COLLEGE OF HUMANITIES

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THE IMPACT OF SOCIOECONOMIC AND DEMOGRAPHIC FACTORS ON BREASTFEEDING: *ANALYSIS FROM THE 2007 SWAZILAND DEMOGRAPHIC AND HEALTH SURVEY*

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Dedication

I wish to extend my appreciation to my sister Buyile Simelane for her support in good and bad times. To my parents, I recognize their love and support for education. To them I dedicate this work.

Acknowledgements

I owe my deepest appreciation to all those who contributed and encouraged me throughout the study. My deepest gratitude to Dr Kerry Vermaak for her assistance, guidance and tireless reading, critiquing and editing this dissertation. This work would have not been completed without your tireless assistance and support.

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I cannot forget the God almighty for instilling patience and determination in me to work passionately without fail. To him I put my trust.

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Acronyms

ANC	Antenatal Care
CI	Confidence Interval
EAs	Enumeration Areas
PCA	Principal Component Analysis
SDHS	Swaziland Demographic and Health Survey
SES	Socioeconomic Status
VIF	Variance Inflation Factor
WI	Wealth Index
WHO	World Health Organisation
UNICEF	United Nations International Children's Emergency Fund
USA	United States of America

Abstract

Aim: Studies that investigate the main predictors of breastfeeding duration are important in realising the WHO recommendation of breastfeeding for two years and beyond. The main aim of the study was to model the impact of socioeconomic and demographic factors on the rate and duration of breastfeeding, while controlling for health sector variables. A secondary analysis of the 2007 Swaziland Demographic and Health Survey (SDHS) was conducted to achieve this aim.

Sample: A total sample of 2,812 women aged 15-49 reported the birth of at least one child born within five years of the survey. However only 2,601 women out of the 2,812 had information on the duration of breastfeeding of their last born children, and these were used as a sample for analysis in this study. Thus 211 from the 2,812 were considered missing.

Method: To establish the effects of the socioeconomic and demographic variables on the breastfeeding rate (ever breastfed) while controlling for health sector variables, a multivariate logistic regression was used. Furthermore, to model the impact of socioeconomic and demographic variables on the duration of breastfeeding, three logistic regression models were fitted to the data for children breastfed for at least six, 12 and 24 months of age.

Results: The rate of ever breastfeeding was found to be 94.3 % in Swaziland. In the multivariate logistic regression, highly educated women, women residing in urban areas, women residing in the Manzini region, delivery through cesarean section, and non-use of modern contraceptives were associated with lower odds of ever breastfeeding.

For the duration of breastfeeding three binary logistic models were fitted at six, 12 and 24 months. Of the mothers with a child aged 6 to 11 months at the time of the survey, 17.5% had breastfed for at least six months. In the multivariate analysis, highly educated mothers, those older than 20 years, mothers residing in urban areas, and mothers who delivered at a health facility were more likely to have breastfed their last born child for at least six months.

Among mothers with a last born child aged 12 to 23 months at the time of the survey, 39.8% reported to breastfeeding for at least 12 months. In the multivariate analysis less educated and uneducated mothers, mothers aged 35 and above, mothers residing in rural areas, mothers with a parity of one child, mothers using modern contraceptives, and mothers who delivered in a health facility had higher odds of breastfeeding for at least 12 months.

At the time of the survey only 13.1% of the mothers with a last born child aged 24 and above reported breastfeeding for at least 24 months. In the multivariate analysis mothers from the poorest households had the lowest odds of breastfeeding for at least 24 months compared to the poorer and richest households. Mothers older than 20 years, those who were married, mothers who delivered in a health facility, and were using modern contraceptives were more likely to report have breastfed their last born child at 24 months during the time of the survey.

Conclusion: The study found that the rate of ever breastfeeding is common in Swaziland. However, more attention need to be focused on the duration of breastfeeding as it is below the WHO recommendation with only 13.1% of children breastfed up to two years and beyond. The study found that SES, demographic and health sector variables were significant predictors of breastfeeding.

Chapter one

Introduction

1.1 Background

The World Health Organisation (WHO) recommends that all mothers should be encouraged to breastfeed exclusively for the first six months of infants' lives, and continue breastfeeding up to two years and beyond after the introduction of solid food (World Health Organisation, 2006). Extended breastfeeding greatly decreases the incidence and prevalence of child morbidity and mortality since breast milk has been documented to account for approximately 40% of children energy needs between 12 and 23 months (Aryal, 2007). Delgado and Matijasevich (2013) noted that in breastfeeding up to two years and beyond, the child is provided with major nutrients necessary for growth and development such as calcium, vitamin A and proteins, thereby enhancing overall child health as it reduces malnutrition. The WHO reports that out of the 10.9 million annual child deaths, almost two thirds are attributed to malnutrition and poor feeding practices (WHO, 2006)

Exclusive breastfeeding is central in the prevention of mother to child transmission of HIV and reduces the incidence and prevalence of infections such as diarrhoea, respiratory infections, urinary tract infections, meningitis and otitis media in infants (Nyanga *et al.,* 2012). Betal and Boulghaurjian (2005) argued that developing countries are beset with poor water and sanitation, underscoring the importance of breast milk which is uncontaminated. Waddington *et al.* (2012) argued that approximately 750 million people have poor sanitation and lack of access to clean water, primarily in developing countries and are thus more prone to infections including

diarrhoea. The WHO and United Nations International Children's Emergency Fund (UNICEF) reported that almost half of the 2.5 billion cases of diarrhoea worldwide among children were located in African and South Asian countries. Some children in developing countries have a weak immune system and are poorly fed, thus being vulnerable to infections such as diarrhoea (WHO and UNICEF, 2009). Molbak *et al*. (1994) conducted a longitudinal study in Guinea-Bissau and found that prolonged breastfeeding protected children against diarrhoea. The incidence of diarrhoea among children aged above a year was higher for children who were weaned early relative to those who were breastfed longer (Molbak *et al.,* 1994).

Regardless of the WHO recommendations, developing countries are still lagging behind in maintaining high prevalence and duration of breastfeeding (Mushaphi *et al.,* 2008), Specifically in Swaziland it was found that the mean duration of breastfeeding was 15.7 months (Central Statistical Office and Micro International Inc, 2008). This study attempts to examine the socioeconomic and demographic predictors of ever breastfeeding and breastfeeding at six, twelve and 24 months.

1.2 Objectives

1.2.1 Broad study objective

The overall aim of the study is to investigate the effect of socioeconomic factors and demographic factors on breastfeeding (that is, whether a child has ever been breastfed and breastfeeding at six, twelve and 24 months of age).

1.2.2 The specific objectives of the study

The specific objectives of the study are:

- To examine the effect of SES on breastfeeding.
- To examine the effect of maternal demographic factors on breastfeeding.
- To examine the effect of child characteristics on breastfeeding.
- To examine the effects of health service use factors on breastfeeding.

1.3 Study questions

The fundamental questions that the research aims to answer are:

- Is there a significant association that exist between breastfeeding and SES?
- Which are the maternal demographic factors that significantly associated with breastfeeding?
- Are the socioeconomic and demographic factors still significantly associated with breastfeeding even after controlling for health service use factors?

1.4 Research hypotheses

The null hypotheses of the study state:

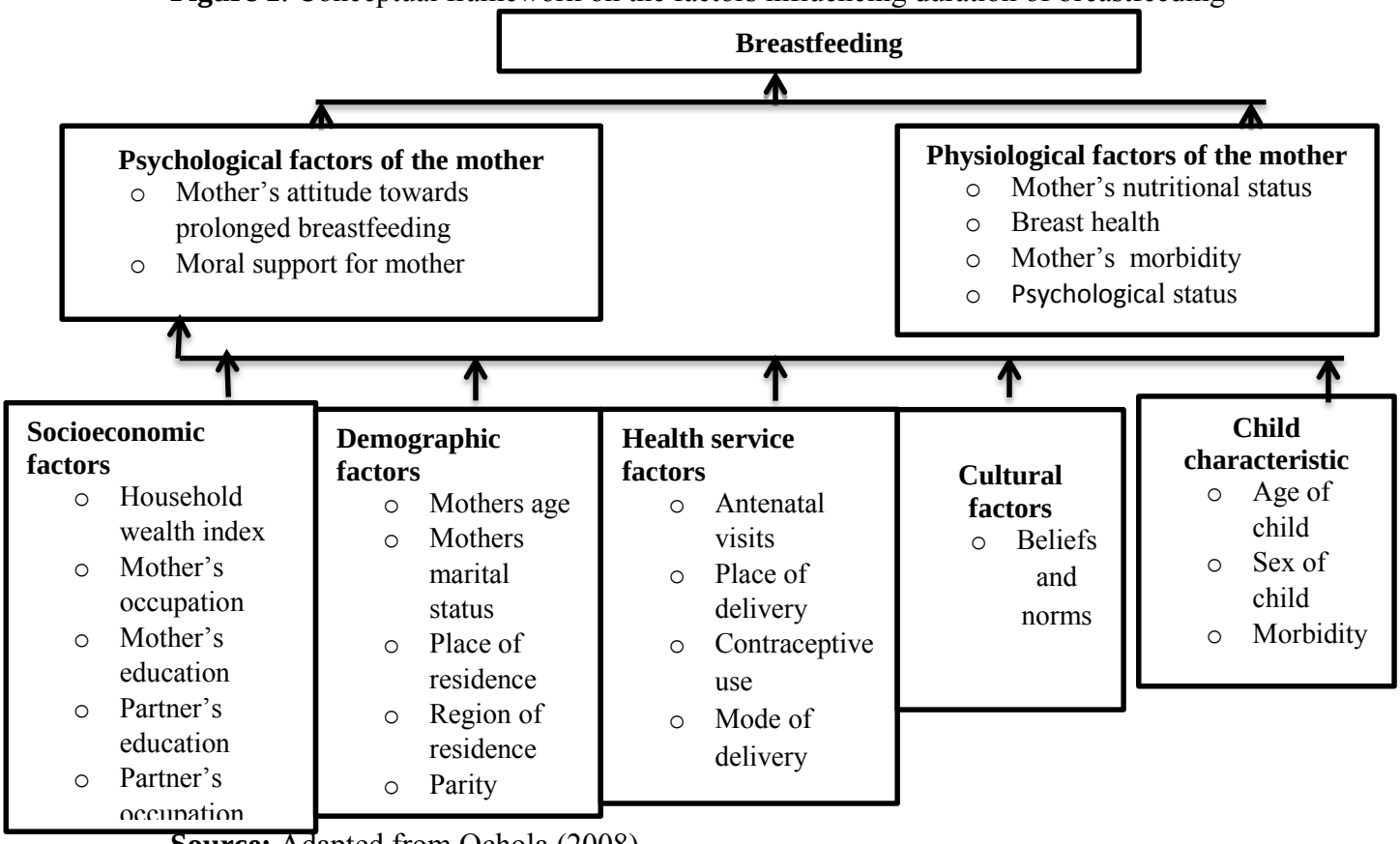
- There is no significant association between SES and breastfeeding.
- There is no significant association between maternal demographic factors and breastfeeding.
- There is no significant association between SES and demographic factors and breastfeeding, after controlling for health service factors.

1.5 Conceptual framework of the study

The conceptual framework for this study has been constructed to investigate the effect of socioeconomic and demographic factors on breastfeeding. Most important is that in Swaziland, there are limited studies that clearly demonstrate the impact of socioeconomic and demographic

factors on breastfeeding. Njeri (2012) states that a conceptual framework functions as a guide to examine the impact of the socioeconomic and demographic factors on breastfeeding. This study adapted a conceptual framework used by Ochola (2008) to provide a foundation in which the results of the study can be interpreted based on a broader theoretical analysis. The framework is based on the assumption that there are seven factors that have a major influence on breastfeeding. These factors are socioeconomic; demographic; cultural; health sector factors; characteristics of the child; psychological factors in the mother; and physiological factors in the mother. The arrows in figure 1 show that the first four factors (socioeconomic, demographic, health sector and cultural) have varying influence on the latter two (mother's psychological and physiological factors) which in turn impact on the overall process of breastfeeding.

Figure 1: Conceptual framework on the factors influencing duration of breastfeeding



Source: Adapted from Ochola (2008)

Chapter two

Literature review

2.1 Introduction

This chapter reviews studies that investigated the effect of socioeconomic and demographic factors on breastfeeding in both developing and developed countries. The theoretical framework presents a model that help to comprehend the effect of the SES, demographic and health sector variables on duration of breastfeeding discussed in detail in the chapter.

