

**FEEDING PRACTICES OF MOTHERS WITH INFANTS AND
CHILDREN ATTENDING PRESCHOOLS IN A HIGH
SOCIOECONOMIC AREA IN JOHANNESBURG**

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Submitted in fulfilment of the requirements in respect of the Master's Degree

M.Sc. Dietetics

in the

Department of Nutrition and Dietetics

in the

Faculty of Health Science

at the

University of the Free State

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25 April 2019

DECLARATION

I, **Annica Madeleen Rust**, declare that the Master's Degree research dissertation or interrelated, publishable manuscripts/published articles, or coursework Master's Degree mini-dissertation that I herewith submit for the Master's Degree qualification **Magister in Dietetics** at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

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ACKNOWLEDGEMENTS

I would like to express my sincerest gratitude to the following people:

- My God, for giving me the strength I needed to complete this study.
- My family and friends, and especially my husband, Neel, for their support and encouragement.
- My supervisor, Dr Lucia Meko, of the Department of Nutrition and Dietetics, University of the Free State, for her continuous feedback, motivation, and support.
- Me Riette Nel, of the Department of Biostatistics, University of the Free Sate, for her assistance with the statistical analyses of the data.
- Mr Danie Steyl, for the language editing of my thesis.
- The school principals and the respondents for taking part in the study.

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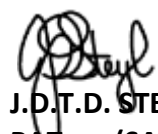
STATEMENT WITH REGARD TO LANGUAGE EDITING OF THESIS

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Title of thesis: Feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg

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Yours faithfully



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ACRONYMS & ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
MBFI	Mother-Baby Friendly Initiative
EBF	Exclusive breastfeeding
g	gram
HIV	Human Immunodeficiency Virus
IU	international unit
kcal	kilocalorie
kg	kilogram
kJ	kilojoule
mg/kg/day	milligram per kilogram per day
mg	milligram
mg/day	milligram per day
NEC	Necrotising Enterocolitis
ppm	parts per million
UK	United Kingdom
UNICEF	United Nations International Children's Emergency Fund
USA	United States of America
WHO	World Health Organisation
ZA	South Africa
%	percentage
>	greater than
<	less than

KEY TERMS

Brand name	A trademark or a name given by a manufacturer/distributor to a product or a product range. This would include a brand logo.
Breastfeeding	A suckling action of the infant or young child on the mother's breast to obtain breast milk.
Breast milk	Human milk that is obtained from a woman's breast by the suckling action of an infant or young child or by the expression of breast milk from the breast.
Complementary feeding	Solids are introduced at six months when breast milk alone is no longer sufficient to meet nutritional needs of the infant; therefore, foods can be added while continuing with breastfeeding.
Exclusive breastfeeding	Defined as when an infant receives only breast milk or expressed breast milk from a mother or guardian.
Formula feeding	Feeding of a cow's milk-based or soya-based milk with the composition nearly the same as breast milk.
Infant	An infant is a person who is 12 months of age or under the age of 12 months.
Infant formula	A breast milk substitute that is manufactured according to the standards of the Codex Alimentarius International Food Standards to satisfy by itself and meet the nutritional requirements of infants during the first six months up to introduction of complementary feeding.
Manufacturer	A person, corporation or an entity that is in the business of manufacturing (production, preparation, processing, or preservation).
Mixed feeding	When an infant younger than six months combines breastfeeding with formula and/or other liquids or solids.

SUMMARY

Breastfeeding is the preferred feeding method, as it is not only nutritionally complete for the first four to six months but will also provide immunological, psychological, physiological, and developmental benefits for the infant. In recognition of the benefits of breastfeeding, the World Health Assembly has set a target of 50% for all infants to be breastfed exclusively from birth up to six months. Despite the well-known benefits of exclusive breastfeeding (EBF), the exclusive breastfeeding rate at six months was 32% in South Africa (ZA) in 2016. The EBF rates mentioned above, published by the South African Department of Health, are said to be representative of the country, but do not distinguish between feeding practices of mothers of different socioeconomic levels.

The aim of this study was to determine breastfeeding practices and associations between breastfeeding practices and demographics of mothers in a high socioeconomic area in Johannesburg. To achieve the aim, the following factors were assessed: mother and infant/child's socio-demographic information, mothers' feeding practices, and factors affecting feeding practices.

The majority of mothers were younger than 35 years of age (58.9%), were married or cohabiting (83.5%), and had an education level higher than Grade 12 (88.8%). Although most of the mothers initiated breastfeeding at birth ($n=102$, 94%); however, the duration of EBF was short. Thirty-four mothers (31.3%) breastfed their infants at four months, and 64 mothers (58.7%) breastfed their infants at six months. Only two mothers (1.8%) exclusively breastfed their infants at six months. A statistically significant difference was not found between breastfeeding duration at six months and the mothers' age ($p=1.0000$), highest level of education ($p=1.0000$), gross household income ($p=0.3368$), marital status ($p=0.2825$), and type of delivery ($p=1.0000$).

In an effort to guide researchers in describing factors affecting breastfeeding practices, Hector and co-workers developed a conceptual framework of factors affecting breastfeeding practices. They categorised these factors as individual-level, group-level and society-level factors. The most common factor (on group level) why mothers with a high socioeconomic status in this study decided not to breastfeed was that formula milk was more convenient when working and less time consuming (63%). The misperception of insufficient milk supply

was a common individual-level factor (37%) why mothers in this study decided not to breastfeed. The most common society-level factor why mothers did not breastfeed was that it was culturally unacceptable to breastfeed in public or in front of others (29%).

The majority of mothers (60.4%) based their choice of formula on the advice of paediatricians. The most common property that influenced the choice of infant formula used by mothers was the brand name of the infant formula (42.5%). It is evident that advertising of infant formula did not significantly affect mothers' decisions of formula to use. Rather, 17.6% of mothers indicated that their own research on infant formula influenced their decision of which formula to use.

This study supports the literature published that the feeding practices of mothers with different demographics differ from one another. To compare feeding practices among different demographic statuses best, it is recommended that a validated screening tool be developed. Future research should investigate the options to make breastfeeding more convenient and implement interventions for modifiable factors such as breastfeeding intention, social support (including work environment), and expression of breast milk confidently. More research should be conducted on the infant formula information given on websites to determine if manufacturers comply with Article 4.1 of the World Health Organization (WHO) International Code of Marketing of Breast Milk Substitutes.

OPSOMMING

Borsvoeding is die verkose voedingsmetode omdat dit nie net die nodige voedingswaarde vir die eerste vier to ses maande aan 'n baba verskaf nie, maar ook omdat dit immunologiese, sielkundige, fisiologiese en ontwikkelingsvoordele aan 'n baba bied. Ter erkenning van die voordele van borsvoeding het die Wêreldgesondheidsvereniging 'n doelwit gestel dat 50% van alle babas slegs vanaf geboorte tot ses maande geborsvoed moet word. Nieteenstaande die alombekende voordele van borsvoeding was die borsvoedingskoers in Suid-Afrika teen ses maande 32% gedurende 2016. Laasgenoemde borsvoedingkoers is deur die Suid-Afrikaanse Departement van Gesondheid gepubliseer en is verteenwoordigend van die hele land, maar tref nie onderskeid tussen die voedingspraktyke van moeders op verskillende sosio-ekonomiese vlakke nie.

Die doel van die studie was om borsvoedingspraktyke en assosiasies tussen borsvoedingspraktyke en demografiese eienskappe van moeders in 'n hoë sosio-ekonomiese area in Johannesburg te bepaal. Om die hoofdoelwit te bereik, is die volgende faktore geassesseer: moeder en baba/kind se sosio-demografiese inligting, moeders se voedingspraktyke, en faktore wat die voedingspraktyke beïnvloed.

Die meerderheid moeders was minder as 35 jaar oud (58.9%), getroud of het saamgeleef (83.5%), en het graad 12 of 'n hoër graad van opvoeding (88.8%) gehad. Al het die meeste moeders begin met borsvoeding ná geboorte ($n=102$, 94%) was die duur van eksklusiewe borsvoeding kort. Vier-en-dertig moeders (31.3%) het hulle babas op vier maande geborsvoed, en 64 moeders (58.7%) het hulle babas op ses maande geborsvoed. Slegs twee moeders (1.8%) het hulle babas eksklusief tot ses maande geborsvoed. 'n Statisties betekenisvolle verskil is nie tussen borsvoeding op ses maande en die moeder se ouderdom ($p=1.0000$) vlak van opvoeding ($p=1.0000$), bruto huishoudelike inkomste ($p=0.3368$), huwelikstatus ($p=0.2825$) en tipe geboorte ($p=1.0000$) gevind nie.

In 'n poging om navorsers te lei om die faktore te beskryf wat 'n effek op borsvoedingspraktyke het, het Hector en sy medewerkers 'n konseptuele raamwerk van faktore wat borsvoedings praktyke beïnvloed, ontwikkel. Faktore is gekategoriseer as: individuelevlakfaktore, groepvlakfaktore en gemeenskapsvlakfaktore. Die algemeenste faktor

(groepevlak) waarom Suid-Afrikaanse moeders in 'n hoë sosio-ekonomiese area besluit het om nie te borsvoed nie was dat formulemelk meer gerieflik was en minder tyd in beslag geneem het (63%) vir die moeders wat werk. Die wanpersepsie dat hulle 'n onvoldoende hoeveelheid melk produseer was 'n algemene individuelevlakfaktor waarom moeders besluit het om nie te borsvoed nie. Die algemeenste gemeenskapsvlakfaktor waarom vroue nie geborsvoed het nie, was dat dit kultureel nie aanvaarbaar was om in die openbaar te borsvoed nie.

Die meerderheid moeders (60.4%) het hul besluit oor watter formule hul moet gebruik, gebaseer op die advies wat pediater verskaf het. Die algemeenste eienskap wat 'n invloed op 'n moeder se keuse van formule gehad het, was die handelsnaam (42.5%). Dit is bevind dat die advertering van formules nie 'n betekenisvolle verskil gemaak het by die moeder se keuse oor watter formule sy moet gebruik nie, maar eerder haar eie navorsing oor formules wat haar keuse beïnvloed het (17.6%).

Die studie ondersteun die literatuur wat oor die voedingspraktyke van moeders met verskillende demografiese eienskappe gepubliseer is. Dit word aanbeveel dat 'n geldige siftingshulpmiddel (vraelys) ontwikkel moet word sodat voedingspraktyke tussen moeders met verskillende demografiese eienskappe vergelyk kan word. Toekomstige navorsing moet ondersoek instel na hoe om borsvoeding meer gerieflik te maak asook om ingrypings in werking te stel ten opsigte van veranderbare faktore soos om met borsvoeding te begin, sosiale ondersteuning (sluit werksomgewing in), en om borsmelk te kan uitmelk. Meer navorsing moet ook gedoen word om inligting wat oor baba formule op webtuistes beskikbaar is, te analiseer om te bepaal of hulle aan Artikel 4.2. van die WHO se Internasionale Kode van Bemarking van Borsmelkplaasvervangings voldoen.

Chapter 1: Introduction

1.1 Background

Optimal nutrition during the first two years of life is vital for the growth, development, health, and survival of children (American Academy of Pediatrics, 2012:e827; Cox & Carney, 2017:281; UNICEF, 2017:1). The absence of optimal nutrition leads to malnutrition and refers to undernutrition (from inadequate dietary energy requirements resulting in wasting, stunting, and micronutrient deficiencies) or overnutrition (excess dietary energy requirements resulting in overweight/obesity) (UNICEF, 2018b:1; WHO, 2018b:1). The phenomenon of hidden hunger, which is characterised by micronutrient deficiencies, is receiving increased attention. Hidden hunger occurs when an unbalanced diet is consumed that is energy efficient but deficient in essential micronutrients such as vitamin A, zinc, or iron (UNICEF, 2012:19; WHO, 2014:1).

For the first two years of life, breastfeeding remains the golden standard in providing adequate nutrition to infants (American Academy of Pediatrics, 2012:e827; Cox & Carney, 2017:281; UNICEF, 2017:1). Undoubtedly, breast milk is superior to all infant formulas, as it is the only infant feed with a perfect composition and balance of nutrients that provides optimal growth and, psychological, physiological, immunological, and developmental benefits for an infant (American Academy of Pediatrics, 2012:e827; Cox & Carney, 2017:281; Rolfes et al., 2018:464). Breastfeeding mothers themselves may gain short- and long-term benefits from breastfeeding (American Academy of Pediatrics, 2012:e831). Breastfeeding also offers socioeconomic benefits for governments and the population (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:281; Rolfes et al., 2018:464).

The above-mentioned benefits of breastfeeding have been proven by numerous studies (American Academy of Pediatrics, 2012:1; Cox & Carney, 2017:281; Garter et al., 2005:495; Rolfes et al., 2018:464; Yezingane Network & UNICEF, 2011:3). For this reason, bodies such as the American Academy of Pediatrics (2012:e828), the World Health Organisation (WHO) (2009b:3) and the United Nations International Children's Emergency Fund (UNICEF)(2017:1) all recommend that infants should be breastfed exclusively for six months after birth. Complementary food should be introduced from six months, whilst breastfeeding continues up to the age of two years or beyond.

In turn, the emphasis on EBF has led to the launch of the International Code of Marketing of Breast Milk Substitutes as well as the Mother-Baby Friendly Initiative (MBFI) to improve global breastfeeding rates (Cox & Carney, 2017:282; WHO, 1981:8; WHO, 2009a:3).

1.2 Breastfeeding rates

1.2.1 Breastfeeding initiation and exclusive breastfeeding at six months

Recommendations regarding breastfeeding initiation are that infants should receive breast milk within one hour of birth (UNICEF, 2016:8 UNICEF, 2017:1; WHO, 2018c:1). Early initiation of breastfeeding decreases infant mortality in the most vulnerable time of their life and will also help to establish EBF. However, only 45% of all newborns were put to the breast within the first hour of their lives in 2015 (UNICEF, 2016:8; 30).

According to UNICEF (2016:8), Eastern and Southern Africa had the highest global breastfeeding initiation rates in 2015. However, it must be taken in consideration that the above-mentioned data set did not include data from all high-economy countries due to a lack of data in the majority of the high-economy countries. Although Southern Africa had the highest breastfeeding initiation rate from 2011 to 2017, it unfortunately did not translate into lower mortality rates in Eastern and Southern Africa (UNICEF, 2016:30). In Table 1.1, breastfeeding rates around the world are summarised. The current data are difficult to compare because the data were from different years. It can be noted that breastfeeding initiation percentages in high-income economies are high but ironically, rates for EBF at six months is lower in high-income economies than in low-income economies. A slight overall increase from breastfeeding initiation rates can be seen in the data set. This is reflected in a UNICEF report that states a minor global increase in early initiation of breastfeeding of 14% over the past 15 years (UNICEF, 2016:8).

In recognition of the benefits of breastfeeding and the feeding recommendations at six months, the World Health Assembly has also set a goal of 50% for EBF at six months to be reached by 2025 (UNICEF, 2016:46; UNICEF, 2017:1; WHO, 2012a:60).

Global exclusive breastfeeding (EBF) rates at six months do not meet international standards as shown in Table 1.1. Globally, 40% or only two in five infants less than six months of age are breastfed exclusively (UNICEF, 2016:9). This translates to a 4% increase in EBF rates from the year 2000 to 2017. In low-income countries, rates for EBF vary from 6% to 57%, as seen

in Table 1.1 (UNICEF, 2016:31, 43, 47; World Bank, 2018:1). The largest increases can be seen in countries such as South Asia. Latin America, the Caribbean, East Asia, and the Pacific show slow or no increase in breastfeeding rates (UNICEF, 2016:46). UNICEF (2016:47) reported that only 32 out of 101 countries from their database have already reached the 2025 goals. These statistics show a grim picture, indicating the unlikelihood of meeting a global 10% increase in rates for EBF at six months (UNICEF, 2017:1).

Despite the well-known benefits of breastfeeding, changes to legislation and the initiation of programmes to strengthen breastfeeding, the breastfeeding rates of South Africa (ZA) still do not meet the current global average for EBF at six months for the period 2000-2010 (WHO, 2011:113; WHO, 2012b:116-118).

Table 1.1: Global Breastfeeding rates (Andrew & Harvey, 2011:49; Centres for Disease Control and Prevention (CDC), 2009:2; Goosen et al., 2014:1; Onah et al., 2014:8; SADH, 2016:28; SADH, 1998:12; UNICEF, 2016:31, 43, 47; UNICEF, 2018a:1; WHO, 2011:104-113; WHO, 2012b:116-118; WHO, 2018a:1; World Bank, 2018:1)

Population group*	Year	Breastfeeding initiation percentage	Exclusive breastfeeding rate at 6 months (Goal= 50%)
High-income economies			
European region	2000-2010		23.0%
	2005-2011		24%
UK	2000 -2010	78%	1.0%
	2005-2011		< 1%
Australia	2010	93%	15.0%
United States of America (USA)	2004		12.1%
	2005		12.3%
	2006		14.1%
	2007	75%	13.8%
	2008		14.6%
	2009		16.2% 13.6%
	2010	71%	35%
	2011		18.8%
	2013		22.3%

Population group*	Year	Breastfeeding initiation percentage	Exclusive breastfeeding rate at 6 months (Goal= 50%)
	2011-2017	40%	32%
	2005-2011		29%
	2000-2010		30.0%
East Asia and Pacific	2000		30%
	2015		31%
	2011-2017	43%	28%
Eastern Europe and central Asia	2000		21%
	2000-2010	57%	30%
	2015		30%
Middle East and North Africa	2015		35%
	2011-2017	40%	32%
Upper-middle-income economies			
Namibia	2000-2010		24%
South Africa	1998		< 2 %
	2000-2009		7%
	2000 -2010		8%
	2016		32%
Latin America and Caribbean	2000		31%
	2015	49%	32%
	2011-2017	54%	38%
Lower middle-income economies			
India	2000-2010		33.5-46%
Lesotho	2000-2010		54%
Swaziland	2000 -2010		32%
	2005-2011		44%
South East Asia region	2000-2010		44.0%
South Asia	2000		47%
	2015	42%	59%
	2005-2011		45%
	2011-2017	39%	52%
Low-income economies			
Africa region	2005-2011		33%

Population group*	Year	Breastfeeding initiation percentage	Exclusive breastfeeding rate at 6 months (Goal= 50%)
	2000-2010		31.0%
West and Central Africa	2000		20%
	2015	40%	29%
	2011-2017	40%	29%
Eastern and Southern Africa	2000		43%
	2015	59%	57%
	2011-2017	63%	55%
Zimbabwe	2000-2010		6%
	2005-2011		6%
Eastern Mediterranean region	2000-2010		35.0%
	2005-2011		35%
Global	2000-2010		36.0%
	2005-2011		37%
	2007-2014		36%
	2011-2017	45%	40%

*Population groups are classified under economies according to the World Word list of economies

1.2.2 Breastfeeding and complementary feeding rates from 6 months to 24 months.

The WHO (2012b:59) and UNICEF (2016:10) state that breastfeeding and complementary feeding recommendations are poorly adhered to worldwide. Globally, a third of infants have not initiated complementary feeding at six to eight months (UNICEF, 2016:10). Inadequate breastfeeding and complementary feeding practices lead to poor nutritional status in the form of undernutrition, wasting, stunting, and overnutrition (WHO, 2009b:3). In addition to the effects of poor nutritional status mentioned above, inadequate feeding (late introduction of complementary feeding) also results in micronutrient deficiencies, and an increased risk for infectious diseases. In turn, these are associated with an increased rate of infant and child mortality (Jacdonmi et al., 2016:1284; UNICEF, 2016:10; WHO, 2009b:3).

1.2.3 Breastfeeding in South Africa

Breastfeeding initiation and rates for EBF in sub-Saharan Africa are very low (Table 2.1) (Goosen, 2014:1; WHO, 2011:104-113). In ZA, the national rates for EBF at six months is t

32%, which is slightly lower compared to the global rate of 36% (SADH, 2007:187; SADH, 2016:28; WHO, 2011:113).

1.3. Problem statement

Despite these well-known benefits of breastfeeding, the national EBF rate in ZA at six months was only 32% in 2016, which is slightly lower compared to the global rate of 36%-40% (South African Department of Health, 2016:29; WHO, 2011:113). Although the breastfeeding rate is far from the 50% goal set by the World Health Assembly, 32% can be considered as a tremendous improvement from the reported < 2% in 1982 (SADH, 1998:12; UNICEF, 2016:46; UNICEF, 2017:1; WHO, 2012a:60). To improve the feeding practices (breastfeeding) of mothers with infants, the South African Government committed itself and took action by initiating and adapting all policies, legislation, and protocols to support breastfeeding such as the Mother-Baby Friendly Initiative (MBFI) and of Breast Milk Substitutes.

The rates for EBF at six months, as mentioned above, and feeding practices published by the South African Department of Health (SADH, 2016:29) are representative of the whole country and do not distinguish between the feeding practices of mothers in high and low socioeconomic areas. Of the studies conducted on breastfeeding rates and infant-feeding practices in ZA (Table 1.2), only two of the 16 were performed in high socioeconomic areas. Studies done with regard to breastfeeding rates and feeding practices of mothers in high socioeconomic areas in ZA are limited. This means that the picture painted on infant feeding is based predominantly on low socioeconomic communities. Considering the diversity of ZA in terms of its demographics, it is important that the socioeconomic groups are included in such research. This may assist in improving infant-feeding practices in the country.

Table 1.2: Summary of studies done with regard to breastfeeding rates and feeding practices in South Africa

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socioeconomic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Kruger & Gericke	2003	Gauteng	144	Feeding and weaning practices from mothers and caregivers of children (< 3 years old) attending clinics	Low	88.1	Rarely practiced	Unknown	Rarely	2 to 3 months
Sibeko et al.	2005	Cape Town	126	Beliefs, attitudes and practices of breastfeeding mothers from a peri-urban community in ZA	Low	Unknown	none	78	Unknown	1 month
MacIntyre et al.	2005	Limpopo	150	Feeding practices of mothers with infants (< 8 weeks) attending clinics	Low	99	4.6 (9 weeks)*	6.7	42.7	5 weeks

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socioeconomic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Bester	2006	Western Cape	55	Feeding practices of infants 0 – 6 months attending clinics	High	78.18	Unknown	1 month (43.64)	21.82%	2 months
Mamabolo et al.	2004	Limpopo	276	Follow-up study of term infants to 12 months to monitor growth and feeding practices	Low	44	4.1 *includes 6 months	1 month (9.7)	1 month (1.5)	1 month
Faber & Benadé	2007	KwaZulu-Natal	505	Feeding practices of 6 – 12-month-old infants	Low	96	< 1 *includes 6 months	23	18	3 months
Van der Merwe et al.	2015	Mpumalanga	435	Feeding practices of mother infants (< 6 months) attending clinics with different baby-friendly status	Low	75	36*includes 6 months	47+43/435	39+72/435	45 days

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socioeconomic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Goga et al.,	2012	Western Cape	665 HIV+ 218 HIV-	Infant-feeding practices amongst HIV exposed* and non-exposed **infants (< 9 months)	Low	Unknown	47.9* 67.6** (includes 6 months)	4.3* 23.3**	47.3* 9**	3 weeks
Kassier & Veldman	2013	Bloemfontein	189	Feeding practices of mothers and caregivers with infants 0-24 months at clinics	Low	Unknown	Unknown	54.3	12.7	2 months
Goosen et al.	2014	Western Cape	140	Feeding practices of mothers (< 6 months) at clinics	Low	77	6 at time of interview Included different ages before 6 months.	39 (79 started before 3 months)	31	3 months

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socioeconomic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Frans et al.	2015	Limpopo	275	Knowledge and practices of mothers about EBF with infants (6 months) at clinics	Low	Unknown	42.3 (includes 6 months)	48.6	9.1	Unknown
Siziba et al.	2015	Gauteng, North West, Eastern Cape, Free State	580	Feeding practices of mothers attending health facilities	Low	Unknown	12 (In their sixth month of life)	70	19	Unknown
Tshikovhi & Gericke	2015	Gauteng (Pretoria)	200	Feeding practices of mothers attending pharmacies in Pretoria	High	Unknown	Unknown	Unknown	Unknown	Unknown
Madiba	2015	Gauteng (Pretoria)	244	Factors associated with mixed feeding practices among HIV positive woman with infant from 6 to 9 months	Low	Unknown	Unknown	Unknown	56.8	Unknown

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socioeconomic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Seonandan & McKerrow	2016	KwaZulu-Natal	94	Infant and young child feeding	Low	Unknown	< 3 months 78	Unknown	Unknown	Before 6 months
Chaponda et al.,	2017	Gauteng (Tembisa)	30	Feeding practices among HIV-positive mothers	Low	50	Unknown	Unknown	Unknown	1 month

HIV exposed* and HIV non-exposed **infants

1.4 Study aim

The aim of this study is to determine factors that affect the feeding practices of mothers with infants and children attending pre-schools in a high socioeconomic area in Johannesburg.

1.5 Study objectives

To achieve the main aim, the following factors were assessed:

- The mother and infant/child's sociodemographic information.
- Mothers' infant-feeding practices.
- Factors affecting feeding practices (i.e., individual-, group-, and society-level factors).
- The effect of individual-, group-, and society-level factors on feeding practices.
- The relationship between sociodemographic factors and infant-feeding practices (i.e. breastfeeding and formula feeding).

1.6 Outline of thesis

- Chapter 1: Introduction and an exploration of the problem statement.
- Chapter 2: Literature review.
- Chapter 3: Methodology.
- Chapter 4: Article 1: Breastfeeding practices of mothers in a high socioeconomic area in Johannesburg.
- Chapter 5: Article 2: Infant formula feeding practices of mothers in a high socioeconomic area in Johannesburg.
- Chapter 6: Article 3: Factors affecting the feeding practices of mothers with infants in a high socioeconomic area in Johannesburg.
- Chapter 7: Conclusions and recommendations.

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Chapter 2: Infant feeding and feeding practice of mothers

2.1 Introduction: History of infant feeding

Infant feeding evolved from an era when wet nursing was a common practice to bottle feed with animal milk and later formula milk. As seen in Table 2.1, each era contributed to the current infant-feeding practices (Stevens et al., 2009:38).

Table 2.1: Timeline of infant feeding

Reference	Year	History
Stevens et al., 2009:32	2000 BC	Wet nursing was a common practice when a mother died from childbirth or could not initiate lactation.
Stevens et al., 2009:32	1800 BC to 950 BC	Wet nursing became an alternative of choice. Wet nursing was regulated by laws and contracts.
Stevens et al., 2009:34	950 BC	Wet nursing was demanded by women of a high socioeconomic class in Greece.
Stevens et al., 2009:34	300 BC to 400 AD	Wet nurses (slaves) were contracted to feed the abandoned infants.
Stevens et al., 2009:34	Renaissance	Wet nurses remained the first choice for mothers who could not breastfeed, and it was preferred that mothers should breastfeed their own children.
Stevens et al., 2009:34	16th century	Concerns about wet nursing started.
Stevens et al., 2009:34	17th century	Despite objections against wet nursing, wet nursing remained a preferred and well-paid practice. Aristocratic women viewed breastfeeding as an unfashionable practice that would ruin their figures and interfere with their social activities.
Stevens et al., 2009:34	18th century	Wet nursing shifted away from the high socioeconomic class to a low socioeconomic class. The industrial revolution led to innovation of bottle feeding.
Stevens et al., 2009:34	19th century	Artificial feeding became a substitute to wet nursing. Bottle and nipple feeding were initiated. Teats and nipples were made of leather Animal milk was the most common source of artificial feeding.
Needham, 1854:1	1854	Orwell H. Needham invented the first breast pump to promote the expression of breastfeeding

Reference	Year	History
Stevens et al., 2009:36	1865	Dr Justus von Liebig developed the first infant formula, and breastfeeding rates started to decline.
Stevens et al., 2009:36 Thornley, 2008:104	20th century	Wet-nursing died out in the early years of the 20th century, and in the middle of the 20th century, milk banks in hospitals were introduced. Breastfeeding rates declined until the 1970s. The initiation of breastfeeding awareness campaigns on the importance of breastfeeding resulted in a steady increase of breastfeeding rates. The first commercial infant formula was produced.

2.2 Benefits of breastfeeding

Breastfeeding is the preferred feeding method as it is not only nutritional complete for the first four to six months but will also provide immunological, psychological, physiological and developmental benefits for the infant, as well as hormonal, physical and psychosocial benefits for the mother. Breastfeeding will also have socioeconomic benefits (American Academy of Pediatrics, 2012:e828-e833; Cox & Carney, 2017:281; Garter et al., 2005:495; Rolfes et al., 2012:454; Yezingane network & UNICEF, 2011:3). Breast milk is a safe feeding method that is always at the correct temperature with no risk of bacterial contamination (UNICEF, 2016:14).

2.2.1 Benefits of breastfeeding for the infant

Immunological benefits of breastfeeding include reduced risk for the development of infectious diseases such as bacterial meningitis, bacteraemia, diarrhoea, necrotising enterocolitis (NEC), otitis media, respiratory tract infections, and urinary tract infections (Cox & Carney, 2017:281; Garter et al., 2005:495; Lessen & Kavanagh, 2015:447; Rolfes et al., 2018:464). The risk for lower respiratory tract infections can be reduced by 72% in the first year of life if the infants are breastfed exclusively in the first four months, and the risk for otitis media can be reduced by 50% if infants are breastfed exclusively in the first three months after birth (American Academy of Pediatrics, 2012:e829; Cox & Carney, 2017:281). A possible association has been found between EBF and a reduced incidence of asthma, atopic dermatitis, and eczema (American Academy of Pediatrics, 2012:e829, European Academy of

Allergy and Clinical Immunology, 2018:1). Other benefits of breastfeeding include improved cognitive development and promotion mother and child bonding (Andres et al., 2012:1134; Cox & Carney, 2017:281; Garter et al., 2005:495; Yezingane Network & UNICEF, 2011:3). A systematic review of 17 studies found a positive relationship between breastfeeding and performance in intelligence tests (Horta et al., 2015:18). A 36% reduction in the incidence of sudden infant death has also been found (American Academy of Pediatrics, 2012:e828; Cox & Carney, 2017:281). A prospective population-based birth cohort over 30 years from 5914 neonates found that breastfeeding was associated with improved intelligence tests (Victora et al., 2015:205). Breastfeeding may prevent the development of hypercholesterolemia, atherosclerosis, Type 1 and Type 2 diabetes mellitus, obesity, and hypertension later in life (Cox & Carney, 2017:281; Rolfes et al., 2018:464).

Studies from around the world have found that EBF reduces mortality rates in infants in comparison with non-breastfed infants (Chen & Rogan, 2004:e435; Debes et al., 2013:13; UNICEF, 2016:42; UNICEF, 2017a:2). The improvement of breastfeeding rates could save up to 823 000 lives from birth to five years (UNICEF, 2016:42).

