify			
28. Since our last visit, has your baby ingested any stones or soil?					
(1) Yes		(0) No		(99) Don't Know	
29. What do you wash your hands with?					
(0) Only water		(1) Soap and Water		(2) Water and ash	
(3) Other, specify:					

30. How do you wash yourself and your baby? Please tick only one response for you and one response for your baby					
	Mother	Baby		Mother	Baby
Sink			Shower		
Bath			Basin		
Other Specify:					

31. How often do you wash yourself and your baby? Please tick only one response for you and one response for your baby					
	Mother	Baby		Mother	Baby
Everyday			3-4 Times per Week		
1-2 Times per week			Other, specify:		

32. How do you heat the water to wash yourself and your baby? Please tick only one response					
(0) Electric Geyser		(1) Boil on Stove, gas, or Fire		(2) Use cold water	
(3) Other, specify:					

33. What do you use to wash yourself and your baby? Please tick only one response for you and one response for your baby					
	Mother	Baby		Mother	Baby
Only water			Water and Soap		
Water and Ash			Other, specify:		

SECTION D: Researcher Observations and General						
34. Where does the baby sleep?						
35. Where does baby spend the majority of its time?						
36. Who looks after the baby most of the time?						
37a. Are there animals in the house?						
37b. Are there kennels/kraal (separate area) for domestic animals and livestock?						
38. General Cleanliness of House	Good (0)		Average (1)		Poor (2)	
Comments:						
39. General Cleanliness of Toilet	Good (0)		Average (1)		Poor (2)	
Comments:						
40. General Cleanliness of Kitchen	Good (0)		Average (1)		Poor (2)	
Comments:						

41. General Cleanliness of Baby Area	Good (0)		Average (1)		Poor (2)	
Comments:						
Adapted from UNICEF/Palestinian Hydrology Group (Gaza) & USAID/Mercy Corps (North Kivu -DRC) & DPHRU SES and IA Questionnaires. Core Questions on Drinking-Water and Sanitation for Household Surveys. WHO and UNICEF. 2006.						

Criteria for Researcher Observations	
No dirt/grease/stains	1 - 2 Criteria met (Poor) 3 - 4 Criteria met (Average) 5 - 6 Criteria met (Good)
Furniture, fixtures, and surfaces are without dust or grease	
No foul Smell	
Floors are clean and dry	
Waste is separated and stored separately	
Absence of pests (flies, cockroaches, etc.)	

Appendix 6



MIA (LF)

University of the Witwatersrand, Johannesburg
Developmental Pathways for Health Research Unit
Department of Paediatrics and Child Health

Soweto Baby WASH Study
Morbidity and Illness Assessment (MIA - LF)

SBWID: (Mother)	**SBW**					
SBWID: (Infant)	**SBW**					

Timepoint:			**Month**
Visit Location:	Home	DPHRU	Other:
If other, specify:			

Any other enrolment or ID:	**No**		**Yes**		**Specify,**

Researcher Name:			**Researcher Signature:**						
Researcher Code:			**Date:**	D	D	M	M	Y	Y

Comments:

_____

_____

_____

1. Since our last visit, has your child had any of the following?

	Yes (1)	No (0)	How many days did your baby have this condition?	Where did you get the treatment?
Fever				
Poor appetite				
Irritability				
Coughing/Wheezing/Hoarseness				
Difficulty breathing (rapid, noisy)				
Sneeze/runny/stuffy nose				
Diarrhoea: Three or more loose or liquid stools per day. If yes, was the diarrhoea;				
Acute watery diarrhoea (lasts several hours or days)				
Acute bloody diarrhoea (dysentery)				
Persistent diarrhoea (lasts 14 days or longer)				
Vomiting				
Gut/Stomach Sensitivity				
Rash				
Eye problems (red/ itching eyes)				
Other (specify)				

Coding:

0: No treatment	6: Well baby clinic
1: Self treatment	7: Private Hospital
2: Private Doctor (General Practitioner)	8: Chemist/ Pharmacist