2.2 Socioeconomic factors and breastfeeding

2.2.1 Socioeconomic status

Bollen, Glanville and Stecklov (2001) argued that there is no universal definition of socioeconomic status (SES). SES depends on the stratification of particular measurements that a society deems significant, such as income, wealth, education, place of residence, occupation, household ownership of goods, items and household dwelling characteristics (Bollen, Glanville and Stecklov, 2001). The common understanding is that SES situates individuals, households and families in different strata in a particular society (Bollen, Glanville and Stecklov, 2001).

The study conducted in Nepal reported a significant association between socioeconomic status and breastfeeding, with a higher mean duration of breastfeeding among women who have a low SES (Aryal, 2007). However, in United States of America (USA) Thulier and Mercer (2009) found that women who are in a low SES category exhibit poor initiation and shorter duration of breastfeeding compared to women found in higher socioeconomic groups. Lack of knowledge on

breastfeeding among women of low socioeconomic status is cited as a major factor for the low rate and duration of breastfeeding in the USA (Dreesman, 2014).

Table 1: Summary of studies that have been published investigating the effect of socioeconomic, demographic and health sector variables on the duration of breastfeeding in developing countries. Studies arranged according to year of data collection, starting with the most recent.

Population	Definition of the outcome variable	Method of analysis	Results of the SES, demographic and health sector factors. Only factors significantly associated with longer breastfeeding duration in the multivariate analysis are presented.
Wang *et al.* (2014) Country: China (Hong Kong) 2010 longitudinal study Sample: 2098 mothers	Breastfeeding for more less than 1 week, 1-3 weeks, and more than3 to 6 weeks	Ordinal logistic regression	• Mother working part time, • Maternal occupation • Family income less than HK$10,000, • Parity
Akter and Rahman (2010) Country: Bangladesh 2004 Demographic and Health survey Sample:5364 mothers	Breastfeeding duration up to 48 months	Cox proportional hazard model	• Maternal age • Maternal education • Modern contraceptive use • Age at marriage • Parity • Mode of delivery • Maternal region of residence • Maternal occupation • Maternal religion
			Continued

Table 1 continued			
Population	Definition of the outcome variable	Method of analysis	Results of the SES, demographic and health sector factors. Only factors significantly associated with longer breastfeeding duration in a multivariate analysis are presented.
Mazumber and Hossain (2012) Country: Bangladesh 2004 Demographic and Health survey Sample: 4023 mother child pairs	Breastfeeding up to 36 months	Cox proportional hazard method	• Maternal place of residence • Maternal religion • Maternal age at marriage • Mode of delivery • Household wealth index • Maternal occupation
Aryal (2007) Country: Nepal 2000 Demographic Survey on Fertility and Mobility in rural Nepal Sample: 1,019 ever married women	Breastfeeding duration 1-18 months and above	Cox proportional hazard model	• Maternal age • Maternal education • Household wealth
Giashuddin and Kabir (2004) Country: Bangladesh Demographic and Health Survey 1999-2000 Sample: 5068 mothers	Breastfeeding in months	Cox proportional hazard model	• Maternal education • Household income • Birth interval • Household wealth index • delivery assistant
			Continued

Table 1 continued			
Population	Definition of outcome variable	Method of Analysis	Results of the SES, demographic and health sector factors. Only significant factors in a multivariate analysis are presented
Kyi Kyi (2000) Country: Philippines 1998 Demographic and Health survey. Sample: 4527 women	Breastfeeding up to 3 years	Multiple regression	• Maternal age • Child birth order • Maternal place of residence • Maternal education • Household wealth • Place of delivery
Abada, Trovato and Lalu (2001) Country: Philippines 1993 Demographic and Health Survey Sample:1659 valid cases	Breastfeeding from 0 to 40 moths	Cox proportional hazard model	• Occupation • Education • Parity • Maternal place of residence

Source: Studies compiled and presented by the author

Table 2: Summary of published studies investigating socioeconomic, demographic and health sector variables associated with the duration of breastfeeding in developed countries. Studies arranged according to year of data collection, starting with the most recent.

Population	Definition of the outcome variable	Method of analysis	Results of the SES, demographic and health sector factors. Only factors significantly associated with breastfeeding duration in a multivariate analysis are presented.
Hafizan and Sutan (2014) Country: Malaysia 2009 survey in three maternal and child health clinics. Sample:159 mothers with children aged six	Duration of exclusive breastfeeding	Multivariate binary logistic regression	• Maternal employment status • Ethnicity of the mother
Carletti *et al*. (2011) Country: Italy Institute for maternal health and child health between July 2007&July 2008 Sample: A cohort study of 400 infants	Breastfeeding up to 24 months	Multivariate logistic regression	• Maternal age
Langellier, Chaparro and Whaley (2012) Country: California 2005 Los Angeles County Health Survey Sample: 4,725 women	Duration of breastfeeding at 6, 12 and 24 months	Multivariate logistic regression	• Maternal race • Maternal age • Mother foreign born • Interview in Spanish • Other parents in the household • Breastfeeding intention • Hospital breastfeeding, • Formula discharge at hospital • Maternal return to work
			Continued

Table 2 continued			
Population	Definition of the outcome variables	Method of Analysis	Results of the SES, demographic and health sector factors. Only factors significantly associated with longer breastfeeding duration in the multivariate analysis are presented.
Merewood *et al.* (2007) Country: United States 2003 medical records for infants at medical centre (BMC) longitudinal study Sample: 336 infants	Breastfeeding at 6 months	Multivariate logistic regression	• Maternal age • Maternal place of birth • Maternal race
Flacking, Nyqvist and Ewarld (2007) Country: Sweden A longitudinal study (1993-2001) Sample: 37343	Breastfeeding up to 6 months	Multivariate logistic regression	• Maternal education level • Maternal employment benefits • Social welfare • Household income
Dubois and Girard (2003) Country: Canada Longitudinal study (1998-2002) Sample:2223 children	Breastfeeding in the first 4 months	Multivariate logistic analysis	• Maternal age • Maternal education

Source: Studies compiled and presented by the author

2.2.2. Education level

Education has been found by a number of studies to be a strong predictor of the duration of breastfeeding. A systematic literature review of studies conducted in USA by Thulier and Mercer

(2009) established that more highly educated women were more likely to practise prolonged breastfeeding than less educated and uneducated women. A longitudinal study conducted by Dubois and Girard (2003) in Canada revealed that the probability of breastfeeding for a longer duration was greater among highly educated women compared to women with less than a high school diploma. Flacking, Nyqvist and Ewald (2007) did a longitudinal study in Sweden investigating the factors affecting breastfeeding up to four months between term and pre-term infants. In their study they found that for both term and pre-term infants, the probability of being breastfed for a longer duration was higher if the mothers had higher education level compared to mothers with lower education level.

Dubois and Girard (2003) found that the influence of education on breastfeeding duration remained significant, even after adjusting for mediating variables. After controlling for the maternal education, annual family income and the type of the family (nuclear and extended) and of the parents, highly educated women were more likely to breastfeed at one, two, three and four months compared to women with no high school diploma. Although research has found that longitudinal studies are compromised when attrition rates are high, threatening the generalizability and reliability of the findings, the study done by Dubois and Girard (2003) consisted of a large sample of 2,223 women in order to accommodate participant loss.

Heck *et al*. (2006) argued that highly educated women are not only more likely to seek breastfeeding information and knowledge compared to less educated and uneducated women, but they have the ability to obtain this knowledge from a variety of sources such as radio, newspapers and institutions of higher training.

However, evidence in developing countries has shown an inverse relationship between the increase in education level and duration of breastfeeding. Abada, Travato and Lalu (2001) did an analysis of the 1993 Philippines DHS and found that women with lower level or no education had a higher probability of continuing breastfeeding up to 40 months relative to women with higher education. Giashuddin and Kabir (2004) in a cross sectional study in Bangladesh also found that women who had a higher education level had a higher probability of discontinuing breastfeeding at an earlier age than those who had no formal education or have lower years of schooling. In a similar vein, Akter and Rahman (2010) in their cross sectional study in Bangladesh found that the odds of terminating breastfeeding at 48 months were lower for women without formal education relative to highly educated women. Similar findings were noted in Nepal (Aryal, 2007).

Conversely, an analysis from the 1998 DHS done by Kyi Kyi (2000) in the Philippines showed a similar trend to the developed countries, that the likelihood of prolonged breastfeeding was higher for highly educated women compared to non-educated women. These results are different from those reported using the earlier 1993 DHS data from the Philippines, which noted that highly educated women breastfeed for a shorter duration (Adaba, Travato and Lalu, 2001). The findings produced by Kyi Kyi (2000) further deviate from the evidence presented by numerous studies in developing countries that there is a negative association between highly educated women and prolonged breastfeeding.

The possible explanation for the negative association of increased education on breastfeeding duration is that education has been associated with preferring bottle feeding since the mothers are involved in formal work thus resulted in lower rate and shorter duration of breastfeeding (Abada, Travato and Lalu, 2001). The main factor reported by Abada, Travato and Lalu (2001) is

that formal education instils a change in the way of life from traditional to modern hence resulting to shorter duration of breastfeeding. The ability of educated women to afford baby formulae is stated by Giashuddin and Kabir (2004) as the main reason for lower rate and shorter duration of breastfeeding. Highly educated women are more likely to be employed thus more likely to cease breastfeeding early (Giashuddin and Kabir, 2004). Mixed messages about the benefit and risk of breastfeeding also influence the duration of breastfeeding (Denison, 2002). Denison argued that mixed feeding is dangerous for the child since it irritate the lining of the stomach that predisposing the baby to HIV infection from breast milk

2.2.3 Household wealth index

The household wealth index has been widely used to measure the standard of living in developing countries (Smits and Steendijk, 2013). Rady, El-Sheikh and Oumar (2011) have argued that the customary measure of SES has been monetary. However, an argument can be made that income as a measure of SES has numerous shortcomings. For example, income greatly varies in developing countries where permanent and full time employment is not a norm, and the quality of data collecting methods and tools are not robust.

To interrogate the findings of the different studies on the effect of the household wealth index on breastfeeding, it is imperative to understand the methodology used to construct it. Cordova (2008) argued that when using the principal component analysis (PCA) to create the household wealth index, the factors that situate individuals in the categories of relatively poor or wealthy are considered, such as the assets and ownership of goods. Cordova (2008) argued that by not spontaneously situating households and individuals in SES categories based on the features of their residential and physical environment makes the PCA a robust method. As an example, Cordova argued that people residing in urban areas should not be automatically situated in the

wealthier categories based on the mere appearance of the infrastructure, but rather weights of the index should be calculated on assets thus situating individual households in different relevant categories.

Different studies conducted in developing countries underscore the importance of the household wealth index in predicting the duration of breastfeeding. A study by Senarath, Dibley and Agho (2007) created the household wealth index with three categories (poor, middle and rich) using the household wealth index. Even after holding constant other demographic, health sector and environmental factors that affect breastfeeding duration Senarath, Dibley and Agho (2007) found significant association of the household wealth index to breastfeeding duration,. The propensity of feeding children with formula milk was greater among women from wealthier households relative to those from poor households (Senarath, Dibley and Agho, 2007). A study conducted by Giashuddin and Kabir (2004) in Bangladesh found that the household wealth index was a significant predictor of the duration of breastfeeding. After adjusting for intervening variables they found that mothers who resided in poor households had a greater likelihood of breastfeeding for a longer duration relative to women staying in the wealthiest households. Giashuddin and Kabir (2004) argued the reason for this was that women residing in wealthier households tend to work in better paying jobs and hence have less time to care for their children. They also argued that women from more affluent families in Bangladesh tend to have enough money to afford formula feeding. Kyi Kyi (2000) did an analysis of the 1998 DHS in the Philippines found that women from the wealthier households breastfed for a longer duration than the poorest households. Therefore, the suggestion made by Kyi Kyi (2000) is that no absolute conclusion can be made that women from the richest households exert shorter breastfeeding duration relative to women from the poorest households.