2.2.2 Benefits of breastfeeding for the mother

Breastfeeding mothers may gain short- and long-term benefits from breastfeeding (American Academy of Pediatrics, 2012:e831). Postpartum blood loss is reduced in mothers, and mothers may experience a rapid involution of the uterus (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:281; Lessen & Kavanagh, 2015:447; Rolfes et al., 2012:454). Breastfeeding mothers often return to pre-pregnancy weight much sooner than mothers who do not breastfeed (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:281, Yezingane Network & UNICEF, 2011:3). Child spacing is improved by the delayed return of regular ovulation, even though breastfeeding is not a dependable method of contraception (American Academy of Pediatrics, 2012:e831; Cox & Carney, 2017:281; Rolfes et al., 2018:464; Yezingane Network & UNICEF, 2011:3). Breastfeeding will reduce the risk of developing postpartum depression (Lessen & Kavanagh, 2015:445). The iron status of breastfeeding mothers is protected by prolonged amenorrhea during breastfeeding or decreased menstrual blood loss (American Academy of Pediatrics, 2012:e831; Cox & Carney, 2017:281; Rolfes et al., 2012:454). Breastfeeding also decreases the risk for breast or ovarian cancer, Type 2 diabetes and postmenopausal osteoporosis in woman (American

Academy of Pediatrics, 2012:e831; Cox & Carney, 2017:281; Rolfes et al., 2012:454; UNICEF, 2017a:2).

2.2.3 Socioeconomic benefits of breastfeeding

Breastfeeding will not only be beneficial for the mother and the baby but also offer additional benefits such as socioeconomic benefits for governments (American Academy of Pediatrics, 2012:e832; Lancet, 2016:6; Lessen & Kavanagh, 2015:447; Rolfes et al., 2012:454). If breastfeeding is carried out optimally, it assists in reducing medical paediatric costs due to children becoming sick less often. Breastfeeding will reduce episodes of diarrhoea and respiratory infections by 72% and respiratory infections by 57% (Lancet, 2016:6). Longer duration of breastfeeding is associated with higher intelligence tests, which will translate into higher earning potentials and economic growth (UNICEF & WHO, 2017:1). Employers also benefit by lower rates of parental absenteeism from work (American Academy of Pediatrics, 2012:e836; Garter et al., 2005:495). Lastly, there is also a positive effect on the environment if formula is reduced as less manufacturing will lead to less packaging that needs to be discarded (Lancet, 2016:6; Rolfes et al., 2012:454). A 10% increase of EBF at six months would translate in a health care saving of \$312 million (an estimated R3.6 billion at R11.65 to the US dollar) in the US, \$48 m (an estimated R559 m at R11.5 to the US dollar) in the UK, \$30 m (an estimated R349.5 m at R11.65 to the US dollar) in China, and \$6 m (an estimated R59.9m at R11.65 to the US dollar) in Brazil.

2.2.4 Contraindications to breastfeeding

EBF up to six months of age remains the golden standard for infant feeding; however, breastfeeding and any other milk except for specialised formula are contraindicated for infants with galactosemia, maple syrup urine disease, and phenylketonuria (American Academy of Pediatrics, 2012:e832 Erick, 2012:365-369). Breastfeeding may be contraindicated permanently for mothers diagnosed with human immunodeficiency virus (HIV) who are not on treatment. Mothers may avoid breastfeeding temporarily if diagnosed with human t-cell lymphotropic virus, herpes simplex virus Type 1, drug abusers, or if on certain medications (radioactive iodine, anti-epileptic, sedating psychotherapeutic, chemotherapeutic, and psychotropic medication). Mothers may still continue to breastfeed with a breast abscess, hepatitis B, hepatitis C, mastitis, tuberculosis (managed according to national guidelines), and with substances, but health problems to the infant may be a

concern (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:282; Rolfes et al., 2012:457-458; WHO, 2009a:7-9). Poor production of breast milk by the mother is rarely a problem, but can be noticed in failure to thrive in breastfed infants. The maternal causes can be from a poor milk production and a poor let-down reflex. Poor production result from hyperthyroidism, insufficient antihistamine use, excessive antihistamine use, insufficient development of alveolar tissue, inverted nipples, excessive caffeine intake, a diet low in vitamin D and B12, and fatigue. A poor letdown can be caused by stress, anxiety, drugs, hypertension, and smoking. The reason for failure to thrive on breast milk should be assessed and addressed; if the problem cannot be resolved, infant formula should be implemented (Cox & Carney, 2017:290; WHO, 2009a:7).

2.3 Express breast milk and breast pumps

Breast milk can be expressed manually or by using breastfeeding pumps. The reasons why mothers express breast milk is well reported. Obese woman may find it easier to express breast milk than to breastfeed due to large breasts and may experience anxiety about exposing their bodies (Johns et al., 2013:7). Expressed breast milk is preferred when mothers are on medication that contraindicates breastfeeding. Expressed breast milk can also be used to mix with porridge for infants younger than a year (Labiner-Wolfe et al., 2008:S67). Mothers who have trouble to initiate breastfeeding are also more likely to express breast milk. Breast pumps are used more commonly by mothers with preterm infants to express and to fortify the breast milk (Johns et al., 2013:7). Breast pumps can also be used when an infant has suckling difficulties. Mothers who suffer from hypogalactia (to increase milk secretion), hypergalactia (excessively tight breast or incomplete emptying), sore breast or being temporally ill can use breast pumps (Flaherman et al., 2013:2; United States Patent., 1987:1). Other reasons include breast engorgement and mastitis (Flaherman et al., 2013:2; Johns et al., 2013:7). Mothers who are concerned that they may not produce enough or too much milk will express breast milk (Johns et al., 2013:7). The expression of breast milk allows a mother to be away from the infant while continuing to breastfeed her infant. (Win et al., 2006:1, 4). This allows more independence for working mothers (United States Patent., 1987:1; Win et al., 2006:1, 4). Win et al. (2016:1, 4) and Labiner-Wolfe et al. (2008:S67) found that mothers who expressed breast milk were more likely to breastfeed for longer or to breastfeed their infants exclusively at six months. A prospective cohort

study by Bai et al. (2016:499) found contradictory results, as exclusive expressed breastfeeding was associated with shorter breastfeeding duration compared to only feeding at the breast.

Despite the benefits of the expression of breast milk, McInnes et al. (2015:10) found that UK websites provided information about expressing breast milk that was inconsistent, incomplete and not based on evidence.

2.4 Infant feeding recommendations

Infant and child feeding are facing the double burden of malnutrition in the form of undernutrition and overnutrition (overweight or obesity) in low- and middle-income countries (WHO, 2013:6). Optimal nutrition for the first 1000 days (from conception until the second birthday) in a child's life is imperative to growth, health and neurodevelopment, as it sets the foundation for a healthy and a prosperous future to combat the double burden of malnutrition (UNICEF, 2018:1). Proposed paediatric food-based dietary guidelines developed for the South African population are still being tested before their implementation (Vorster et al., 2013:S52).

2.4.1 The first hour of life

The first hour of life is one of the most vulnerable times in an infant's life (UNICEF, 2016:8). To safeguard the infant from acquiring infection and to reduce the risk of infant mortality, the WHO and UNICEF recommend the initiation of breastfeeding within an hour after birth (UNICEF, 2016:8; UNICEF & WHO, 2017:1; WHO, 2018b:1).

2.4.2 Birth to six months

EBF is defined as breast milk (including expressed or from a wet nurse) that is received by the infant and includes oral rehydration solution, drops, syrups (vitamins, minerals, and medicines) and excludes anything else (WHO, 2017:4). The American Academy of Pediatrics (2012:e828), WHO (2009b:3) and UNICEF (2017a:1) recommend that infants should be breastfed exclusively for at least six months after birth. Initially, infants will be fed on demand, usually between eight to twelve feeds in 24 hours or every two to three hours on the cues of early signs of hunger such as increased activity, alertness, or sucking motions. Crying would be a late sign of hunger. Infants of two months and older will feed every four

hours, and by two to three months, infants will not require night feeds (Cox & Carney, 2017:287; Rolfes et al., 2012:468; UNICEF, 2016:16).

To prevent rickets, the American Academy of Pediatrics (2018:1), UNICEF (2017b:1), CDC (2019:1), and Ziegler et al. (2014:1) recommend that all exclusively or mixed breastfed infants should receive 400 IU vitamin D supplementation from the first few days of life until the infant is weaned to one litre of full-cream cow's milk per day. All formulas in the United States of America (USA) are sold with at least 400 IU vitamin D; therefore, supplementation is not needed (American Academy of Pediatrics, 2018:1). According to the WHO (2018c:1), vitamin D supplementation may be used to prevent rickets in children who are at risk; however, the WHO rejects the above-mentioned recommendations and suggests that further research is needed before the above-mentioned recommendation can be made.

Breast milk will provide adequate iron to most breastfed babies. Exceptions may include low birth weight or premature babies, or a situation where maternal and prenatal iron status is low (Lessen & Kavanagh, 2015:2; American Academy of Pediatrics, 2010:5). Maternal hypertension and diabetes can also result in low foetal iron stores in term and preterm babies (American Academy of Pediatrics, 2010:2). In these circumstances, adding iron drops before complementary feeding is initiated is recommended (American Academy of Pediatrics, 2010:2; Lessen & Kavanagh, 2015:2).

Intramuscular vitamin K1 (phytonadione) at the dose of 0.5-1 mg should be administered after birth to reduce the risk haemorrhagic disease of newborns. Intramuscular dosage is recommended because an oral dose is variably absorbed and does not provide adequate concentrations or stores for the breastfed infant (American Academy of Pediatrics, 2012:e832; Erick, 2012:379; Lessen & Kavanagh, 2015:2).

2.4.3 Six months to two years and older

The criteria for selected infant-feeding practices define complementary feeding as breast milk including expressed or from a wet nurse and solid or semi-solid foods (WHO, 2007:4). Complementary food can be introduced from six months, while breastfeeding continues up to the age of two years (UNICEF, 2016:8, 10; WHO, 2018b:1). The Global Strategy for Infant and Young Child Feeding recommends that complementary feeding must be given that is adequate (provides macro and micronutrient needs), safe (hygienically prepared food),

initiated at the correct time, and properly fed (considers appetite and satiety) (WHO, 2003:8).

Nutritional requirements, developmental readiness, and allergic reactions are the most important factors to consider when introducing solids. From four to six months of age, a balanced diet with all the textures (soft, semi-solid, and solid) can be introduced, depending on the developmental readiness of children shown in Table 2.2 (Erick, 2012:385; Rolfes et al., 2012:473; UNICEF, 2015:5). From six to eight months, children must receive at least two meals per day, and three meals per day for children of nine to twenty-four months, with additional snacks as required (UNICEF, 2016:16; WHO, 2018:1).

The Australasian Society of Clinical Immunology and Allergy (2016), American Academy of Allergy Asthma & Immunology (2015) and UNICEF, 2015:15 recommend that highly allergenic foods (dairy, soy, egg, wheat, peanut butter, and fish or shellfish) can be introduced from four to six months of age, depending on the infant's developmental readiness and to decrease the risk of developing allergies. There is no scientific evidence to prove that a delayed introduction of allergic food will prevent the development of food allergies (Gray et al., 2014:337; UNICEF, 2015:8, 15). To detect food allergies, it is recommended that one single food item should be introduced at a time and that a new food item should not be introduced before two to seven days. A small amount of food must be introduced at first, and mothers must be on the lookout for any signs or symptoms of an allergic reaction. Rice cereal is usually introduced first, followed by vegetables, fruits, and proteins (Erick, 2012:383; UNICEF, 2015:8, 15; McKean & Mazon, 2017:309).

Rapid growth demands high protein and iron needs; thus, iron-fortified cereal, meats, and meat products should be introduced from about six months (American Academy of Pediatrics, 2012:e835; Rolfes et al., 2012:473; McKean & Mazon, 2017:303). The Iron needs for breastfed infants are approximately 1 mg/kg/day by four to six months (American Academy of Pediatrics, 2010:8; Erick, 2012:383). Fruits and vegetables high in vitamin C such as strawberries, oranges, broccoli, tomato, and potato should be added to each meal to assist with iron absorption (Rolfes et al., 2012:454).

Foods that can be choked on, for example nuts, raisins, popcorn, grapes, bread with peanut butter, and small sweets, should not be introduced before one year of age. Vegetables should be introduced before fruits to increase vegetable acceptance (Erick, 2012:383).

Full cream cow's milk should not be introduced before one year of age (American Academy of Pediatrics, 2018:1; Rolfes, 2012:472; Trahms & McKean, 2012:380; UNICEF, 2015:12). Cow's milk should not be introduced because it contains higher levels of protein, fat, cholesterol, and calcium than breast milk does. Cow's milk is also lower in iron and vitamin C. A high calcium and low vitamin C content will reduce the iron absorption, and the high protein content will put strain on an infant's kidneys). Cow's milk but not breast milk also contains beta-lactoglobulin, for which infants can become intolerant, too (WHO, 2009:9). Low-fat or fat-free cow's milk should not be introduced before two years of age (Rolfes, 2012:472; Trahms & McKean, 2012:382).

Honey should not be given under one year of age, because an infant does not have the immune capacity to fight an infection caused by *Clostridium botulinum* spores that are found in honey. Added sugar and salt, sweets, chocolates, chips, fast foods, and processed and refined foods should not form part of the child's diet (Erick, 2012:282; Rolfes et al., 2012:454; UNICEF, 2015:12).

Supplementary fluoride of 0.25 mg/day should be limited to infants residing in communities where fluoride concentration in the water is < 0.3 ppm (American Academy of Pediatrics, 2012:e832; Erick, 2012:383; Lessen & Kavanagh, 2015:2).

The nutritional requirements for children from six to twenty-three months is higher per kilogram of weight than any other time in the lifecycle putting, which, if inadequately fed, increases the risk for malnutrition (Rolfes et al., 2012:465; UNICEF, 2016:10). Malnutrition in the form of undernutrition in the first two years of the life of an infant is linked to stunting and irreversibly impaired intellectual performance, amongst others (WHO, 2009b:3). Overnutrition can lead to childhood obesity and will predispose the child to becoming an obese individual. Obesity places the individual at an increased risk for hypercholesterolemia, hypertension, atherosclerosis, and Type 2 diabetes mellitus (Erick, 2012:365; Rolfes et al., 2012:454; WHO, 2009b:5).

Table 2.2: The introduction of solids (Erick, 2012:385; Rolfes et al., 2012:473; UNICEF, 2015:4-8).

Age (months)	Feeding skill and developmental readiness	Appropriate foods and amounts to be added
0-4	<p>The infant will turn his/her head towards any object that touches his/her cheek.</p> <p>The infant will swallow by using the back of the tongue and will gradually learn to swallow with the front of the tongue.</p> <p>The infant will push food out of the mouth by a reflex action during the first 3 months.</p>	Breast milk or infant formula on demand.
4-6	<p>The infant is able to sit and to hold his/her head steady.</p> <p>The push reflex will decrease and will develop the ability to swallow. Less food will be round their faces and more food in their mouths.</p> <p>The infant will begin to open his/her mouth and will lean forward to show interest in food.</p> <p>The infant will show satiety by turning his/her head away or by leaning back.</p>	<p>Breast milk or infant formula on demand – 240 ml x 4 per day.</p> <p>First, begin to introduce iron-fortified cereal mixed with breast milk, formula or water – 20 ml x 2 per day.</p> <p>If well tolerated, legumes, vegetables. and fruits can be introduced 15 ml x 1-2</p>
6-8	<p>The infant develops a finger and thumb grasp and is able to eat finger foods.</p> <p>The infant begins to drink from a cup.</p>	<p>Breast milk or infant formula on demand – 240 ml x 4 per day.</p> <p>Baby cereal or bread – 30 ml x 4 per day.</p> <p>Introduce two portions of soft-textured vegetables (30 ml – 45 ml) and two portions of soft-textured fruits (30 ml) per day.</p> <p>Add strained or finely chopped meat portions – 15 ml x 2-4 per day.</p>

Age (months)	Feeding skill and developmental readiness	Appropriate foods and amounts to be added
8-10	<p>The infant is able to hold his/her own bottle.</p> <p>The infant is able to reach and to grab a spoon and food.</p> <p>The infant is able to sit unsupported.</p>	<p>Breast milk or infant formula on demand – 240 ml x 4 per day.</p> <p>Begin to introduce baby cereal or bread from the table – 30 ml x 4 per day.</p> <p>Introduce 2 portions of cooked and chopped vegetables (30 ml-45 ml) and 2 portions of chopped fruits (30 ml) per day.</p> <p>Add finely chopped meat portions – 15 ml x 4-6 per day.</p> <p>Introduce full-fat yoghurt</p>
10-12	<p>The infant is able to begin eating with a spoon but still spills food.</p>	<p>Breast milk or infant formula on demand – 240 ml x 4 per day.</p> <p>Baby cereal or bread – 30 ml x 4-6 per day.</p> <p>Introduce 3-4 portions of vegetables (30 ml-45 ml) and 3-4 portions of fruits (30 ml) per day.</p> <p>Add chopped meat portions: 15 ml x 4-6 per day.</p>

2.4.4 Breastfeeding and HIV

In women with HIV and acquired immune deficiency syndrome (AIDS), breastfeeding should be reassessed to prevent mother-to-child transmission of the virus through breast milk to the infant (WHO, 2009b:60). The feeding method in women with HIV and AIDS will depend on the individual circumstances of the mother as well as the HIV status of the infant after birth, because HIV can also be transmitted during pregnancy and the birth process (WHO, 2009b:59).

The WHO recommends that HIV-positive mothers on antiretroviral therapy (ART) should breastfeed exclusively for six months to reduce the risk of postnatal HIV transmission. Mothers living with HIV on ART should continue to breastfeed for at least 12 months and may continue for up to 24 months or longer. HIV-positive mothers who are mixed-feeding their infants should be reassured that ART reduces the risk for postnatal HIV transmission. Despite the fact that EBF is recommended, mothers (on ART) who practise mixed feeding

should not be advised to stop breastfeeding for the risk of HIV transmission while mixed feeding (WHO, 2016:3-4). Mothers or caregivers who choose to formula-feed their infants should do so only when they are able to formula-feed the infant exclusively for the first six months after birth, able to prepare formula with safe water and when there is adequate sanitation at household level and in the community, provide adequate infant formula milk to support the normal growth and development of the infant, prepare the formula frequently enough, ensure a low risk of diarrhoea and malnutrition easily access health care centres that offer extensive child health services; and if they are supported by family (WHO, 2016:8).

In developed countries, it would be safer to choose donor breast milk, to heat-treat breast milk from HIV-infected mothers or to provide formula milk to prevent the transmission of the virus to infants not infected with HIV. In developing countries, the risks and benefits of breastfeeding should be weighed up against formula milk. Formula milk provides less protection against infectious diseases and can be inappropriate or contaminated, which may lead to increased infant mortality risk than breastfeeding while on anti-retroviral (ART) medication in developing countries (American Academy of Pediatrics, 2012:e832; WHO, 2009b:59; WHO, 2016:6).

2.5 Legislation and the initiation of programmes to strengthen breastfeeding

An infant's first feed would be in a hospital or in a maternity facility, depending on the place of birth. Thus, the likelihood that breastfeeding would be initiated depends on the practices implemented in hospitals or maternity facilities. To promote, sustain, and improve breastfeeding practices in hospitals and maternity facilities, the WHO and UNICEF launched the International Code of Marketing of Breast Milk Substitutes in May 1981, as shown in Table 1.2 (WHO, 1981:8).

In the 20th century, commercial infant formulas were regarded as the norm; consequently, breastfeeding rates started to decline. The Innocenti Declaration was formed in 1990 when 30 countries gathered to create a global plan to improve and strengthen breastfeeding rates (UNICEF, 2018:20, 22). The Innocenti Declaration assisted with the implementation of the International Code of Marketing of Breast Milk Substitutes in different countries (UNICEF, 2018:17). The International Code of Marketing of Breast Milk Substitutes was also adopted

into South African legislation to support breastfeeding and to increase breastfeeding rates (SAJCN, 2011:1).

The WHO and UNICEF also launched the Mother-Baby Friendly Initiative (MBFI) in 1991. The MBFI initiative certifies hospitals as baby friendly if they implement all 10 steps to breastfeeding (Table 2.1) and comply with the International Code of Marketing of Breast Milk Substitutes in an effort to promote and to protect breastfeeding (Cox & Carney, 2017:281; WHO, 1981:8; WHO, 2009b:3). The MBFI was launched officially in ZA in 1994 and received Government participation in 1995 (Henney, 2013:3).

The World Health Assembly Resolution 65.6 endorsed a comprehensive implementation plan on Maternal Infant and Young Child Nutrition in 2012. This plan included six global nutritional targets for 2025. The fifth target aims to increase the rate of EBF in the first six months up to at least 50% (WHO, 2012a:60).

Healthy People is a national health-promotion and disease-prevention programme developed by the Department of Health and Human Services of the USA in 1979. The programme launches evidence based on nation health objectives to monitor and to improve the health of the nation. The programme set goals for year 2000, 2010 and 2020. New goals are currently being developed for 2030 (Office of Disease Prevention and Health Promotion, 2018:1).

The aim of all the above-mentioned world health authorities is to improve breastfeeding rates, which in turn may mean healthier populations.

Initially, Millenium Development Goals (MDGs) were developed with the aim of reducing with the problems of poverty and hunger. The Sustainable Development Goals (SDG's) build on successes of the MDGs and consist of 17 goals which were set by the United Nations General Assembly in 2015 to promote the prosperity of people while protecting the planet. These goals have to be reached by year 2030 (SDG's, 2018:1). The improvement of breastfeeding would help to reach SDG 2 (End hunger, achieve food security and improvement of nutrition and promote sustainable agriculture) and SDG 3 (Ensure healthy lives and promote well-being for all at all ages) (SDG's, 2018:1; Srinivas & Katsinde, 2016:144).

Table 2.3: The International Code of Marketing of Breast Milk Substitutes (WHO, 1981:8)

Article 1: Aim of the Code	Article 2: Scope of the Code
<p>The provision of safe and adequate nutrition for infants by protecting and promoting breastfeeding.</p> <p>To ensure the proper use of breast-milk substitutes based on adequate information and through appropriate marketing distribution.</p>	<p>The code applies to the marketing, practices, quality, availability, and information concerning the use of breast-milk substitutes, including infant formula, and other milk products, food, and beverages including complementary foods when marketed or presented to be suitable, with or without modification, for partial or total replacement of breast milk, feeding bottles, and teats.</p>

The Tshwane declaration of support for breastfeeding in ZA was made at the St George Hotel in Gauteng (ZA) on the 22nd and 23rd of August 2011. At the meeting, it was declared that ZA would actively promote and support EBF for the first six months of life (Republic of South Africa, 2015:33; SAJCN, 2011:1). The South African Government committed itself to take action by initiating and adapting all policies, legislation, and protocols to support breastfeeding. The International Code of Marketing of Breast Milk Substitutes was adopted into the legislation of the country to support breastfeeding. Legislation with regard to maternity leave for working mothers was reviewed to protect and extend maternity leave to promote a breastfeeding-friendly work environment (SAJCN, 2011:1).

Table 2.4: Ten steps to breastfeeding (Cox & Carney, 2017:282; WHO, 2009b:28-29)

Every facility providing maternity services and care for new born infants should:
<ol style="list-style-type: none"> 1. Have a written breastfeeding policy that is routinely communicated to all health care staff. 2. Train all health care staff in skills necessary to implement this policy. 3. Inform all pregnant women about the benefits and management of breastfeeding. 4. Help mothers initiate breastfeeding within half an hour of birth. 5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants. 6. Give new born infants no food or drink other than breast milk, unless medically indicated. 7. Practise rooming-in, that is, allows mothers and infants to remain together, 24 hours a day. 8. Encourage breastfeeding on demand.

- | |
|---|
| <ol style="list-style-type: none">9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic. |
|---|

The WHO developed an implementation manual to provide guidance on ending the inappropriate promotion of foods for infants and young children with the aim to promote, protect, and support breastfeeding. The goal is also to prevent obesity and non-communicable diseases and to promote healthy eating by ensuring that caregivers receive the adequate and accurate feeding information. Therefore, the promotion of foods for infants and young children is considered inappropriate if it contributes to obesity and non-communicable diseases, interferes with breastfeeding, causes dependency on commercial products, or if it is misleading. Seven recommendations are discussed in this document to provide guidance for parliamentarians, health policy makers, ministries responsible for trade and commerce, food and drug authorities, manufacturers, distributors of foods for infants and young children, and health professionals to be able achieve the main aim (WHO, 2017:1-51).

2.6 Maternal feeding

During lactation, the nutritional requirements of women increase. Milk production is affected by maternal hydration as well as the frequency and suckling of the infant. Milk composition varies according to the maternal diet. Research has found that fatty acids, vitamin D, selenium, iodine, water-soluble B-vitamins in breast milk may vary according to maternal intake. Thus, breast milk of malnourished mothers will be at risk for nutrient deficiencies (Ballard & Morrow, 2013: 4; Cox & Carney, 2017:283-284).

The production of 100 ml of milk (approximately 75 kcal or 315 kJ) requires 85 kcal or 357 kJ expenditure. A healthy breastfeeding mother can lose 1 pound (0.45 kg) per week and still produce an adequate volume of milk for her infant. Milk production will also decrease with suboptimal intake (intake less than 1800 calories or 4560 kJ per day) (Cox & Carney, 2017:283).

Breastfeeding mothers need to take an additional 25 g of protein per day (Cox & Carney, 2017:281). The recommended dietary allowance (RDA) for carbohydrates is 210 g per day but may be adjusted depending on activity and weight. There is no reported RDA for lipids during breastfeeding (Erick, 2012:366).

Tobacco smoking is not recommended for breastfeeding mothers because tobacco compounds such as nicotine is secreted into breast milk and will have an adverse effect on infants (Banderali et al., 2015:327; Primo et al., 2013:393; Rolfes et al., 2012:458). The amount of nicotine found in breast milk is more than double the nicotine found in maternal serum. This is a matter of concern because the evidence is limited about when infants develop the ability to metabolise nicotine after systemic absorption (Banderali et al., 2015:327). Maternal smoking during lactation will increase the risk of sudden infant death syndrome and sleep disruptions (Banderali et al., 2015:327; Rolfes et al., 2012:458). The risk of neurodevelopment and behaviour disorders, overweight and obesity, impaired homeostasis, and respiratory allergies will also increase (Banderali et al., 2015:327).

Alcohol consumption is not recommended for lactating mothers. Alcohol easily enters breast milk and can alter the taste of breast milk. Alcohol is not metabolised effectively by infants; therefore, a small amount of alcohol can cause sleepiness and may interfere with feeding. Alcohol may inhibit oxytocin production and in turn inhibit the let-down process (Bowen & Tumback, 2010:460; Rolfes et al., 2012:454). It is no surprise that infants will ingest 20% less milk in the first four hours after maternal alcohol consumption (Haastrup et al., 2013:171). Maternal alcohol consumption during lactation may have long-term negative effects on child development (Bowen & Tumback, 2010:460). Occasional alcohol intake may be within safe limits, but breastfeeding should be delayed for 2 hours (Bowen & Tumback, 2010:460; Rolfes et al., 2012:454).

Caffeine enters breast milk and may cause an infant to be more irritable and awake; therefore, caffeine consumption should not exceed 300 mg per day (Cox & Carney, 2017:285; Rolfes et al., 2012:454).

Infants may show intolerance such as fussiness or loose stools from food items the mother has ingested. It is advised that mothers should avoid the irritants such as cow's milk protein, cruciferous vegetables, carbonated drinks, or spicy foods temporarily until the infant's gastrointestinal tract is more mature (Cox & Carney, 2017:290).

2.7 Sociodemographic factors related to breastfeeding rates

A correlation has been found between the demographic factors (age, marital status, educational level, and socioeconomic status) of a mother and the initiation and duration of breastfeeding.

2.7.1 Breastfeeding rates according to age and educational level

Age will play a role in breastfeeding initiation, as mothers younger than 20 years have a lower breastfeeding initiation ratio compared to mothers older than 30 years (American Academy of Pediatrics, 2012:e828). Younger women are also more likely to breastfeed for a shorter duration (Li et al., 2008:S70, Santana et al., 2017:107). Healthy People 2020 (2017a) reported that older mothers (18 to 28 years) were 50% to 100% more likely to breastfeed than younger mothers aged between 12 and 17 years. Results from a low socioeconomic income group in ZA in a study by Pillay et al. (2017:1) also found an association between mothers younger than 17 years and early cessation of breastfeeding. According to Magnusson et al. (2016:439) and Peterson and DaVanzo (1992, cited in Jara-Palacios et al., 2015:2), younger women tend not to breastfeed or to stop breastfeeding early because they could have missed educational opportunities about breastfeeding; they are more likely to be less educated and not to have a social environment that supports breastfeeding. An older can also be associated with emotional stability and experience gained from previous pregnancies (Kronborg & Vaeth, 2004:215; Park et al., 2003, cited in Jara-Palacios et al., 2015:2, Santana et al., 2017:107;).

Conflicting results were found from a higher socioeconomic income group in South African and Ecuador as an association between maternal age and the duration of breastfeeding could not be found (Bester, 2006:91; Park et al., 2003, cited in Jara-Palacios et al., 2015:2).

An association has been found between low breastfeeding rates and the educational level of mothers. Tshikovhi & Gericke (2015:10) found a correlation between education level and knowledge about infant feeding in ZA. Participants with a lower education level were less knowledgeable about the correct infant feeding methods and about the benefits of breastfeeding. Slusser et al. (2004:168) and Li et al., (2008:S70) confirmed that mothers with a lower education level in the USA did not plan to breastfeed and were less likely to initiate breastfeeding. Thus, mothers with a lower educational level are less likely to breastfeed for

a longer duration or to exclusively breastfeed their infants (Bailey et al., 2008:176; Onah, 2014:1; Park et al., 2003, cited in Jara-Palacios et al., 2015:2; Santana et al., 2017:107).

2.7.2 Breastfeeding rates according to socioeconomic status

Numerous large-scale studies in the USA found a correlation between socioeconomic status and breastfeeding rates. A higher socioeconomic status was associated with higher breastfeeding initiation and breastfeeding rates in the USA (American Academy of Pediatrics, 2012:e828; Healthy People 2020, 2017c:1; Li et al., 2008:S70). Similar results were found in Myanmar for women from various socioeconomic backgrounds (Hmone et al., 2017:29).

Three studies performed in Nigeria, the United Kingdom (UK), and in ZA found conflicting results. A study in ZA with 55 participants from a high socioeconomic group could not confirm the above-mentioned finding, as no significant correlation between a higher income and a longer duration of breastfeeding could be found (Bester, 2004:93). Earl (1998:209) found that breastfeeding knowledge and thus breastfeeding ratios of 12 mothers in the UK were equal, irrespective of socioeconomic class. A study in Nigeria with 400 participants could not confirm an association between breastfeeding and higher socioeconomic status (Onah, 2014:1). The findings by Bester (2006:93), Earl (1998:209), and Onah (2014:1) correlate with the global breastfeeding statistics that were reported by the WHO (WHO, 2010:104-113; WHO, 2012b:110-111). The results given in Table 2.5 show that mothers with a higher income did not have higher rates for EBF at six months.

A Swedish study that collected data from 51 425 infants from 2004 to 2010 found a reverse trend where mothers from a high socioeconomic status increasingly and intentionally chose to breastfeed, whereas mothers from a lower socioeconomic class had not followed the trend until 2010 (Magnusson et al., 2016:439).

Table 2.5: Global Breastfeeding rates (WHO, 2010:104-113; WHO, 2012b:110-111)

Income Group	Exclusive breastfed infants at 6 months (%)		
	2005-2011	2000-2009	2007-2014
Low income	42	38	47
Lower middle income	38	37	33

Upper middle income	?	34	29
High-income	16	12	-

2.7.3 Breastfeeding rates according to marital status

Married or cohabiting mothers are more likely to plan to breastfeed their infants (Magnusson et al., 2016:439; Slusser et al., 2004:168). They also have higher rates for EBF in comparison with single, divorced, and separated mothers (Healthy People 2020, 2017b; Magnusson et al., 2016:439). Married mothers are also more likely to have an increased duration of breastfeeding (Li et al., 2008:S70; Odom et al., 2013:e728).