3: Government Clinic	9: Faith Healer
4: Private Clinic	10: Sangoma/ Traditional Healer
5: Government Hospital	11: Other (specify)

2. 2.Since our last visit, has your child being diagnosed with the following by a doctor: (Check the Road to Health Card)

	Yes (1)	No (0)	How many days did your baby have this condition?	Where did you get the treatment?
Pneumonia				
Bronchiolitis				
Bronchitis				
Gastroenteritis				
Asthma				
Croup				
Measles				
Allergy				
Rhinitis				
Chicken Pox				
Other (specify)				

3. Has your child been vaccinated in the last month?

Yes (1)		No (0)	

If YES, which vaccine(s)? (Check the Road to Health Card and weight)

Timepoint	**Vaccination**	**Date given**	**Weight (grams)**
	BCG		

Birth	OPV0	DD/ MM/ YY	
6 Weeks	OPV1 RV1 DTap-IVP-Hib1 Hep B1 PCV1	DD/ MM/ YY	
10 Weeks	DTap-IVP-Hib2 Hep B2	DD/ MM / YY	
14 Weeks	DTap-IVP-Hib3 Hep B3 PCV2 RV2	DD/ MM/ YY	
9 Months	MEASLES1 PCV3	DD/ MM/ YY	

4. Since our last visit, was the baby admitted to a hospital or clinic, for injury or serious medical or developmental problems? (Check the Road to Health Card)

Yes (1)		No (0)	

If YES, please specify…

Date of admission	**How many days did the baby stay?**	**What was the diagnosis when your baby was admitted?**
DD / MM / YY		
DD / MM / YY		
DD / MM / YY		
DD / MM / YY		

0: No treatment		6: Well baby clinic	

1: Self treatment		7: Private Hospital	
2: Private Doctor (General Practitioner)		8: Chemist/ Pharmacist	
3: Government Clinic		9: Faith Healer	
4: Private Clinic		10: Sangoma/ Traditional Healer	
5: Government Hospital		11: Other (specify)	

5. 5.Since our last visit, from whom did you receive medical care for your child? (several responses possible)

6. How long does it take you to get to where you receive medical care?

Hours		Minutes	

7. On average how long do you spend there?

Hours		Minutes	

8. On average how many times have you used this service in the past month?

Number of Visits	

9. Do you have a medical aid?

Yes (1)		No (0)	

10. Does your child have medical aid?

Yes (1)		No (0)	

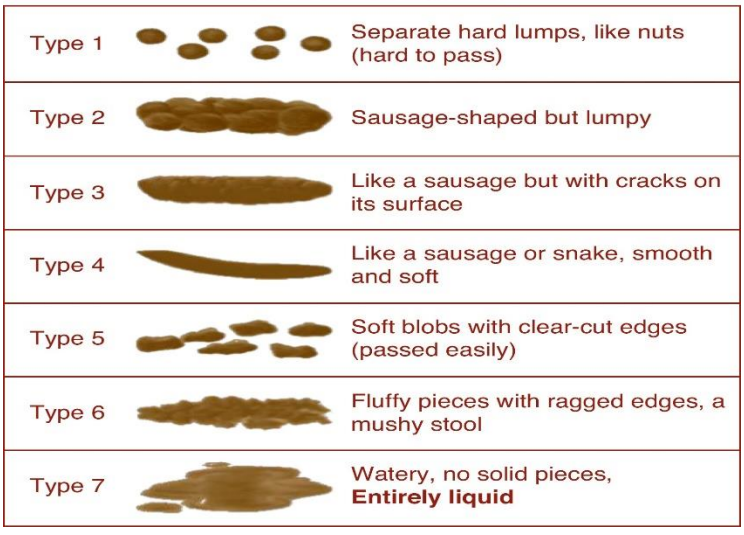
11. How would you describe your child's last bowel movement?