2.2.4 Maternal occupation

Maternal occupation remains one of the key factors believed to impact on breastfeeding. In the Philippines, Akter and Rahman (2010) did a cross sectional study and found that women with formal employment had higher odds of terminating breastfeeding at 48 months compared to women without employment. In the 1993 Philippines DHS Abada, Trovato and Lalu (2001) found that there were significant differences in breastfeeding duration between women depending on the type of employment. Women who were in formal employment had a higher probability of ceasing breastfeeding at 48 months compared to women involved in informal employment such as agriculture.

To assess the effect of the occupational status of the women, Wang *et al*. (2014) conducted a longitudinal study in Hong Kong in five health care facilities. They found that even after controlling for demographic, obstetric and intra-partum factors, the occupation of the mother was a significant predictor of breastfeeding duration. Women who were engaged in formal employment breastfed for a shorter duration compared to women not formally employed. Whilst this was a longitudinal study, the questionnaires were mailed to women to conduct the follow up, which meant there was a greater chance that questions were skipped and even that some respondents failed to return the questionnaires at all. As those who responded may be significantly different from those who did not respond, this may have impacted on the whether the sample was representative of all women. Feveile, Olsen and Hogh (2007) in their study found that mailed questionnaires had a lot of missing values among the respondents.

The literature suggests that even if knowledge and awareness about breastfeeding among employed women can be considered as an advantage informing longer breastfeeding compared to unemployed women, in developing countries maternity leave policies restrict the duration of

maternity leave (Mandal, Roe, and Fein, 2014). A number of developing countries such as Swaziland still fail to afford pregnant women the 14 weeks stipulated by the International Labour organisation (ILO, 2012). This is true primarily where the diffusion of modernisation has necessitated that women participate in formal employment (Abada, Trovato and Lalu, 2001).

Several studies conducted in developed countries revealed a significant relationship between mothers' occupation and duration of breastfeeding. A study conducted in California by Langellier, Chaparro and Whaley (2012) found that women with longer maternity leave were more likely to breastfeed their children compared to women who return to employment prior to six months. Increased chances of continued breastfeeding were apparent among women who were not employment relative to women participating in formal employment in Malaysia (Hafizan and Sutan, 2014).

Hafizan and Sutan (2014) found that even after controlling for demographic factors, the occupational status of the mother was significant in Malaysia. Women who were employed were more likely to breastfeed for a shorter duration (Hafizan and Sutan, 2014). It should be noted that the study was conducted in a health facility where pregnant women attending antenatal care where asked to retrospectively recall breastfeeding duration for a previous child. Therefore, selection bias was pronounced as only women who had more than one child would have been included in the sample (Hafizan and Sutan, 2014).

Based on the argument of the literature in both developing and developed countries a conclusion can be drawn that women who were involved in formal employment breastfeed for a shorter duration compared to women not working outside the home primarily in developing countries.

2.3 Demographic factors and breastfeeding

2.3.1 Maternal age

Various studies have assessed the association of maternal age on breastfeeding. Thulier and Mercer (2009) did a systematic review of studies in the USA and found that maternal age had a strong positive association with breastfeeding. In Bangladesh, Akter and Rahman (2010) found that the age of the mother was highly predictive of the duration of breastfeeding, with women who were older than 25 years breastfeeding for a longer duration than those aged less than 14 years. In Nepal, Aryal (2007) found that the probability of ceasing breastfeeding at 18 months and beyond were lower for older women than younger women. After holding all other factors constant, older women had higher odds of practicing prolonged breastfeeding defined as breastfeeding until 18 months and beyond (Aryal, 2007). In Philippines, it has been suggested that older women were resistant to adopt formula feeding, and instead continued to practice breastfeeding as an ideal feeding practice for children (Abada, Trovana and Lalu, 2001).

Studies conducted in developed countries revealed an inverse relationship between maternal age and breastfeeding duration. A cohort study done in Italy revealed that women who were younger than 35 years had a higher rate and longer duration of breastfeeding than women aged below 20 years (Carleti *et al.,* 2011). One can argue that when conducting a longitudinal study, the sample need to be large enough to produce reasonable estimates over time. However, the study done by Carleti *et al.* (2011) had only 400 children investigated over 36 months, which affect the reliability and validity of the study when too many participants are lost for follow up. A shortcoming of this study was attrition as there were only 132 mothers of the children available for investigation at two years, meaning a significantly large number of the participants were lost over the two years period (Carleti *et al.,* 2011).

Further, the margin of error due to over fitting the model may be evident in studies where the sample for analysis is very small as observed in the study conducted by Carleti *et al.* (2011). Carteli *et al.* (2011) fitted 15 covariates in the multivariate logistic regression model indicating model over fitting (Type 1 error) and produce unreliable estimates.

2.3.2. Parity

A cross sectional study was done in Bangladesh by Akter and Rahman (2010) found that the total number of children a woman has is a significant predictor of the rate and duration of breastfeeding. Their findings revealed that the more children a woman had the higher the probability of terminating breastfeeding before 48 months Abada, Trovato and Lalu (2001) found similar findings in the Philippines: as the number of children increased per woman, the probability of prolonged breastfeeding was greatly reduced.

Theoretically, the experience of the mother on breastfeeding could be regarded as a factor contributing to the higher rate and duration of breastfeeding for subsequent children a woman has (Amatayakul *et al.,* 1999). Bhalotra and Soest (2006) argued that in developing countries high fertility result in short birth spaces and subsequently shorter breastfeeding duration.

A longitudinal study was conducted in the Wyoming region of the United States, and revealed that parity was negatively associated with breastfeeding (Hill, Humenick, Argubright et al., 1997). Hill *et al.* (1997) indicated that the effect of the number of children a woman has on breastfeeding duration was not well established in the literature. Even though the study was longitudinal but caution need to be exercised in that it was done out of a purposive methodology which cannot be generalized (Carr, 1994).

2.3.3 Maternal marital status

Maternal marital status has been found to be positively associated with breastfeeding (Thulier and Mercer, 2009; Akter and Rahman, 2010). Meedya, Fahy and Kable (2010) conducted a literature review using online studies from Australia and found that married women had a higher rate and longer duration of breastfeeding than unmarried women. A comparative literature review was conducted by Callen and Pinelli (2004) to model the difference in breastfeeding rate and duration in Europe, Australia, USA and Canada, who reported similar findings in all those countries, that is, children who are born to married women tend to be breastfed for a longer duration.

There are conflicting results with regard to the effect of marital status on breastfeeding. Fertility studies have made an attempt to map the effect of early marriages on fertility and in turn breastfeeding (UNICEF, 2005). Early age at marriage has been found by a number of studies to be associated with early pregnancy. There is a strong positive association between early marriage and the fast transition from zero parity to subsequent parities, according to Suwal (2001). For example in developing countries, marriage may be regarded as an institution for child reproduction, thus the interval to bearing the first child and subsequent children would be shorter. The argument is that women who enter marriage at a younger age tend to have shorter birth spacing due to higher parity and expectation by society for women married to have more children primarily in developing countries (Suwal, 2001). Therefore, the effect of marriage on breastfeeding may differ from one region to the next.

Makinwa-Abebusoye (2001) presented the relationship between marriage and the number of children in an African household. The value of marriage has been underscored by a number of studies conducted in an African context, explaining that marriage is regarded to be an important element for family formation which is an institution for child bearing. It has been argued that early marriage in Africa, outside of South Africa, is a criterion for achieving larger family size. Children are perceived to provide support for the parents at old age and contributors to labour necessary for the households' survival. Further, where women have low SES higher fertility may be seen to boost their social standing. Higher fertility implies shorter birth spacing which negatively affects breastfeeding duration. When studying the effects of marital status on breastfeeding, one needs to take into account the value of marriage in different regions.

2.3.4 Maternal place of residence

Place of residence has been found by several studies to be a significant predictor of breastfeeding. Abada *et al.* (2001) found in the study done in the Philippines that the odds of continued breastfeeding were higher in the rural areas as opposed to the urban areas. Kyi Kyi (2000) also found that in the Philippines, women residing in the urban areas were more likely to cease breastfeeding earlier than women in rural areas. Giashuddin and Kabir (2004), in a study conducted in Bangladesh, found that the overall average duration of breastfeeding was higher in rural areas as opposed to urban areas. In their cross sectional study in Bangladesh, Mazumder and Hossain (2012) found that in both the bivariate and multivariate logistic models, women who were residing in the rural areas had higher odds of breastfeeding for a longer duration than women in urban areas.

Abada, Trovana and Lalu, (2001) argued that urbanisation is associated with nuclear families and most women were employed leading to poor breastfeeding. Contrary to the urban setting, women

in rural areas are believed to be receiving support from extended family members and actually are less likely to be working outside the home. Therefore, women in rural areas do not only have adequate time to care for their children but are also supported by their extended family members to continue breastfeeding (Abada, Trovana and Lalu, 2001). Perez-Escamilla (1994) further noted that formula feeding marketing campaigns through the media which are more accessible to urban residents are responsible for the short duration and poor breastfeeding rate in urban areas.

One can argue that the process of breastfeeding is not inherent but is learned behaviour. Supporting the theory of learned behaviour is Pessoa (2001), citing that in primitive societies longer duration of breastfeeding was instilled in young girls by older female extended family members. However, with modernisation and urbanisation, nuclear families have replaced the importance of extended families which impact positively on breastfeeding (Pessoa, 2001). Saadeh (1993) argued that in settings where the extended family is lacking there is the need for mothers support groups to improve breastfeeding duration. Thulie and Mercer (2005) argued that in the USA women in urban areas are more likely to be engaged in formal employment implying that immediately after delivery, usually before six months, they had to return to work hence weakening the propensity to practise continued breastfeeding for two years and beyond.

On another hand, in Tanzania Shririma, Gebre-Medhin and Greiner (2001) found that urban women had a higher probability of exclusively breastfeeding their children for a longer duration compared to their rural counter parts. Women residing in rural areas were described as being conservative and reliant on traditional information that disadvantages the rate and duration of exclusive breastfeeding, which is the infant is given only breast milk, without any additional food or drink including water (Shririma, Gebre-Medhin and Greiner, 2001). Kakute *et al*. (2005) stated that in Cameroon cultural beliefs promote mixed feeding before six months by feeding

children water, porridge, peanuts table foods etc. However Shririma, Gebre-Medhin and Greiner (2001) argued that women in urban areas are more exposed to breastfeeding information through antenatal care and access to radio, TV, and newspapers thus practising exclusive and prolonged breastfeeding as opposed to women in rural areas.

2.4 Child characteristics

2.4.1. Sex of the child

Mazumder and Hossain (2012) argued that the is a disparity in the duration of breastfeeding between male and female children Chakravarty (2012) conducted an analysis of DHS data from 17 African countries and found that male children received better attention and nutrition relative to their female counterparts, and noted that male children in the West and North Africa were breastfed for a longer duration compared to female children. In Sub Saharan Africa, while female children were still found to be disadvantaged regarding breastfeeding, they were less disadvantaged than female children in North and West African (Chakravarty, 2012).

Similarly, Chaudhuri (2012) found that in India males were favoured relative to females and were more likely to be breastfed for a longer duration compared to their female counterparts. Furthermore, the patriarchal society in India acts as a drive that sustains the preference for males, as opposed to females for family lineage which negatively affects breastfeeding of female children as short birth intervals were apparent when the child was female. Chaudhuri (2012) argued that the birth spacing in Africa and Asia after the birth of a female child was shorter than the one reported for a male child.

2.5 Health system factors and breastfeeding

2.5.1 Mode of delivery

A systematic review of studies from developed and developing countries reported that women who delivered through cesarean section had a shorter duration of breastfeeding compared to women who deliver vaginal (Prior, *et al*., 2012). Similarly, in a cross sectional study done in Saudi Arabia found that women who delivered vaginally had a higher average duration of breastfeeding relative to women who delivered through caesarean section (six and four months respectively) (Shawky and Abalkhail, 2003). Akter and Rahman (2010) did a study in Bangladesh, and found that the average duration of breastfeeding of women who delivered vaginally was higher than for women who delivered through cesarean section. A cross sectional study done in Turkey found that women who delivered through cesarean section breastfed for a shorter duration than women who delivered vaginally (Camurdan *et al*., 2008).

Shawky and Abalkhail (2003) modelled breastfeeding duration for 12 months using a sample of 400 women randomly selected from six health facilities in Saudi Arabia and found that women who delivered through cesarean section were more likely to terminate breastfeeding before 12 months compared to women who delivered vaginally (Shawky and Abalkhail, 2003). Women selection bias may be pronounced compromising the generalizability of the result to other women with children in the community due to the fact that the study was based in a hospital facility and thus dependent on participants who attended the hospital.