2.8 Breastfeeding knowledge, attitudes and practices related to breastfeeding

To plan programmes and interventions to promote EBF, the factors that affect breastfeeding need to be investigated (Hector et al., 2005:52). The conceptual framework of factors affecting breastfeeding practices was developed by Hector et al. (2005:52). The framework was developed to guide researchers to conduct comprehensive studies on factors affecting breastfeeding practices. These factors are categorised as individual-level factors, group-level factors and society-level factors (see Figure 1).

Andrew & Harvey (2011:52) found that the factors affecting breastfeeding practices among mothers in the UK include knowledge and the role of health care professionals, family and social influences, independence, physical capability, self-identity, and lifestyle. The conceptual framework by Hector et al. (2005:52) (see Figure 2.1) illustrates the above-mentioned factors and categorises them as individual-level factors, group-level factors, and society-level factors. Lancet (2016:3) published a similar framework.

A CONCEPTUAL FRAMEWORK OF FACTORS AFFECTING BREASTFEEDING PRACTICES

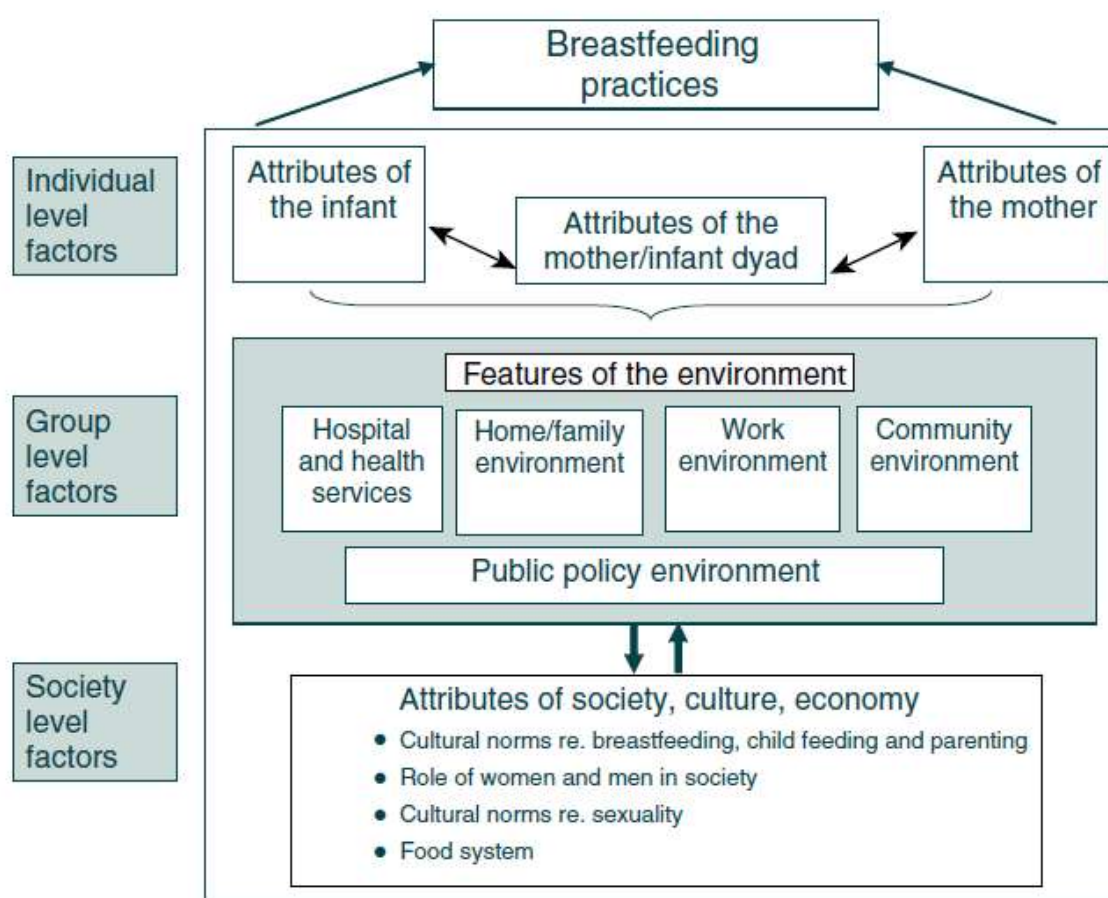


Figure 2.1: Conceptual framework of the factors affecting breastfeeding practices (Hector et al., 2005:53)

2.8.1 Individual-level factors

A decision is based on individual-level factors that are associated with the mother, infant, and the mother-infant pair (Hector et al., 2005:53; Rollins et al., 2016:492). Individual-level factors include the mother's knowledge about breastfeeding, her intention to breastfeed, her parenting skills and experience, her birth experience, her and the infant's health status, and the nature of early interaction between her and the infant. These factors can overlap with sociodemographic variables (Hector et al., 2005:53).

2.8.1.1 Attributes of the infant

Brown et al. (2014:e184), Li et al. (2008:S69), and Kirkland and Fein (2003:278) found that the reasons for the cessation of breastfeeding varied according to the age of infants.

Preterm babies have significantly lower duration of breastfeeding compared to term babies (Ericson et al., 2016:1). Preterm infants, depending on their gestational age, will have immature sucking behaviour and will find it difficult to coordinate breathing and swallowing simultaneously, which will delay EBF as preterm infants often need to be fed with expressed breast milk by means of a tube (Ericson et al., 2016:2).

Brown et al. (2014:e184) and Kronborg & Vaeth (2004:219) reported that women were more likely to stop breastfeeding after the first six weeks after birth.

2.8.1.2 Attributes of the mother

i. Psychological factors and intention to breastfeed

Psychosocial variables such as self-esteem and self-efficacy are associated with breastfeeding rates. Mothers with an intention to breastfeed will have a high sense of self-efficacy (confidence or a belief that they can succeed in breastfeeding) (Bailey et al., 2008:177; Cox et al., 2015:1; Kronborg & Vaeth, 2004:215). O'Brien et al. (2009:62) found that self-efficacy was one of the most important factors to contribute to breastfeeding. A large descriptive study by Vari et al. (2013:604) on students found that breastfeeding attitude significantly influenced breastfeeding initiation and beliefs. They concluded that by portraying breastfeeding as a loving behaviour instead of focusing on important facts about breastfeeding would influence breastfeeding attitudes in the community positively (Vari et al., 2013:604). A mother's independence is another personal factor that may influence her choice or intention to breastfeed or not. Factors such as not having to shop, prepare, clean, or heat breast milk, as they would with formula milk, have a positive influence on the choice to breastfeed (Andrew & Harvey, 2011). A South African study on a similar income group found that mothers did not feel less independent with breastfeeding, but agreed that social support would increase their independence (Bester, 2006:78). In contrast, some mothers believe that breastfeeding decreases their independence, as they need to breastfeed at home to avoid embarrassment or disapproval from the public (Earl, 2002:212-213; Kong & Lee, 2004:376). A study in Hong Kong confirmed that mothers felt that breastfeeding decreased their independence. The mothers reported that they felt "socially tied down". This created a potential problem for mothers in Hong Kong, as it was believed that mothers should not be tied down to family (Kong & Lee, 2004:347). To increase their independence, mothers were forced to initiate formula feeding. Mothers who formula-fed their children

felt more independent and in control, as they could determine feeding routines. Not all mothers succeeded with expressing breast milk, and some mothers found that it would be inconvenient and embarrassing to breastfeed at work (Andrew & Harvey, 2011:52, Kong & Lee, 2004:347). Both these studies confirm the reasons why breastfeeding rates are lower than the goals set by the World Health Assembly (UNICEF & WHO, 2017:1).

ii. Knowledge about breastfeeding

Studies in high socioeconomic areas in South African, Hong Kong, Myanmar, and the USA concluded that mothers did not breastfeed because of a lack of knowledge about breastfeeding (Bester, 2006:99; Earl, 2002:209; Hmone et al., 2017:29; Hong, 2015:42; Kong & Lee, 2004:372; Kronborg & Vaeth, 2004:215). Sibeko et al. (2005:35) found that most mothers in a low socioeconomic area in ZA decided to breastfeed because of the health benefits associated with breastfeeding. Although mothers may be knowledgeable about breastfeeding, mothers from a low socioeconomic area in ZA and Mexico perceive breastfeeding as a feeding method for poor people (Mgolozeli & Shilubane, 2015:90, Swigart et al., 2017:22). A study in Nigeria on mostly a lower socioeconomic income group found conflicting results because knowledge about breastfeeding did not reap higher EBF results (Onah et al, 2014:3).

South African mothers from a high socioeconomic area made an informed decision to breastfeed or to use formula feeding because they were mostly knowledgeable about factors such as smoking, alcohol, and medication consumption that could affect the composition of breast milk negatively (Bester, 2006:72). Only a small percentage of woman used smoking and medication as a reason for the cessation of breastfeeding in the USA (Li et al., 2014:S74).

Myths about breastfeeding can influence a mother's decision to breastfeed negatively. These myths include the notion that the size of breasts are unsuitable for breastfeeding, nipple size, inverted nipples, fear to lose her figure, the notion that breastfeeding causes sagging breasts, and the fear of contracting breast cancer (Bester, 2006:76; Hector et al., 2005:52; Kong & Lee, 2004:373). Mothers who are embarrassed or who have body and breast shape concerns are less comfortable with initiating breastfeeding or to breastfeed in public (Johnston-Robledo & Fred, 2008:14). Some lactating mothers believe that breastfeeding will cause sagging breasts. Breasts will swell and will become enlarged after

birth but will shrink back to the pre-pregnancy size with proper support, diet, and exercise. Aging will change breast shape and size, but the process will not be accelerated with breastfeeding (Rolfes et al., 2012:459).

The myth or perception of insufficient milk is one the most commonly reported reasons worldwide to stop breastfeeding (Brown, 2014:e184; Hector et al., 2005:52; Jara-Palacios et al., 2015:2; Li et al., 2008:S74; MacIntyre et al., 2016:70; Madiba et al., 2015:36; Mgozeli & Shilubane, 2015:87; Odom et al., 2013:e729; Sun et al., 2017:359; Swigart et al., 2017:22; Tenfelde et al., 2013:213; Yotebieng et al., 2013:5). When a mother is not confident that she is supplying sufficient milk to feed her infant enough milk, she is more likely to stop breastfeeding, regardless of the age of her infant. In many cases, the perception of insufficient milk supply can be a lack of knowledge about lactation or a technical difficulty rather than the inability to produce enough milk (Li et al., 2008:S72-74). Insufficient milk supply is truly a myth or a misperception, since fewer than 5% of women are biologically incapable of producing sufficient milk (Neifert et al., 1990, cited in Odom et al., 2013:e729).

To understand the true reasons for insufficient milk supply, the physiology of milk production should be understood. The rapid drop in oestrogen and progesterone production after birth and an increased prolactin secretion sets the stage for milk production. Prolactin is modulated from the anterior pituitary of the central nervous system, which stimulates milk production, and oxytocin from the posterior pituitary stimulates mammary gland contraction, causing milk ejection. This process is known as a letdown process. Oxytocin is released by tactile, visual, olfactory, and auditory stimulation and inhibited by physical and emotional stress, pain, fatigue, and anxiety (Cox & Carney, 2017:286). Skin-to-skin care will stimulate the milk letdown process (Cox & Carney, 2017:286).

Thus, the cause of insufficient milk supply can descend from the mother (poor letdown or poor production) or from the infant (high energy requirements due to defects or diseases, low intake due to disease or poor intake due to poor latching, infrequent feeding, or craniofacial abnormalities). One of the most common actual reasons for insufficient milk supply can occur when a mother is stressed. When there is physical or emotional stress and no psychological relaxation, the milk letdown process can be inhibited (Cox & Carney, 2017:286; O'Brien et al., 2009:61). Therefore, it is important to identify whether insufficient

milk supply is a physiological or psychological problem and to address it accordingly (Sun et al., 2017:363). Women with an increased risk for low or delayed milk production caused by a low prolactin production include women who are obese, have diabetes, women with retained placental fragments in the uterus, and women who are stressed during delivery (Cox & Carney, 2017:286). Mothers that were unsure about the quantity and quality of breast milk that the baby was receiving were less anxious with the initiation of formula milk (O'Brien et al., 2009:61). It was no surprise that 50% of US mothers with the perception that they supplied insufficient amounts of milk changed to the supplementation of formula milk. The suckling-induced pulsatile oxytocin release, which is not stimulated enough by the infant on formula in conjunction with breastfeeding (mixed feeding) will lead to actual reduction in milk production (Cox & Carney, 2017:286; Lessen & Kavanagh, 2015:447).

Bester (2006:76) found conflicting results from mothers in a high socioeconomic class who formula-fed their children because they were well aware of the myths about breastfeeding. The myths about breastfeeding influenced neither their choice of feeding method nor the low breastfeeding rates in ZA, as depicted in the study.

Mexican mothers' believe that infants will not be satisfied with breast milk only and therefore give infant formula feeding and food to supplement breast milk. Another belief is that infants need water in addition to breast milk to improve hydration; therefore, teas will be introduced soon after birth (Swigart et al., 2017:22).

To improve the knowledge of mothers about breastfeeding, studies performed in low socioeconomic and upper-low socioeconomic areas recommend antenatal breastfeeding counselling and the initiation of early postnatal lactation programmes (Goga et al., 2012:12; & Perkar, 2012:38). According to a Cochrane review with 24 trials with 10 056 women, there was no evidence that antenatal breastfeeding education could improve the initiation of breastfeeding or EBF at six months in a high socioeconomic income group (Lumbiganon et al., 2016:1). More randomised control studies on high and low-socioeconomic areas are necessary to determine if antenatal counselling should be initiated.

iii. Previous experience

Kronborg and Vaeth (2004:210), Li et al. (2008:S70), and Andrew and Harvey (2011:56) found an association between primiparous babies and a shorter duration of breastfeeding.

Difficulty with breastfeeding the first child often leads to using formula feeding to feed the mothers' second child (Andrew & Harvey, 2011:56).

iv. Health status

Mothers with a lower health status who need to take medication were associated negatively with breastfeeding rates (Li, 2008:574; Odom et al., 2013:e726; Saha, 2018:9). Maternal obesity and perinatal depression can influence breastfeeding negatively (Rahman et al., 2015:25; Tenfelde et al., 2014:181). Perinatal depression was associated with early discontinuation of breastfeeding among mothers from a low socioeconomic class in Pakistan (Rahman et al., 2015:253).

2.8.1.3 Attributes of the mother-infant dyad

Kong and Lee (2004:372) found that the majority of woman, 221 or 96.1% in a study in Hong Kong, believed that breastfeeding created a bond between mothers and their infants. This had a positive influence on the decision to continue breastfeeding.

A relationship has been found between complications during pregnancy and caesarean section deliveries and a delayed initiation of breastfeeding (Bai et al (2016:492; Chaplin et al., 2016:147; Takahashi et al., 2017:1; Tenfelde et al., 2016:8). Caesarean section deliveries are also associated with a shorter duration of breastfeeding and lower rates for EBF (Hobbs et al., 2016:8; Khasawneh & Khasawneh, 2017:4; Onah et al., 2014:1). The global increase of caesarean section deliveries over the past two decades can be a barrier to breastfeeding if it is not addressed timely. In Canada, the rate of caesarean section deliveries has increased from 17.6% in 1995 to 27.1% in 2012 (Hobbs, 2016:2). However, Siziba (2014:57) could not find an association between caesarean section deliveries and the initiation of breastfeeding in a South African population. To improve the early initiation of breastfeeding, added support for breastfeeding for women with caesarean section deliveries or for women with complications is needed (Takahashi et al., 2018:1).

2.8.2 Group-level factors

According to Hector et al. (2005:53), group-level factors are environmental attributes that affect a mother's choice to breastfeed directly. These environmental attributes include promotion of breastfeeding by hospital and health facilities, household characteristics (such as family size, family circumstances and responsibilities, partner support, etc.), and public

policies (i.e., childcare allowances, paternity leave policies) (Bester, 2006:80; Hector et al., 2005:53; Rollins et al., 2016:492).

The opinion of family members and health care professionals play a fundamental role in a mother's decision to breastfeed (Bester, 2006:82; Odom et al., 2014:1204; Tshikovhi & Gericke, 2015:8). Seventy-five percent of mothers in a high socioeconomic group in ZA have based their decision on the advice of others (Bester, 2006:78).

A study by Simpson et al. (2016:1-6) was the first to use a mobile application for data collection in the UK. The study examined a mother's experience of breastfeeding in public and found that 80% of mothers had a positive public breastfeeding experience in the UK.

2.8.2.1 Hospital and health services

Faber and Benade (2007:19) found that community health workers played the biggest role in promoting breastfeeding in a low socioeconomic setting in ZA. Nurses also significantly influenced a mother's feeding choice in a low socioeconomic setting in ZA (Chaponda et al., 2017:1). In a Swedish setting, it was found that the midwife and a nurse played a significant role in promoting breastfeeding. Mothers will often decide before birth whether they will initiate breastfeeding or formula feeding or how long they will breastfeed (Andrew & Harvey, 2011:56; Magnusson et al., 2016:439). Thus, the midwife and the nurse will play an important role to convey adequate knowledge to a mother in order to make an informed decision (Magnusson et al., 2016:439). Hospitals and clinic visits serve as primary end points for intervention to promote breastfeeding, because mothers may decide to stop breastfeeding at hospitals if they experience maternal and child health problems (Jama et al., 2017:2; Odom, 2013:e731). Health workers in ZA may be lay health workers, or enrolled or registered nurses. In ZA, there are still inconstant breastfeeding messages, especially in the context of HIV and breastfeeding (Jama et al., 2017:2). Therefore, paediatricians and health care providers who work at hospitals and clinics play a crucial role in correcting myths about infant feeding and in promoting breastfeeding (Mnyani et al., 2017:9; Odom, 2013:e731).

2.8.2.2 Home and family environment

Mphego et al. (2014:289) found that feeding practices of mothers living in large households in poorly resourced communities in Mpumalanga in ZA were influenced highly by family

members. A mother's autonomy was weakened if she was single and unemployed, which lowered her chance of EBF. Despite the willingness to breastfeed exclusively, mothers had fears about ignoring cultural practices. Similar results were found by Osman et al. (2009:4) on Lebanese mothers. Lebanese mothers are highly influenced by family members, especially by the grandmother. Grandmothers would discourage mothers to breastfeed, as they are biologically incapable to breastfeed. It may be possible that the grandmother believed that if her daughters could breastfeed successfully, it would reflect negatively on their own ability to breastfeed.

A father's role in supporting breastfeeding mothers is an example of a social factor that is reported to influence the mothers' choice to breastfeed (Andrew & Harvey, 2011:52; Bester, 2006:77; Hector et al., 2005:53; Kong & Lee, 2004:345). Paternal support will not only influence initiation of breastfeeding but will have a positive influence on the duration of breastfeeding (Li et al., 2014:S74). According to Kong & Lee (2004:345), formula milk would make the support from the father easier and more feasible to feed and bond with the child. The situation in ZA is different, as 80% of mothers agreed that their husbands encouraged them to breastfeed and stated that fathers did not feel left out if a mother were to breastfeed her child. Although mothers were encouraged by fathers to breastfeed, two thirds of the mothers still agreed that they considered using formula milk when the method of feeding was chosen, as they could share workload (Bester, 2006:78). Mothers that are aware that an infants' father or doctor believed that breastfeeding and formula feeding were equal was associated with a lower breastfeeding initiation rate (Odom et al., 2014:1204). These factors would also include the father's viewing of open breasts, sexuality, and the usage of breast milk substitutes (Hector et al., 2005:53).

Mothers also believed that older children would play a role in their decision, as she would not be able to breastfeed in public with her older children. Many mothers mentioned that breastfeeding is a time-consuming process that would not allow them enough time to take care of their older children (Andrew & Harvey, 2011:52).

Family support is an important factor in initiating and practising breastfeeding successfully. It is important that health care practitioners must identify incorrect family beliefs and a lack of support in antenatal classes and address them accordingly (Osman et al., 2009:4).

2.8.2.3 Work environment

The work environment (whether it supports flexible work hours or not, maternity leave days and a lactation-friendly environment) is also an attribute that will greatly influence breastfeeding outcomes (American Academy of Pediatrics, 2012:e836; Bai et al., 2016:492; Bester, 2006:80; Healthy People 2020, 2018:1, S69; Hector et al., 2005:53; Kozhimannil et al., 2016:6-7; Odom et al., 2013:e729; Sizaba, 2014:47;; Yotebieng et al., 2016:492). Mothers who have longer maternity leave, return part-time, and have more flexible working hours are more likely to breastfeed exclusively (Frans et al., 2015:823; Mirkovic et al., 2014:6; Monteiro et al., 2017:478). Workplace laws to improve the work environment were associated with a longer duration of breastfeeding among mothers (Roe et al., 1999:167; Smith-Gagen et al., 2014: 2041). Slusser et al. (2004:168) found that a supportive breastfeeding environment could help mothers to express breast milk efficiently. They also found that breastfeeding mothers did not work less than mothers with older infants did. Thus, a breastfeeding-friendly workplace benefits the employer and employee.

2.8.2.4 Community environment

In Mali in Western Africa, Sierra Leone, and Nepal, breasts have no sexual connotation, and woman expose their breasts freely and without reservation in public. This atmosphere makes breastfeeding in public socially acceptable. On the contrary, in countries such as the USA, UK, China, and ZA, breasts are associated with sexual behaviour and pleasure, and breastfeeding must take place only in a private place, the same as with sexual behaviour (Daglas & Antoniou, 2012:356).

Studies in the UK confirmed that the public perception about breastfeeding played a crucial role in a mothers' feeding choice. A descriptive, cross-section study by Earl (2002:212) on 19 women in the UK found that most mothers perceived breastfeeding as "out of place" in the modern society. The author also mentions that the women experienced breastfeeding as embarrassing, disgusting, and inconvenient (Earl, 2002:212). Andrew and Harvey (2011:52) obtained similar results on 12 women from the same population interviewed a few years later. Many mothers felt uncomfortable about feeding in public, as they were uncertain about the approval of breastfeeding in public. This left mothers with the decision to breastfeed only at home or to use formula milk. On the other hand, mothers who used formula feeding for their children were concerned about judgement of not breastfeeding in

public. These social factors can explain why rates for EBF (Table 1.1) at six months in the UK, are the lowest in the world.

Breastfeeding in public is regarded as unacceptable in a Chinese population and in Nigeria (Kong & Lee, 2004:375; Wanjohi et al., 2017:5). In Nigeria, women fear that the “evil eye” will look at them in public and will cause their milk to dry up or that the mother will develop breast sores (Wanjohi et al., 2017:5). Similar results were obtained in a South African population. Bester (2006:79) found that half of the mothers believed that breastfeeding in public was unacceptable, irrespective of the belief of most of the mothers (n=53/96.36%) that breastfeeding is a natural human activity.

2.8.2.5 Public policy environment

Paid maternal leave protects the relationship between the mother and the infant, which would facilitate breastfeeding (Cooklin et al., 2012:249). Countries with longer paid maternity leave will have a beneficial influence on breastfeeding rates, as shown in Table 2.6. Canada increased its paid maternity leave from six months to one year, depending on length of employment and the hours worked. This resulted in an increase in breastfeeding rates at six months by 40%. In Norway, the paid maternity leave increased from 10 weeks to 40 weeks, resulting in an increase in breastfeeding rates at six months from 10% to 80% (Abdulloeva & Eyler, 2012:773). Karmaus et al. (2017:1) recommended an increase in the duration of maternal leave in USA.

Table 2.6: Summary of global maternity leave in 2016

Reference	Country	Paid Maternity leave (weeks)			Exclusive breastfeeding 6 months (Goal=50%)
		Weeks	Average payment rate	Full rate equivalent in weeks	
South Africa. Department of Law, 2018. WHO, 2018a:1 SADH, 2016:28;	South Africa	17	-	-	32%
OECD, 2018 Statistics Canada	Canada Government of Canada	17-52	48.4	9.6	89%
Government of the UK WHO, 2018a:1	UK	39	30.9	12.1	< 1%
OECD, 2018	Australia	18	42.3	7.6	15.0%

OECD, 2018	Mexico	12	100	12	14.4%
OECD, 2018 WHO, 2018a:1	USA	12	-	-	22.3%
OECD, 2018	Japan	14	67	9.4	54%

Maternity leave in ZA is 17 weeks, as noted in Table 2.6; however, maternity leave does not always include payment. South African mothers are allowed to have 30-minute breaks per day for breastfeeding or expressing milk for the first six months (SA, 1998:4). Currently, no studies are done in South Africa on mothers and their knowledge about breastfeeding rights in the workplace.

2.8.3 Society-level factors

The acceptability of breastfeeding can also be influenced by society-level (or social) factors (Bester, 2006:77; Hector et al., 2005:53; Johns et al., 2013:1; Mphego et al., 2014:289). The Centers for Disease Control and Prevention (CDC) (2017:1) published data that clearly showed how EBF until six months of age differed among different cultures in the American population. The results compiled in Table 1.1 strongly support this statement. The comparison of rates for EBF in ZA and its neighbouring countries (Swaziland, Namibia, Lesotho, and Zimbabwe) clearly show that race/ethnicity can influence EBF ratios.

Different cultures have different myths and beliefs that influence feeding patterns (Bandyopadhyay, 2009:4-6; Castro et al., 2014:1845; Mphego et al., 2014:11.). Myths and beliefs are poorly documented and some of the information as discussed below may be outdated, the information should therefore not be generalised.

Irish mothers have a lower breastfeeding initiation percentage compared with non-Irish mothers and initiate complementary food much earlier than mothers with Chinese or Asian backgrounds do. Interestingly, Chinese and Asians have higher breastfeeding rates, which suggest a relationship between early introduction of complementary feeds and low breastfeeding rates (Castro et al., 2014:1844).

In India, the mother and infant should be isolated from the rest of the household immediately because of the “impurity and polluting effects of childbirth”. Other mothers believe they should be kept under isolation to protect the infant and to allow enough time for bonding and the mom to rest after birth. In the Indian population, food taboos are a

common practice. Women would avoid certain food items that to their belief would be harmful for the infant. Women would avoid food that in their opinion have laxative effects, is cold, can cause rash, and is acidic. Some women believe in “special” food items that would improve their health and that would increase production of breast milk (Bandyopadhyay, 2009:4-6).

In the Muslim community, mothers have to follow a 40-day diet that is believed to improve the mother’s and infant’s health. Initiation of breastfeeding was delayed in villages because breastfeeding was believed to be insufficient and harmful to the infant (Bandyopadhyay, 2009:4-6). Certain cultures in India, Turkey, Ibadan, Guinea-Bissau, Kenya, and Nigeria regard colostrum as harmful to the infant; therefore, it is not given to infants but rather expressed and discarded (Bandyopadhyay, 2009:4-6; Ergenekon-Ozelci et al., 2006:147; Wanjohi et al., 2017:4). In these communities, breastfeeding is delayed, and glucose water and herbal preparations are given to infants. It was also found that mothers avoided breastfeeding their infants after they had worked in the sun and to stop lactation if they fell pregnant again (Ergenekon-Ozelci et al., 2006:147).

In Nigeria, it is a cultural belief that boys are not breastfed and that breastfeeding for a long duration is counterproductive (Wanjohi et al., 2017:4).

In Nepal, a herbal drop (janamghuti) is given to infants from 1 month to clean the stomach of an infant by inducing vomiting (Ulak et al., 2012:7). Lebanese women believe that they can hurt their infants with breastfeeding, they also believe that they have inherited the ability to produce “bad milk” and that abdominal cramps can be transferred from the mother to the infant through breast milk (Osman et al., 2009:4).

In Mexican communities, it is believed that food and drinks affect production of breast milk. *Caldo* (broth) and *atole* (a traditional hot drink) were believed to promote the production of breast milk and that spicy food and some cold foods would impede milk production (Swigart et al., 2017:22).

In Bangladesh, it is believed that when a breastfeeding baby falls ill, it can be attributed to the mother’s behaviour. It is believed that the mother behaved in such a way that made her and the infant vulnerable to spiritual powers that will affect breast milk. The only way to send the powers away is to initiate artificial feeding (Daglas & Antoniou, 2012:355).

Low-income African-American mothers believe that breastfeeding is expensive, because mothers must eat healthy to provide nutritionally adequate breast milk. They also believe that breastfeeding would make their children too attached to them (clingy). Breastfeeding is considered natural but still not a cultural norm among African-American mothers (Kim et al., 2017:S151).

Mphego et al. (2014:289) found that women from a low-income environment in Mpumalanga in ZA were highly influenced by family members to give solids, water-based formulas, and complementary and traditional medicines from an early age. Despite the pressure from family members, most mothers practiced EBF with the desire to protect their babies from HIV transmission.

2.9 Formula feeding

Formula feeding is often the preferred alternative to infant feeding for various reasons (McKean & Mazon, 2017:305). Despite efforts to increase breastfeeding rates, formula feeding still forms a large part of mothers' feeding practices in general.

2.9.1 The history of formula feeding

Infant formula feeding is prepared to mimic the composition of breast milk (Martin et al., 2016:1). The recipe for infant formula feeding has changed over the years and is ever changing in order to perfect the formula, as shown in Table 2.7.

Table 2.7: Timeline of the development formula feeding

Reference	Year	History
Stevens et al., 2009:35 Castilho & Filho, 2010:183	1856	Dr Gale Borden invented condensed milk.
Stevens et al., 2009:36 Deckelbaum et al., 2004:42 Castilho & Filho, 2010:183	1865-1867	Dr Justus von Liebig developed the first commercial infant formula of cow's milk, wheat, malt and potassium bicarbonate.
Castilho & Filho, 2010:183	1883	No advantage found with using evaporated milk.
Barness, 1987:169	1885	AV Meigs first analysed breast milk: 1.1% protein, 4.7% fat, 6.2 % sugar.
Castilho & Filho, 2010:183	1890	Pasteurisation of milk.

Reference	Year	History
Stevens et al., 2009:36	1920	Development of non-milk formulas for infants allergic to cow's milk.
Stevens et al., 2009:37 Deckelbaum et al., 2004:42 Castilho & Filho, 2010:183	1929	American Medical Association formed a committee to regulate safety and quality of formulas. First soy formulas were commercially available.
Deckelbaum et al., 2004:42	1959- 1960s	Iron fortification was introduced. Renal solute load was considered with infant formula. Whey:casein ratio formulated to be similar to breast milk.
Stevens et al., 2009:37; Cutler & Wright, 2002:43	1970-1988	Sales representatives from a well-known company dressed like nurses and provided free samples of formula milk without proper instructions, leading to many infant deaths. Direct marketing to the public led to tension between the medical profession and formula manufactures and resulted in a worldwide boycott of the company.
Cutler & Wright, 2002:43 Stevens et al., 2009:37 Deckelbaum et al., 2004:42	1990	The company started advertising on television because they could not access doctors and specialists. The American Academy of Pediatrics launched the marketing code. Nucleotide fortification was introduced to infant formulas.
Deckelbaum et al., 2004:42	2000s	Long-chain polyunsaturated fatty acid was introduced to infant formulas.