0. Type 1	
1. Type 2	
2. Type 3	
3. Type 4	
4. Type 5	
5. Type 6	
6. Type 7	

12. In the past month, when you went to (location of sensitisation) for baby care, do they tell you about (topics of sensitisation)?

Location(s) of sensitisation in the past month		Topic of sensitisation	Yes (1)	No (0)
0. Clinic		Breastfeeding		
1. Hospital				
2. Community/Church Group				
3. Family/Friends				
4. Other, Specify:				

Bristol stool chart



0. Clinic		Disease prevention		
1. Hospital				
2. Community/Church Group				
3. Family/Friends				
4. Other, Specify:				
0. Clinic		Hygiene and Sanitation		
1. Hospital				
2. Community/Church Group				
3. Family/Friends				
4. Other, Specify:				
0. Clinic		Nutrition		
1. Hospital				
2. Community/Church Group				
3. Family/Friends				
4. Other, Specify:				
0. Clinic		Other, specify: _____		
1. Hospital				
2. Community/Church Group				
3. Family/Friends				
4. Other, Specify:				

13. Has a Community Health Worker been to see you and your baby since our last visit?

Yes (1)		No (0)	

If YES, please specify…

Days post-partum			Weeks Post-Partum			Months Post-Partum			Other, please specify
2 days	YES (1)	NO (0)	2 weeks	YES (1)	NO (0)	2 months	YES (1)	NO (0)	
7 days	YES (1)	NO (0)	6 weeks	YES (1)	NO (0)	3 months	YES (1)	NO (0)	
						4 months	YES (1)	NO (0)	
						5 months	YES (1)	NO (0)	
						6 months	YES (1)	NO (0)	
						9 months	YES (1)	NO (0)	
						12 months	YES (1)	NO (0)	

14. Do you, or others at home, suffer from any of the following conditions?

	Adult		Children			Adult		Children	
1. Hypertension	YES (1)	NO (0)	YES (1)	NO (0)	6. Diarrhoea	YES (1)	NO (0)	YES (1)	NO (0)
2. Diabetes	YES (1)	NO (0)	YES (1)	NO (0)	7. LRTI	YES (1)	NO (0)	YES (1)	NO (0)
3. Anaemia	YES (1)	NO (0)	YES (1)	NO (0)	8. Other	YES (1)	NO (0)	YES (1)	NO (0)
4. TB	YES (1)	NO (0)	YES (1)	NO (0)		YES (1)	NO (0)	YES (1)	NO (0)
5. HIV	YES (1)	NO (0)	YES (1)	NO (0)		YES (1)	NO (0)	YES (1)	NO (0)
If Other, Specify:									

Appendix 7

Barriers and facilitators of breastfeeding practices and their associations with infant growth at six months of age, a study in Soweto, South Africa.

Interview Guide

Good morning/afternoon. My name is Lutricia Moagi. I am an MSc student registered with University of Witwatersrand. I am conducting my MSc on Breastfeeding practices of mothers living in Soweto: associated factors and associations with infant growth at 6 months age. I appreciate your participation in this study. Before we start, I would like your permission to record this interview so that I can be able to create a transcript of our conversation later. Feel free to alert me if, at any time during the interview, you want me stop recording. The interview will take no more than 1 hour. Your answers will help me get a better understanding of your personal experience with your infant feeding choices. Your responses will be kept confidential. Your participation in this study is voluntary and you may withdraw your consent to participate at any time. Do you have any questions or concerns you would like me to address before we start?

NOTE: Check audio recording equipment with the participant before beginning the formal interview.

We will start with the interview now, with your permission.