The reason for the negative effects of cesarean section on breastfeeding could be that it is associated with higher risks for rehospitalisation due to excess blood loss, complication to cesarean wound, infection of the uterine (Kuguoglu *et al*., 2012). Kuguoglu, *et al.* (2012) argued that formula feeding is more likely among women who delivered through caesarean section since

they become very weak to care for the baby. Kuyper, Vitta, and Dewey (2014) argued that some women opt for cesarean section because they do not favour the natural process of child birth and breastfeeding.

2.5.2 Antenatal care visit

Lincetto *et al*. (2006) noted that from the year 2000 approximately 60% of pregnant women in the African region were reported to have attended antenatal care at least once. However, they noted that the effect of antenatal visits on breastfeeding would only be evident after four antenatal clinic (ANC) visits.

Kyi kyi (2000) argued that women who attend antenatal care receive counselling from health providers on the importance of exclusive and prolonged breastfeeding. Therefore, there is a positive association between repeated ANC visits and breastfeeding (Kyi Kyi, 2000). It could also be argue that the benefit of ANC is not only for breastfeeding counselling and education but also that women would be educated on the use of modern contraceptives, which could increase birth spacing thus allowing for prolonged breastfeeding (Kyi Kyi, 2000).

2.5.3 Place of delivery

Abada, Trovato, and Lalu, (2001) argue that the place of delivery to be a significant predictor of breastfeeding duration. An analysis on the Philippines DHS revealed that women who delivered at home had a higher likelihood of terminating breastfeeding earlier than women who delivered in a health facility (Abada, Trovato, and Lalu, 2001). Women who delivered in a health facility in the Philippines had 15% higher likelihood of continuing breastfeeding their last child up to 40 months compared to women who delivered at home. These findings might be explained by the fact that women who deliver in the health facilities are supported and encouraged to breastfeed

by health workers (Abada, Trovato, and Lalu, 2001). However Kyi Kyi (2000) presented opposing findings from the Philippines: women who delivered in a modern health facility tend to have a higher likelihood of terminating breastfeeding than women who deliver at home. Kyi Kyi (2000) cited the availability of community health workers who are closer to the people and can support women by addressing difficulties of breastfeeding, as a prime factor for women who delivered at home to have longer duration of breastfeeding. However, in countries like Swaziland where there are few skilled community health workers, the use of health facilities creates opportunities for women to receive crucial information from health professionals (McCreary *et al.,* 2004).

2.5.4 Modern contraceptive use

The effect of modern contraceptive on breastfeeding is well established in the literature. The Cox proportional hazard method used by Perez-Escamilla, Maulen-Radovan and Dewey (1996) in Mexico revealed that women who used modern contraceptives were more likely to breastfeed for a longer duration than women who used traditional or no contraceptives. Similarly, using data from the 2004 DHS in Bangladesh, Akter and Rahman (2010) found that women who used modern contraceptives had a longer average duration of breastfeeding than women who did not use them.

However, a study conducted by Leon and Potter (1989) in Mexico suggested that the relationship between modern contraceptive use and breastfeeding duration was not a simple one. They found women who were breastfeeding tend to discontinue modern contraception, and once they resumed modern contraception they tended to terminate breastfeeding.

This is supported by a comparative study between Paraguay (1990 data) and Bolivia (1994 data) found that women who used modern contraception were more likely to terminate breastfeeding. The authors indicated that while breastfeeding, the women tend to use breastfeeding as a natural contraceptive (lactation amenorrhea), and then resumed the use of modern contraception once they had discontinued breastfeeding (Shapiro-Mendoza et al., 2007).

In order to gain clarity on the association between modern contraceptive use and breastfeeding duration, Jayachandran (2014) analysed data the 1994, 1997, 2002, and 2007 Indonesian DHS data. The author concluded that the value of breastfeeding in weakening fecundity was stronger during the initial stages of breastfeeding, particularly in the first six months. Therefore, as continued breastfeeding is practised, relying on breastfeeding alone for family planning may reduce birth spacing between children, as opposed to modern contraception which is the more reliable method.

2.6 Summary

This chapter summarised literature on the effects of socioeconomic, demographic and service factor on breast feeding. The literature highlighted that SES was instrumental in predicting the breastfeeding duration. In developing countries, highly educated, women from wealthier households, and employed women were less likely to breastfeed for a longer duration. With regard to the demographic variables in developing countries, older women, mothers with lower parity, married women, women residing in rural areas were more likely to breastfeed for a longer duration. However, the characteristics of the child were also instrumental in predicting breastfeeding. Male children were more likely to be breastfed for a longer duration primarily in developing countries like India where son preference is a norm. Health sector variables were also reported in the literature to have a positive impact on breastfeeding duration. In developing

countries women who delivered vaginally, delivered in a health facility and used modern contraceptives were more likely to breastfeed for a longer duration. However, the direction of influence of SES, demographic and health sector variables on breastfeeding is not the same between developing and developed countries. For example in Canada highly educated women were more likely to practise prolonged breastfeeding compared to less or uneducated women (Dubois and Girard, 2003).

Chapter three

Methodology

3.1 Introduction

The major aim of the study was to investigate the effect of socioeconomic factors (SES) and demographic factors on the rate and duration of breastfeeding. This chapter provides the sampling design of the 2007 Swaziland Demographic and Health Survey (SDHS) and the methods of data analysis used for this dissertation.

3.2 Sampling design and source of data

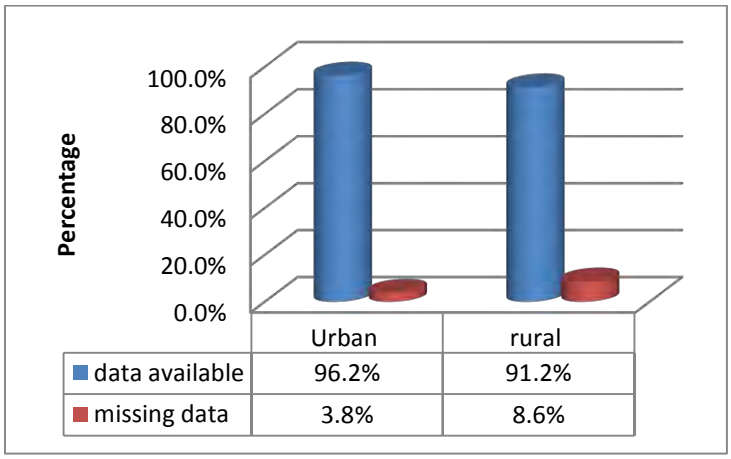
The 2007 SDHS used a probabilistic sampling method which allows for the results to be generalised (CSO and Macro International Inc, 2008). The SDHS reports that the 1997 Swaziland Population and Housing census provided the list of all enumeration areas (EAs) in the country. From the list, 275 enumeration areas (EAs) were sampled through a probability method, 111 urban and 164 rural were drawn and these were the primary sampling units. A systematic sampling was used as a sampling method to draw the 5,500 households, which were the secondary sampling units, from the EAs. Out of the 5,500 households, 4,843 household were interviewed, representing a 88% response rate. In each individual household, a questionnaire was used to capture information pertaining to all women aged 15-49, which were consented and considered eligible in the study. Of the 5,301 eligible women, a total of 4,987 (94.1%) women were successfully interviewed. The high response rate and the sampling strategy employed are an indication of the representativeness, reliability and validity of the survey. Each eligible woman

was interviewed about the birth history of their children and was asked breastfeeding questions based on their last born child in the five years preceding the survey.

3.2.1. Missing data

In order to understand the rate and duration of breastfeeding in Swaziland it is imperative to describe the distribution of the sample. The entire Demographic and Health Survey comprised a total of 4,987 women (CSO and Macro International Inc, 2008). However, only 2,812 women reported having a child in the five years before the survey, and so were included in the sample. However, the study excluded 211 (7.5%, 95% CI: 94.0-97.6) of the 2,812 sample since they had missing responses for the questions on breastfeeding of their last born children. Therefore, the analysis was based on the 2,601 women. The rate of ever breastfeeding was calculated to be 87% in the SDHS d (CSO and Macro International Inc, 2008). This study also found the prevalence of any breastfeeding to be 87.0% if the number of women with missing responses (7.5%, 95%CI: 6.6-8.61)) were included in the analysis.

Figure 2: Percentages of available and missing data for urban and rural respondents



Source: computed by the author from the 2007 SDHS

3.2.2 Potential bias by the missing data

To address the potential bias which may result from the missing data from the 2,812 women, a dummy variable was created where missing data was coded as one and available data was coded as zero. All the independent variables were plotted against the missing data to see if they were significantly associated to it. The outcome of this analysis appears in section 4.2 of the chapter four.

3.3 Dependent variables

The study is based on investigating socioeconomic and demographic factors on breastfeeding. Therefore the rate and duration of breastfeeding was predicted based on the dependent variables below:

1) To measure ever breastfeeding rate in this study mothers were asked, "For how many months did you breastfeed (NAME)?"
2) To measure duration of breastfeeding mothers were asked "For how many months did you breastfeed (NAME)?"

At the time of the survey 2,812 mothers had a child 0-55 months, and of these 491(17.5%) had a child aged 6-11 months breastfed for at least 6 months or reported they were still breastfeeding at 6 months. This was used to create the breastfeeding duration variable 6 months. Out of the 2,812 women with a lastborn child only 1,120 (39.8%) had a child aged 12 – 23 months at the time of the survey, and had therefore breastfed for at least 12 months. There were 368 (13.1%) out of the 2812 women with a last born child during the survey, breastfed their lastborn child for at least 24 months. This was used to create the breastfeeding duration variable 24 months.

Table 3: Percentage of the number of children breastfeed by age at the time of survey

Variables	Age of last born children	Children breastfed (%)
6 months	Child 6 – 11 months	491(17.5)
12 months	Child 12 – 23 months	1,120 (39.8)
24 months	Child 24 months and older	368 (13.1)

Source: Computed by the author from the 2007 SDHS

The study adopted the analysis by Langellier, Chaparro and Whaley (2012), where children aged less than six months were excluded from the analysis. Batal and Boulghaurjian (2005) also used a similar methodology to measure breastfeeding initiation and duration in Lebanon, where children aged less than six months were not included in the six month cohort, children aged 11 months and below were not included in the12 month cohort, and children aged 23 months and below were not included in the 24 month cohort, and children with missing values and never breastfed were excluded from the analysis.

3.4 Independent variables

Socioeconomic factors and demographic variables were used as principal covariates, and health service variables were used as control variables in the study to inform the major predictors of duration of breastfeeding. Socioeconomic factors such as household wealth index where the mother was a resident, mother's occupation, and mother's education status were regarded as primary SES factors. Demographic variables included the age of the mother, her marital status, place and region of her residence, parity and the sex of the child. Health service variables

included the mode of delivery (normal or caesarean), modern contraceptives use, place of delivery, and antenatal care visits.

3.4.1 Constructing the household wealth index using the PCA

The household head provided information on the asset and living conditions in the household (CSO and Macro International Inc, 2008). The household wealth index has been used to measure economic status primarily in developing countries where the methodology for measuring income is unsatisfactory (Rustein and Johnson, 2004). The Principal Component Analysis (PCA) was used to create the household wealth index in SDHS using variables such as type of drinking water source, electricity and type of toilets and other related household consumer goods and dwelling characteristics to derive the household wealth index from a dataset (CSO and Macro International Inc, 2008).

Coombe (2006) refers to the PCA as a method that compresses data and creates a covariance matrix. To explain the technique (PCA) Coombe (2006) presented the following equation where the wealth index (WI) is derived from sampled data such as the Demographic and Health Survey

The method can be presented for two independent variables that vary randomly as follows:

$$Covariance(X,Y) = \sum_{i=1}^{n} \frac{(x_i - \overline{x}\ (y_i - \overline{y}\ )}{N}$$

The parameters of the model are explained as follows:

$$Covariance\ \big((X,Y) = 0\ \big) equal\ to\ the\ cov\ for\ the\ independent\ variables$$

$Covariance\ (X,Y\ )$ Is equal to variable (X)

$\overline{x}$ – Is equal to the average X

$\overline{y}$ – Is equal to the average of Y

Coombe (2006) further states that a matrix for the covariance was created by subtracting the average of an individual sample vector resulting in centering of the data. The matrix is calculated as follows: $M = \frac{1}{N} AA^T$

M −Represent the matrix

The matrix factor was represented as AA^T and $\frac{1}{N}$ is regarded as the scale factor.