As the world population is increasing, the demand for infant formula feeding is also increasing. Infant formula feeding is a \$50 billion (an estimated R703 billion at R14.07 to the US dollar) industry and is expected to be the fastest-growing packaged food category over the next five years (Martin et al., 2016:5).

2.9.2 Advantages and disadvantages

2.9.2.1 Advantages

EBF until six months remains the golden standard, but formula feeding can be life-saving for infants and mothers with certain conditions when breastfeeding is permanently or temporary contraindicated, as mentioned above. Infants born with a very low birth weight (< 1500 g), born less than 32 weeks of gestational age, and newborns with a hypoglycaemia risk may require other food/formula feeding in addition to breast milk for this limited period (Rolfes et al., 2012:457-458; WHO, 2009:7-9).

2.9.2.2 Disadvantages

Breast milk has a perfect composition that is low in protein and has a high bioavailability of minerals to suit the immature digestive system of an infant. Breast milk also provides factors that formula milk does not provide, such as immunological cells (monocytes, NK cells, T cells, B cells, neutrophils, eosinophils, and immature granulocytes) and appetite-regulating hormones to support the development of a healthy gut biome (Ballard & Morrow, 2013: 23; Lessen & Kavanagh, 2015:445). Breast milk contains oligosaccharides that are a natural example of a prebiotic that will provide digestive and immune health (Ballard & Morrow, 2013: 23; Lessen & Kavanagh, 2015:4453; Vandenplas et al., 2015:11). Breast milk oligosaccharides will provide indirect immunity to the infant by serving as a substrate for gut bacteria (probiotic) and by stimulating the infant gut production of immunoglobulin A which will interfere with pathogen binding (Ballard & Morrow, 2013:23; Lessen & Kavanagh, 2015:445; Martin et al., 2016:7). Breast milk stem cells were discovered in 2007; future studies still have to reveal the potential benefits (Briere et al., 2016:1; Witkowska-Zimny & Kaminska-El-Hassan, 2017:6). Formula milk will not provide all of the above-mentioned benefits. Galacto-oligosaccharide and fructo-oligosaccharide are currently added to formula milk to imitate the effect of breast milk oligosaccharides, but their structure differs from breast milk and potentially their effects as well (Ninonuevo & Bode, 2008:10).

The use of powdered infant milk formula will always have a microbial risk because milk formula cannot always be produced and packed in a sterile environment. The risk to obtain low numbers of microorganisms such as *E. sakazakii* in formula milk will always be evident. *E. sakazakii* will cause Necrotizing enterocolitis (NEC), bacterial meningitis, neonatal sepsis,

and inflammatory diseases in the gut that can result in mortality or severe neurological disorders (Goldberg, 2009:504).

2.9.3 Regulation of infant formula

All types of formula must meet global standards, as recommended by the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), which is commissioned by the Codex Alimentarius International Food Standards (CODEX STAN 72-1981) (FAO & WHO, 2016:2; Koletzko et al., 2005:584; Owens et al., 2012:1). The Codex Alimentarius is compiled by the World Health Organisation and the Food and Agriculture Organisation of the United Nations to standardise the composition for infant formula and formulas for medical purposes intended for infants. When applying the above-mentioned standards, the recommendations of the International Code of Marketing of Breast Milk Substitutes, the Global Strategy for Infant and Young Child Feeding, and World Health Assembly resolution WHA54.2 should be taken into consideration (FAO & WHO, 2016:2).

2.9.4 Types of infant formula

As indicated above, the recipe for infant formulas has changed as a result of consumer demands and advances in technology. Infant formulas can be categorised as term, preterm, enriched, soy, lactose-free, hypoallergenic, nonallergenic, antireflux, and toddler formulas (O'Connor, 2009:565).

2.9.4.1 Term/standard formula

Term formulas are modulated to have a composition close to breast milk and are recommended for most infants (O'Connor, 2009:565). Term formulas will contain 20 kcal per 30 ml or 84 kJ per 30 ml (O'Connor, 2009:565). Term or standard formulas will have a 30% fat content (Hong, 2018:155). Lactose is the carbohydrate source of most formulas, and cow's milk is a protein source. The ideal term formulas should be fortified with iron to prevent iron deficiency anaemia. Formulas with long-chain polyunsaturated fatty acids such as arachidonic acid and docosahexaenoic acid are the most common recently added to formulas (O'Connor, 2009:565).

2.9.4.2 Preterm and enriched formula

Preterm infants have increased protein and energy requirements. Phosphorous, calcium, and magnesium will be transferred *in utero* during the third trimester. Thus, preterm infants will have increased requirements of these minerals. Preterm formulas contain 24 kcal/100.8 kJ per 30 ml, and enriched formulas contain 22 kcal per ounce (92.4 kJ per 0.03 kg) (O'Connor, 2009:565).

2.9.4.3 Specialised term formula

i. Soy formula

Soy formulas are indicated for galactosemia and hereditary or primary lactase deficiency. The formulas do not contain lactose, as corn maltodextrin will be the carbohydrate source of most formulas and the protein isolated from soybeans as protein source, which makes them free of lactose and cow's milk protein (Hong, 2018:156; O'Connor, 2009:565). The fat content is similar to standard formulas. Soya contains isoflavones, which is a phytoestrogen. Phytoestrogen content is a cause for concern with regard to neurobehavioral and sexual development (Hong, 2018:155). Soy-based formulas contain 600-1300 ng/ml of aluminium, almost 10 times more than breast milk (4-65 ng/ml). Aluminium may interfere with calcium absorption in premature infants and is therefore contraindicated for premature infants. Infants with cow's milk protein allergy may show sensitiveness to soy or may have a soy protein allergy (10-14% of these infants); therefore, hydrolysed cow's milk protein and amino acid-based formulas have proved to be more effective and should be the first-line treatment option for treating cow's milk protein allergy (Hong, 2018:156; Owens et al., 2012:29).

ii. Lactose-free formula

Lactose-free formulas are indicated for galactosemia, congenital lactase deficiency, primary lactase deficiency, and secondary lactase deficiency after acute gastroenteritis. Lactose intolerance is often over diagnosed in infancy because lactose intolerance is most likely to develop after 12 months of age (O'Connor, 2009:565; Hong, 2018:155). Temporary lactase deficiency can also be caused by acute gastroenteritis; therefore, lactose-free formulas are also indicated for acute gastroenteritis (Hong, 2018:155; O'Connor, 2009:565). However, not all infants with acute gastroenteritis present with lactose intolerance and recover with

breastfeeding or on a standard formula. The formula does not contain lactose as a carbohydrate source but contains maltodextrin, rice, and bananas. Lactose-free formulas are lower in fat and contain vegetable oil and medium-chain triglycerides as a fat source to prevent malabsorption of fat. Lactose-free formulas are higher in protein and lower in iron to prevent the growth of intestinal bacteria. Electrolyte content is increased to prevent dehydration due to gastroenteritis (Hong, 2018:155).

iii. Partially hydrolysed formula

Partially hydrolysed formula is a formula where milk proteins are broken down into peptides. The peptides have a form of antigenicity and is the reason why it is contraindicated for the prevention of allergic diseases in infants with a family history of allergies. Partially hydrolysed formula also contains lactose and is therefore contraindicated in infants with galactosemia or lactose intolerance (Hong, 2018:155).

iv. Extensively hydrolysed formula

Extensively hydrolysed formula is indicated for milk protein, soy protein, cow's milk protein allergy, galactosemia, or lactose intolerance. The prevalence of infants with a true immunoglobulin E (IgE)-mediated milk protein allergy is low. Infants with a milk protein allergy will develop antibodies against the large protein molecules in cow's milk. The antibodies detected in the blood/skin prick test are used to diagnose a milk protein allergy. Milk protein allergies can also be accompanied by cutaneous, respiratory, and gastrointestinal symptoms such as blood in stool. Infants with cow milk-induced enteropathy will be equally sensitive to soy protein; therefore, extensively hydrolysed protein formulas are recommended. Hypoallergenic formulas contain extensively hydrolysed proteins that are less likely to set off antibody production (O'Connor, 2009:565). The carbohydrate sources are corn maltodextrin, sugar, and corn syrup. Fat source is from vegetable fat and MCT to be absorbed easily (Hong, 2018:157).

v. Amino acid-based formula

An amino acid-based formula is indicated for children with milk protein allergy that is not tolerated or when the symptoms persist despite using extensively hydrolysed formulas (Hong, 2018:158; Owens et al., 2012:29). Amino acid-based formulas can also be used for enteral nutrition for infants with Crohn's disease. The protein source is synthetic free amino

acids with no peptides and is thus lactose free. MCT oil is used as a fat source (Hong, 2018:158).

vi. Antireflux formula

Infants have a decreased resting tone of the lower oesophageal sphincter, which increases the risk for gastro-oesophageal reflux (O'Connor, 2009:565). Reflux is considered physiological and does not require pharmacological treatment unless it is accompanied by failure to thrive, oesophagitis, respiratory complications, or significant discomfort. Anti-reflux formulas are thickened with rice starch (O'Connor, 2009:565; Owens et al., 2012:29). An infant formula that is pre-thickened can be considered as non-pharmacological treatment that is nutritionally safe (Owens et al., 2012:29).

vii. Formulas for inborn error of metabolism

Inborn errors of metabolism are a group of inherited metabolism disorders where the normal metabolism of carbohydrates, proteins, and fats cannot take place due to decreased or absent enzymes. This will result in the accumulation of certain metabolites. Examples of inborn errors of metabolism are phenylketonuria, methylmalonic propionic acidemia, and urea cycle disorders. Specific formulas are designed for the inborn errors of metabolism as well as formulas that are free from leucine, protein, and methionine (Hong, 2018:157).

2.9.4.4 Follow-on formulas

Follow-on formulas have been developed for infants and children from nine to twenty-four months. The milk-based toddler formulas are supplemented with iron, vitamin C, vitamin E, calcium, and zinc. They also contain DHA and AA (O'Connor, 2009:565). The World Health Assembly does not recommend follow-on formulas over cow's milk together with complementary foods (Owens et al., 2012:30).

2.9.4.5 Additional components added to infant formulas

Long-chain polyunsaturated fatty acids (arachidonic acid and docosahexaenoic acid) are added to infant formulas with the motivation to promote neural and visual development (Garg et al., 2017:160; O'Connor, 2009:565; Owens et al., 2012:26). Standard infant formulas are supplemented with alpha-linolenic acid and linolenic acid, the precursors of docosahexaenoic acid (DHA) and arachidonic acid (AA). However, a study by Cochrane that

reviewed 31 randomised controlled trails cannot recommend the routine supplementation of DHA and AA to infant formulas (Jasani et al., 2017:1).

Prebiotics in the form of indigestible oligosaccharides and probiotics in the form of *Bifidobacterium lactis* and *Lactobacillus* are supplemented to infant formula with the motivation to modulate gut microbiota, improve immune function, and prevent or reduce the incidence of diarrhoea (Radke et al., 2017:622). A systematic review by the committee of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) on nutrition does not recommend the routine use of pre- and probiotic-supplemented formula in infants because there is a lack of data on the long-term effects (Braegger et al., 2011:238-250). More controlled follow-up trials to define optimal dosage, intake durations, safety, and efficacy should be conducted before recommendations on probiotics can be made (Braegger et al., 2011:238-250; Quin et al., 2018:1).

ESPGHAN supports the optional addition of nucleotides to infant formulas and recommends that they do not exceed the maximum of 5 mg/100 kcal or 5 mg/420 kJ (Koletzko et al., 2005:584).

2.9.5 Preparation of infant formula

Infant formulas should be prepared according to the instructions on the tin. This would involve mixing the correct amount of powder with the correct amount of water. The preparation should take place in a clean environment. All equipment (bottles, nipples, mixers, the top of the formula can) used should be washed thoroughly or should be sterilised. Formula may be prepared for up to a period of 24 hours and then be refrigerated. Formula should be warmed in a hot water bath and not in a microwave oven because a microwave oven heats the formula unevenly and can result in burning the infant. Formula that was warmed and not consumed should be discarded immediately (Trahms & McKean, 2012:382).

2.9.6 Knowledge, attitudes and practices related to formula-feeding

When a mother chooses to formula-feed, she does so after careful consideration of a formula that will provide the best nutrition for her infant (Hong, 2015:42). The factors that may play a role in the mother's purchasing decision are similar to the factors that play a role in the decision to breastfeed. The factors will include psychological influences (needs,

perceptions, motivations, and attitudes) as well as sociological influences (cultures, social classes, reference groups, and opinion leaders) that will lead to need recognition (Hong, 2015:37; Petty et al., 2012:425; Tshikovhi & Gericke, 2015:10). Need recognition is defined as the stage when the customer/mother realises that her current state of affairs (e.g. infant with eczema) is different to her ideal state (e.g. infant without eczema), which will lead to information search and evaluation (Petty et al., 2012:425). The purchase decision involves the collection and evaluation of information about the formula being considered (Petty et al., 2012:425). Sources of information include internal sources (previous experience with a milk formula or brand) and/or external sources (advice from friend, family health care professionals, and advertisements) as shown in the consumer decision model for infant formula (Figure 2.3) and the simplified consumer behaviour model (Figure 2.2). The infant formula that is given to the infant in the hospital and formulas that are on tender in government will also influence the initial brand choice (Cutler & Wright, 2002:45).

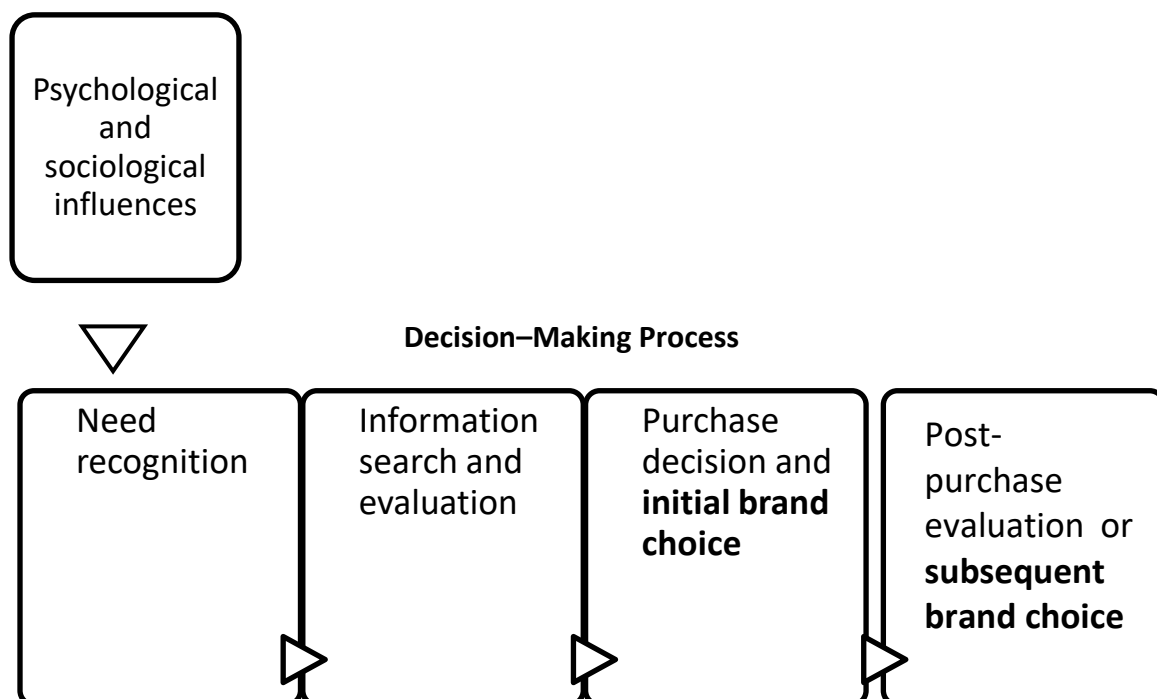


Figure 2.2: Simplified model of consumer behaviour (Cutler & Wright, 2002:45; Petty et al., 2012:425)

A study by Bester (2006:99-102) in ZA found that almost a quarter of mothers did not enjoy breastfeeding, which lead to the initiation of formula milk. This is an example of a

psychological influence or an attitude creating a need that leads to a purchase decision. Mothers who chose to initiate formula milk were well aware of the best infant feeding method and the benefits of breastfeeding but were unsure about the volume of breast milk received by the infant and therefore chose to formula-feed the infant, as they would be assured that the baby would receive the correct volume of milk for optimum growth. This is an example of how a psychological influence or a perception creates a need to initiate formula feeding.

Tshikovhi & Gericke (2015:10) found that the purchase situation can have a minor influence on the decision-making process of mothers in a high socioeconomic area. The absence of a brand of formula had a minor influence on the purchase decision, because most mothers were willing to shop around if the chosen formula was not in stock.

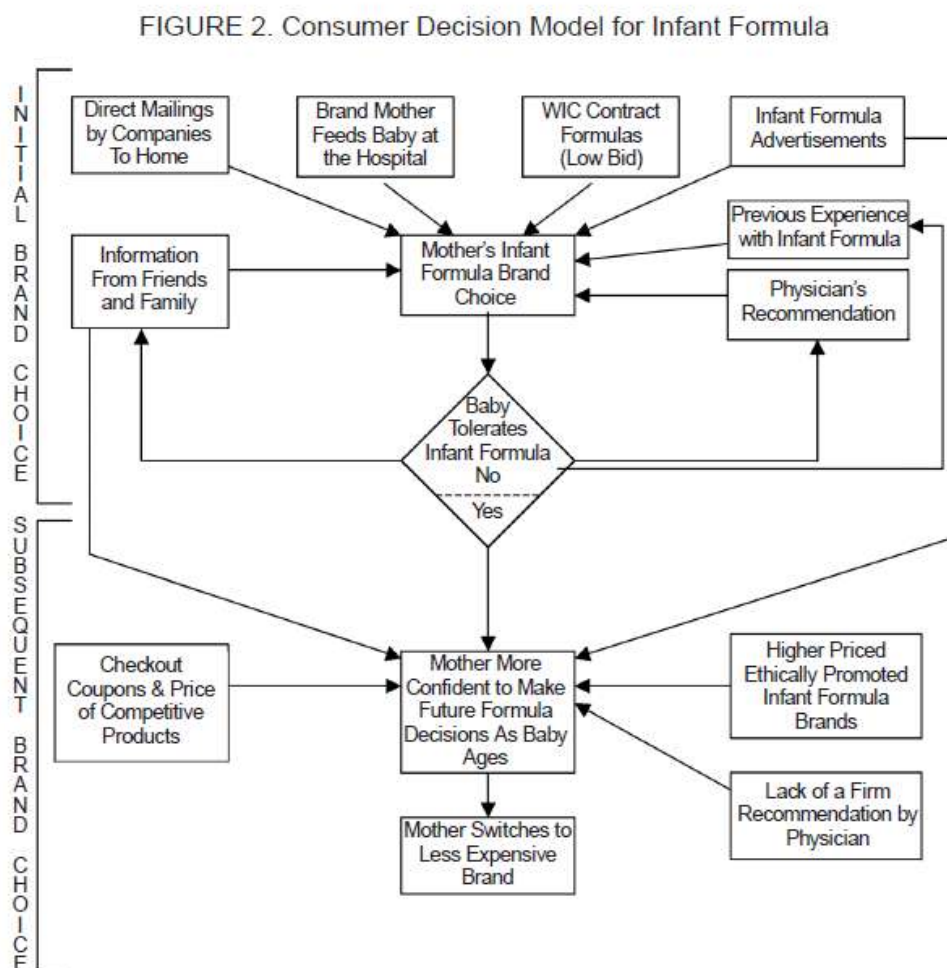


Figure 2.3: Consumer decision model for infant formula (Cutler & Wright, 2002:45)

The initial brand choice can be influenced by information from family, friends, and physicians, as shown in Figure 3 (Cutler & Wright, 2002:45). According to Bester (2006:83) and Tshikovhi & Gericke (2015:10), it is evident that South African mothers with a high socioeconomic status and a high educational profile gained most of their information about infant feeding from nurses and paediatricians. Both of the studies found that paediatricians exerted the greatest influence on the choice of formula milk to be used in a population with a similar educational level and income. In ZA, paediatricians had a 32% to 62% influence on the choice of formula milk. This is an example of how an external source can influence the purchase decision.

The advertisement of milk formulas played a role in mothers' decisions on infant feeding, before the International Code of Marketing of Breast Milk Substitutes was initiated in May 1981 (Cutler & Wright, 2002:45; Kong & Lee, 2004:375). Despite the International Code of Marketing of Breast Milk Substitutes that was initiated in May 1981, infant formula advertisements still played a role in initial brand choices in the year 2002, as shown in Figure 2 (Cutler & Wright, 2002:45). A study in Hong Kong found conflicting results by confirming that this code was implemented successfully, as advertisements did not play a role in their decision (Kong & Lee, 2004:375).

Another factor that is not indicated in Figure 3 that may influence brand choice is information available on the formulas on the Internet. Monteiro and Assis (2016:1) analysed 50 websites of food companies, blogs, and sites that specialise in nutrition and found the guidelines given in disagreement with the recommendations of the Ministry of Health in Brazil and that the information could lead to misconceptions.

A psychological influence to consider when selecting an infant formula will be the claimed health benefit an infant might experience with a specific formula. (Hong, 2015:39; Tshikovhi & Gericke, 2015:9). Tshikovhi and Gericke (2015:9) found that 99 or 49.5% of mothers were influenced by this factor to buy a specific formula.

Most mothers in a high economic setting in ZA chosen a specific brand because they believed it was superior in composition, the chosen formula was well known, and therefore more recommended by friends and families (Bester, 2006:104; Tshikovhi & Gericke, 2015:10).

2.11 Conclusion

To conclude, breastfeeding is undoubtedly the best infant feeding method for the first six months, with the benefits of breastfeeding being widespread (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:281; Garter et al., 2005:498; Rolfes et al., 2012:454). Despite the benefits of breastfeeding, the global rates are still not near to the 2025 goals set out by the World Health Assembly. The choice of feeding method is influenced by numerous factors. A better understanding of these factors will aid in protecting, promoting and supporting breastfeeding to increase global breastfeeding rates.

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Chapter 3: Research Methodology

3.1 Study design

A descriptive cross-sectional study was conducted.

3.2 Sample

3.2.1 Population

The population for this study included mothers of infants aged three months to four years attending selected private preschools in Johannesburg North. Johannesburg North (as shown in Figure 3.1) is the area left from the N3 (mostly M1), not going lower than M3 in the South of Johannesburg. To the left, it is enclosed by the N1, and to the North, it stretches all the way to Midrand. Johannesburg North includes the following areas: Sandton (Fourways, Bryanston, Woodmead, and Sunninghill), Midrand (Vorna Valley), and Randburg (Olivedale and Douglasdale).



Figure 3.1: Gauteng map indicating freeways and regions

Johannesburg North, which includes Sandton, can be viewed as a high socioeconomic area because Sandton is regarded as one of the affluent areas on the African continent (STATS SA, 2017:1). Therefore, it was assumed that residents and mothers of children attending preschools in this area would be from a high socioeconomic level, i.e. Living Standards Measure seven to ten (see Appendix A).

3.2.2 Sample selection

There are 28 private preschools in Johannesburg North (see Appendix B). Convenience sampling was used to select preschools nearest to the researcher in Johannesburg North. The eight private preschools included in the study were Curro Castle Bryanston, Curro Castle Waterfall, Curro Castle Douglasdale, the Little Ashford Preschool School Bryanston, Nature Montessori Douglasdale, Nurture and Nature Montessori Bryanston, Cleverdon Preschool, and Minnieland Crèche & Preschool.

All the mothers of children aged three months to four years attending these preschools were informed of the study (see study procedure) and invited to participate in the study. Based on the reported number of children attending the schools, the sample for the study was calculated. Each school had approximately 100 to 200 mothers with infants in the specified age group. If 50 to 100 mothers per school gave consent, the study would have approximately 600 participants.

3.2.2.1 Inclusion criteria

Mothers or guardians were included in the research project if:

- they gave informed consent;
- they had infants or children attending the preschools mentioned above;
- their infants or children were born between 2014 to 2018;
- only the youngest child was included;
- only the younger twin was included if the mother had twins; and
- they were able to communicate in English.

3.3 Measurements

3.3.1 Operational definitions

To achieve the objectives of this study, the following information was collected:

- Sociodemographic data.
- Individual, group or society factors influencing feeding practices.
- Information about formula milk.

3.3.1.1 Socio-demography

Demographics can be defined as specific characteristics that describe participants (Petty et al., 2012:795). Demographic information in this study included background information about the mother and the infant.

Practices can be defined as “a way of doing something as a result of habit, custom or a tradition” (Rundell, 2017:1). For the purpose of this study, practices referred to the form of feeding, i.e. EBF, infant formula, and the introduction of solids.

EBF is defined as when an infant receives only breast milk or expressed breast milk from a mother or guardian (WHO, 2009:4; WHO, 2016:6). Solids, other liquids and water may not be added to breast milk, except for oral rehydration solution, drops, or syrups (WHO, 2009:4). Complementary feeding is initiated at six months when breast milk alone is no longer sufficient to meet nutritional needs of the infant; therefore, foods can be added while continuing with breastfeeding (Trahms & McKean, 2012:376; WHO, 2009:4). Formula feeding is the feeding of a cow’s milk-based or soya-based breast-milk substitute; with the composition nearly the same as breast milk (Rolfes et al., 2012:471; Trahms & McKean, 2012:381). Mixed feeding is when an infant younger than six months combines breastfeeding with formula and/or other liquids or solids (WHO, 2016:6). Weaning can be defined as the process in which an infant’s diet gradually moves from only breast/formula milk to a more varied diet (Trahms & McKean, 2012:384).

3.3.1.2 Individual-level factors

For the purpose of this study, individual-level factors referred to mothers’ and guardians knowledge about breastfeeding and personal factors influencing breastfeeding practices (Hector et al., 2005:53).

3.3.1.3 Group-level factors

Group-level factors included environmental factors such as the hospital, home, and work environment that affected breastfeeding. Group-level factors also included the effect of the community from which the mother came and public policies on feeding practices.

3.3.1.4 Society-level factors

For the purpose of this study, society-level factors referred to how attributes of society, culture, and the economy influenced the mother's feeding practices.

3.3.2 Techniques

The data were collected using a self-administered questionnaire (Appendix C) that had been compiled and structured based on the conceptual framework of factors affecting breastfeeding practices compiled by Hector et al. (2005:53).

The questionnaire was structured according to sociodemographic information and the feeding practices of mothers:

Sociodemographic information about the mother included her age, marital status, highest level of education obtained, and monthly household income. Questions about the mother's youngest infant included the child's date of birth, gender, and information on how he or she was born.

Educational level and household income were used to determine the mothers' Living Standards Measure level (South African Audience Research Foundation, n.d.). Living Standards Measure level was used to make associations between living standards and feeding practices or choice of the brand of formula milk to be purchased.

Feeding practices included in the study pertained to the mother's youngest infant. Questions on the infant's feeding from birth were included in the questionnaire.

The questionnaire included questions on individual factors that influenced mothers' feeding choices (18 questions); questions on group-level factors (eight questions); as well as questions on society-level factors (five questions). For these questions, mothers had the options to respond to the options given as factors possibly influencing their feeding choices by indicating whether they strongly agreed, agreed, disagreed, strongly disagreed or could not remember.

Mothers who indicated that formula milk was used as a primary or complementary feed answered an additional four questions about the formula.

3.4 Study procedures

- Eight preschools with infants and children aged 3 months to 4 years were conveniently selected in Johannesburg North (High Living Standards Measure area), as indicated above.
- Approval for the research study was sought from the Health Sciences Research Ethics Committee of the University of the Free State.
- Permission to perform the study at the above-mentioned preschools was obtained from the principals (see Appendix D).
- A pilot study including five mothers was performed at one of the selected schools in February 2018.
- The preschool principal sent out an e-mail with the attached information letter (see Appendix E) to inform the mothers with infants from the age of 3 months to children of four years about the study to be performed at the preschool.
- The researcher attached an informed consent form (Appendix F) to the questionnaire for mothers who were willing to participate in the study at the preschool. Mothers completed the consent form prior to answering the questionnaire. Completed questionnaires and consent forms were placed in different boxes afterwards to ensure confidentiality.
- The researcher delivered all questionnaires at the schools in the last week of September 2017. The number of questionnaires delivered at the selected schools was according to the number of mothers who met the inclusion criteria. The researcher gave the questionnaires to the preschool principals, who distributed the questionnaires to all the teachers.
- The teachers of each class gave the questionnaires to mothers who were willing to participate during drop-off or at the collection of children/infants in February/March 2018. Mothers had a week to complete the questionnaire and to return the questionnaire to the school, where they placed the completed questionnaire in boxes.

- The researcher collected the completed questionnaires from the preschool principals at the end of the week in February/March 2018.
- The researcher captured and coded data in EXCEL in March and sent the data electronically via e-mail to the Department of Biostatistics at the University of the Free State.

3.5 Pilot study

A pilot study is a smaller version of a proposed study conducted to develop and refine the steps in the research process. Pilot studies consider the questionnaire of the proposed study in depth to improve its quality if necessary (Monsen & Chenney, 2005:5).

The pilot study included five mothers from one of the selected preschools. The pilot study evaluated whether the mothers understood the questions easily. The results from the participants in the pilot study were included in the study because no amendments were made to the questionnaire.

3.6 Measurement and Methodology errors

3.6.1 Reliability and validity

Joppe (2000), cited in Golafshani (2003:59) defines reliability as follows: “The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability, and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable.”

Validity measures the extent to which questionnaire measures a trait. Questionnaires should be validated for a specific population, setting, disorder, or diagnosis (Nestlé Nutrition Institute, 2017:1). Golafshani (2003:599) defines validity as follows: “Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are.”

To ensure validity, the questionnaire was based on the latest literature regarding infant-feeding practices and factors that affect feeding practices (American Academy of Pediatrics, 2012:e828; Bester, 2006:99; Hector et al, 2005:53; Petty et al., 2012:425; Rolfes et al., 2012:454; Tshikovhi & Gericke, 2015:10; WHO, 2017:1).

3.6.2 Limitations

Participants from a high Living Standards Measure area were selected; therefore, literacy should not be a concern. Mothers with four-year-olds might not remember the exact timing of introducing feeds when completing the questionnaire; therefore, a “can’t remember” option was included in the questionnaire. The greatest concern was a low response rate due to no contact between the researcher and the participant. To counter this, the principals were asked to assist the researcher to ensure as much participation as possible.

3.7 Statistical analysis

Descriptive statistics, namely frequencies and percentages, were used for categorical data, and means, standard deviations, or medians and percentages for continuous data were calculated per feeding practice, individual- and society-level factors. Associations between feeding practices and individual-, group-, and society-level factors were calculated and described by means of 95% confidence intervals. The analysis was performed by the Department of Biostatistics of the Faculty of Health Science, University of the Free State.

3.8 Ethical aspects and informed consent

Ethical approval for the study was obtained from the Health Sciences Research Ethics Committee at the University of the Free State. Permission to perform the study at Curro Castle Bryanston, Curro Castle Waterfall, Curro Castle Douglasdale, the Little Ashford Preschool School Bryanston, Nature Montessori Douglasdale, Nurture and Nature Montessori Bryanston, Cleverdon Preschool and Minnieland Creche & Preschool was obtained from the principal of each preschool (Appendix D).