1. Please tell me about your experience when you fed your baby? [Probe for whether it has been easy, difficult, etc., and why they feel that way]
    a. What kind of adjective(s) would you use to describe the experience?
    b. How did it feel to feed your baby?
2. How was your baby fed from the time they were born until 6 months? [Probe both about the method of feeding, e.g., breast, bottle, etc., as well as the content of feeds]
    a. How was your baby fed soon after birth?
    b. How did feeding change during the first six months, if at all?
    c. What were the reasons for changing?
    d. How did this compare with how you fed your other children when they were that age [only if they report other children]?
3. What experiences did you have in health facilities from the time you were pregnant, to giving birth, and afterward, that influenced how you fed your baby?
    a. Probe for antenatal experience, delivery experience (establish what type) and post-natal experience?
    b. Explore the role of health care workers
4. Who else in your life influenced your infant feeding decisions?
    a. How did they influence you about infant feeding?
    b. What did they say?
    c. How did you interpret this information?
    d. Who was most influential and why?
    e. How much do you listen to this information or these people?

5. How do other people in your family or community feed babies?
    a. What infant feeding practices have traditionally occurred in your family?
    b. And within your group of friends?
6. What else influenced your decision about infant feeding?
    a. Probe for information sources, contexts (like going back to work/school) and the like
    b. For each factor they mention, clarify how it influenced them (positive or negative to determine if it was a barrier or facilitator)

7.
    a. Were there other types of information or support that would have been helpful to you to decide and support you in your decision?
    b. What kind of support did you receive?

8.
    a. What support would have been most useful to you around infant feeding?
    b. Would you do anything differently from what you have done this time?

9. Is there anything you would like to ask or to add?

Appendix 8

R14/49 Dr R Said Mohamed et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M170753

NAME: (Principal Investigator)	Dr R Said Mohamed et al
DEPARTMENT:	School of Clinical Medicine Developmental Pathways for Health Research Unit Medical School
PROJECT TITLE:	Interaction between nutrition, infection, household environment and care practices and their impact on growth and development in infants between birth and one year of age
DATE CONSIDERED:	28/07/2017
DECISION:	Approved conditionally
CONDITIONS:	The socio-economic status and demographic questionnaire may NOT be used without further consultation with the HREC (Med)
SUPERVISOR:	Not applicable
APPROVED BY:	Professor PE Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	06/11/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially reviewed in **July** and will therefore be due in the month of **July** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 9

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R49 Ms L Moagi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M210344

NAME: **(Principal Investigator)**	Ms L Moagi
DEPARTMENT:	School of Clinical Medicine Department of Paediatrics and Child Health Developmental Pathways for Health Research Unit Medical School University
PROJECT TITLE:	*Barriers and facilitators of breastfeeding practices and their associations with infant growth at six months of age; a study in Soweto, South Africa*
DATE CONSIDERED:	2021/03/26
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Mr D Momberg and Dr S Nieuwoudt
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2021/06/21

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

DECLARATION OF INVESTIGATORS

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

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

Signature of Principal Investigator _____ Date _____

Appendix 10

Barriers and facilitators of breastfeeding practices and their associations with infant growth at six months of age, a study in Soweto, South Africa.

In-depth interview guide information sheet and consent

My name is Lutricia Moagi I am a Master's student at the University of the Witwatersrand (Wits) Department of Paediatrics. As part of the SOWETO BABY WASH study, I would like to conduct a follow-up interview to identify factors associated with breastfeeding practice up to 6 months of age and to explore infant feeding decision-making influences and processes for mothers of young infants from the Soweto BABY WASH study.

I would like to invite you to participate in the study by undertaking an in-depth interview on your personal infant feeding experiences and decision-making process on infant feeding for the first six months of life.

What is involved in the study?

The interviews will be conducted once at our offices at Chris Hani Baragwanath Academic Hospital (MRC/Wits Developmental Pathways for Health Research Unit). With your permission, I will ask you to participate in the one-time interview that will take not more than 1 hour in one of our private interview rooms at DPHRU. I would like your permission to audio-record the interview to ensure that I do not miss any valuable information that you will share. A chain of questions will be asked and the answers you will give me will help me better understand

- the factors that are associated with infant feeding practices
- what influenced your infant feeding choices
- the decision-making process of infant feeding practices under 6 months

Should you feel uncomfortable answering questions during the interview, we can skip it and move to the next one.