Zwane and Masango (2012), in their description of the derivation of the household wealth index in the 2007 SDHS argued that the housing circumstances were key components in measuring household wealth. For this reason the wealth index included the type of building material such as walls and floors, and availability of durable goods such as the refrigerator, radios, television and mode of transport used in the household such as a car, bicycle and truck. Once the different proxies for standard of living in the household had been identified, an exploratory analysis was conducted and adjustment for the household size was made (Gunnsteinsson *et al.*, 2010).

3.4.2 The definition and categorization of the explanatory variables

The study operationalized and categorized the variables before the analysis. Most of the variables in the SDHS are continuous and were transformed to categorical variables accordingly.

Table 4: Operationalization and categorization of variables

Socioeconomic variables	
Maternal education	no education=0 , primary=1, secondary=2, higher =3
Maternal occupation	not working=1, working=2
Household wealth index	poorest=1, poorer=2, middle=3, richer=4, richest=5
Demographic variables	
Maternal age	less than 20 years=1, 20-34 years =2, 35 years and over=3
Maternal marital status	not married=1, married=2,
Maternal place of residence	urban =1, rural=2
Region of residence	Hhohho=1, Manzini=2, Shiselweni=3, Lubombo=4
Parity	one child=1, 2 to 4 children=2, 5and above children=3
Sex of child	male=1, female=2
Health service variables	
Mode of delivery	Normal=1 , caesarean section=2
Modern contraceptive use	using =1, not using=2
Antenatal visits	no antenatal =0, less than 3=1, 3 to 5 visits=2, 6 and above visits=3
Place of delivery	home=1, health facility =2

Source: variables defined and categorized by the author from the 2007 SDHS

3.5 Statistical analyses

The study used Stata 12 (StataCorp, Texas, USA) for data analyses. Bivariate and multivariate tests were used to investigate the association between the rate and duration of breastfeeding and its associated explanatory variables. Descriptive statistics were used to check for the distribution of the variables and a chi square test (X^2) was used to test for association between the covariates and breastfeeding.

For the duration of any breastfeeding, Akter and Rahman (2010) suggest that the mean duration of breastfeeding can be used as a summary measure for a bivariate test. This method requires the use of both complete and censored observations of the breastfeeding data. For this study, the mean measure of duration of breastfeeding was evaluated relative to the covariates and a critical value ($p = 0.05$) was used to measure the association using the log rank test.

The bivariate and multivariate logistic regression was further employed to determine the association of the socioeconomic and demographic factors on the rate and duration of breastfeeding. A logistic regression model suits the outcome variables investigated in the study since the outcome variable (breastfeeding) was categorised into two: never breastfed (coded zero) and breastfed (coded one). Duration of breastfeeding was measured with the logistic regression at 6, 12 and 24 months. Therefore three logistic models were fitted for duration of breastfeeding in the study. The models were further tested using Hosmers-Lemeshow to validate how well they fit the data. The variance inflation factor (VIF) was also used to test for multi-collinearity.

For a dichotomous outcome variable (γ), the general logistic regression model is presented as follows:

$$Ln(P_i/1 - P_I) = \propto + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{Ki}$$

Where, $(P_i/1 - P_I) -$ indicates the odd ratio

$i = 1,2, \ldots . n$

P_i - The chance of breastfeeding happening, X_{1i}, X_{2i}, X_{ki}-Represents the covariates, $\beta_k, \ldots \ldots \beta_k -$ represent the gradients of the variables $X_1, \ldots \ldots \ldots X_{ki}$ respectively.

3.6. Study validity and reliability

One of the studies conducted in Swaziland sought to understand the experience of HIV positive mothers' breastfeeding exclusively in Swaziland which cannot be generalised to the entire population (Shongwe and Mkhonta 2014). However, this study is the first to try and examine the impact of socioeconomic status and demographic factors on the prevalence and duration of breastfeeding from the SDHS. The SDHS is a reliable dataset that comprised of approximately 91.8% and 95.1% response rates for urban and rural women respectively. The reliability and validity of the survey is also apparent in that it is a statistically representative survey hence its findings can be generalised to the entire population. The data was also weighted by the author using the SVY command in Stata 12. Additionally, the field staff were trained about the importance of quality data and they did some role plays to familiarise themselves with the data collection procedures before the actual study (CSO and Marco International Inc, 2008). To ensure a standard quality collection procedure by the staff, pretesting and or a pilot survey was conducted before the actual survey.

3.7 Limitations of the study

The study is based on secondary data analysis to investigate the impact of socioeconomic status and demographic factors on duration of breastfeeding. However, self-reporting means people may suffer memory lapse or even report incorrect information which would then distort the results of the study. The SDHS was a household survey, meaning not all families and persons were interviewed in the country which means the data need to be treated with caution as no absolute statements were reported but only statistical inferences were reported. When the survey was conducted, some women were still breastfeeding (censored observation). The 2007 SDHS data falls short of information on HIV status of women, which makes it impossible to investigate

the effect of HIV on breastfeeding in Swaziland. The unavailability of data on HIV/AIDS is a huge shortcoming since studies have documented that HIV greatly influences breastfeeding in countries like Swaziland where the prevalence is high (Fadnes, 2009).

The use of the logistic regression may be a shortcoming in the study in that it is not a robust method to measure event to time compared to the Cox proportional hazard method which endeavours to model the time it take an event to occur and adjust for truncation bias (Akter and Rahman, 2010). However, in this study the model (Cox Proportional hazard method) did not fit our data well when the assumptions (proportionality) of the model were tested hence the binary logistic regression was used to measure the duration of breastfeeding at six, 12 and 24 months.

3.8 Strength of the study

The study has several strengths which include that the study was conducted out of a large sample of mothers interviewed in the 2007 SDHS. The study took cognisance of the role of potential confounders (health sector variables) influencing the results. The 2007 SDHS is representative in nature hence allowing the results to be generalised to the entire population.

Chapter four

Results

4.1 Introduction

The study examined the effect of socioeconomic factors and demographic factors on the rate (ever breastfed) and duration of breastfeeding while controlling for health service factors. Results of bivariate and multivariate analysis are presented for the rate of breastfeeding in section 4.3 and for the duration of breastfeeding in section 4.4.

4.2 Relationship of the socioeconomic, demographic and health sector variables on the missing data

A significantly large proportion of missing values may be a potential source of bias. Therefore the study begins by examining the association of the selected independent variables on the missing data. Table 5 show that the household wealth index, mothers' education, mothers' age, mothers' marital status, place of residence and mode of delivery were significantly associated to missing data in the chi-square test. The proportion of women without data on breastfeeding status of their last child was higher (10.8%) for uneducated women. However, the proportion of mothers who did not provide information on the breastfeeding status of their last child decreased with an increase in education level. During the survey 13.9% of the mothers from the poorest households did not provide breastfeeding status on their last birth. Approximately 2.5% of the women from the richest households had missing data. Similarly a significantly large amount of the mothers who did not provide information on the breastfeeding status of their last birth was reported by women aged 20-34 and 35 and above. Only 8.8% of the married women did not

provide breastfeeding information on their last birth. Women in rural areas had higher missing data on children' breastfeeding status than their urban counterparts. Approximately eight percent of the children that were delivered vaginally had missing data pertaining to breastfeeding.

Table 5: Relationship of the selected independent variables on the missing data

Socioeconomic variables Total	Number of women 2,812	# of women with missing data 211	P-value
Maternal education(valid= 211)			0.001
No education	265	31(10.8)	
Primary	1,007	96(9.3)	
Secondary	1,365	80(6.4)	
Higher	175	4(1.9)	
Maternal occupation (valid=211)			0.162
Not working	2,276	179 (7.9)	
Working	536	32 (6.0)	
Household wealth index(valid=211)			<0.001
Poorest	567	79(13.9)	
Poorer	603	62(9.6)	
Middle	539	41(7.6)	
Richer	530	18(3.6)	
Richest	573	11(2.5)	

Table 5 continued

Demographic variables	Number of women 2,812	# of children missing data 211	P-value
Maternal age (valid=203)			0.011
Less than 20	266	8(3.0)	
20-34 years	1,863	150(8.0)	
35 and over	516	45(8.9)	
Marital status(valid=211)			0.005
Not married	1,170	63(5.8)	
Married	1,642	148(8.8)	
Maternal place of residence (valid=211)			<0.001
Urban	724	24(3.8)	
Rural	2,088	187(8.6)	
Region of residence(valid=211)			0.262
Hhohho	714	49(7.2)	
Manzini	767	51(6.2)	
Shiselweni	633	50(8.7)	
Lubombo	698	61(8.7)	
Parity (valid=211)			<0.001
One child	1,324	52(4.2)	
2 to 4	680	69(8.7)	
5 and above	597	90(13.1)	
Sex of the child (valid=211)			0.363
Male	1,296	118 (8.0)	
Female	1,305	93(7.1)	

Continued

Table 5 continued

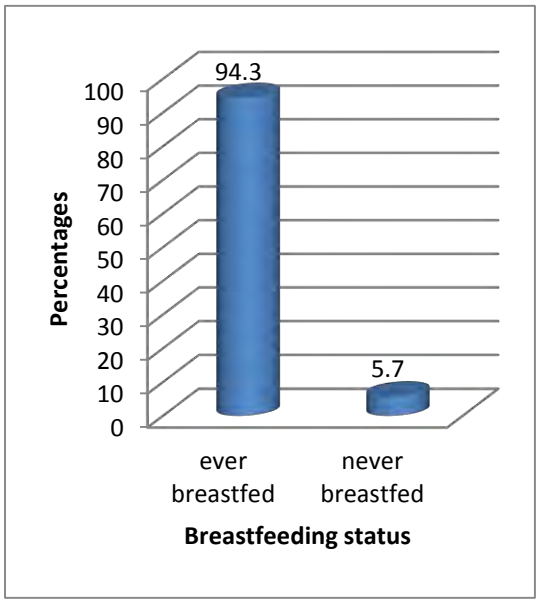
Health sector variables	Number of women 2,812	# of children missing data 211	P-value
Mode of delivery (valid= 211)			0.003
Normal	2,574	206(8.0)	
Cesarean section	228	5(2.4)	
Modern contraceptive use(valid=211)			0.3900
Using	1,531	99 (6.5)	
Not using	1,281	112(8.7)	
Antenatal visits (valid=26)			0.697
Not attended	55	1(1.0)	
Less than 3	95	2(2.6)	
3 to 5 visits	981	13(1.3)	
6 and above	1,005	10(1.2)	
Place of delivery (valid =211)			<0.001
Home	925	170(18.2)	
Health facility	1,887	41(2.5)	

Source: Computed by the author from the SDHS, chi-square test, $p<0.005$

4.3 Association of the socioeconomic and demographic factors on the last born children ever breastfed

Figure 3 shows that the prevalence of ever breastfeeding in Swaziland is 94.3% (95% CI: 93.1-95.1). Of the 2,601 women, 5.7 % (CI: 4.9-6.9) were reported to have never breastfed their last born child at all. The findings suggest that breastfeeding is common in Swaziland. Worth to note is that last born children with missing data were excluded from the analysis.

Figure 3: Prevalence of ever breastfeeding prevalence in Swaziland



Source: Computed by the author from the 2007 SDHS.

4.3.1 The rate of children ever breastfeeding by explanatory variables

In terms of socioeconomic variables, table 6 show that half (50.4%) of the children were born to mothers with secondary education while only nine percent were born to uneducated women. Interesting is that only a handful (6.2%) of the last born children born to mothers with higher education level were ever breastfed. Approximately 80.4% of the children were born to women who are unemployed. Almost 19% of the last born children were born to women from the poorest households, whilst 20.4% of the children were born to mothers in the richest households.

Approximately, 19.6% of the last born children were born to women from households of middle socioeconomic status.

The analysis of the demographic variables in this study demonstrates that more than two thirds (70.6%) of the children were born to women between the ages of 20 and 34 years, whilst only 10.4% of the children were born to women aged less than 20 years. However, more than a third (42.7%) of the children were born to unmarried women. Approximately 76.8% of the children were born by women who reside in rural areas. More than half (51.1%) of the last born children were born to women with only one child. Approximately a quarter (26.1%) of the last born children were born to women with a parity of two to four children.