An informed consent form (Appendix F) and an information sheet (Appendix E) were given to the participants to read and sign prior to answering the questionnaire.

Efforts were made to keep personal information confidential and anonymous. Absolute confidentiality could not be guaranteed. Personal information may be disclosed if required by law. Organisations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Health Sciences Research Ethics Committee at the University of the Free State.

To show appreciation, the researcher offered a free consultation to the preschools. The consultation included an assessment of cooking methods, meal plan, and portions. Recommendations were made according to the assessment.

3.9 Time schedule

The study took place at preschools in Sandton during 2018.

Tasks	Target date
Literature overview and gathering	January 2018
Preparing proposal	March/April 2017
Finalising proposal	June 2017
Evaluation committee	June 2017
Ethics Committee	August/September 2017
Pilot study	February 2018
Data gathering, coding and placing of data in EXCEL	February/March 2018
Data Analysis	November 2018
Compiling dissertation	May – January 2019

3.10 Budget

Expenditure	Cost per unit	Total units	Total amount
Questionnaires	R1.50 /p	600	R900.00
Consent forms	R1.50 /p	600	R900.00
Information sheets	R1.50 /p	600	R900.00
Fuel	3.5 R/km (AA rates)	80 km per school x 7	R1960.00
Phone Calls (Cell phone to cell phone)	R1.20/min	± 15 min/7 schools	R126.00
Pens	R8.00	7	R65.00
Editing	40c/word	± 10 000 words	R8000.00
Binding			R4000.00
Photocopies (articles, drafts and other)	R1.50 /p	800 units	R1200.00
Other (3 publications)	R 9000 per publications	3	R27 000.00

Expenditure	Cost per unit	Total units	Total amount
Total			R45 051.00

The researcher applied for a bursary to pay for the costs of the study.

3.11 Implementation of findings

Studies to determine the factors with the biggest influence on feeding practices of mothers situated in a high socioeconomic environment are limited in ZA. This study assessed the feeding practices of mothers and determined which factors played the greatest role in a mother's decision not to breastfeed. These results gave some insight into why current breastfeeding goals, with a focus on mothers situated in a high socioeconomic area, are not met.

3.12 References

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Chapter 4: Article – Breastfeeding practices of mothers in a high socioeconomic area in Johannesburg

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Objectives: The objective of the study was to determine breastfeeding practices and associations between breastfeeding practices and demographics of mothers in a high socioeconomic area in Johannesburg.

Design: A descriptive cross-sectional study was conducted.

Setting: The study was carried out in Johannesburg North, which includes the areas of Sandton (Fourways, Bryanston), Midrand (Vorna Valley), and Randburg (Douglasdale).

Subjects: One hundred and nine mothers residing in Johannesburg North agreed to participate and met the inclusion criteria of the study.

Results: Most of the mothers (n=102, 94%) initiated breastfeeding at birth. Thirty-four mothers (31.3%) breastfed their infants at four months, and 64 mothers (58.7%) of mothers breastfed their infants at six months. Only two mothers (1.8%) exclusively breastfed their infant at six months. A statistically significant difference was not found between breastfeeding duration at six months, and the mothers' age ($p=1.0000$), highest level of education ($p=1.0000$), gross household income ($p=0.3368$), marital status ($p=0.2825$), and type of delivery ($p=1.0000$), but a statistically significant difference was found between the age of breastfeeding cessation and marital status ($p\text{-value}=0.0437$).

Conclusion: Breastfeeding initiation rates were high in mothers from a high socioeconomic area; however, the duration of exclusive breastfeeding was short. A statistically significant difference was found between the age of breastfeeding cessation and marital status.

4. 1 Introduction

Breastfeeding is the preferred feeding method, as it is not only nutritionally complete for the first four to six months but also provides immunological, psychological, physiological, and developmental benefits to the infant, as well as hormonal, physical and psychosocial benefits for the mother (American Academy of Paediatrics, 2012a:1; Cox & Carney, 2017:281; Garter et al., 2005:495; Rolfes et al., 2012:454; Yezingane Network & UNICEF, 2011:3).

Breastfeeding contributes to socioeconomic growth through reduced infant mortality and medical costs (Cox & Carney, 2017:281; UNICEF, 2016:15; UNICEF & WHO, 2017:2). Longer breastfeeding duration is associated with higher intelligence scores in children, which later translates into higher earning potential; in turn, this contributes to socioeconomic growth (Horta & Victora, 2015:18; UNICEF & WHO, 2017:1). According to the United Nations Children's Fund (UNICEF) and the World Health Organisation (WHO), increased breastfeeding rates have the potential to save more than \$300 billion annually (0.49% of GNI) (UNICEF & WHO, 2017:1).

Additionally, scaling up breastfeeding could save 823 000 lives per year in children aged 5 years and younger, because of a reduced risk for infections and diarrhoea; and a reduced risk of non-communicable diseases later in life (UNICEF & WHO, 2017:1).

The American Academy of Paediatrics (2012b:e828), WHO (2009:3), and UNICEF (2017:1) recommend that infants should be breastfed exclusively (no other liquids or foods) for at least six months after birth. In recognition of the benefits of breastfeeding, the World Health Assembly has set a target of 50% of all infants to be breastfed exclusively from birth up to six months (UNICEF & WHO, 2017:1). To promote breastfeeding, further, breastfeeding initiation is recommended within an hour after birth (UNICEF, 2016:8; UNICEF & WHO, 2017:1; WHO, 2018:1). It is recommended that complementary food can be introduced from six months, while breastfeeding should continue up to the age of two years (UNICEF, 2016:8-10; WHO, 2018:1).

Despite these well-known benefits of exclusive breastfeeding (EBF), the global EBF rate at six months was 40% in 2017 and in South Africa (ZA) 32% in 2016 (SADH, 2016:28; UNICEF & WHO, 2017:8). Although the breastfeeding rates in ZA are far from the recommended 50%, the 32% can be considered as an improvement from the reported < 2% in 1982 (SADH, 1998:12). To improve mothers' infant-feeding practices (with an emphasis on breastfeeding), the South African Government has showed commitment to infant feeding recommendations by initiating and adapting policies, legislation, and protocols to support breastfeeding (SAJCN, 2011:1).

The rates for EBF at six months mentioned above and feeding practices published by the South African Department of Health are said to be representative of the country, but do not distinguish between feeding practices of mothers at different socioeconomic levels. Table

4.1 summarises all studies carried out in ZA determining breastfeeding rates and mothers' feeding practices. Only two of the 16 summarised studies (Bester, 2006:1; Tshikovhi & Gericke, 2015:1) were performed in high socioeconomic areas, i.e. the Cape Metropole and Tshwane, respectively. To improve mothers' feeding practices holistically, more studies in higher socioeconomic areas are needed. The article reports on mothers' breastfeeding practices and the association of breastfeeding practices with the mothers' sociodemographic.

Table 4.1: Summary of studies done with regard to breastfeeding rates and feeding practices in South Africa

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socio-economic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Kruger & Gericke	2003	Gauteng	144	Feeding and weaning practices from mothers and caregivers of children (< 3 years old) attending clinics	Low	88.1	Rarely practiced	Unknown	Rarely	2 to 3 months
Sibeko et al.	2005	Cape Town	126	Beliefs, attitudes and practices of breastfeeding mothers from a periurban community in South Africa	Low	Unknown	none	78	Unknown	1 month
MacIntyre et al.	2016	Limpopo	150	Feeding practices of mothers with infants (< 8 weeks) attending clinics	Low	99	4.6	6.7	42.7	5 weeks

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socio-economic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Bester	2006	Western Cape	55	Feeding practices of infants 0 – 6 months attending clinics	High	78.18	Unknown	1 month (43.64)	21.82%	2 months
Mamabolo et al.	2004	Limpopo	276	Follow up study of term infants to 12 months to monitor growth and feeding practices	Low	44	4.1 (includes 6 months)	1 month (9.7)	1 month (1.5)	1 month
Faber & Benadé	2007	KwaZulu-Natal	505	Feeding practices of 6 – 12-month-old infants	Low	96	< 1 (includes 6 months)	23	18	3 months
Van der Merwe	2015	Mpumalanga	435	Feeding practices of mother infants (< 6 months) attending clinics with different baby-friendly status	Low	75	36 *includes 6 months	47+43/435	39+72/435	45 days

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socio-economic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Goga et al.	2012	Western Cape	665 HIV+ 218 HIV-	Infant-feeding practices amongst HIV exposed* and non-exposed **infants (< 9 months)	Low	Unknown	47.9* 67.6** (includes 6 months)	4.3* 23.3**	47.3* 9**	3 weeks
Kassier & Veldman	2013	Bloemfontein	189	Feeding practices of mothers and caregivers with infants 0-24 months at clinics	Low	Unknown	Unknown	54.3	12.7	2 months
Goosen et al.	2014	Western Cape	140	Feeding practices of mothers (< 6 months) at clinics	Low	77	6 at time of interview Included different ages before 6 months.	39 (79 started before 3 months)	31%	3 months
Frans et al.	2015	Limpopo	275	Knowledge and practices of mothers about EBF with infants (6 months) at clinics	Low	Unknown	42.3 (includes 6 months)	48.6	9.1	Unknown

Reference	Year of publication	Area	Sample size	Population and context	Low/ high socio-economic	BF Initiation (%)	EBF up to 6 months (%)	Introduction of formula with breastfeeding (% of participants)	Only formula (%)	Age at which solids were introduced
Siziba et al.	2015	Gauteng, North West, Eastern Cape, Free State	580	Feeding practices of mothers attending health facilities	Low	Unknown	12 (In their sixth month of life)	70	19	Unknown
Tshikovihi & Gericke	2015	Gauteng (Pretoria)	200	Feeding practices of mothers attending pharmacies in Pretoria	High	Unknown	Unknown	Unknown	Unknown	Unknown
Madiba	2015	Gauteng (Pretoria)	244	Factors associated with mixed feeding practices among HIV positive woman with infant from 6 to 9 months	Low	Unknown	Unknown	Unknown	56.8%	Unknown
Seonandan & McKerrow	2016	KwaZulu-Natal	94	Infant and young child feeding	Low	Unknown	< 3 months 78	Unknown	Unknown	Before 6 months
Chaponda et al.,	2017	Gauteng (Tembisa)	30	Feeding practices among HIV-positive mothers	Low	50	Unknown	Unknown	Unknown	1 month

HIV exposed* and HIV non-exposed **

4.2 Methods

A descriptive cross-sectional study was conducted in selected private preschools in Johannesburg North from 26 February to 2 March 2018.

4.2.1 Population and sample selection

The population for this study included all mothers of infants and children aged three months to four years attending selected private preschools in Johannesburg North in Gauteng, ZA. Residents living in this area are classified as having a Living Standards Measure (LSM) score of seven to ten, which translates into a high socioeconomic status (STATS SA, 2017:1).

Convenience sampling was used to select eight private preschools in close proximity to the researcher in Johannesburg North.

All mothers of children attending these preschools were informed of the study and invited to participate.

4.2.2 Data collection

A self-administered questionnaire was used for data collection. The questionnaire consisted of four sections: demographic information, mothers' feeding practices, factors affecting feeding practices, and information about formula feeding practices. To ensure validity, the questionnaire was developed based on the latest literature regarding infant-feeding practices and factors that affect feeding practices (American Academy of Paediatrics, 2012b:e828; Bester, 2006:99; Cutler & Wright, 2002:45; Hector et al, 2005:53; Petty et al., 2012:425; Rolfes et al., 2012:454; Tshikovhi & Gericke, 2015:10; WHO, 2017:1). Content validity was ensured by having the questionnaire reviewed by a panel of nutrition and research professionals, and the face validity was assessed during the pilot study prior to the study.

The preschool principals sent out e-mails with an information letter informing all mothers of the study to be performed at the preschool. The teachers handed out questionnaires to mothers interested in taking part in the study. Responses to the questionnaire were restricted to the mother's youngest child. In cases where mothers had more than one child attending the preschool, mothers were requested to complete the questionnaire using only

the youngest child's information. If the mother had twins, only the younger twin was included in the study.

Mothers had one week to complete the questionnaires, after which mothers were requested to place the completed questionnaires in boxes placed at the preschools to ensure confidentiality. The researcher collected the boxes at the schools at the end of the allocated time.

4.2.3 Ethical approval & data collection

Approval to undertake this study was obtained from the Health Sciences Research Ethics Committee of the Faculty of Health Sciences at the University of the Free State (UFS-HSD2017/1185). Written permission to undertake the study was obtained from the principals of all the preschools. Participation was voluntary, and mothers provided written informed consent prior to completing the questionnaire.

4.2.4 Pilot study

The pilot study included five mothers from one of the selected preschools. The pilot study evaluated whether the mothers understood the questions easily and to note the time it would take to complete the questionnaire. The results from the mothers in the pilot study were included in the study because no amendments were made to the questionnaire.

4.2.5 Statistical analysis

Descriptive statistics, namely frequencies and percentages, were used for categorical data, and means, standard deviations, or medians and percentages for continuous data were calculated per demographic and feeding practices. The appropriate statistical test and p-value were determined for associations. The Chi-square test or Fisher's exact test for categorical data and the Kruskal-Wallis test for numerical data were calculated. Fisher's exact test was also extended to general tables (rxc) by Freeman and Halton (1951), and this test is also known as the Freeman-Halton test or the Fisher-Freeman-Halton exact test (Freeman & Halton, 1951:141-149). The statistical analysis was performed by the Department of Biostatistics of the Faculty of Health Sciences, University of the Free State.

4.3 Results

4.3.1 Sociodemographic characteristics

The sociodemographic data of the 109 mothers who completed the questionnaire are summarised in Table 4.2. The mothers' median age was 34 years. Most of the mothers (89%) had higher education and training qualifications, and the majority was married (75%). The gross income in most of the households (60%) was more than R45 785 per month.

The children's gender distribution reported on was 44% male and 56% female. The median age of the mother's youngest infant was 2.2 months. Caesarean section delivery was the most common type of delivery (76%).

Table 4.2: Demographic characteristics of the mothers included in the sample

Demographic characteristics of the mothers	n	%
Mother's age		
24-34.9 years	54	58.9
≥35 years	44	41.1
Highest level of education		
Grade 12	12	11.2
Diploma/certificate	30	28.0
Degree	30	28.0
Postgraduate qualification	35	32.7
Gross household income		
< R12 280	3	2.9
R12 280 – R14 585	4	3.9
R18 210 – R20 973	8	7.8
R24 212 – R29 679	11	10.8
R37 709 – R45 785	15	14.7
> R45 785	61	59.8
Marital status		
Single	11	10.1
Married	82	75.2
Cohabiting	9	8.3
Divorces/separated	7	6.4
Type of delivery		

Demographic characteristics of the mothers	n	%
Vaginal	26	24.1
Caesarean	82	75.9

Associations with sociodemographic characteristics were established. The association between educational level and gross household income was not statistically significant ($p=0.0607$); however, there was a tendency for higher educated mothers to earn a higher household income (Table 4.3).

Table 4.3: Association between educational level and gross household income

Gross household income	Educational level n (%)				P-Value (Fisher's Exact Test)
	Grade 12	Diploma/ Certificate	Degree	Postgraduate qualification	
< R12 280	-	3 (10.7)	-	-	0.0607
R12 280 – R14 585	-	2 (7.1)	1 (3.7)	-	
R18 210 – R20 973	1 (9.09)	4 (14.3)	2 (7.4)	1 (2.9)	
R24 212 – R29 679	2 (18.2)	3 (10.7)	2 (7.4)	4 (11.4)	
R37 709 – R45 785	3 (27.3)	3 (10.7)	7 (25.9)	2 (5.7)	
> R45 785	5 (45.5)	14 (46.4)	25 (55.6)	28 (80.0)	

Almost all of the mothers initiated breastfeeding at birth (94%), as shown in Table 3.

Table 4.4: Breastfeeding initiated at birth

	n	%
Yes	102	94.4
No	6	5.5

Mothers' feeding practices are given in Table 4.5. Only 1.8% of the mothers continued to exclusively breastfed their youngest infant at five to six months. EBF was higher at three to four months, as 31.3% of the mothers exclusively breastfed their youngest infants, and 60% of the mothers exclusively breastfed their infants at one to two months.

A third of the mothers (33.7%) introduced formula feeding (i.e., mixed feeding) at one to two months. At three to four months, a quarter of the mothers (24.8%) mixed-fed their infants, and at five to six months, 16.8% practised mixed feeding.

Most mothers stopped breastfeeding their infants at three to four months (21.6%), followed by 17.7% of mothers at 12+ months.

In this study, 65.7% of the mothers introduced solids at five to six months, followed by 21.3% who introduced solids at three to four months. A little over a tenth of mothers (10.2%) introduced solids at seven to eight months, while 1.9% introduced solids at nine to ten months.

Table 4.5: Feeding practices of the mothers at different ages

Feeding practices	Age in months n (%)								
	1-2	3-4	5-6	7-8	9-10	11-12	12 +	Formula not used	Can't remember
Exclusive breastfeeding duration	64 (58.7)	34 (31.3)	2 (1.8)	-	-	-	-	-	-
Mixed feeding*	34 (33.7)	25 (24.8)	17 (16.8)	7 (6.9)	5 (5.0)	-	1 (1.0)	11 (10.8)	1 (1.0)
Breastfeeding cessation	14 (13.7)	22 (21.6)	16 (15.7)	9 (8.8)	7 (6.9)	4 (3.9)	18 (17.7)	12 (11.8)	-
Introduction of solids	- -	23 (21.3)	71 (65.7)	11 (10.2)	2 (1.9)	- -	- -	- -	1 (1)

* Introduction of formula feeding during breastfeeding.

A statistically significant difference was not found between breastfeeding duration at six months and mode of delivery (p-value=1.0000), nor was the association between the age of the mother and breastfeeding duration at six months of the infant statistically significant (p-value=1.0000). A statistically significant difference could not be found between breastfeeding duration and the level of education in this high socioeconomic income group (p-value=1.0000). Mothers with an education level higher than Grade 12 tended to breastfeed longer in comparison with mothers with only Grade 12. In this study, a statistically significant difference could not be found between breastfeeding duration at six months and gross household income (p-value=0.1060) Lastly, a statistically significant difference could not be

found between breastfeeding duration and marital status in this study population (p-value=0.2825) (Table 4.6).

Table 4.6: Association between breastfeeding practices and sociodemographic factors

Demographic factors	Breastfeeding duration n (%)			Fisher-Freeman-Halton exact test@ 6 months Pr < = P
	EBF@ 2 months	EBF@ 4 months	EBF@ 6 months	
Mode of delivery				
Vaginal	13 (20.6)	8 (23.5)	-	1.0000
Caesarean	50 (79.4)	26 (76.5)	2 (100)	
Average age				
<35 age	41 (62.1)	25 (73.5)	1 (50.0)	1.0000
≥35 age	22 (34.9)	9 (26.5)	2 (50.0)	
Educational level				
Grade 12	7 (11.0)	6 (17.7)	-	1.0000
Diploma/Certificate	17 (27.0)	9 (26.5)	1 (50.0)	
Degree	19 (30.0)	9 (26.5)	-	
Postgraduate qualification	20 (32)	10 (29.4)	1 (50.0)	
Gross household income				
< R12 280	2 (3.3)	-	-	0.3368
R12 280 - R14 585	1 (4.9)	2(6.1)	-	
R18 210 – R20 973	4 (6.6)	3 (9.1)	1 (50.0)	
R24 212 – R29 679	10 (16.4)	5 (15.2)	-	
R27 709 - R45 785	11 (18.0)	8 (24.2)	-	
> R45785	31 (50.8)	15 (45.5)	1 (50.0)	
Marital status				
Married or cohabiting	53 (82.8)	30 (88.2)	2 (100.0)	0.2825
Separate, divorced or single	11 (17.2)	4 (11.8)	-	

As seen in Table 4.6, a statistically significant difference could not be found between breastfeeding duration and marital status. The percentage of mothers who breastfed until

six months was higher in the mothers who were married or cohabiting than in the separate, divorced, or single group. A statistically significant difference was found between the age of breastfeeding cessation and marital status (p-value=0.0437) (see Table 4.7).

Table 4.7: Association between age of breastfeeding cessation and marital status

Age of breastfeeding cessation n (%)	Marital status		P-value (Fisher's Exact Test)
	Married or cohabiting	Separate, divorced or single	
1 to 2 months	11 (78.6)	3 (21.4)	0.0437
3 to 4 months	19 (82.6)	4 (17.4)	
5 to 6 months	16 (100.0)	-	
7 to 8 months	5 (55.6)	4 (44.4)	
9 to 10 months	6 (85.7)	1 (14.3)	
11 to 12 months	2 (50.0)	2 (50.0)	
12+ months	14 (77.8)	4 (22.2)	
Still breastfeeding	12 (100.0)	-	

The association between breastfeeding initiation and level of education (p-value=0.6159), marital status (p-value=1.0000), type of delivery (p-value=0.6314) and gross household income (p-value=0.7895) was not statistically significant (see Table 4.8).

Table 4.8: Association between breastfeeding initiation and sociodemographic factors

Sociodemographic factors	Breastfeeding initiation n (%)		P-Value (Fisher's Exact Test)
	Yes	No	
Highest level of education			
Grade 12	11 (91.7)	1 (8.3)	0.6159
Diploma/Certificate	29 (96.7)	1 (3.3)	
Degree	29 (96.7)	1 (3.3)	
Postgraduate qualification	32 (91.4)	3 (8.6)	
Marital status			
Single	11 (100)	-	1.0000
Separated/divorced	75 (92.6)	6 (7.4)	
Married	9 (100)	-	
Cohabiting	7 (100)	-	
Type of delivery			
Vaginal	24 (92.3)	2 (7.7)	0.6314
Caesarean	77 (95.1)	4 (4.9)	
Gross household income			
< R12 280	3 (100)	-	0.7895
R12 280 - R14 585	4 (100)	-	
R18 210 – R20 973	8(10)	-	
R2 R27 709 - R45 785	7 (87.5)	1 (12.5)	
4 212 – R29 679	15(100)	-	
> R45 785	56 (91.8)	5 (8.2)	

4.4 Discussion

Most of the mothers who participated in this study were younger than 35 years of age, married/cohabiting, and had an education level higher than Grade 12. Mothers in this study mostly lived in a household with a monthly income of R37 709. This is one of a few studies that report on the infant-feeding practices of mothers in a high socioeconomic area in ZA. Gauteng, which includes Johannesburg, is the smallest but fastest growing province in the country and can be regarded as the epicentre for economic growth in ZA (City of

Johannesburg, 2018:14-15). Johannesburg North, which includes Sandton, can be viewed as a high socioeconomic area because Sandton is regarded as one of the affluent areas on the African continent (STATS SA, 2017:1).

Early initiation of breastfeeding decreases infant mortality in the most vulnerable time of their lives and will also help to establish EBF (UNICEF, 2016:8, 30). The initiation of breastfeeding within one hour after birth will reduce the risk of infections and thus reduce the risk of early mortality (UNICEF, 2018:8). Breastfeeding initiation rates ranged from 59% to 96% in low socioeconomic areas in ZA (Chaponda et al., 2017:1; Faber 2007:16; Goosen et al., 2014:50; Kruger & Gericke, 2003:217; MacIntyre et al., 2016:70; Mamabolo 2004:327). On the other hand, Bester (2006:91-93) conducted a study on 55 mothers with a high socioeconomic status in the Western Cape and found that 78.2% of mothers initiated breastfeeding. This is lower than the results found in this study, in which 96% of the mothers initiated breastfeeding. Though a statistically significant association could not be made between breastfeeding initiation and household income, a higher socioeconomic status has been associated with higher breastfeeding initiation and breastfeeding rates (American Academy of Paediatrics, 2012b:e828; Li et al., 2008:S70). Although the breastfeeding initiation rate is high in this study, only 79% of the mothers initiated breastfeeding within one hour after birth. These results are higher than the results published by UNICEF in 2016 on early breastfeeding initiation rates in Eastern and South Africa (59%). Mothers in this high socioeconomic income group tended to be higher educated and thus more likely to initiate breastfeeding.

Earl (1998:209) found that breastfeeding knowledge and thus breastfeeding duration of 19 mothers in the United Kingdom were equal, irrespective of socioeconomic class. A study in Nigeria with 400 mothers could not confirm an association between breastfeeding and higher socioeconomic status (Onah, 2012:1). All of the above-mentioned results confirm findings that a higher socioeconomic status does not lead to higher rates for EBF or duration at six months (WHO, 2010:104-113; WHO, 2012:110-111).

EBF declined with the age of infants in this study. At five to six months of age, only 2% of the mothers in this high-income group exclusively breastfed their infants. At three to four months, 31.3% of the mothers in this study were exclusively breastfeeding their infants. This is lower than the national EBF rate of 32% at four to five months (exclusive breastfed under

the age of six months) (SADH, 2016:28). The low percentage of mothers who were exclusively breastfeeding their infants at six months is a matter of concern; it is lower than the percentages found in other studies given in Table 4.1. UNICEF (2018:1) states that differences in breastfeeding rates are not only observed between countries but also between different socioeconomic areas in a country. Similar to a study by Bester (2006) in the Western Cape, an association could not be established between a higher income and EBF duration (Bester, 2006:93). Earl (1998:209), WHO (2010:104-113), WHO (2012:110-111) and Onah (2012:1) also reported that a higher socioeconomic income was not necessarily a predictor of higher rates for EBF at six months.

This study did not find a statistically significant association between maternal age and breastfeeding duration. A study in Ecuador found results similar to the current study, as they also could not find an association between maternal age and the duration of breastfeeding (Jara-Palacios et al., 2015:2). However, it was shown that maternal age played an important role in breastfeeding. Compared to older women, younger women are more likely to breastfeed for a shorter duration (Li et al., 2008:S70; Santana et al., 2017:107). A study by Pillay et al. (2018:19) in a low socioeconomic income group in ZA found that mothers younger than 17 years tended to stop breastfeeding earlier and tended to have more breastfeeding problems than older mothers had. Younger women tend to stop breastfeeding early because, compared to older mothers, younger mothers may have missed educational opportunities about breastfeeding, are likely to be less educated, and are less likely to have a social environment that supports breastfeeding (Jara-Palacios et al. 2015:2; Magnusson et al., 2016:439). A greater age is mostly associated with emotional stability and experience gained from previous pregnancies, which influences breastfeeding positively (Kronborg & Vaeth, 2004:215; Park et al., 2003, cited in Jara-Palacios et al., 2015:2; Santana et al., 2017:107).

Mothers with a lower education level reported not to plan to breastfeed and were less likely to initiate breastfeeding (Li et al., 2008:S70; Slusser et al., 2004:168). Mothers with a lower educational level were also less likely to breastfeed exclusively or to breastfeed for a longer duration (Bailey et al., 2008:176; Onah, 2012:1; Park et al., 2003, cited in Jara-Palacios et al., 2015:2; Santana et al., 2017:107). Most of the mothers in this study (89%) had a higher level of education training; however, their education status was not associated significantly with

breastfeeding duration. Similar to less educated mothers, mothers in this study tended to not breastfeed exclusively for a long duration. It is possible that because mothers in this study had a high level of education, which invariably means a higher earning potential, they had low breastfeeding duration rates. This can be explained by the possibility that these mothers were more likely to be employed in work environments that did not support breastfeeding.

In this study, the percentage of mothers who breastfed their infants for up to six months or longer was higher in the married or cohabiting group than in the separated, divorced or single group. Apparently, married or cohabiting mothers are more likely to plan to breastfeed their infants compared to single or separated mothers, and they are likely to breastfeed for a longer duration (Li et al. 2008:570; Odom et al. 2013:e728; Slusser et al., 2004:168). Married or cohabiting mothers also have higher rates for EBF in comparison with single, divorced, and separated mothers (Magnusson et al., 2016:439). In a low socioeconomic setting in ZA, an association between marital status and rates for EBF could not be found (Frans et al., 2015:821). Although an association was not found between marital status and breastfeeding duration in this study, it was interesting to find a statistically significant association between the infant's age of breastfeeding cessation and the mothers' marital status.

The WHO statement on caesarean section (c-section) rates reported that the international health care community perceived an ideal caesarean rate to be between 10% and 15% (WHO, 2015:1). C-section deliveries are associated with delay in breastfeeding initiation and shorter duration of breastfeeding (Khasawneh & Khasawneh, 2017:4; Onah et al., 2014:1; Palla & Kitsantas, 2017:167). A delay in breastfeeding initiation is caused by a delay in skin-to-skin contact and thus a reduced oxytocin flow (Palla & Kitsantas, 2017:167). In first-world countries such as Australia and Canada, c-section deliveries increase from 17.5% to 18% in 1991 to 1995 to 27.1% to 32% in 2011 to 2012 (Chaplin et al., 2016:144; Hobbs et al., 2016:1). The increase in caesarean section deliveries in first-world countries over the past two decades can be a barrier to breastfeeding if it is not addressed timely (Chaplin et al., 2016:144; Hobbs et al., 2016:1; Palla & Kitsantas, 2017:167). The c-section delivery rate in this study is higher than the reported 60.4% in a high socioeconomic setting in ZA found by Naidoo & Moodley (2009:254), with three quarters (76%) of the mothers in this study having

had c-section deliveries. A statistically significant association was not found between the birthing method and breastfeeding duration in this study; however, in other studies, an association was found between c-section deliveries and delayed breastfeeding initiation (Bai et al., 2016:492; Chaplin et al., 2016:147; Hobbs et al., 2016:8; Takahashi et al., 2017:1; Van der Merwe et al., 2015:12). Although breastfeeding initiation rate in this study was high, 10% of mothers who delivered using a c-section indicated that c-section delivery delayed their breastfeeding initiation, as reported elsewhere (Chapter 5). Early breastfeeding initiation can be improved by providing adequate support for breastfeeding women with c-section deliveries and for mothers in general, regardless of the birthing method (Takahashi et al., 2018:1).

The low EBF rate can possibly be explained by the ages of mixed feeding and the introduction of solids. Mixed feeding is defined as when an infant younger than six months combines breastfeeding with formula and/or other liquids (other milk or water) or solid food (WHO, 2016:6). Mixed feeding, which in this study refers to the introduction of infant formula, was practiced as early as one to two months by 33.7 % of the mothers.

Complementary feeding is defined as feeding an infant solid or semi-solid foods together with breast milk (including expressed milk or from a wet nurse) (WHO, 2007:4). Complementary food can be introduced from six months, while breastfeeding continues up to the age of two years (UNICEF, 2016:8, 10; WHO, 2018:1). The recommended age for the introduction of solids is from about six months of age. A balanced diet with all the textures (soft, semi-solid, and solid) can be introduced depending on the developmental readiness of children (Erick, 2012:385; Rolfes et al., 2012:473; UNICEF, 2015:5; McKean & Mazon, 2017:309). There is also a tendency for mothers to either introduce solids too early or too late. Often the quantity and quality of foods introduced is also not adequate. However, according to UNICEF (2016:11), almost 70% of six- to eight-month-old infants receive adequate solid foods in terms of diet quantity and quality, globally (UNICEF, 2016:11). It is worthy to note that mothers in this study included solids only from three to four months compared to other studies reporting mothers introduced solid foods for their infants as early as one month, as shown in Table 4.1.

4.5 Limitations

Mothers from a high Living Standards Measure area (33% of the mothers had a postgraduate diploma) were selected; therefore, literacy was not a concern. Mothers with four-year-olds might not remember the exact timing of introducing feeds when completing the questionnaire; therefore a “can’t remember” option was included in the questionnaire. The greatest concern was a low response rate due to no contact between the researcher and the mother. To counter this, the principals were asked to assist the researcher to ensure as much participation as possible.