Possible risk

There are no right or wrong answers, I am more interested in your personal experience and point of view. If I ask you a personal question that makes you uncomfortable, you do not have to answer. There are chances that some of the questions we ask might trigger some emotional setbacks. If this occurs one of our staff, trained in counselling, will be available to talk with you and refer you to the Psychology Unit at Chris Hani Baragwanath Academic Hospital where you will be given an appointment with a psychologist.

Benefits

You will not benefit directly from this study. The information collected may help us see the gap when it comes to infant feeding practices and help to find ways in which we could support infant feeding practices for infants under six months of age.

Costs to you

Participating in this study will involve no costs for you. When you visit our offices you will receive refreshments after the interview, R100 for transport and a R60 airtime voucher.

Voluntary participation in research:

You have the right to agree or refuse to participate in this research. If you decide to participate and later change your mind, you are free to stop at any time or to opt-out of any part of the study. Your refusal to participate will not result in any penalty or loss of benefits to which you are otherwise entitled.

Records of your participation in this research:

You have the right to privacy. The information about your participation will be kept in locked files. Audio recordings and transcripts of the interview will be stored in locked and/or password protected files.

-If results are published, they will not lead to individual identification.

-Ethical approval: This study protocol has been submitted to the University of the Witwatersrand's Human Research Ethics Committee (HREC).

Your questions:

The investigator listed on the first page of this form is available to answer your questions about this research. You may contact the investigator at any time on the following number (079) 810-7951. If you require any further information or have any questions/complaints about the study, please contact the Human Research Ethics Committee of the University of the Witwatersrand on (011) 717-1234 or rhulani.mkansi@wits.ac.za.

YOU WILL HAVE A COPY OF THIS INFORMATION SHEET TO KEEP

If you are happy to take part in the study, please read and sign the attached consent form and contact us to confirm your participation. Contact us on 0798107951 or lutricia.moagi@wits.ac.za.

Your signature on the consent form certifies the following:

· You have read the information provided in this consent form

· You have received answers to all of your questions.

· You have freely decided to participate in this research.

· You understand that you are not giving up any of your legal rights.





I agree to be a participant in the study. The goals and methods of the study are clear to me.

I understand that the study will involve interviews. All the details and purposes of this interview have been explained to me. I understand that I have the right to refuse to participate in the study.

I agree to participate in the study on the condition that:

1. I can withdraw voluntarily from the study at any time and that no adverse consequences will follow withdrawal from the study.

2. I have the right not to answer any or all questions posed in the interviews and not to participate in any or all procedures/assessments.

3. The University of the Witwatersrand's Human Research Ethics committee has approved the study protocol and procedures.

4. All results will be treated with the strictest confidentiality.

5. Only group results, and not my individual results, will be published in scientific journals and in the media.

6. The study scientific team is committed to treating participants with respect and privacy through interviews conducted in private and follow-up counselling available on request.

7. I will receive a referral note to a health service if any result is out of the normal range or a problem is detected during the study.

MOTHER OF CHILD

Printed Name	Signature / Mark or Thumbprint	Date and Time

RESEARCH ASSISTANT

Printed Name	Signature	Date and Time

Appendix 11

Barriers and facilitators of breastfeeding practices and their associations with infant growth at six months of age, a study in Soweto, South Africa.

AUDIO-RECORDING INFORMED CONSENT

- I hereby confirm that Lutricia Moagi informed me about the use of audio-recording software that will record my inputs in response to the questions asked during the interview process.
- I have received, read, and understood the written information (Participant Information Sheet, Informed Consent, and the Audio-Recording Consent) regarding the study.
- I am aware that the results of the study, including my audio-recording, will be anonymously processed into a study report, and will be kept on file.
- In view of the requirements of research, I agree that the audio data collected during this study can be transcribed and processed in a computerised system.
- I consequently give my consent to my responses being audio-recorded.

***PARTICIPANT**:*

Printed Name Signature / Mark Date and Time

I, Lutricia Moagi confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

RESEARCHER:

Printed Name Signature Date and Time