For health service variables, the study reveals that 91.6% of the children were born vaginally whilst only 8.4% were born through cesarean section. Less than half (45.4 %) of the children were born to women who are not using any form of modern contraceptives. Nearly half (45.6%) of the children were born to women who attended antenatal care more than three or four times while only three percent of the children were born to women with no antenatal visits. Nearly a third (28.6%) of the last born children were born at home, while 71.4% were born in a health facility. Table 6 show the distribution of the last born children to women by explanatory variables.

Table 6: The distribution of the last born child breastfed by the explanatory variables

Socioeconomic variables	Number of women	Number of children
	2,812	2,601 (%)
Maternal education (valid= 2,601)		
No education	265	234 (9.0)
Primary	1,007	911(34.4)
Secondary	1,365	1,285(50.4)
Higher	175	171(6.2)
Maternal occupation (valid=2,601**)**		
Not working	2,276	2,097(80.4)
Working	536	504(19.6)
Household wealth index(valid=2,601)	567	488(18.8)
Poorest	603	541(20.8)
Poorer	539	498(19.6)
Middle	530	512(20.4)
Richer	573	562(20.4)
Richest		
Demographic variables		
Maternal age (valid=2,442)		
Less than 20	266	258 (10.4)
20-34 years	1,863	1,713 (70.6)
35 and over	516	471 (19.0)
Maternal marital status(valid=2,601)		
Not married	1,170	1,036 (42.7)
Married	1,642	1,416 (57.3)

Continued

Table 6 continued

Demographic variables	Number of women-2,812	No of children 2,601(%)
Place of residence (valid=2,601)		
Urban	724	700 (23.2)
Rural	2,088	1,901 (76.8)
Region of residence(valid=2,601)		
Hhohho	714	665 (27.2)
Manzini	767	716 (31.2)
Shiselweni	633	583 (21.5)
Lubombo	698	637 (20.2)
Parity (valid=2,601)		
One child	1,376	1,324(51.1)
2-4 children	749	680(26.1)
5and above	687	597(22.8)
Sex of the child(valid=2601)		
Male	1,414	1,296 (50.2)
Female	1,398	1,305 (49.8)

Continued

Table 6 continued

Health service variables	Number of women	Number of children (%)
	2,812	2,601
Mode of delivery (valid= 2,601)		
Normal	2,574	2,368(91.6)
Cesarean section	228	223 (8.4)
Modern Contraceptive use(valid=2,601)		
Using	1,531	1,432(54.6)
Not using	1,281	1,169(45.4)
Antenatal visits (valid=2,11)		
Not attended	55	54(2.6)
Less than 3	95	93(4.3)
3 to 5 visits	981	968 (45.6)
6 and above	1,005	995(47.5)
Place of delivery (valid=2,601)		
Home	925	713(28.6)
Health facility	1,887	1,846(71.4)

Source: Computed by the author from the 2007 SDHS. Some variables do not add up to 2,601 due to missing data

4.4 Bivariate and multivariate analysis for prevalence of ever breastfed

4.4.1 Logistic regression model building for ever breastfed

Austin and Tu (2004) suggest that while it is imperative to have a simple model in which not all covariates are included to avoid the problem of over fitting the data, at the same time too few predictors may produce unreliable estimates. Therefore the study adopted the automated backward elimination method in which all the predictors of breastfeeding prevalence were initially included in the entire model (Austin and Tu, 2004). The study set a variable selection condition in which variables with a significant p-value less than 0.20 ($p<0.20$) were retained in the model. However Stoddard (2010) observed that significant variable selection methods have a lot of weaknesses in that some independent variables may be better predictors of breastfeeding rate yet get excluded or not retained by the full model. Indeed, when we conducted the automated backward elimination method to measure the rate of ever breastfed (any duration of breastfeeding), place of residence and maternal occupation did not meet the cut off significance value ($p < 0.20$) set by the study. However, we included the two variables (mothers' occupation and place of residence) as a priori in addition to the other variables that were significant at $p < 0.20$. Stoltzfus (2011) suggested that the method of variable selection when building a model requires careful validation and cautious interpretation, taking into account the strength and weaknesses of the method.

However the logistic regression is prone to multi-collinearity, therefore, for the multivariate model multi-collinearity was tested for the independent variables using the tolerance and variance inflation factor (VIF). The VIF measures the effect of the multi-collinearity among the covariates of the study which influence the accuracy of the prediction (Robinson and Schumacker, 2009). Multi-collinearity can result in an inflated variance thus resulting in some

covariates adding little or nothing in the entire model. Robinson and Schumacker (2009) suggest that the threshold value at which a variable is considered to have high multi-collinearity is when the VIF is above 10.

Table 7: Testing for multi-collinearity using the tolerance and variance inflation factor (VIF)

Variable	Tolerance	VIF
Maternal education	1.39	0.72
Maternal occupation	1.04	0.96
Household wealth index	1.82	0.55
Maternal age	1.56	0.64
Marital status	1.07	0.93
Place of residence	1.48	0.67
Region of residence	1.03	0.97
Parity	1.75	0.57
Sex of the child	1.00	0.91
Mode of delivery	1.03	0.97
Modern contraceptive use	1.09	0.92
Place of delivery	1.06	0.94
Mean VIF	1.27	

Source: Computed by the author from the 2007 SDHS

Tables 7 above reveals the findings of the independent variables used in the multivariate logistic regression model investigating the rate of any breastfeeding. In the entire model it is apparent that no covariates exceed the VIF of 10 or a tolerance value less than 0.10. It is fundamental to test for the multi-collinearity in the model to avoid exaggerated standard errors and very wide confidence intervals (CIs). Therefore the conclusion can be drawn that the covariates of the study do not violate the assumptions of the model.

4.4.2 Bivariate and multivariate analysis of ever breastfed women by explanatory variables

The results of the study show that 94.3% (95%CI: 93.1-95.1) of the last born children were breastfed at any particular point in time in Swaziland in the last five years before the survey. When investigating the socioeconomic variables, we find that the rate of any breastfeeding among uneducated women was high at 97.4%, while women with higher education level had 87.2% of ever breastfed their lastborn child. Basically the findings reveal that as the mothers' education level increases, the rate of ever breastfeeding decreases. This is confirmed by the 87% of children who were once breastfed by women with higher education compared to 96.2 % of women with primary education level who ever breastfed their last born child.

For demographic variables, the results also demonstrated that overall the age of the women was not a significant predictor of ever breastfeeding, meaning that there was no significant difference between women of different age groups ever breastfeeding their last born children. Married women also showed a slightly higher prevalence of last born children ever breastfed (94.9%) relative to 93.3% of children born to unmarried women. Differences in children ever breastfed among the administrative regions is apparent, with the least developed region (Lubombo) showing a higher rate of children ever breastfed relative to the other regions.

For health service variables, it can be said that women who gave birth vaginally had a higher rate of children ever breastfed (94.6%) compared to only 89.5% of women who delivered through a cesarean section. Table 8 below show the findings of the bivariate and multivariate analysis.

Table 8: Results of the bivariate and multivariate analysis on the number of women who breastfed their children at any duration (ever breastfeeding).

Socioeconomic factors	Any breastfeeding Ever breastfed(95% CI)	Bivariate OR(95% CI)	Multivariate OR(95%CI)
Maternal education level			
No education	97.4 (94.4-98.8)	Reference	Reference
Primary	96.2(94.5-97.4)	0.8(0.4-1.9)	1.0(0.4-2.3)
Secondary	92.7(91.0-94.1)	0.4(0.9-1.9)*	0.5(0.2-1.1)
Higher	87.2(81.1-91.5)	0.2(0.1-0.5)*	0.4(0.4-1.6)**
Maternal occupation			
Not working	93.9(92.7-94.9)	Reference	Reference
Working	94.3(91.6-96.1)	1.0 (0.7-1.6)	1.2(0.6-1.5)
Household wealth index			
Poorest	96.2 (93.9-97.6)	Reference	Reference
Poorer	96.2(93.7-97.3)	0.9 (0.5-1.7)	1.2(0.6-2.3)
Middle	95.4(92.4-96.7)	0.8 (0.4-1.6)	1.2(0.6-2.5)
Richer	93.3(90.1-95.2)	0.6 (0.3-1.1)	1.2(0.6-2.6)
Richest	90.0(87.0-92.4)	0.3(0.2-0.6)*	0.7(0.4-1.6)
Demographic variables			
Maternal age			
Less than 20 years	95.4(91.2-97.2)	Reference	Reference
20-34 years	93.9(92.3-94.8)	0.8 (0.4-1.4)	1.1(0.6-2.1)
35 and over	95.2(92.7-96.9)	1.0(0.5-2.2)	1.7(0.7-4.2)
Marital status			
Not Married	93.3(91.2-94.4)	Reference	Reference
Married	94.9(93.3-95.8)	1.2 (0.9-1.7)	1.3(0.9-2.0)

Table 8 continued

Demographic factors	Any breastfeeding (ever breastfed)	Bivariate OR (95%CI)	Multivariate OR (95% CI)
Place of residence			
Urban	89.1(85.8-91.4)	Reference	Reference
Rural	95.1(94.4-96.4)	2.5(1.8-3.5)*	2.0(1.3-3.1)*
Region of residence			
Hhohho	95.0(92.3-96.1)	Reference	Reference
Manzini	91.1(88.5-93.0)	0.5(0.3-0.8)*	0.6(0.4-1.0)*
Shiselweni	95.1(92.9-96.7)	0.9 (0.6-1.6)	0.7(0.4-1.0)
Lubombo	96.8(95.0-97.8)	1.2 (0.7-2.1)	1.1(0.6-1.9)
Parity			
one child	93.8(92.1-95.0)	Reference	Reference
2-4 children	94.3(91.7-95.6)	1.1 (.8-1.7)	0.8(0.5-1.2)
5 and above	94.8(92.3-96.4)	1.3 (0.9-2.1)	0.6(0.3-1.1)
Sex of the child			
Male	94.4(92.6-95.5)	Reference	Reference
Female	93.4(92.3-95.0)	0.8 (0.6-1.1)	0.6(0.3-1.1)
Health sector variables			
Mode of delivery			
Cesarean section	89.5(83.8-92.70	Reference	Reference
Vaginal	94.6(93.3-95.4)	2.0 (1.2-3.1)**	2.3(1.4-3.8)*

Continued

Table 8 continued

Health sector variables	Any breastfeeding (Ever breastfed)	Bivariate OR(95%CI)	Multivariate OR(95% CI)
Modern contraceptive use			
Using	94.9(93.1-95.7)	Reference	Reference
Not using	93.3(91.6-94.7)	0.8 (0.6-1.1)	0.7(0.5-1.0)**
Place of delivery			
Home	94.2(92.0-95.8)	Reference	Reference
Health facility	94.9(92.6-95.0)	0.9 (0.7-1.4)	1.2(0.8-1.8)

***p<0.10 **p<0.05 *p<0.01 significance values. CI: confidence interval, Antenatal care was dropped from bivariate and multivariate model due to missing values, Model goodness of fit=0.77

After fitting the final model which predicted the rate of breastfeeding, the chi-square goodness of fit test was conducted to check whether the multivariate model was a good fit for the data. The model goodness of fit was found to be insignificant at $p > 0.05$ thus showing that the model fitted the data well at $p = 0.77$, indicating that the assumptions of the model were not violated.

Furthermore, table 8 displays the results of the unadjusted and adjusted model. In the full multivariate model, maternal education level, region of residence, place of residence, mode of delivery and modern contraceptive use were found to have a significant effect on women ever breastfeeding their last born child. In the bivariate analysis it can be seen that as the household wealth increased, women were less likely to have reported ever breastfeeding their last born child. Women in the richest households were 70% less likely to have ever breastfed their last born child compared to those in the poorest households. However, this association did not remain significant in the multivariate model. It is also worth noting that there was no significant

difference between ever breastfeeding the last born child between women working and those not employed at the time of the interview.

Maternal education level was also found to be significantly associated with women ever breastfeeding their last born children both in the bivariate and multivariate model. In the multivariate model women with higher education were 60% less likely to have ever breastfed compared to uneducated women. In the bivariate model, women who stayed in rural areas were 2.5 times the odds of breastfeeding their children compared with unemployed women. However, in the multivariate analysis, women in rural areas had twice the odds to breastfeed than women in urban areas.