With the comparison of rates for EBF at six months between countries and communities from different years, it is important to be aware that the indicators could be calculated and interpreted differently (Siziba, 2015:167). Rates for EBF do not represent the proportion of infants who did not receive anything other than breast milk from birth until six months but refer to the proportion of all children currently aged nought to five months that received only breast milk at the time of data collection (UNICEF, 2016:22). Most of the studies documented in Table 4.1 do not indicate how EBF rate was calculated or if it included infants until six months of age.

4.6 Conclusion

The findings of this study illustrate the associations between feeding practices and demographics. This is the only study to date to report on breastfeeding duration of mothers in a high socioeconomic area in ZA. Although a statistically significant association could not be made between breastfeeding initiation and household income, a higher socioeconomic status has been associated with higher breastfeeding initiation and breastfeeding rates (American Academy of Pediatrics, 2012:e828; Li et al., 2008:S70). In the current study, an association between a higher socioeconomic status and a longer duration of breastfeeding could not be found, possibly because of the small sample size of this study. The WHO published similar results that confirm findings of the current study that a higher socioeconomic status does not lead to higher rates for EBF or duration at six months (WHO, 2010:104-113; WHO, 2012:110-111). It can also be noted that breastfeeding initiation in high-income economies is high, with low rates for EBF at six months in high-income economies compared with those in low-income economies.

4.7 Recommendations

The current study supports the theory that mothers with different demographics follow different feeding practices. To compare feeding practices among different demographics best, a validated screening tool (questionnaire) should be developed by using the indicators for assessing infant and young child feeding practices used by the World Health Organization (WHO, 2007:4).

In ZA the promotion of breastfeeding in high socioeconomic areas are often neglected. The results of the study emphasise the need to improve the promotion of breastfeeding in high socioeconomic areas.

4.8 Conflict of interest

The author declares that she has not encountered any conflict of interest.

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Chapter 5: Article – Infant formula feeding practices of mothers in a high socioeconomic area in Johannesburg

Rust, A.M.

Objectives: The objective of the study was to investigate the formula feeding practices of mothers in a high socioeconomic area in Johannesburg.

Design: A descriptive cross-sectional study was conducted.

Setting: The study was conducted in Johannesburg North, South Africa.

Subjects: One hundred and nine mothers residing in Johannesburg North participated in the study and met the inclusion criteria.

Results: The majority of mothers based their decision on which infant formula to use on the advice of paediatricians (60.4%), followed by friends (39.6%), nurses (38.7%), and family (33%). The most common property that influenced the choice of infant formula used by mothers was the brand name of the infant formula (42.5%). Mothers preferred a range of infant formula that had a follow-on formula available (39.9%). The infant's medical condition (35.6%), the composition of the formula milk (34.5%), and the formula that the infant preferred (34.5%) were other common properties indicated by mothers.

Conclusion: South African mothers in high socioeconomic status obtained most of their information about infant feeding from paediatricians. The infant formula property that mostly influenced mothers' choice of infant formula was the brand name of the formula.

5.1 Introduction

Breast milk is a nutritionally complete feed for infants and is superior to all infant formulas, as it is the only infant feed with a perfect composition and balance of nutrients, therefore, it provides optimal growth and psychological, physiological, immunological, and developmental benefits for an infant (American Academy of Pediatrics, 2012:e827; Cox & Carney, 2017:281; Rolfes et al., 2012:454). Although infant formula is prepared to mimic the composition of breast milk, the composition cannot replicate breast milk completely, as breast milk also contains antibodies, hormones, and enzymes that cannot be added to infant formulas (Martin et al., 2016:1; Owens et al., 2012:1).

Exclusive breastfeeding (EBF) from birth to six months includes breast milk (including milk expressed or from a wet nurse) that is received by the infant that includes oral rehydration solution, drops, syrups (vitamins, minerals, and prescribed medicines) and excludes anything else (WHO, 2007:4). Although EBF until six months remains the golden standard for infant feeding, breast milk substitutes can be life-saving for infants with certain conditions or when breastfeeding is contraindicated permanently or partially for the mother. Breastfeeding and any other milk except for specialised formula are contraindicated for infants with galactosemia, maple syrup urine disease, and phenylketonuria. Breastfeeding may be contraindicated permanently for mothers diagnosed with human immunodeficiency virus (HIV) who are not on treatment. Mothers may avoid breastfeeding temporary if diagnosed with human t-cell lymphotropic virus, active herpes simplex virus Type 1, drug abusers, mothers on certain medications (radioactive iodine, anti-epileptic, sedating psychotherapeutic, chemotherapeutic, and psychotropic medication) (American Academy of Pediatrics, 2012:e832; Cox & Carney, 2017:282; Rolfes et al., 2012:467-468; WHO, 2009:7-9).

Infant formula can be defined as a breast milk substitute that is manufactured to meet the nutritional requirements of infants during the first months after birth up to the introduction of complementary feeding WHO & FAO, 2016:2). Most infant formulas are derived from cow's milk and have been modified to mimic breast milk (UNICEF, 2014:1). A wide range of infant formulas is available. These infant formulas can be categorised as term, preterm, enriched, soy, lactose-free, hypoallergenic, non-allergenic, anti-reflux, and toddler formulas (O'Connor, 2009:565).

All the above-mentioned formulas must meet global standards set by the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), which is commissioned by the Codex Alimentarius International Food Standards (CODEX STAN 72-1981) (Koletzko et al., 2005:584; Owens et al., 2012:1; WHO & FAO, 2016:2). The Codex Alimentarius is compiled by the World Health Organisation (WHO) and the Food and Agriculture Organisation (FAO) of the United Nations to standardise the composition for infant formula and formulas for medical purposes intended for infants. When applying the above-mentioned standards, the recommendations of the International Code of Marketing of Breast Milk Substitutes and the Global Strategy for Infant and Young Child Feeding and World Health Assembly Resolution WHA54.2 should also be considered (WHO & FAO,

2016:2). To guide manufacturers, distributors, importers and retailers further, the Department of Health released the R.911 Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act 54 of 1972) Regulations relating to foodstuffs for infants and young children (South African Department of Health, 2012:3).

Various infant formula brands globally and nationally seek brand loyalty by hospital staff, doctors, and consumers (Rosenberg et al., 2008:290). However, if all infant formulas sold meet the composition and manufacturing requirements, as indicated above, there should be no reason to recommend one brand over another (Owens et al., 2012:1; UNICEF, 2014:3).

When a mother chooses to use formula feed, she does so after careful consideration of a formula that will provide the best nutrition for her infant (Hong, 2015:42). A mother may make the decision of an infant formula by making use of the model of consumer behaviour (Figure 5.1) or the consumer decision model for infant formula (Figure 5.2) (Cutler & Wright, 2002:45; Petty et al., 2012:425). According to the model, factors such as needs, perceptions, motivations and attitudes (psychological influences) and others such as culture, social classes, and opinion leaders (sociological influences) affect a mother's decision to breastfeed or use formula feed, thus creating a need (Hong, 2015:37; Petty et al., 2012:425; Tshikovhi & Gericke, 2015:10).

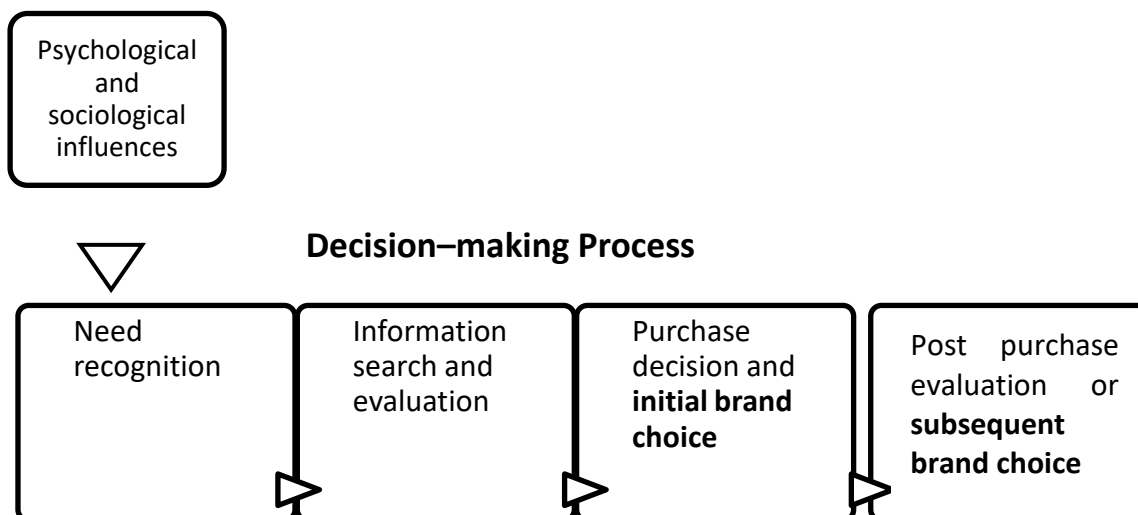


Figure 5.1: Simplified model of consumer behaviour (Cutler & Wright, 2002:45; Petty et al., 2012:425)

Need recognition is defined as the stage when the customer or mother realises that her current state of affairs is different to her ideal state, which will lead to a search for and

evaluation of information (Petty et al., 2012:425). The purchase decision involves the collection and evaluation of information about the formula being considered (Figure 5.1) (Petty et al., 2012:425). This information is obtained from sources that may be internal to the mother (i.e., previous experience with a milk formula or brand) and/or external sources (i.e., advice from friends, family, health care professionals, and advertisements) (Figure 5.2).

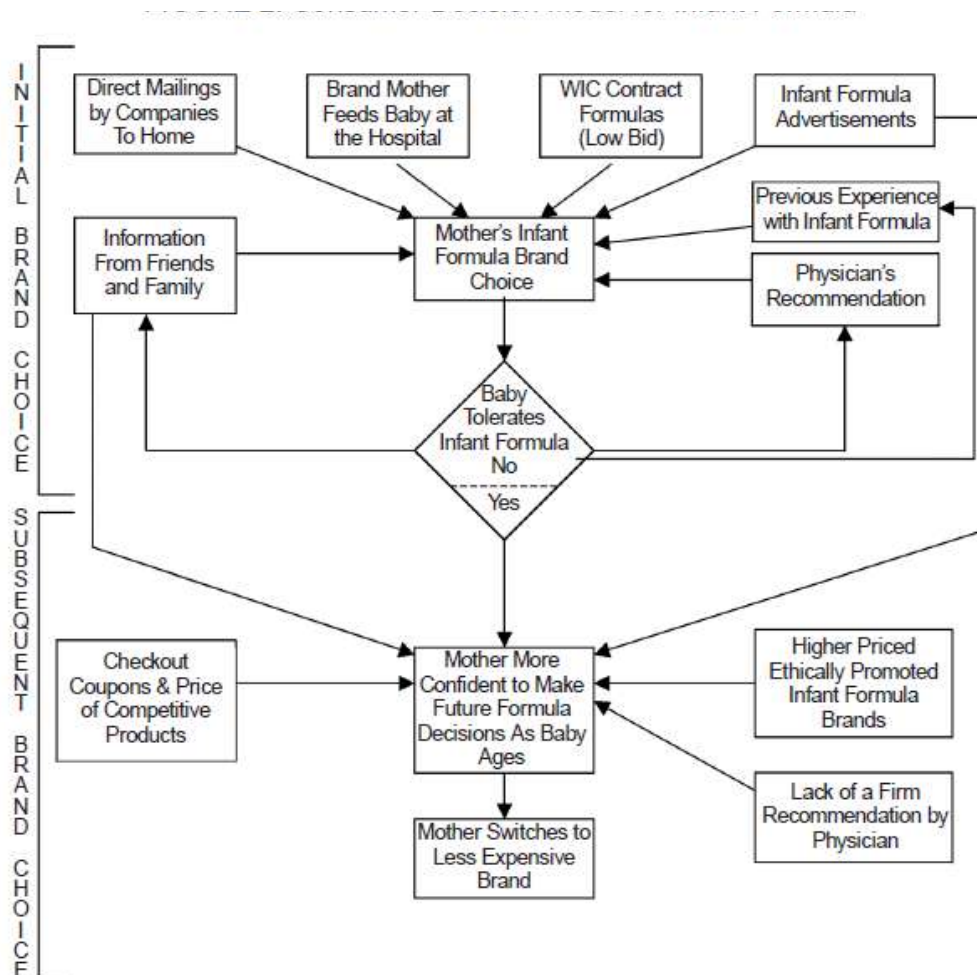


Figure 5.2: Consumer decision model for infant formula (Cutler & Wright, 2002:45)

Most studies conducted in South Africa (ZA) do not focus on the decision to use infant formula but rather on the use of infant formula in combination with breastfeeding (Bester, 2006:1; Chaponda et al, 2017:1; Faber 2007:16; Frans et al., 2015:812; Goosen et al, 2014:50; Kruger & Gericke, 2003:217; MacIntyre et al, 2016:70; Siziba et al., 2015:170; Van der Merwe et al., 2015:12). In addition, these studies were mostly carried out in low socioeconomic areas. Results from most of these studies show that barriers such as a lack of knowledge and experience, returning to work, a lack of breastfeeding support after birth, lack of facilities to support breastfeeding at work and public places, health problems, and

family dynamics affect a mother's decision to use formula. In turn, these reasons lead to low rates for EBF and a high rate of use of infant formula (Chaponda et al, 2017:1; Frans et al., 2015:812; Kruger & Gericke, 2003:217; Siziba et al., 2015:178; Sowden et al., 2009:44). Research on infant-feeding practices in a high socioeconomic area in ZA is limited. Therefore, this article aims to describe formula feeding practices of mothers with a high socioeconomic status.

5.2 Methods

A descriptive cross-sectional study was conducted in selected private preschools in Johannesburg North from 26 February to 2 March 2018.

5.2.1 Population and sample selection

The Living Standards Measure (LSM) is a South African marketing research tool used to segment the population according to living standards and disposable income (African Audience Research Foundation, 2017:1). The population for this study included mothers of infants and toddlers aged three months to four years attending selected private preschools in Johannesburg North. Johannesburg North includes the following areas: Sandton (Fourways, Bryanston, Woodmead, and Sunninghill), Midrand (Vorna Valley), and Randburg (Douglasdale). According to the South African Audience Research Foundation (2017:1) and the LSM, mothers residing in these areas meet the criteria to be categorised as having a high socioeconomic status (i.e., an LSM score of 7 to 10).

There are 28 private preschools in Johannesburg North. Convenience sampling was used to select eight preschools nearest to the researcher in Johannesburg North. All mothers of children aged three months to four years attending these preschools were informed of the study and were invited to participate in the study. If a mother had more than one child at the preschool, only the youngest child was included in the study, and if she had twins, only the younger twin was included in the study.

5.2.2 Data collection

A self-administered questionnaire was used to collect data. The questionnaire consisted of four sections: demographic information, mothers' feeding practices, factors affecting feeding practices, and information about the use of infant formula. For the purposes of this article, the focus was on the mothers' formula feeding practices. Questions related to infant

formula feeding practices were formulated based on relevant literature (Bester, 2006:99; Sowden et al., 2008:42; Tshikovhi & Gericke, 2015:10). The questions investigated introduction of formula milk, detailed information about the type of infant formula introduced, and the reasons for changing the type of formula (where applicable). Finally, questions regarding factors that influenced the choice of infant formula given were also included in the questionnaire.

Validity was ensured by using the latest literature regarding infant-feeding practices and factors influencing these feeding practices in developing the questionnaire (American Academy of Pediatrics, 2012:e828; Bester, 2006:99; Cutler & Wright, 2002:45; Hector et al, 2005:53; Petty et al., 2012:425; Rolfes et al., 2012:454; Tshikovhi & Gericke, 2015:10; WHO, 2017:1). A review of the questionnaire by a panel of nutrition and research professionals ensured content validity, while face validity was assessed during the pilot study prior to the study.

5.2.3 Ethical approval

Approval to undertake this study was obtained from the Health Sciences Research Ethics Committee of the Faculty of Health Sciences at the University of the Free State (UFS-HSD2017/1185). Written permission to undertake the study was obtained from principals of all the preschools. Participation of the mothers was voluntary, and mothers provided written informed consent prior to answering the questionnaire.

5.2.4 Pilot Study

The pilot study included five mothers from one of the selected preschools. The pilot study evaluated whether the mothers understood the questions easily and to note the time it would take to complete the questionnaire. The results from the mothers in the pilot study were included in the study because no amendments were made to the questionnaire.

5.3 Statistical Analysis

Descriptive statistics, namely frequencies and percentages, were used for categorical data, and means, standard deviations, or medians and percentages for continuous data were calculated. The analysis was performed by the Department of Biostatistics of the Faculty of Health Science, University of the Free State.

5.4 Results

5.4.1 Sociodemographic characteristics

The sociodemographic data of the infants include the median age and gender distribution. The median age of the mother's youngest infant reported on was 2.2 months. Most of the infants included in the study were females 61 (56%), and 48 (44%) were male.

The sociodemographic data of the mothers who answered the questionnaire are summarised in Table 5.1. The mothers' median age was 34 years. Most of the mothers (89%) had tertiary qualifications, i.e. a diploma, degree, or postgraduate degree. Approximately two thirds of the mothers were living in a household with a gross household income of more than R45 785 per month. Three quarters of the mothers were married, while only 6% were divorced. Caesarean section delivery was the most common type of delivery (76%).

Table 5.1: The demographic characteristics of the mothers using formula feeding

Demographic characteristics of the mothers	n	%
Age of mother		
< 25	1	1.0
25-34	53	58.0
> 35	44	41.0
Highest level of education		
Grade 12	12	11.2
Diploma/certificate	30	28.0
Degree	30	28.0
Postgraduate qualification	35	32.7
Gross household income		
< R12 280	3	2.9
R12 280 – R14 585	4	3.9
R18 210 – R20 973	8	7.8
R24 212 – R29 679	11	10.8
R37 709 – R45 785	15	14.7
> R45 785	61	59.8
Marital status		
Single	11	10.0
Married	82	75.2
Cohabiting	9	8.2
Divorces/separated	7	6.4
Type of delivery		
Vaginal	26	24.0
Caesarean	82	75.9

5.4.2 Feeding practices

Most of the mothers (n=102, 94.4%) initiated breastfeeding at birth. Half of the mothers (n=3, 50%) made their decision to formula-feed during pregnancy (Table 5.2).

Table 5.2: Decision made to formula-feed this infant

Time period	n	%
During pregnancy	3	50.0
At birth	1	16.7
After birth	2	33.3

5.4.3 Infant formula feeding practices

Mixed feeding in the context of this study refers to food and/or drinks (including infant formula) given to an infant in addition to being breastfed (UNICEF, 2016:42; Van der Merwe et al., 2015:123). Although EBF until six months remains the golden standard for infant feeding, mixed feeding was a common practice in this study. Most mothers (33.7%) practised mixed feeding from when the infant was aged one to two months.

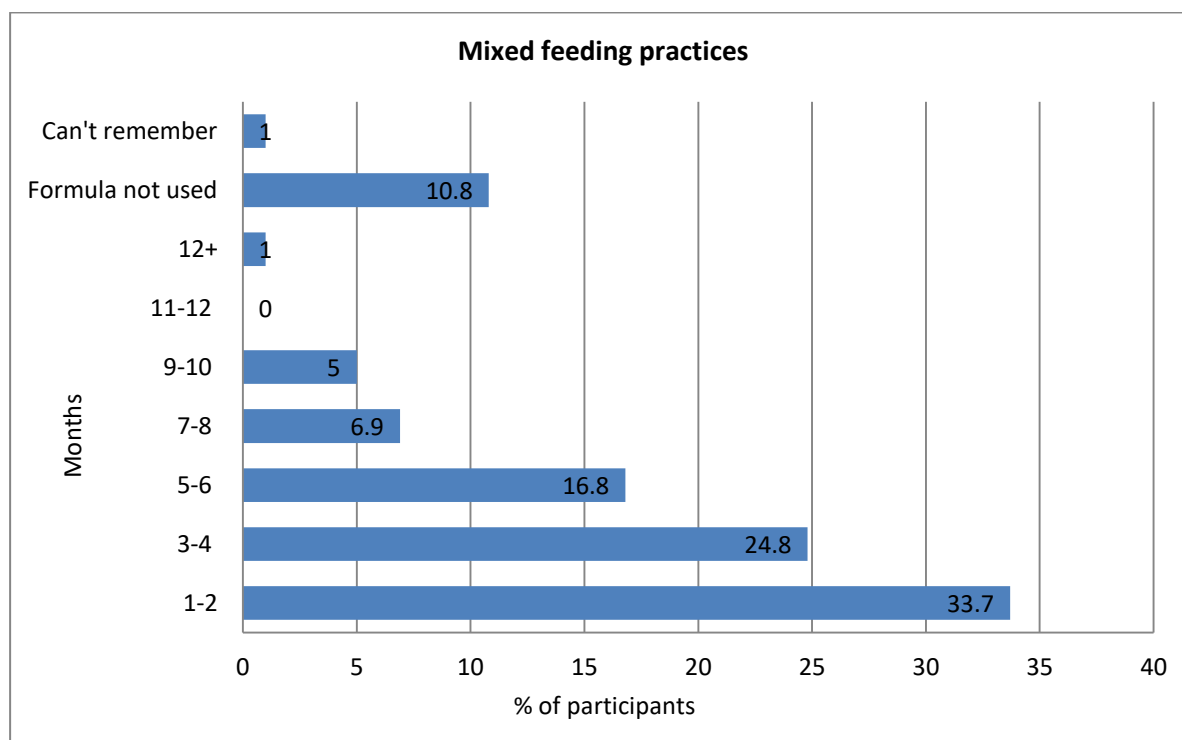


Figure 5.3: Mixed feeding practices

The top eight infant formula manufactures preferred by the mothers in study were listed. In this study, infant formulas of three international brands were most preferred. More than half of the mothers (n=57, 65%) purchased their first formula from one of the largest infant formula manufactures globally (Brand A). Brand C was second (n=14, 16%) and Brand B (n=9, 7.9%) was the third most preferred.

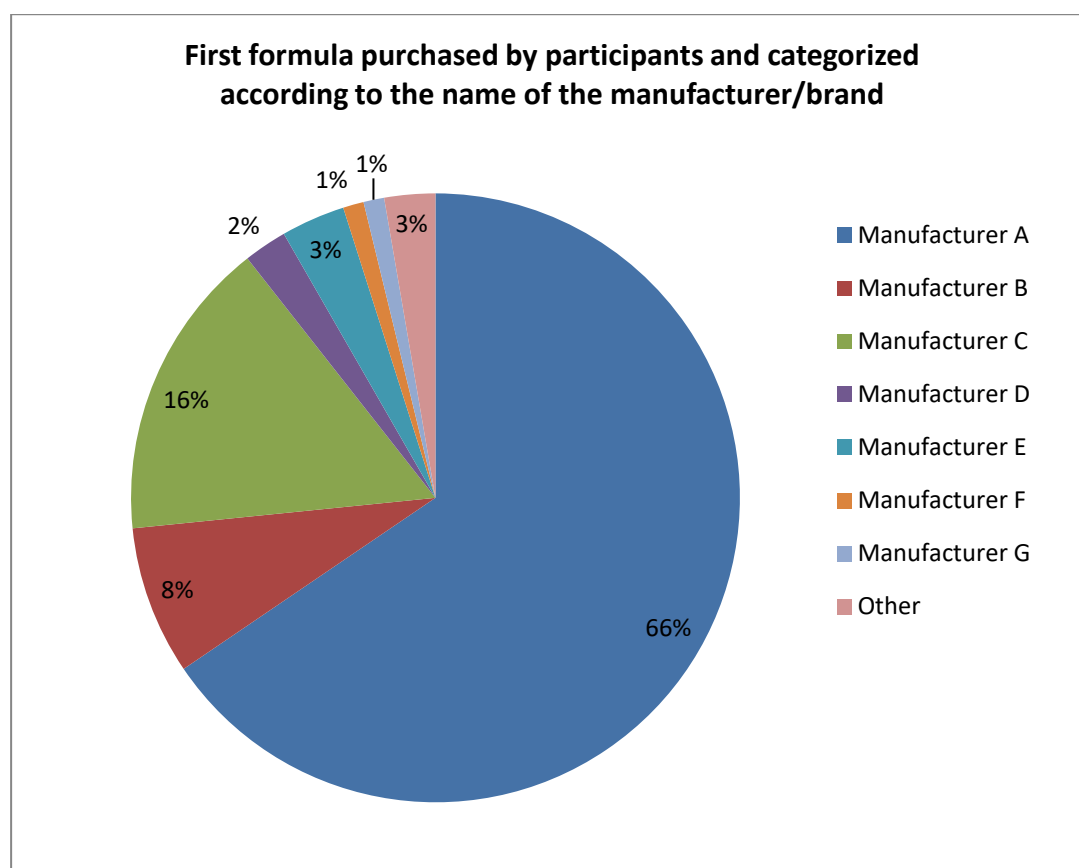


Figure 5.4: First formula purchased by participants and categorised according to the name of the brand

Of the mothers who used formula milk (n=89), 17 mothers responded to the question on reasons for changing their infant's formula. The most common reason why mothers changed from one formula to another, as shown in Table 5.3, was that the infant had outgrown the formula used (11.6%).

Table 5.3: Four most common reasons for changing the first formula purchased by mothers

Reason	n	%
Age-outgrown the formula	5	11.6

Constipation	4	9.3
Too expensive/Financial	4	9.3
Started cow's milk	4	9.3

The majority of mothers relied on their paediatrician's advice (60.4%) when it came to the type of formula to be used, followed by advice from friends (39.6%) and family members (33%), as shown in Figure 5.5.

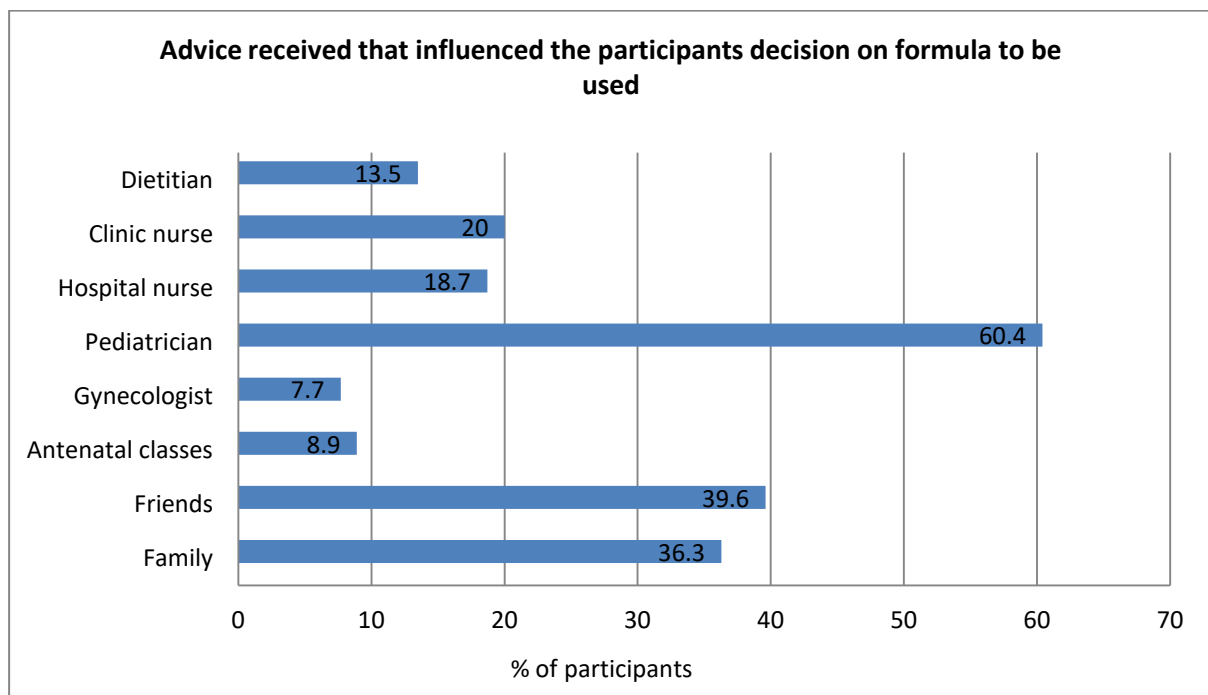


Figure 5.5: Advisor who influenced the mother's decision on formula to use

Additional to responding about where the mothers received advice from, was a question on the person who had the greatest influence on the choice of infant formula used (Table 5.4). Individuals who had the greatest influence on the mothers were the paediatrician (24.7%), followed by the mother making the choice herself (17.6%), friends (10.6%), and family (5.9%) with the least influence on the mother.

Table 5.4: The four biggest influences on the mother's decision on formula to use

Advice received from:	n	%
Paediatrician	21	24.7

The mother's personal choice	15	17.6
Friends	9	10.6
Family	5	5.9

Properties of an infant formula may affect the decision of formula to be used, as documented in Table 5.5. The name or the brand of the infant formula (42.5%) had the greatest influence on the decision of which formula to use. Mothers in this study also based their decision of an infant formula on whether the range to be used had follow-on formulas available (39.9%). A little over a third of the mothers (35.6%) indicated that the infant's medical condition and the composition of the formula (34.5%) influenced the type of formula chosen.

Table 5.5: Properties of an infant formula that has an influence on the decision of which formula to use

Properties if infant formula	n	%
Display of infant formula tins in the supermarket	5	5.8
Label of the tin	6	6.9
Size of the tin	16	18.4
Colour scheme of the label	1	1.2
Name/ brand of the product	37	42.5
Price of the formula	22	25.3
Composition of the formula	30	34.5
Availability of the formula at the shops	23	26.4
Infant prefers the taste	30	34.5
Chose the formula due to the infant's medical condition	31	35.6
The range has follow-on formulas available	34	39.9

5.5 Discussion

Having a closer look at the mothers' demographics, most of the mothers were younger than 35 years of age (59%), most mothers were married/cohabiting (83.4%) and had an education

level higher than Grade 12 (88.8%). In other words, mothers who participated in this study were young and could be considered as highly educated.

Most mothers initiated breastfeeding but resorted to add formula to their feeding routine as early as one to two months. Mixed feeding is a common phenomenon, and although this study did not determine these, various reasons for mixed feeding or switching from breastfeeding to infant feeding have been discussed in literature (Van der Merwe et al., 2015:1). Only 11% of the mothers in this study reported never having formula-fed their infants. A previous study conducted in the Cape Metropole in ZA in a high socioeconomic setting found that more mothers (20%) never breast-fed their infants and almost 50% of the mothers discontinued breastfeeding during week one to twelve (Bester; 2006:94). Half of the mothers in this study made their decision to initiate formula feeding during pregnancy. This might indicate that the mothers had a negative attitude towards breastfeeding. The American Academy of Pediatrics published similar results and added that education in this period could have the most influence to change a mother's option about the feeding method (Odom et al., 2014:1205). Contrary to the results of this study, 80% of mothers in a study by Bester (2006:94) performed in a high socioeconomic area in the Cape Metropole in ZA made their decision to formula-feed at birth, which indicates that those mothers' attitude towards breastfeeding were positive.