Region of residence was found to be a strong predictor of women ever breastfeeding, after adjusting for intervening variables. Last born children to women in the Lubombo region were 10% more likely to be ever breastfed relative to children born to women in the Hhohho region. The odds of women ever breastfeeding their children is 40 % and 30% lower in Manzini and Shiselweni regions respectively compared to the Hhohho region. In the saturated multivariate model, the mode of delivery was found to be strongly significant to women ever breastfeeding their last born child: women who gave birth vaginally had 2.5 times to ever breastfeed their last born child at some point in time compared to women who gave birth through cesarean section. Significant differences in women ever breastfeeding their last born child were also evident amongst women using modern contraceptives and those not using modern contraceptives. In the multivariate analysis women who were not using any form of modern contraceptives were 30% less likely to have ever breastfed their last born children, relative to women using modern contraceptives. In the saturated model, women who gave birth at a health facility had higher

probability of ever breastfeeding their lastborn children than those who delivered at home even though the model did not find a significant difference.

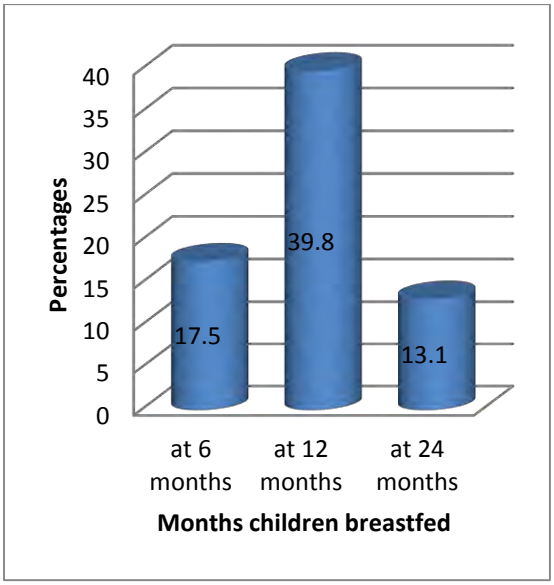
4.5 The effects of socioeconomic and demographic factors on breastfeeding duration

4.5.1 Prevalence of breastfeeding for six, twelve and 24 months

This study followed the WHO recommendation of analysing breastfeeding up to two years and beyond (WHO, 2006). The results in figure 4 below were derived from a snapshot (cross sectional) survey (SDHS). The figure shows that only 17.5% of women with a child 6 – 11 months reported breastfeeding their lastborn child for at least six months. A third (39.8%) of the mothers with a child 12 – 23 months reported breastfeeding for at least 12 months. However, of the total mothers in the sample with the last born child age 24 and older, only 13.1% were breastfed for at least 24 months. Hereafter for the simplicity of expression the variables will be referred to as follows:

Women with a child 6 – 11 months, breastfeeding at 6 months: 6 months
Women with a child 12 – 23 months, breastfeeding at 12 months: 12 months
Women with a child 24 months and older, breastfeeding at 24 months: 24 months

Figure 4: Prevalence of the duration of breastfeeding at least six, 12 and 24 months



Source: Computed by the author from SDHS weighted data

4.5.3 The socioeconomic and demographic variables associated with breastfeeding at six, 12 and 24 months

The Pearson chi-square (X^2) test was used in the study to provide a bivariate test for the correlation between the socioeconomic, demographic and health sector variables on the duration of breastfeeding in Swaziland. The chi-square test maps the significance or measures the null hypothesis that there is no significant association between the covariates and duration of breastfeeding. The result in table 9 indicates that maternal education was significant associated with duration of breastfeeding at six months and 12 months at the time of the survey.

In the six months model: among children who had been breastfed for at least six months, 48.6% of mothers had secondary education. Among the children who were breastfed for at least six months, 5.8% of mothers had no education while 8.0% of the mothers had higher education level. A third (35.8 %) of the mothers with primary level education were breastfed their children

at 12 months. Half (50.3 %) of the mothers with secondary education breastfed their lastborn children for at least 12 months.

Maternal occupation was also found to be a significant predictor of the duration of breastfeeding for the first six months of a child's life. At six months, more than two thirds (83.7%) of the mothers without employment breastfed their lastborn children, whereas only 16.3% of the mothers who were employed breastfed their lastborn children. However, while maternal occupation was not significant at 12 and 24 months, it reveals that women who were not employed breastfeed for a longer duration than those who were employed during the time of the survey.

The household wealth index was found to be a significant predictor of the duration of breastfeeding at 12 months in the chi-square analysis. Among those women who breastfed their last born children at12 months, 23% came from poor households. However, among the women who breastfed their children, 17.3% came from the richest households.

Table 9: Percentage of any breastfeeding by explanatory variables

Socioeconomic variables	6months (95%CI)	12 months (95%CI)	24 months(95%CI)
Maternal education			
No education	5.6(3.8-8.1))	9.4 (7.8-11.3)	9.3(6.6-12.8)
Primary	37.9(33.5-42.5)	35.8(32.9-38.8)	37.7(32.7-43.0)
Secondary	48.6(43.9-53.2)	50.3(47.0-53.1)	46.2(41.0-51.6)
Higher	8.0(5.8-10.9)	4.7(3.6-6.2)	6.8(4.6-9.8)
p-value	0.008	0.051	0.423

Table 9 continued

Socioeconomic factors	6 months(95%CI)	12 months(95%CI)	24 months(95%CI)
Maternal occupation			
Not working	83.7 (80.0-86.9)	79.6(77.0-82.0)	78.7(74.0-82.7)
Working	16.3(13.1-20,0)	20.4(18.0-23.0)	21.3(17.3-26.0)
p-value	0.053	0.383	0.390
Household wealth index			
Poorest	19.3(16.0-23.2)	19.6(17.3-22.1)	16.5(13.0-20.8)
Poorer	18.6(15.2-22.5)	22.7(20.2-25.4)	25.5(21.2-30.4)
Middle	20.8(17.2-24.91)	20.4(18.1-23.0)	17.8(14.1-22.2)
Richer	20.1(16.6-24.1)	20.0(17.6-22.6)	18.7(14.8-23.4)
Richest	21.2(17.6-25.4)	17.3(15.1-19.8)	21.4(17.4-26.0)
p-value	0.735	0.013	0.157
Demographic variables	6 months(95%CI)	12 months(95%CI)	24 months(95%CI)
Maternal age			
Less than 20	16.7(13.4-20.6)	9.2(7.5-11.2)	2.0 (1.0-4.2)
20-34	70.3(65.7-74.5)	71.3(68.4-74.1)	67.5(62.2-72.4)
35 and above	13.0(10.1-16.6)	19.5(17.1-22.0)	30.5(25.7-35.7)
p-value	<0.001	0.267	<0.001
Marital status			
Not married	46.8(42.2-51.5)	42.0(39.0-45.1)	32.0(27.2-37.1)
Married	53.2(48.5-57.8)	58.0(54.9-61.0)	68.0(62.9-72.8)
p-value	0.047	0.634	<0.001

Continued

Table 9 continued

Demographic variables	6 months(95%CI)	12 months (95%CI)	24 months (95%CI)
Place of residence			
Urban	28.4(24.3-32.8)	20.0(17.6-22.6)	20.6 (16.8-25.0)
Rural	71.6(67.2-75.7)	80.0(77.4-82.4)	79.4(75.0-83.2)
p-value	0.005	0.002	0.211
Region of residence			
Hhohho	26.8(22.9-31.2)	27.8(25.2-30.7)	27.8 (23.3-32.9)
Manzini	31.4(27.1-36.1)	30.0(27.2-33.0)	32.4 (27.6-37.7)
Shiselweni	20.9(17.4-24.9)	22.1(19.7-24.7)	19.8 (15.9-24.3)
Lubombo	20.8(17.5-24.6)	20.0(17.8-22.4)	20.0 (16.3-24.3)
p-value	0.968	0.677	0.833
Parity			
One child	58.7 (54.0-63.2)	50.3 (47.2-53.4)	39.9 (34.8-45.2)
2-4 children	26.2 (22.3-30.5)	26.7(24.0-29.5)	28.9 (24.3-33.8)
5 and above children	15.2 (12.2-18.7)	23.1(20.6-25.7)	31.3(26.5-36.4)
p-value	<0.001	0.779	<0.001
Sex of the child			
Male	50.9(46.2-55.5)	51.1(48.1-54.2)	50.1(44.8-55.4)
Female	49.1(44.5-55.5)	48.9(45.8-52.0)	49.9 (44.6-55.2)
p-value	0.742	0.427	0.979

Continued

Table 9 continued

Health sector variables	6 months (95%CI)	12 months (95%CI)	24 months (95%CI)
Mode of delivery			
Normal	93.4(90.7-95.3)	92.4(90.7-95.3)	90.2 (86.6-92.9)
Cesarean section	6.6(4.7-9.3)	6.6(4.7-9.3)	9.8(7.1-13.4)
p-value	0.140	0.238	0.275
Modern contraceptive use			
Using	59.3(54.6-63.8)	57.1(54.0-60.1)	57.4 (54.0-60.1)
Not using	40.7(36.2-45.4)	42.9(39.9-46.0)	42.6(39.9-46.0)
p-value	0.028	0.029	0.256
Place of delivery			
Home	26.1(22.2-30.3)	29.8(27.1-32.7)	28.9(24.3-34.0)
Health facility	73.9(69.7-77.8)	70.2 (67.3-72.9)	71.1(66.0-75.7)
p-value	0.1723	0.294	0.923

Source: Computed by the author from the DHS data, Chi square, $p = 0.05$

The results of the chi square test in table 9 above reveal that among the demographic factors marital status, maternal age, place of residence, parity, and antenatal visits had a significant effect on the duration of breastfeeding in Swaziland. Maternal age is strongly correlated to the duration of breastfeeding. Women aged 20 to 34 years have a higher proportion (70.3%) of the last born children breastfed at six months compared with women under twenty years, of whom only 16.7% breastfed their last born children at six months. Surprising about the results is that only two percent of children were breastfed by women under 20 at 24 months. Of the children breastfed at two years, 30.5% were breastfed by women aged 35 and above. Whilst more than two thirds (67.5 %) of the women aged 20-34 years breastfed their children. This implies that

women aged 35 and above breastfeed for a longer duration than women under 20. More than two thirds (68.0%) of the married women breastfed their last born children whilst only a third (32.0 %) of the unmarried women breastfed their last born children at two years.

Place of residence was also found to be the significant predictor of the breastfeeding duration. Women in rural areas tended to breastfeed for a longer duration than women in urban areas. Results show that 80.0% of the women who breastfed their children were from rural areas at 12 months. Parity was significantly associated with continued breastfeeding/breastfeeding duration. The results showed that almost two thirds (58.7 %) of the last born children were breastfed at six months by women with only a single child. More than a third (39.9 %) of the women with a single child breastfed at 24 months.

Among the health sector variables, modern contraceptive use was found to be a significant predictor of breastfeeding duration at six and 12 months. Among the children breastfed for six months, more than half (59.3 %) of the women used modern contraceptive whilst less than half (40.7%) of the women did not use any form of modern contraceptives. Of those lastborn children breastfed for 12 months, more than half (57.1%) of the women used modern contraceptives. The results suggest that women who were using modern form of contraceptives breastfed for a longer duration than those not using modern contraceptives.

4.5.4 A bivariate logistic regression analysis of socioeconomic, demographic and health sector factors on the duration of breastfeeding at six, 12 and 24 months

To model prolonged breastfeeding, three models were fitted at six, 12 and 24 months for both bivariate and multivariate models. The results of the bivariate analysis in table 10 below show that maternal education level, maternal occupation, household wealth index, modern

contraceptive use, marital status, maternal age, place of residence, parity, mode of delivery and sex of the child were significantly associated with duration of breastfeeding.

When investigating socioeconomic variables, highly educated women were 120 % more likely to have breastfed their lastborn children for at least six months compared to women with no education. Similarly, women with primary education were 90% more likely to breastfeed their last born child for six months, relative to women with no education. However, women with primary education tend to breastfeed for a longer duration at 12 months similar to uneducated women. The duration of breastfeeding was shorter at 12 months for women with higher level of education. Maternal occupation was found to be a significant predictor for duration of breastfeeding at six months as shown in table 10. Employed women were 20% less likely to breastfeed to at least six months compared to unemployed women. As expected, the household wealth index was found to be a significant predictor of breastfeeding at 24 months. The findings reveal that women from poorer households were 40% more likely to breastfeed for at least two years relative to women in the poorest households.