Although pre-schools were from a high socio-economic area, not all the participants were could be classified as having a high socio-economic status according to the bruto income of the household and in relation to those reliving standards also chose to formula feed her infant. It is thus possible that socio-economic class does not have a greater influence on the use of formula and that other factors as displayed in the consumer decision model for infant formula and lifestyle factors such as convenience, work hours, etc. may influence this decision (Cutler & Wright, 2002:45).

There are more or less eight well-known infant formula brands available on the South African market. Each brand will have standardised infant formulas and formulas for medical purposes such as soy-based, lactose-free, partially hydrolysed, extensively hydrolysed, amino-acid-based, anti-reflux, and formulas for inborn error of metabolism available. It has been 10 years since Tshikovhi & Gericke (2015:10) conducted their study, and similar to their

finding, one brand still dominates the formula milk industry in ZA. This brand was used by 66% of the mothers in this study.

When a mother chooses to formula-feed, she does so after careful consideration of a formula that will provide the best nutrition for her infant and will often change a formula to provide the best for her infant (Hong, 2015:42). The initial brand choice of formula can be affected by external factors as indicated in the model for Consumer Decision Model for Infant Formula (Figure 5.2) (Cutler & Wright, 2002:45). This includes information by family, friends, and physicians (Cutler & Wright, 2002:45). The majority of mothers (60.4%) in our study based their decision on which formula to use on the advice of paediatricians, followed by friends (39.6%), nurses (38.7%), and family (33%). Similar results were found in the studies by Bester (2006:83) and Tshikovhi & Gericke (2015:10). South African mothers with a high socioeconomic status and a high educational profile gained most of their information about infant feeding from nurses and paediatricians. Both of the studies found that paediatricians (32%-62%) had the greatest influence on the choice of formula milk to be used in a population of mothers with a high socioeconomic status. Although most of the mothers in this study made an informed choice of feeding method during pregnancy, only 8.9% of the mothers indicated that advice had been given to them in antenatal classes. The above-mentioned is an example of a how an external source may influence the information received by the mother and how she may evaluate the infant formula to be used, which will lead to the purchase decision (Petty et al., 2012:425).

Mothers also choose infant formula based on the properties of the formula (Sowden et al., 2008:42). In terms of this study, properties such as display of infant formula in the supermarket, label of the tin, size of the tin, colour scheme of the label, brand of the product, price of the formula, composition of the formula, availability of the formula at the shops, taste preferred by the infant, choice of the formula due to infant's medical condition, and follow-on formulas available in the range were considered as possible predictors of infant formula chosen by mothers. Possible health benefits that an infant may gain with a specific formula are also a strong predictor of the choice of an infant formula (Hong, 2015:41; Tshikovhi & Gericke, 2015:9). For the most part, mothers often choose an infant formula based on their brand loyalty or based on the fact that the brand is well known (Bester, 2006:104; Tshikovhi & Gericke, 2015:10). This phenomenon was confirmed in this

study, as most mothers (60.4%) indicated the brand name as the greatest influence on the choice of infant formula. A property of infant formula that influenced the decision of mothers in this study when choosing an infant formula was whether the range had follow-on formulas available (39.9%). The infant's medical condition (35.6%), the composition of the formula (34.5%) and the formula preferred by the infant (34.5%) were other factors that influenced a mother's choice of formula. Tshikovhi & Gericke (2015:9) found that almost half of the mothers sampled in their study chose an infant formula based on its health benefits. Thus, it is important to take note that very few mothers made their decision of an infant formula based on visual aspects such as colour scheme, the label of the tin, and infant formula displays.

The results are similar to the results found by Bester (2006:84), who found in their study that the availability of a follow-up formula influenced mothers' choices (41.8%) of a formula, followed by the infant's medical condition (29.1%). A larger proportion of mothers in their study than in this study indicated that the composition of the formula (61.82%) and the formula preferred by the infant (41.8%) influenced mothers' decision on which formula to use.

The most common reason noted about why mothers with infants in a high socioeconomic area changed the initial formula used was that the infant had outgrown the formula used (11.6%), because the infant was perceived to be constipated (9.4%), due to expenses (9.3%), and also because cow's milk (9.3%) was given to the infant.

The advertisement of milk formulas used to play a significant role in mothers' decisions about infant feeding before The International Code of Marketing of Breast Milk Substitutes was initiated in May 1981 (Cutler & Wright, 2002:45; Kong & Lee, 2004:375). The International Code of Marketing of Breast Milk Substitutes was developed to promote, sustain, and improve breastfeeding practices in hospitals and maternity facilities (WHO, 1981:8). When this code was successfully implemented in countries, it reduced the influence of marketing through advertisements on infant feeding (Kong & Lee, 2004:375). It is also evident in the current study that the advertisement of milk formulas did not play a role in a mother's decision about infant feeding because the International Code of Marketing of Breast Milk Substitutes is well implemented in ZA.

An infant's first feed occurs after birth in hospital. Infant formulas are readily available in hospitals for mothers who are unable to breastfeed, who do not want to breastfeed by choice, or for infants who are in need of specialised formulas. The infant formula that is given to infants in hospital and formulas that are on tender from the government will influence the initial brand choice to which a mother is exposed (Cutler & Wright, 2002:45). In this study, it was also found that infant formula initiated in the hospital influenced the mother's decision on which formula to use. If the infant formula offered in hospital was well tolerated, most mothers preferred to continue using the formula and did not consider changing brands.

Seventeen percent of mothers in this study indicated that they had decided on the infant formula to use themselves. It is possible that in making this decision, mothers would have consulted various websites of food companies, blogs, and sites to obtain information on infant formulas. The purchase decision refers to the collection and evaluation of information about the formula being considered (Petty et al., 2012:425). Tshikovhi & Gericke (2015:10) found that the purchase decision had a minor influence on the decision-making process of mothers in a high socioeconomic area. Mothers are willing to shop around to purchase the brand from another retailer. Although not indicated in the model by Cutler and Wright (2002:45), information available on the Internet is another factor that may affect brand choice. Monteiro and Assis (2016:1) analysed 50 websites of food companies that specialise in nutrition and found that the guidelines given contained information that could lead to misconceptions.

5.6 Limitations

Mothers from a high Living Standards Measure area (33% of mothers had a postgraduate qualification) were selected; therefore, literacy was not a concern. Mothers with four-year-olds might not remember the exact timing of introducing feeds when completing the questionnaire; therefore, a "can't remember" option was included in the questionnaire. The greatest concern was a low response rate due to no contact between the researcher and the mother. To counter this, the principals were asked to assist the researcher to ensure as much participation as possible. Another possible limitation was the small sample size with only 109 participants.

5.7 Conclusion

The findings of this study illustrate the factors affecting the choice of mothers residing in a high socioeconomic area of infant formula to be used. It has been 10 years since Tshikovhi & Gericke (2015:10) conducted their study, and it is still evident that South African mothers residing in a high socioeconomic status gained most of their information about infant feeding from paediatricians. The majority of mothers (60.4%) based their decision on which formula to be used on the advice of paediatricians, followed by friends (39.6%), nurses (38.7%), and family (33%). Although most of the mothers in this study made an informed choice of feeding method during pregnancy, limited advice was given to mothers in antenatal classes about infant formula (8.9%). Mothers in a high socioeconomic area considered the properties of an infant formula when choosing an infant formula. Mothers preferred a range that had follow-on formulas available (39.9%), followed by formulas due to the infant's medical condition (35.6%), composition of the formula, and the formula that the infant preferred (34.5%). From this study it seems as if the advertising of milk formulas does not play a significant role in mothers' decisions on infant feeding anymore because the International Code of Marketing of Breast Milk Substitutes is possibly well implemented in ZA (Cutler & Wright, 2002:4; Kong & Lee, 2004:375; see chapter 6). Therefore, the infant formula information of food companies on websites and blogs could explain why 17.6% of mothers indicated that their personal choices or own research on infant formula influenced their decisions about which formula to use.

5.8 Recommendations

As recommended by Tshikovhi & Gericke (2015:10), future research should focus on why paediatricians recommend specific brands of infant formulas.

In this study, it was evident that most of the participating mothers made an informed choice of feeding method during pregnancy. Future research should assess the advice given to mothers in antenatal classes about infant feeding and formula (8.9%).

More research should be done on the infant formula information of food companies on websites and blogs to analyse if they do comply with Article 4.1 of the International Code of Marketing of Breast Milk Substitutes of the WHO.

5.9 Conflict of interest

The author declares that she has not encountered any conflict of interest.

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Chapter 6: Article – Factors affecting the feeding practices of mothers with infants in a high socioeconomic area in Johannesburg

Rust, A.M.

Objectives: The objective of this study was to investigate individual-, group- and society-level factors affecting feeding practices of mothers with infants in a high socioeconomic area in Johannesburg.

Design: A descriptive cross-sectional study was conducted.

Setting: Johannesburg North, in the Gauteng Province, South Africa.

Subjects: One hundred and nine mothers residing in Johannesburg North who met the inclusion criteria participated in the study.

Methodology: A self-administered questionnaire was used for data collection.

Results: The misperception of insufficient milk supply was the most common reason among individual-level factors (37%) why mothers decided not to breastfeed. The most common group-level factor why mothers decided not to breastfeed was that formula milk was more convenient when working and therefore less time consuming (63%). The most common society-level factor why mothers did not breastfeed was that it was culturally unacceptable to breastfeed in public or in front of others (29%).

Conclusion: The most common factor why mothers decided not to breastfeed was that formula milk was more convenient when working and therefore less time consuming.

6.1 Introduction

A mother's decision to breastfeed is affected by various factors, including her beliefs and attitudes towards breastfeeding, her workplace, acceptability of breastfeeding in her community and the availability of skilled health professionals who support breastfeeding among family and friends (UNICEF, 2016:18). The World Health Organisation (WHO) (2014:2) attributes low rates for exclusive breastfeeding (EBF) to cultural, health-system, social, and commercial factors. These and other factors affect a mother's infant-feeding practices, such as unfavourable feeding beliefs and practices of caregivers (e.g. addition of liquids or solids at six months); hospital and workplace practices and policies that do not support

breastfeeding; a lack of knowledge on breastfeeding practices among women, their partners, families and friends; a lack of skilled health care workers; and the promotion of infant formula and breast milk substitutes (WHO, 2014:2). Sociodemographic factors such as a low educational level, younger maternal age, and being an unmarried or single mother with a low socioeconomic status have been found to affect breastfeeding rates negatively. (American Academy of Pediatrics, 2012:e828; Li et al., 2008:S70; Santana et al., 2017:107; Shahla et al., 2010:3; Tshikovhi & Gericke., 2015:10; UNICEF, 2016:52; WHO, 2010:104-113; WHO, 2012:110-111).

In an effort to guide researchers when attempting to describe factors affecting breastfeeding practices, Hector et al. (2005:53) developed a conceptual framework of factors affecting breastfeeding practices. The framework assists researchers to identify reasons for the low rates for EBF currently experienced. Hector et al. (2005:53) categorize factors affecting breastfeeding practices as individual-level factors, group-level factors and society-level factors, as shown in Figure 6.1.

A CONCEPTUAL FRAMEWORK OF FACTORS AFFECTING BREASTFEEDING PRACTICES

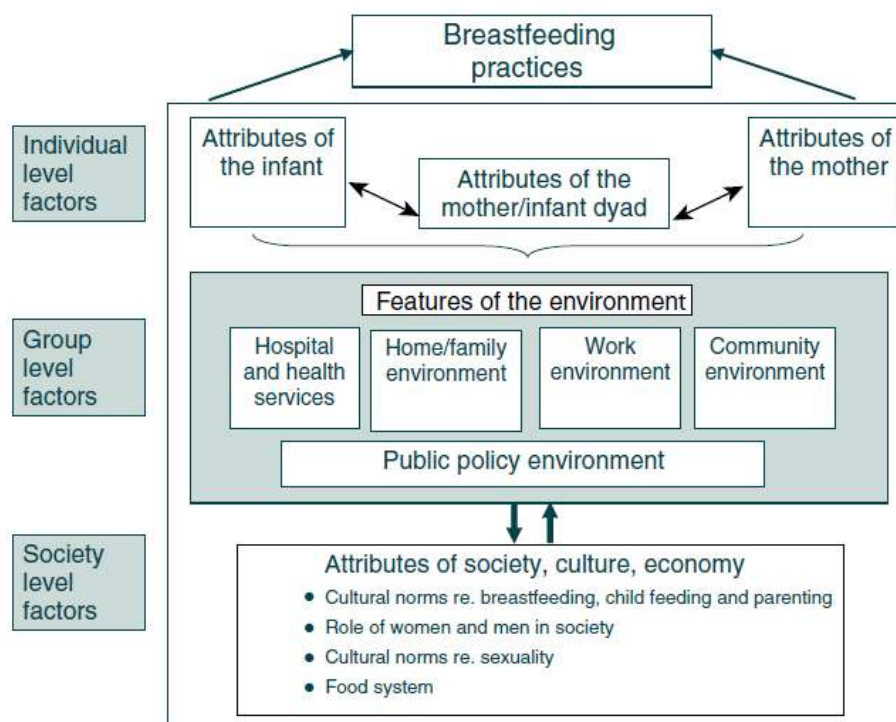


Figure 6.1: Conceptual framework of the factors affecting breastfeeding practices (Hector et al., 2005:53)

Individual-level factors refer to attributes of mothers and infants that influence breastfeeding. These individual-level factors include the mother's knowledge about breastfeeding, her intention to breastfeed, her parenting skills, her birth experience, her and the infant's health status, and the nature of early interaction between her and the infant (Hector et al., 2005:53). Mothers' knowledge about breastfeeding has been associated with increased breastfeeding rates (Bester, 2006:99; Earl, 2002:209; Hmone et al., 2017:29; Hong, 2015:42; Kong & Lee, 2004:372; Kronborg & Vaeth, 2004:215). On the other hand, myths about breastfeeding can influence a mother's decision to breastfeed negatively. Myths include: insufficient milk supply, the size of breasts being unsuitable for breastfeeding, small nipple size, inverted nipples, fear losing her figure, breasts sagging due to breastfeeding, and the fear of contracting breast cancer (Bester, 2006:76, Kong & Lee, 2004:373; Hector et al., 2005:52). Very often, these myths lead to mothers being uncomfortable with initiating breastfeeding or to breastfeed in public because they are embarrassed or they have body and breast shape concerns (Johnston-Robledo & Fred, 2008:14). The myth or perception of insufficient milk is also a common reported myth for the cessation of breastfeeding (Brown, 2014:e184; Hector et al., 2005:52; Jara-Palacios et al., 2015:2; Li et al., 2008:S74; MacIntyre et al., 2016:70; Madiba, 2015:36; Mgolozeli & Shilubane, 2015:87; Odom et al., 2013:e729 ; Sun et al., 2017:359; Tenfelde et al., 2013:213; Swigart et al., 2017:22; Yotebieng et al., 2013:5).

Group-level factors refer to environmental attributes such as hospital and health services, the home, and work and community environments that affect breastfeeding practices (Hector, 2005:53). The promotion of breastfeeding by hospital and health facilities improves breastfeeding practices (Jama et al., 2017:2; Odom, 2013:e731; WHO, 2014), while the promotion of infant formula, milk powder, and other breast-milk substitutes leads to a decline in breastfeeding (WHO, 2018:1). Unskilled health care workers, hospital and health care practices, policies that do not support breastfeeding, and health care workers and policy makers that do not have proper knowledge on breastfeeding lead to low rates for EBF (Mnyani et al., 2017:9; Odom, 2013:e731; WHO, 2014:1). Other group-level factors that affect breastfeeding practices include family size, family circumstances and responsibilities, and support from a partner. Government policies on childcare allowances, as well as

maternity and paternity leave policies, are proven to influence breastfeeding practices (Bester, 2006:80; Hector et al., 2005:53; Rollins et al., 2016:492).

External attributes that affect a mother's expectations and acceptance of breastfeeding are referred to as society-level factors (Hector et al., 2005:54). The effect of traditional and cultural practices on infant feeding is well documented (Bandyopadhyay, 2009:4-6; Castro et al., 2014:1845; Mphego et al., 2014:11). Different cultures have different myths and beliefs that influence breastfeeding; the same is true for South Africa (ZA) (Bandyopadhyay, 2009:4-6; Castro et al., 2014:1845; Mphego et al., 2014:11.). In the Northern Cape, for example, traditional medicine is given to the infant for dentition and protection against witchcraft (Du Plessis et al., 2016:2). In Limpopo, traditional food is prepared by grandparents and is given to infants directly after birth to provide energy and to assist infants in passing stool because it is believed that breast milk is insufficient for infants to grow properly (Mushaphi et al., 2008:40). Women are highly influenced by family members to give solids, water-based formulas, and complementary and traditional medicines from an early age (Du Plessis et al., 2016:2; Goosen et al., 2014:54; Mphego et al., 2014:289). The above-mentioned practices are examples of society-level factors that may influence breastfeeding negatively.

Studies determining the link between breastfeeding and socioeconomic status are limited, and results of those published are found to be conflicting (WHO, 2016:30). Additionally, studies aiming to determine breastfeeding rates are mostly concentrated in low socioeconomic communities (UNICEF, 2016:30). At times, a higher socioeconomic status has been associated with higher breastfeeding initiation and breastfeeding rates (American Academy of Pediatrics, 2012:e828; Hmone et al., 2017:29; Li et al., 2008:S70). On the other hand, statistics reported by the WHO showed that a higher socioeconomic status did not result in higher breastfeeding rates (WHO, 2010:104-113; WHO, 2012:110-111).

Gaining knowledge about the feeding practices of mothers with a high socioeconomic status is imperative to ensure a more holistic view of South African breastfeeding practices. Therefore, this article reports on factors affecting infant-feeding practices of mothers in a high socioeconomic area in Johannesburg.

6.2 Methods

A descriptive cross-sectional study was conducted at selected preschools in Johannesburg North from 26 February to 2 March 2018.

6.2.1 Population and sample selection

The population for this study included mothers of infants and toddlers aged three months to four years attending selected private preschools in Johannesburg North. Johannesburg North includes the following areas: Sandton (Fourways, Bryanston, Woodmead, and Sunninghill), Midrand (Vorna Valley), and Randburg (Douglasdale). Residents in these areas fall within the Living Standards Measure (LSM) category of seven to ten, which is categorised as a high socioeconomic level. The Living Standards Measure (LSM) is a marketing research tool used in ZA to segment the population according to standard of living and disposable income (South African Audience Research Foundation, 2017:1). To be classified in the LSM seven to ten category, a mother must earn a larger than R12, 280 gross household income per month, must reside in an urban area, and have Grade 12 and or a higher education qualification (South African Audience Research Foundation, 2017:1). According to this classification, mothers residing in the above-mentioned areas are categorised as having LSM scores of seven to ten.

There are 28 private preschools in Johannesburg North. Convenience sampling was used to select eight preschools nearest to the researcher in Johannesburg North. All mothers of children aged three months to four years attending these preschools were informed of the study and were invited to participate in the study. If a mother had more than one child at the preschool, only the youngest child was included in the study, and if she had twins, only the younger twin was included.

6.2.2 Data collection

A self-administered questionnaire was used for data collection. The preschool principal sent out e-mails with an information letter to inform all mothers of the study. Questionnaires were handed out by the teachers to mothers who were willing to participate in the study. Mothers were requested to place completed questionnaires in boxes placed at each preschool to ensure confidentiality. The researcher collected the boxes at the end of the research period. The questionnaire consisted of four sections: demographic information,

feeding practices of mothers, factors affecting feeding practices, and information about formula feeding practices. To ensure validity, the questionnaire was developed based on the latest literature regarding infant-feeding practices and factors that affect feeding practices (American Academy of Pediatrics, 2012:e828; Bester, 2006:99; Cutler & Wright, 2002:45; Hector et al., 2005:53; Petty et al., 2012:425; Rolfes et al., 2012:454; Tshikovhi & Gericke, 2015:10; WHO, 2017:1). A review of the questionnaire by a panel of nutrition and research professionals ensured content validity, while face validity was assessed during the pilot study prior to the study. This article focuses on factors affecting infant-feeding practices.

6.2.3 Ethical approval

Approval to undertake this study was obtained from the Health Sciences Research Ethics Committee of the Faculty of Health Sciences at the University of the Free State (UFS-HSD2017/1185). Written permission to undertake the study was obtained from the preschool principals. Mothers' participation was voluntary, and the mothers provided written informed consent.

6.2.4 Pilot study

A pilot study was carried out prior to conducting the study, and it included five mothers from one of the selected preschools. The pilot study evaluated whether the mothers understood the questions easily and to note the time it would take to complete the questionnaire. The results from the mothers in the pilot study were included in the study because no amendments were made to the questionnaire.

6.3 Statistical Analysis

Descriptive statistics, namely frequencies and percentages, were used for categorical data; and means, standard deviations, or medians and percentages for continuous data were calculated per feeding practice and individual-, group-, and society-level factors. The analysis was performed by the Department of Biostatistics of the Faculty of Health Science, University of the Free State.

6.4 Results

One hundred and nine mothers out of an expected 600 completed the questionnaire. The results that follow report on individual-level, group-level and society-level factors that affected mothers' breastfeeding or infant-feeding practices (Figure 6.1).

6.4.1 Individual-level factors

According to the results shown in Table 6.1, the most common individual-level factor why mothers in a high socioeconomic area decided not to breastfeed was that they did not have enough milk (37.0%), followed by not knowing if an adequate volume of breast milk is received by her infant (34.5%). Almost twenty-nine percent of the mothers believed that breastfeeding would decrease their independence, and the same percentage believed that their breast milk would not have the optimum composition needed by their infants. Almost a quarter of the mothers (23.1%) decided to stop breastfeeding because they were unable to milk out or to use a breast pump, and 23.5% discontinued breastfeeding because they were unable to breastfeed and smoke or use alcohol.

Some mothers in this study decided not to breastfeed because breastfeeding would make their breasts sag (21.3%). Just under a quarter (19.6%) of the mothers believed that formula milk had the same benefits as breastfeeding and therefore decided to stop breastfeeding. Caesarean section delivery delayed the initiation of breastfeeding of 16.2% of the mothers, while 11.1% of the mothers indicated that pain or discomfort when breastfeeding discouraged them to breastfeed. Only a few mothers (7.4%) stated that it was not their intention to breastfeed and therefore decided not to breastfeed (5.6%). A low percentage of mothers in this study indicated that their health (5.6%) and use of medication (6.7%) were the reasons for discontinuing breastfeeding.

Table 6.1: Individual-level factors affecting mothers' breastfeeding practices

Individual-level factors	Agree	
	n	%
I do/did not have enough milk.	40	37.0
I do/did not know if an adequate volume of breast milk is received by my infant.	37	34.5
Breastfeeding will/would decrease my independence.	31	28.7
I will not be/was not able to breastfeed and to smoke/use alcohol.	25	23.5
I am/was unable to milk out or use a breast pump.	25	23.1
Breastfeeding will/would make my breasts sag (loss of shape).	23	21.3
The benefits of using formula milk are equal to breastfeeding.	21	19.6
Engorgement or mastitis is/was a concern.	20	18.8
Caesarean section delivery delayed the initiation of breastfeeding.	17	16.2
Pain/discomfort of breastfeeding discouraged me to breastfeed.	12	11.1
It was not my intention to breastfeed.	8	7.4
I can't/couldn't breastfeed and use my medication.	7	6.7
I had a bad experience with breastfeeding previously and therefore do not want to breastfeed.	5	5.0
My health is/was a concern.	6	5.6
My breasts sizes are/were too big or too small.	5	4.6
I am/was unable to breastfeed with inverted nipples.	4	3.8
My breast milk will not have the optimum composition.	4	3.7

6.4.2 Group-level factors

The most common group-level factor why mothers decided not to breastfeed was that formula milk was more convenient when working and less time consuming (63.2%) (Table 6.2). Almost half of the mothers indicated that no privacy was given at public places for breastfeeding (49%). A little over a third (34.3%) of the mothers indicated that there were no facilities at work to breastfeed or express or to store the expressed breast milk, while only 28.0% of the mothers indicated that their spouses had not received paternity leave. Breastfeeding was not initiated within an hour after birth in 20.5% of the mothers, while only 13.8% indicated that insufficient information on skin-to-skin contact, breastfeeding on

demand, and professional support had been given to them during hospitalisation. Eleven percent of mothers indicated that they had not been granted 4 months of maternity leave. Only 8.6% of the mothers also indicated that they were not allowed to have recommended breaks of 30 minutes twice per day for breastfeeding or expressing milk for the first six months while at work. Only two mothers indicated that breastfeeding was not recommended during antenatal classes, and one mother indicated that the advertising of milk formula changed her decision to breastfeed.

Table 6.2: Group-level factors affecting mothers' breastfeeding practices

Group level factors	Agree	
	n	%
Formula milk is more convenient when working and less time consuming.	67	63.2
No privacy is/was given at public places for breastfeeding.	53	49.0
There are/were no facilities at work to breastfeed/express and no facilities to store the expressed breast milk.	35	34.3
No paternity leave was granted to my partner.	30	28.0
Breastfeeding was not initiated within an hour after birth.	22	20.5
Information on skin-to-skin contact, breastfeeding on demand and professional support was not given to me during hospitalisation.	15	13.8
I was not given 4 months maternity leave.	11	10.5
I am/was not allowed to have breaks of 30 minutes twice per day for breastfeeding or expressing milk for the first 6 months.	9	8.6
My community does/did not see breastfeeding as normal.	6	5.6
Breastfeeding was not recommended during antenatal classes.	2	1.9
The advertising of milk formula changed my decision.	1	0.9
My partner does/did not support breastfeeding.	1	0.9

6.4.3 Society-level factors

Society-level factors described below are given in Table 6.3. The most common society-level factor why mothers participating in this study did not breastfeed was that it was culturally unacceptable to breastfeed in public or in front of others (30.5%). Mothers indicated that they had stopped breastfeeding because they did not have a social, breastfeeding support network (27.1%). A very small percentage of the mothers (4.6%) indicated that they did not

breastfeed because their mother could not, or preferred that she not breastfeed. It is interesting to note that 14.9% of the mothers did not have professional support to assist with breastfeeding problems.

Table 6.3: Society-level factors affecting mothers' breastfeeding practices

Social-level factors	Agree	
	n	%
It is culturally unacceptable to breastfeed in public or in front of others.	33	30.5
I do not have a social breastfeeding support network.	29	27.1
I did not have professional support.	16	14.9
My mother could not, or preferred that I do not breastfeed.	5	4.6
My doctor, nurse, or dietician advised me not to breastfeed.	1	0.9

6.4.4 Associations

A statistically significant difference was found between when a mother decided to formula-feed an infant and her intention not to breastfeed her infant, as shown in Table 6.4.

Significantly more mothers who decided to formula-feed their infant at birth disagreed that it was not their intention to breastfeed, compared with mothers who decided to formula-feed during pregnancy and during birth.

Table 6.4: Association between when a mother decided to use infant formula and her intention to breastfeed

Decided to formula-feed infant	Individual- level factor: It was not my intention to breastfeed n (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
During pregnancy	3 (100)	1 (100)	2(18.18)	11 (18.97)
At birth	-	-	1 (33.33)	2 (3.45)
After Birth	-	-	6 (54.44)	42 (72.41)
Can't remember	-	-	2 (18.18)	3 (5.17)
P-Value Fisher's Exact Test	0.0250			

6.5 Discussion

The objective of this study was to investigate individual-, group-, and society-level factors affecting feeding practices of mothers in a high socioeconomic area in Johannesburg. The results of this study reported elsewhere revealed that only 2% of mothers having a high socioeconomic status exclusively breastfed their infants up to six months of age (see chapter 4). The results suggest that rates for EBF in these mothers are lower than the expected national rate of 32% at four to five months (exclusive breastfed under the age of six months) and 4.9% at six to eight months (SADH, 2016:28). Factors that possibly could have led to the low rates for EBF were investigated in this study and are categorised and discussed as individual-level factors, group-level factors, and society-level factors.

6.5.1 Individual-level factors

A mother who is not confident that she is supplying sufficient milk to feed her infant is more likely to stop breastfeeding (Li et al., 2008:S72-74). The myth or perception of insufficient milk supply is one the most commonly reported reasons to stop breastfeeding worldwide (Brown, 2014:e184, Hector et al., 2005:52; Jara-Palacios et al., 2015:2; Li et al., 2008:S74; MacIntyre et al., 2016:70; Madiba et al., 2015:36; Mgozeli & Shilubane, 2015:7; Odom et al., 2013:e729; Sun et al., 2017:359; Swigart et al., 2017:22; Tenfelde et al., 2013:213; Yotebieng et al., 2013:5). This was the most common reason why mothers in this study decided not to breastfeed together with the fact that mothers thought that their infants were not receiving an adequate amount of breast milk (37%). Possible reasons for the myth and these findings may be related to the lack of knowledge about lactation or a technical difficulty such as improper latching rather than the inability to produce enough milk (Odom et al., 2013:e729). The misperception persists despite the fact that fewer than 5% of women in general are physiologically incapable of producing sufficient milk (Neifert et al., 1990, cited in Odom et al., 2013:e729).

To understand the true reasons for insufficient milk supply, the physiology of milk production should be understood. The rapid drop in oestrogen and progesterone production after birth and increased secretion of prolactin sets the stage for milk production. Prolactin is modulated from the anterior pituitary of the central nervous system, which stimulates milk production, and oxytocin from the pituitary stimulates mammary gland contraction causing

milk ejection. This process is known as a letdown process. Oxytocin is released by tactile, visual, olfactory, and auditory stimulation and inhibited by physical and emotional stress, pain, fatigue, and anxiety (Cox & Carney, 2017:286).

Thus, the cause of insufficient milk supply can lie in the mother (poor letdown or poor production) or in the infant (high energy requirements due to defects or diseases, low intake due to disease, or poor intake due to poor latching, infrequent feeding, or craniofacial abnormalities). One of the most common actual reasons for insufficient milk supply can occur when a mother is stressed. When there is physical or emotional stress and no psychological relaxation, the milk letdown process can be inhibited (Cox & Carney, 2017:286; O'Brien et al., 2009:61). Therefore, it is important to identify whether insufficient milk supply is a physiological or psychological problem and to address it accordingly (Sun et al., 2017:363). Women with an increased risk for low production of milk caused by low production of prolactin include women who are obese, have diabetes, with retained placental fragments in the uterus, and who are stressed during delivery are at risk for delayed milk production (Cox & Carney, 2017:286). Mothers who were unsure about the quantity and quality of breast milk that their babies were receiving were less anxious with the initiation of formula milk (O'Brien et al., 2009:61). Therefore, it is important to make mothers aware of these factors, which are known to affect only a small percentage of women (Sun et al., 2017:363).

It is likely that mothers did not have confidence in their ability to breastfeed due to low self-esteem and self-efficacy. Mothers with an intention to breastfeed should have a high sense of self-efficacy (confidence or a belief that they can succeed in breastfeeding) (Bailey et al., 2008:177; Cox et al., 2015:1; Kronborg & Vaeth, 2004:215). O'Brien et al. (2009:62) found that self-efficacy was one of the most important factors affecting breastfeeding. Similar results were found in this study, as a statistically significant difference was found between when a mother decided to formula-feed and her intention not to breastfeed her infant (p -value=0.0250). Mothers who did not intend to breastfeed all made the decision during pregnancy, while mothers who intended to breastfeed made the decision during pregnancy, at birth, and after birth.

6.5.2 Group-level factors

Returning to work is one of the main reasons why Australian women ceased breastfeeding (Weber et al., 2011:1). The most common reason among the group-level factors why South African mothers in a high socioeconomic area in this study decided not to breastfeed was that formula milk was more convenient when working and less time consuming (63%). Andrew and Harvey (2011:52) and Kong and Lee (2004:347) found that not all mothers succeeded with expressing breast milk, and some mothers found that it would be inconvenient and embarrassing to breastfeed at work. The work environment (whether it supports flexible work hours or not through maternity leave days and a lactation-friendly environment) greatly influences breastfeeding outcomes (American Academy of Pediatrics, 2012:e836; Bai et al., 2016:492; Bester, 2006:80; Hector et al., 2005:53; Li et al., 2008:S69; Kozhimannil et al., 2016:6-7; Odom et al., 2013:e729; Siziba, 2015:47;). Mothers who have longer maternity leave and may return part-time and have more flexible working hours are more likely to breastfeed exclusively and not initiate formula (Frans et al., 2015:823; Mirkovic et al., 2014:6; Monteiro & Assis, 2016:478). Breastfeeding-friendly facilities at the workplace will translate into a reduction in company health care costs, lower employee absenteeism, a reduction in employee turnover, and an increase in employee morale and productivity (Frans et al., 2015:823; Mirkovic et al., 2014:6; Monteiri & Assis, 2016:478). Thus, a breastfeeding-friendly workplace benefits the employer and the employee.

In ZA, mothers are allowed to have a 30-minute break twice per day for breastfeeding or expressing milk for the first six months (SA, 1998:4). From these results, it seems that the environment in which the women in this study lived was favourable to breastfeeding. This is evidenced by the fact that only 9% of the mothers in this study with a high socioeconomic status indicated that they were not allowed to have breaks for breastfeeding or to express milk for the first six months. There were no facilities at work to breastfeed or to express breast milk and to store the expressed breast milk for 35% of the mothers.

Paid maternal leave protects the relationship between the mother and the infant and facilitates breastfeeding (Cooklin et al., 2012:249). Paid maternity leave in ZA is 17 weeks; however, maternity leave does not always include payment (South African Department of Labour, 2018; SADH, 2016:28). This can be noted in the duration of EBF in this study, which dropped from 58.7% at two months to 31.3% at four months because maternity leave was

over. In this study, it is assumed that the low rate for EBF at six months was also affected by the duration of maternity leave, as most mothers in this study were employed (see Chapter 4). Workplace laws to improve the work environment (flexible work hours, paid maternity leave, and a lactation-friendly environment) are associated with a longer duration of breastfeeding (Roe et al., 1999:167; Smith-Gagen et al., 2014:2041). To improve breastfeeding rates in high socioeconomic areas further, the current workplace laws about breastfeeding should be reinforced, and more laws should be initiated in ZA. Fathers' support of breastfeeding mothers is another important factor that influences a mothers' choice to breastfeed (Andrew & Harvey, 2011:52; Bester, 2006:77; Hector et al., 2005:53; Kong & Lee, 2004:345). A little over a quarter (28%) of the mothers in this study indicated that no paternity leave had been granted to their partner/husband, but only one mother reported not receiving support to breastfeed from her spouse/partner. Paternal support not only influences the initiation of breastfeeding but also has a positive influence on the duration of breastfeeding (Li et al., 2014:S74). According to Kong and Lee (2004:345), formula milk would make the support from the father easier and more feasible to feed and bond with the child. The situation in ZA is different, as 80% of the mothers agreed that their husbands encouraged them to breastfeed, and in a study by Bester (2006), fathers stated that they did not feel left out if a mother were to breastfeed her child. However, two thirds of the mothers still agreed that they considered formula milk when the method of feeding was chosen, as the workload could be shared (Bester, 2006:78).

Numerous factors may affect a mother's decision to breastfeed. The opinions of family members and health care professionals play a fundamental role in a mother's decision to breastfeed (Bester, 2006:82; Chaponda et al., 2017:1; Odom et al., 2014:1204; Tshikovhi & Gericke et al., 2015:8). For the most part, it seems as if most mothers in a high socioeconomic group in South African received breastfeeding support from health care professionals and during antenatal classes (Bester, 2006:82). Although health care professionals play an important role in supporting breastfeeding, it is interesting to note that 15% of the mothers in this study did not have professional support to assist with breastfeeding problems. In this study, 15% of the mothers indicated that insufficient information on skin-to-skin contact, breastfeeding on demand, and professional support was given to them during hospitalisation. It is also a matter of concern that 21% of mothers

indicated that breastfeeding was not initiated within an hour after birth, which led mothers to stop breastfeeding. This is indicative that the Mother and Baby Friendly Hospital Initiative (MBFHI) (an initiative that certifies hospitals as baby friendly if they implement all 10 steps to breastfeeding and comply with the International Code of Marketing) is not implemented fully in private hospitals in ZA (Erick, 2012:365; WHO, 1981:8; WHO, 2009:3).

6.5.3. Society-level factors

Studies in the United Kingdom and ZA (high socioeconomic area) have shown that the perception of the public about breastfeeding plays a crucial role in a mother's feeding choice. Women in these studies reported breastfeeding as embarrassing, disgusting, and inconvenient and that breastfeeding in public is unacceptable (Andrew & Harvey, 2011:52; Bester, 2006:79; Earl, 2002:212). Similar results were found in this study with regard to society-level factors because the most common reason why mothers did not breastfeed was that it was culturally unacceptable to breastfeed in public or in front of others (29%). Mothers also indicated that they stopped breastfeeding because they did not have a social breastfeeding support network (28%).

It is possible that mothers in this study did not want to breastfeed in public because in some societies (particularly Western communities), breasts have a sexual connotation, meaning that they should be exposed only in a private place (Daglas & Antoniou, 2012:356; Kong & Lee, 2004:375; Wanjohi et al., 2017:5). In most African communities, however, this is not the case. In Mali in Western Africa, Sierra Leone, and some South African communities, for example, breasts do not necessarily have a sexual association and women tend to expose their breasts freely and without reservation in public. This lack of association makes breastfeeding in public socially acceptable in these communities (Daglas & Antoniou, 2012:355).

As previously mentioned, support from family members and health care professionals is important when it comes to breastfeeding (Bester, 2006:82; Chaponda et al., 2017:1; Odom et al., 2014:1204; Tshikovhi & Gericke et al., 2015:8). Only a few mothers reported not being advised by health professionals and only 9% of mothers indicated that they did not breastfeed because of their mothers' influence, which is an indication that mothers in this study received support to breastfeed.

6.6 Limitations

Mothers from a high Living Standards Measure area (33% of mothers had a postgraduate qualification) were selected; therefore, literacy was not a concern. Mothers with four-year-olds might not remember the exact timing of introducing feeds when completing the questionnaire; therefore, a “can’t remember” option was included in the questionnaire. The greatest concern was a low response rate due to no contact between the researcher and the mother. To counter this, the principals were asked to assist the researcher to ensure as much participation as possible.

6.7 Conclusion

The findings of this study illustrate factors affecting the feeding practices of mothers in a high socioeconomic area in Johannesburg. The most common (group-level) factor why South African mothers in a high socioeconomic area decided not to breastfeed was that formula milk was more convenient when working and is less time consuming. The myth or perception of insufficient milk is well reported worldwide and was a common individual-level factor in this study why South African mothers in a high socioeconomic area decided not to breastfeed. This was followed by not knowing if an adequate volume of breast milk was received by her infant. A statistically significant difference was found between when a mother decided to formula-feed an infant and her intention not to breastfeed her infant (p -value=0.0250). This study found that all the mothers who did not intend to breastfeed made the decision during pregnancy. The most common society-level factor why South African woman in this study did not breastfeed was that it was culturally unacceptable to breastfeed in public or in front of others. Mothers also indicated that they stopped breastfeeding because she did not have a social breastfeeding support network.

6.8 Recommendations

Recommendations would include the interventions on modifiable factors such as breastfeeding intention, social support (including work environment), and confidence to breastfeed and express milk (Shahla et al., 2010:1).

In this study, a statistically significant difference was found between when a mother decided to formula-feed an infant and her intention not to breastfeed her infant (p -value=0.0250). All the mothers in this study who did not intend to breastfeed made the decision during

pregnancy. Thus, intervention to improve feeding practices includes changes during the antenatal period. Goga et al. (2012:12) and Karanade & Perkar (2012:38) recommend antenatal breastfeeding counselling and the attendance of early postnatal lactation programmes to improve breastfeeding rates in low socioeconomic and upper low socioeconomic areas. A Cochrane review found conflicting results, as 24 trials with 10 056 women found no evidence that antenatal breastfeeding education could improve the initiation of breastfeeding or EBF at six months in a high socioeconomic income group (Lumbiganon et al., 2016:1). Therefore, more randomised control studies on high and low socioeconomic areas are necessary to determine if antenatal counselling should be initiated to improve feeding practices and mothers' intention to breastfeed.

The findings of this study also suggest that more studies should be done in ZA on the mothers and their knowledge about breastfeeding rights in the workplace as well as the facilities at work.

The expression of breast milk with breast pumps has become a more common feeding practice (Johns et al., 2013:1; Rasmussen & Geraghty, 2011:1). However, there is limited information on the prevalence and outcomes of the expression of breast milk with breast milk pumps in high- and low-income areas (Johns et al., 2013:1). This field needs to be investigated.

6.9 Conflict of interest

The author declares that she has not encountered any conflict of interest.

6.10 References

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Chapter 7: Conclusions and recommendations

7.1 Introduction

The objective of the study was to determine factors that affect the feeding practices of mothers with infants and children attending pre-schools in a high socioeconomic area in Johannesburg. To achieve the main aim, the following factors were assessed:

- The sociodemographic information of the mother and infant/child.
- Mothers' feeding practices.
- Factors affecting feeding practices (i.e., individual-, group-, and society-level factors).
- The effect of individual-, group-, and society-level factors on feeding practices.
- The association between sociodemographic factors and infant-feeding practices (i.e., breastfeeding and formula feeding).

7.2 Conclusions

The following conclusions evolved from this study:

7.2.1 A comparison of breastfeeding initiation, duration of exclusive breastfeeding, and duration of breastfeeding with demographics

The findings of this study illustrate associations between breastfeeding initiation, duration of EBF, duration of breastfeeding, and demographics. The following conclusions could be drawn from this section:

- Most of the mothers who participated in this study were younger than 35 years of age, were married/cohabiting, and had an education level higher than Grade 12. Mothers in this study mostly lived in a household with an income of about R37 709.
- The children's gender distribution was such that 44% were male and 56% were female. The median age of the mother's youngest infant was 2.2 months. Caesarean section delivery was the most common type of delivery (76%).

- In this study, a statistically significant difference was not found between household income and breastfeeding duration.
- The association between educational level and gross household income was not statistically significant; however, there was a tendency for higher educated mothers to earn a higher household income.
- Significantly more mothers who were married breastfed their infants at six months, compared to mothers who were single, divorced, or separated.
- No statistically significant association could be made between breastfeeding initiation, breastfeeding, and EBF duration and the mother's age, highest level of education, marital status, and type of delivery.
- Lastly, this study could not find a statistically significant association between the birthing method and breastfeeding duration.

7.2.2 Infant formula feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg.

The findings of this study illustrate the factors affecting a mother's choice of infant formula to be used residing in a high socioeconomic area. Conclusions from this section are as follows:

- Most mothers participating in this study gained most of their information about infant feeding from paediatricians, followed by advice from friends and family members.
- Most of the mothers in this study made their choice of feeding method during pregnancy; however, limited advice was given to mothers in antenatal classes about infant formula feeding.
- More than half of the mothers purchased their first formula from one of the largest infant formula manufacturers globally.
- The majority of mothers based their decision on which formula to use on advice received from paediatricians, followed by friends, nurses and family.

- Mothers with a high socioeconomic status considered certain infant formula properties when choosing an infant formula to use for their infants. The name of the manufacturer or the infant formula brand was the infant formula property that had the greatest influence (42.5%) on the decision of formula to use by mothers in this study. Mothers also preferred a range that had follow-on formulas available, followed by formulas designed for an infant's medical condition and the formula that the infant preferred.
- It is evident that the advertising of milk formulas did not play a role in a mother's decision about infant feeding.
- Mothers also relied on their own personal choices and own research when it came to the decision on which formula to use.

7.2.3 Factors affecting the feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg

This section gives conclusions on factors affecting the feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg.

Factors affecting mother's infant-feeding practices were grouped into individual-, group-, and society-level factors and are as follows:

- The most common group-level factor why mothers in this study decided not to breastfeed was that formula milk was more convenient when working and less time consuming. It was followed by mothers who indicated that there were no facilities at work to breastfeed or express and store the expressed breast milk.
- The myth or perception of insufficient milk is one the most commonly reported reasons to stop breastfeeding worldwide and was also a common individual-level factor in this study why mothers in a high socioeconomic area decided not to breastfeed. This was followed by not knowing if an adequate volume of breast milk was received by her infant.
- The most common society-level factor why mothers in this study did not breastfeed was that it was culturally unacceptable to breastfeed in public or in

front of others. Mothers also indicated that they stopped breastfeeding because they did not have a social breastfeeding support network.

7.3 Recommendations

Recommendations from this study are given in two parts, namely recommendations regarding breastfeeding practices and recommendations for further research.

7.3.1 Recommendations to address breastfeeding practices

7.3.1.1 Breastfeeding at work

Most of the mothers in this study were employed; therefore, it is recommended that employers create a breastfeeding-friendly workplace with lactation programmes. This will be to the benefit of the employer and employee. A supportive breastfeeding environment at work will help mothers to express breast milk efficiently to improve breastfeeding. Breastfeeding-friendly facilities at the workplace may translate into reduced company health care costs, lower employee absenteeism, reduced employee turnover, and increased employee morale and productivity (Frans et al., 2015:823; Mirkovic et al., 2014:6; Monteiro et al., 2017:478). The return in investment is calculated to be double than the amount invested to make a breastfeeding- friendly environment (American Academy of Pediatrics, 2012:e836).

From this study, it is recommended that paid maternity leave in South Africa be increased to six months. Paid maternity leave in ZA is 17 weeks; however, maternity leave does not always include payment (South Africa Department of Labour, 2018:1). Paid maternal leave protects the relationship between the mother and the infant, which would facilitate breastfeeding (Cooklin, 2012:249; OECD, 2018:1). Canada increased its paid maternity leave from six months to one year, depending on the length of employment and the hours worked. This resulted in an increase of 40% in breastfeeding rates at six months (Statistics Canada, 2018:1). In Norway, the paid maternity leave was increased from 10 weeks to 40 weeks, which resulted in an increase in breastfeeding rates at six months from 10% to 80% (Abdulloeva & Eyler, 2012:773). Karmaus et al. (2017:1) also recommended an increase in the duration of maternal leave in USA.

7.3.1.2 Breastfeeding education and support

Paediatricians and health care providers who work at hospitals and clinics play a crucial role in correcting myths about infant feeding and promoting breastfeeding. The knowledge of paediatricians and health care providers regarding infant-feeding practices should be determined, and policies to promote breastfeeding should be implemented. Antenatal classes should include breastfeeding education.

7.3.1.3 Breastfeeding social awareness

Breastfeeding awareness campaigns that target high socioeconomic areas need to be considered and should focus on improving acceptance of breastfeeding in public.

7.3.2 Recommendations for further research

- The current study supports the theory that the feeding practices of mothers with different demographics differ from one another. To compare feeding practices among different demographics efficiently, a validated screening tool (questionnaire) should be developed using the indicators for assessing infant and young child feeding practices of the World Health Organization (WHO, 2007:4).
- Goga et al. (2012:12) and Karanade & Perkar (2012:38) recommended antenatal breastfeeding counselling and the attendance of early postnatal lactation programmes to improve breastfeeding rates in low socioeconomic and upper low socioeconomic areas. More randomised control studies are necessary in high and low socioeconomic areas to determine if antenatal counselling should be strengthened to improve mothers' infant-feeding practices.
- Studies should be done in ZA on the mothers' knowledge of breastfeeding rights in the workplace as well as recommended facilities at work.
- As recommended by Tshikovhi & Gericke (2015:10), future research should focus on why paediatricians recommend specific brands of infant formulas in ZA.
- More research should be done on the information of food companies about infant formula on websites and blogs to determine if they comply with Article 4.1 of the WHO International Code of Marketing of Breast Milk Substitutes.

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Appendix A: Living Standards Measure



Living Standards Measure (LSM) level classification according to demographics (South African Audience Research Foundation, 2017).

LSM LEVEL	Demographics	
1	Female bias 50+ Some High School	Small urban/ Rural Traditional Hut R2, 225 average household income per month
2	Female bias 15–24 and 50+ Some High School Small urban/ Rural	Squatter Hut Shack, Matchbox and Traditional Hut R3, 352 average household income per month
3	Female bias 25-34 and 50+ Some High School Small Urban/ Rural	Squatter Hut Shack, Matchbox and Traditional Hut R3, 357 average household income per month
4	Female bias 35-49 and 50+ Some High School Small Urban/ Rural	Squatter Hut Shack, Matchbox and Traditional Hut R4, 156 average household income per month
5	No gender bias 15-34 Some High School Small urban/ rural	House, matchbox/ Matchbox improved R5, 636 average household income per month
6	Female bias 25-49 Some High School/Grade 12 Large Urban	House/ townhouse, cluster house R7, 876 average household income per month
7-Low	Female bias 25-49 Grade 12 and higher	Urban R12, 280 average household income per month
7-High	Female bias 25-49 Grade 12 and higher	Urban R14, 588 average household income per month
8-Low	Female bias 25-34 and 50+ Grade 12 and higher	Urban R18, 210 average household income per month
8-High	Female bias 25+ Grade 12 and higher	Urban R20, 973 average household income per month
9-Low	Female bias 35+ Grade 12 and higher	Urban R24, 212 average household income per month
9-High	Male bias 35+ Grade 12 and higher	Urban R29, 679 average household income per month
10-Low	Male bias 35+ Grade 12 and higher	Urban R37, 709 average household income per month
10-High	Male bias 35+ Grade 12 and higher	Urban R45, 785 average household income per month

Appendix B: List of Preschools in Johannesburg North

Name	Area	Number
Nanny Poppins Children- A Playgroup	Bryanston	011 022 9108
Happy Learning Preschool	Bryanston	061 372 2154
Little Giggles Preschool	Bryanston	011 022 9108
Cleverdon Preschool	Bryanston	011 463 4763
Rainbow Babies & Kids Nursery School cc	Bryanston	0114634098
Pooh Bear Corner	Bryanston	011 783 3108
The Little Ashford Preschool- Bryanston	Bryanston	011 463 2688
Grosvenor Montessori	Bryanston	011 056 8920
Junior Colleges Sandton	Bryanston	011 706 6609
Minnieland Creche and Pre-School	Bryanston	011 465 2967
Curro Castle Bryanston	Bryanston	087 286 8275
Sandhurst Pre- & Preparatory College	Sandhurst	011 784 0454
Broadacres Academy & Farm Nursery School	Broadacres	011 465 3810
Field & Study Pre-School Montessori	Parkmore	083 600 6833
Little Hands and Feet Montessori	Douglasdale	082 376 7106
Little Earth Kids Pre-School	Douglasdale	011 704 1379
Curro Castle Douglasdale	Douglasdale	087 286 8274
Precious Poppets Preschool	Fourways	011 066 6060
Singing Forest Montessori	Fourways	082 551 6157
Precious Poppets Preschool	Fourways	011 066 6060
Montessori Nosipho	Morningside	072 719 0681
Smiley Kids Morningside	Morningside	011 802 1256
Curro Castle Rivonia	Rivonia	087 287 9550
Tiny Tots	Ferndale	011 793-1621
The Little Ashford Preschool-Petervale	Petervale	011 234 0218
City Kids Preschool	Sandton	0114658848
The Little Ashford Preschool-Sandton	Sandton	011 883 0141
The Little Ashford Preschool-Rosebank	Rosebank	011 268 1661
Ferndale Nursery School	Ferndale	011 787 7532
Oxford Preschool	Ferndale	011 781 0891
345 Nursery School Vorna Valley	Vorna Valley	011 312 1274
Midrand Kids Academy	Midrand	082 745 5869
Curro Castle Waterfall	Midrand	087 286 8326
345 Nursery School Carlswald	Carlswald	011 029 0802

Appendix C: Questionnaire

 		
Feeding practices of mothers with infants and children attending preschools in a high socio-economic area in Johannesburg		
Questionnaire		
Mark the appropriate option with a X or write your answer in the space provided:		
1 Today's date:	d d m m y y	
Demographic information		
Information about the mother		
2	What is your age?	_____ years
3	What is your highest level of education?	
	1	Grade 12
	2	Diploma/Certificate
	3	Degree
	4	Postgraduate qualification
4	What is your average bruto household income per month (salary before deductions)?	
	1	<12 280
	2	12 280 - 14 585
	3	18 210 – 20 973
	4	24 212 – 29 679
	5	37 709 – 45 785
	6	> 45 785
5	What is your marital status?	
	1	Single
	2	Married
	3	Cohabiting
	4	Separated/divorced
	5	Widowed
Information about the infant		
Please answer the questions with reference to your youngest child/infant.		
6	What is the age of your youngest infant/child?	_____ months/years
	Date of birth	_____
7	What is the gender of the infant?	
	1	Male
	2	Female
8	How was the infant born?	
	1	Normal
	2	Caesarean

Feeding practices of mothers

Please answer the questions with reference to your youngest child/infant.

9 Was breastfeeding initiated at birth?

- | | |
|---|-----|
| 1 | Yes |
| 2 | No |

If breastfeeding was initiated at birth(yes), please answer question 9.1 and 9.2.

If breastfeeding was NOT initiated at birth(no), please answer question 9.3

9.1 At what age did you add formula milk while breastfeeding?

- | | | | |
|---|------------|---|------------------|
| 1 | 1-2 months | 5 | 9-10 months |
| 2 | 3-4 months | 6 | 11-12 months |
| 3 | 5-6 months | 7 | 12 + months |
| 4 | 7-8 months | 8 | I can't remember |

9.2 At what age did you stop breastfeeding?

- | | | | |
|---|------------|---|------------------|
| 1 | 1-2 months | 5 | 9-10 months |
| 2 | 3-4 months | 6 | 11-12 months |
| 3 | 5-6 months | 7 | 12 + months |
| 4 | 7-8 months | 8 | I can't remember |

9.3 When did you decide to formula feed this infant?

- | | |
|---|------------------|
| 1 | During pregnancy |
| 2 | At birth |
| 3 | After birth |
| 4 | I can't remember |

10 At what age did you start giving the infant/child solid food?

- | | | | |
|---|------------|---|------------------|
| 1 | 1-2 months | 5 | 9-10 months |
| 2 | 3-4 months | 6 | 11-12 months |
| 3 | 5-6 months | 7 | 12 + months |
| 4 | 7-8 months | 8 | I can't remember |

11 The questions below relate to the reasons why you decided to breastfeed or stop breastfeeding

Please answer the questions with reference to your youngest child/infant.

For the following questions, please mark one block most true to your opinion of the statement made.

1= Strongly agree; 2= Agree; 3= Disagree; 4= Strongly disagree 5= Can't remember

11.1 Individual level factors

11.1.1	It was not my intention to breastfeed.	1	2	3	4	5
11.1.2	The benefits of using formula milk are equal to breastfeeding.	1	2	3	4	5
11.1.3	I had a bad experience with breastfeeding previously and therefore do not want to breastfeed.	1	2	3	4	5
11.1.4	Breastfeeding will/would decrease my independence.	1	2	3	4	5
11.1.5	My health is/was a concern.	1	2	3	4	5
11.1.6	I can't/couldn't breastfeed and use my medication.	1	2	3	4	5
11.1.7	Pain/discomfort of breastfeeding discouraged me to breastfeed.	1	2	3	4	5
11.1.8	Engorgement or mastitis is/was of a concern.	1	2	3	4	5
11.1.9	I will not be/was not able to breastfeeding and to smoke/use alcohol.	1	2	3	4	5
11.1.10	Breastfeeding will/would make my breasts sag (loss of shape).	1	2	3	4	5
11.1.11	I am/was unable to breastfeed with inverted nipples.	1	2	3	4	5

11.1	Individual level factors (continue)					
11.1.12	My breasts size are/were too big or too small.	1	2	3	4	5
11.1.13	My nipples size are/were too small and inadequate for breastfeeding.	1	2	3	4	5
11.1.14	My breast milk will not have the optimum composition.	1	2	3	4	5
11.1.15	I do/did not have enough milk.	1	2	3	4	5
11.1.16	I do/did not know if a adequate volume of breast milk is received by my infant.	1	2	3	4	5
11.1.17	I am/was unable to milk out or use a breast pump.	1	2	3	4	5
11.1.18	Caesarean section delivery delayed the initiation of breastfeeding.	1	2	3	4	5
12.2	Group level factors					
12.2.1	Information on skin-to-skin contact, breastfeeding on demand and professional support was not given to me during hospitalisation.	1	2	3	4	5
12.2.2	My partner does/did not support breastfeeding.	1	2	3	4	5
12.2.3	Facilities, policies and practices at work do not support flexible working hours and the expression of breast milk.	1	2	3	4	5
12.2.4	Formula milk is more convenient when working and less time consuming.	1	2	3	4	5
12.2.5	My community does/did not see breastfeeding as normal.	1	2	3	4	5
12.2.6	No privacy is/was given at public places for breastfeeding.	1	2	3	4	5
12.2.7	No paternity leave was granted to my partner.	1	2	3	4	5
12.2.8	The advertisement of milk formula changed my decision.	1	2	3	4	5
13.3	Social level factors					
13.3.1	It is culturally unacceptable to breastfeed in the public or in front of others.	1	2	3	4	5
13.3.2	I do not have a social breastfeeding support network.	1	2	3	4	5
13.3.3	My mother could not, or preferred that I do not breastfeed.	1	2	3	4	5
13.3.4	I did not have professional support.	1	2	3	4	5
13.3.5	My doctor, nurse or dietitian advised me not to breastfeed.	1	2	3	4	5
Information about formula milk						
If formula was used as primary feed or as complimentary feed (to add to breastfeeding), please answer the following questions.						
Please answer the questions with reference to your youngest child/infant.						
14	What brand/ brands of formula feed are you using/was used? Also indicate the duration of usage in months and reason for changing brands					
Brand of milk formula feed, the duration and reason for changing brands						
	Brand		Duration		Reason for changing	
	1					
	2					
	3					
	4					

Appendix D: Approval letter for the study

LETTER OF APPROVAL – Name of School

To whom it may concern,

I am a master's student in the Department of Nutrition and Dietetics, Faculty of Health Science at the University of the Free State. I would like to grant permission to perform a research study at your facility for the completion of my master's dissertation in Dietetics.

A growing body of evidence has proven the benefits of breastfeeding for the infant, mother and the environment. In an effort to promote breastfeeding the World Health Organisation and the United Nations International Children's Emergency Fund (UNICEF) launched the Ten Steps to Successful Breastfeeding recommendations and the "The Baby-Friendly Hospital Initiative" (BFHI). Despite the well-known benefits of breastfeeding and the global campaigns launched the South African Health and Demographic Survey of 2003 found that only 8% of South African infants under the age of 6 months are exclusively breastfed.

The title of the project: "Feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg"

Main aim: The primary aim of this study is to determine factors which will influence the feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg.

The results of this will give us more clarity on why the breastfeeding goals are not met in South Africa in a high socioeconomic setting.

In order to perform the study it is requested that the principal of the preschool will assist with informing the mothers about the study to be performed at the preschool.

What is involved in the study- The researcher will leave an informed consent form attached to the questionnaire for mothers who are willing to participate in the study at the preschool. Mothers will complete the consent form prior to answering the questionnaire. Mothers will have one week to complete and to return the questionnaire to the preschool. Completed questionnaires and consent forms will be placed into different boxes after completion to ensure confidentiality. This should only take about 10-15 minutes of their time and cooperation.

Risks- There is absolutely no risks participating in this study.

Benefits- The results of the study will give some insight into why current breastfeeding goals, with a focus on mother's situated in a high socioeconomic area are not met.

Confidentiality- Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance

and data analysis include groups such as the Heath Sciences Research Ethics Committee. If results are published, this may lead to individual/cohort identification.

Questions regarding the study may be directed to Dr Lucia Meko at 051 401 2894. Furthermore, you may contact the Secretariat of the Heath Sciences Research Ethics Committee, UFS, at telephone number (051) 401 7794/5 if you have questions about research project.

The participation from your school will be appreciated. I look forward to hearing from you.

Dr L Meko
Study Leader (UFS)

AM Rust
079 538 2555

Hereby I, _____ give permission to the above-named researchers to perform their study at the preschool on the arranged date(s).

Contact details:_____

Signature

Date

Appendix E: Information document to mothers

INFORMATION DOCUMENT TO MOTHERS

Feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg

Dear Participant

I, Annica Madeleen Rust am a master's student in the Department of Nutrition and Dietetics, Faculty of Health Science at the University of the Free State. I am doing research on the factors affecting feeding practices of mothers.

Research is just the process to learn the answer to a question. The purpose of this study is to determine factors which influence the feeding practices of mothers with a high socioeconomic status in Johannesburg North.

Optimal nutrition during the first two years of life is vital for growth, development and health of children. Inadequate feeding practices lead to poor nutritional status in the form of under nutrition, wasting, stunting and over nutrition. The results will give us more insight into the feeding practices of mothers.

What is involved in the study- The researcher will leave an informed consent form attached to the questionnaire for mothers who are willing to participate in the study at the preschool. Mothers will complete the consent form prior to answering the questionnaire. Mothers will have one week to complete and to return the questionnaire to the preschool. Completed questionnaires and consent forms will be placed into different boxes after completion to ensure confidentiality. This should only take about 10-15 minutes of your time and cooperation.

Risks- There is absolutely no risks participating in this study.

Benefits- The results will give dietician more insight into the feeding practices of mothers to be able to compile more relevant feeding guidelines for children.

Participation is voluntary and the participant may discontinue participation at any time.

Confidentiality- Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law. Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the Ethics Committee for Medical Research. If results are published, this may lead to individual/cohort identification.

Questions regarding the study may be directed to Dr Lucia Meko at 051 401 2894. Furthermore, you may contact the Secretariat of the Health Sciences Research Ethics Committee, UFS, at telephone number (051) 401 7794/5 if you have questions about your rights as research subject.

Thanking you in advance for your participation.

The researcher

Appendix F: Letter of consent to mothers/participants

CONSENT TO PARTICIPATE IN RESEARCH

Feeding practices of mothers with infants and children attending preschools in a high socioeconomic area in Johannesburg

You have been asked to participate in a research study by the Department of Nutrition and Dietetics, University of the Free State.

You have been informed about the study by Annica Madeleen Rust.

You may contact Annica Madeleen Rust or Dr Lucia Meko at 051 401 2894 any time if you have questions about the research or if you are injured as a result of the research.

You may contact the Secretariat of the Health Sciences Research Ethics Committee, UFS at telephone number (051) 405 7794/5 if you have questions about your rights as a research subject.

You have absolutely no risks participating in this study.

Your participation in this research is voluntary. Participation may be discontinued at any time.

If you agree to participate, you will be given a signed copy of this document as well as the participant information sheet, which is a written summary of the research.

The research study, including the above information has been described to me.

I understand what my involvement in the study means and I voluntarily agree to participate.

Signature of Participant

Date

Signature of Witness
(Where applicable)

Date