Table10: Bivariate results of explanatory factors on the duration of breastfeeding in months

Socioeconomic variables	OR(95 CI) six months	OR(95 CI) 12 months	OR (95CI) 24 months
Maternal education			
No education	Reference	Reference	Reference
Primary	1.9(1.2-2.9)*	1.0(0.7-1.3)	1.0(0.7-1.5)
Secondary	1.7(1.1-2.5)*	0.9(0.7-1.2)	0.9(0.6-1.3)
Higher	2.2(1.3-3.8)*	0.6(0.4-0.9)*	1.1(0.6-1.8)
Maternal occupation			
Not working	References	Reference	Reference
working	0.8(0.6-1.0)***	1.1(0.9-1.3)	1.1(0.9-1.5)
Household wealth index			
Poorest	References	Reference	Reference
Poorer	0.9(0.6-1.2)	1.1(0.8-1.4)	1.4(1.0-2.0)**
Middle	1.0(0.8-1.4)	1.0(0.8-1.3)	1.1(0.7-1.5)
Richer	1.0(0.7-1.4)	0.9(0.7-1.2)	1.0(0.7-1.5)
Richest	1.1(0.8-1.5)	0.7(0.6-0.9)	1.2(0.9-1.8)

Continued

Table 10 continued

Demographic variables	OR(95% CI) six months	OR(95% CI) 12 months	OR (95%CI) 24 months
Maternal age			
Less than 20	Reference	Reference	Reference
20-34	0.6(0.4-0.8)*	1.2(0.9-1.6)	5.9(2.7-12.6)*
35 and above	0.4(0.2-0.5)*	1.4(1.0-1.8)**	10.1(4.6-22.1)*
Marital status			
Not married	Reference	Reference	Reference
Married	0.8(0.7-1.0)**	1.0(0.9-1.2)	1.7(1.4-2.2)*
Place of residence			
Urban	Reference	Reference	Reference
Rural	0.8(0.6-0.9)*	1.4(1.2-1.7)*	1.1(0.9-1.5)
Region of residence			
Hhohho	Reference	Reference	Reference
Manzini	1.0(0.7-1.3)	0.9(0.7-1.1)	1.1(0.8-1.4)
Shiselweni	0.9(0.7-1.2)	1.0(0.8-1.3)	0.9(0.6-1.2)
Lubombo	1.0(0.8-1.4)	0.9(0.7-1.1)	1.0(0.7-1.3)
Parity			
One child	Reference	Reference	Reference
2-4 children	0.8(0.7-1.1)	1.0(0.8-1.2)	1.6(1.2-2.1)*
5 and beyond	0.6(0.4-0.7)*	1.1(0.9-1.3)	1.9(1.4-2.5)*

Continued

Table 10 continued			
Demographic variables	OR(95 CI) six months	OR(95 CI) 12 months	OR (95CI) 24 months
Sex of the child			
Male	Reference	Reference	Reference
Female	1.0(0.8-1.2)	0.9(0.8-1.1)	1.0(0.8-1.3)
Health sector variables			
Mode of delivery			
Normal	Reference	Reference	Reference
Cesarean section	1.3(0.9-1.9)	0.9(0.7-1.0)***	1.2(0.9-1.8)
Modern contraceptive use			
Using	Reference	Reference	Reference
Not using	0.8(0.7-1.0)**	0.7(0.7-1.0)***	0.8(0.7-1.0)
Place of delivery			
Home	Reference	Reference	Reference
Health facility	1.2(1.0-1.5)	0.9(0.7-1.0)	1.0(0.8-1.3)

***p<0.10 **p<0.05 *p<0.001, significance values CI: confidence interval, Antenatal care visit was dropped from the bivariate model due to a lot of missing values

The bivariate analysis showed that among the demographic variables; maternal age, marital status, place of residence, and parity were found to be significant predictors of the duration of breastfeeding. The maternal age was found to be a significant predicator of breastfeeding at six, 12 and 24 months. Women aged 35 and over had 60% lower odds of breastfeeding up to at least six months relative to women aged less than 20 years. However, the probability of breastfeeding for longer duration than six months increased for women aged 35 years and above. Women aged

35 and above ere40% more likely to breastfeed at 12 months and were ten times more likely to breastfeed at two years and beyond, relative to women below 20 years. Women residing in rural areas were 20% less likely to breastfeed at six months compared to women in urban areas. Paradoxically, at 12 months women who were resident in rural areas were 40% more likely to breastfeed relative to women who stayed in urban areas.

The parity of a woman was a significant predictor of breastfeeding at six and 24 months. As such, women with five and more children were 40% less likely to breastfeed up to six months compared to women with only one child. However at 24 months, women with five and more children were almost 90% more likely to breastfeed than women with only a single child.

The study further indicates that among the health sector variables women on modern contraceptives were most likely to breastfeed at six and 12 months. Conversely, women not using any form of modern contraceptives had 20% less likelihood to breastfeed their last born child at six months and 12 months relative to women on contraceptives. Mode of delivery was significant at 12 months in the bivariate model. Women who delivered through cesarean section had 10% less likelihood to breastfeed than women who delivered vaginally.

4.5.5 Multivariate logistic model building

To model breastfeeding duration, the study adopted an approach in which all the socioeconomic and demographic variables were included in the saturated multivariate model while controlling for health sector variables. The researcher opted to include the rest of the remaining covariates regardless of whether they met the $p < 0.20$ in the backward variable selection method because they were all regarded as important predictors in the study. Potential confounders in the study are health sector variables (antenatal visits, contraceptive use, and parity, mode of delivery and place

of delivery). However antenatal visits had a lot of missing variables hence it was dropped from the multivariate model.

Before fitting the overall model, multi-collinearity was tested using the tolerance and variance inflation factor. Multi-collinearity acts as a pointer on how the variability of the explanatory variables is not described by the other covariates in the entire model (Kistiana, 2009). After fitting the models, the Hosmer-Lemeshow goodness of fit was conducted to investigate how well the binary multivariate logistic model fits the data

Table 11: Testing for multi-collinearity using the tolerance and variance inflation factor (VIF)

Independent variables	Tolerance	VIF
Maternal education	0.74	1.35
Maternal occupation	0.98	1.04
Household wealth index	0.59	1.72
Maternal age	0.61	1.65
Marital status	0.88	1.13
Place of residence	0.71	1.41
Region of residence	0.97	1.03
Parity	0.55	1.83
Sex of the child	0.99	1.01
Mode of delivery	0.98	1.02
Modern contraceptive use	0.95	1.05
Place of delivery	0.93	1.07
Mean VIF	1.28	

Source: Computed by the author from the 2007 SDHS

Table 11 shows the findings of the independent variables used in the three multivariate logistic models investigating breastfeeding at six, 12 and 24 months. In the saturated model it is apparent that no covariates exceed the VIF of 10 or a tolerance value less than 0.10. Therefore conclusions can be drawn that the covariates of the study do not violate the assumptions of the models. Therefore the binary logistic models fit the data well.

4.5.6 Results of the duration of breastfeeding from a multivariate logistic analysis

Table 12 below contains the results of the three multivariate logistic models approximating the duration of breastfeeding at six, 12 and 24 months. When tested through the Hosmer-Lemeshow goodness of fit, the three multivariate logistic regression models were found to fit well the data. showing that Model 1 = (p=0.7031), model 2 = ($p = 0.2077$) and model 3 = (p = 0.6126). Therefore the models' assumptions were not violated meaning that they fit the data well.

Among the socioeconomic variables, maternal education level was found to be a significant predictor of breastfeeding at six and 12 months. Women with at least primary education level were 70% more likely to breastfeed their last born child compared to uneducated women at six months. Worth mentioning is that at six months, women with higher education levels were almost 130% more likely to breastfeed their last child compared to uneducated women. The same significant results were observed for maternal education level at 12 months. However, as the education level increased, women were less likely to breastfeed at 12 months. Women with higher education level were 40% less likely to breastfeed their children compared to women with no education level at 12 months. As expected the results confirmed that highly educated women tend to terminate breastfeeding at six months and thus are less likely to breastfeed up to 24 months compared to women with no education.

The household wealth index emerged as a significant predictor of the duration of breastfeeding at 24 months in the multivariate model. The findings show that women from the richest and poorer households both were 70% more likely to be breastfeeding at 24 months relative to women from the poorest households.

Table 12: Three multivariate models predicting any breastfeeding at six months (model 1), 12 months (model 2) and 24 months (model 3)

Socioeconomic variables	OR(95% CI) Model 1 Six months	OR(95% CI) model 2 12 months	OR (95%CI) model 3 24 months
Maternal education			
No education	Reference	Reference	Reference
Primary	1.7(1.1-2.7)*	1.0(0.7-1.3)	1.1(0.7-1.7)
Secondary	1.4(0.9-2.2)	0.8(0.6-1.1)	0.8(0.5-1.3)
Higher	2.3(1.3-4.3)*	0.6(0.4-1.0)**	0.8(0.4-1.6)
Maternal occupation			
Not working	Reference	Reference	Reference
working	0.9(0.7-1.0)	1.1(0.9-1.4)	1.0(0.8-1.4)
Household wealth index			
Poorest	Reference	Reference	Reference
Poorer	0.8(0.6-1.1)	1.1(0.8-1.4)	1.7(1.1-2.4)*
Middle	0.8(0.6-1.2)	1.1(0.8-1.4)	1.3(0.8-1.9)
Richer	0.9(0.6-1.2)	1.1(0.9-1.5)	1.3(0.8-2.0)
Richest	0.8(0.5-1.2)	0.9(0.7-1.3)	1.7(1.0-2.7)**

Continued

Table 12 continued

Demographic variables	OR(95% CI) Model 1 six months	OR(95% CI) model 2 12 months	OR (95%CI) model 3 24 months
Maternal age			
Less than 20	Reference	Reference	Reference
20-34	0.6(0.4-0.8)*	1.4(1.0-1.8)**	5.3(2.4-11.7)*
35 and above	0.5(0.3-0.8)*	1.9(1.3-2.7)*	9.6(3.8-22.5)*
Marital status			
Not married	Reference	Reference	Reference
Married	0.9(0.7-1.1)	1.0(0.8-1.2)	1.3(1.0-1.7)**
Place of residence			
Urban	Reference	Reference	Reference
Rural	0.8(0.6-1.0)***	1.2(1.0-1.5)***	1.2(0.9-1.7)

Continued

Table 12 continued

Demographic variables	OR(95% CI) model 2 six months	OR(95% CI) model 2 12 months	OR (95%CI) model 3 24 months
Region of residence			
Hhohho	Reference	Reference	Reference
Manzini	0.9(0.7-1.3)	0.9(0.7-1.1)	1.1(0.8-1.5)
Shiselweni	0.9(0.7-1.2)	1.0(0.8-1.3)	0.8(0.6-1.2)
Lubombo	1.0(0.8-1.4	0.9(0.7-1.1)	1.0(0.7-1.3)
Parity			
One child	Reference	Reference	Reference
2-4 children	1.0(0.7-1.3)	0.8(0.6-1.0)**	1.1(0.8-1.5)
5 and beyond	0.8(0.6-1.0)	0.7(0.5-0.9) *	0.9(0.6-1.3)
Sex of the child			
Male	Reference	Reference	Reference
Female	1.0(0.8-1.2)	0.9(0.8-1.1)	1.1(0.9-1.4)
Health service variables			
Mode of delivery			
Normal	Reference	References	Reference
Cesarean section	0.7(0.5-1.1)	0.9(0.6-1.2)	1.2(0.8-1.7)
Modern contraceptive use			
Using	Reference	Reference	Reference
Not using	0.9(0.7-1.1)	0.8(0.7-1.0)	0.8(0.6-1.1)
Place of delivery			
Home	Reference	Reference	Reference
Health facility	1.4(1.1-1.8)*	1.2(1.0-1.5)*	1.4(1.1-1.9)*

Mode 1: goodness of fit =0.7031, Model 2 goodness of fit=0.2077, model 3 goodness of Fit=0.6126, ***p<0.10 **p<0.05 *p<0.001, significance values CI: confidence

Among the demographic variables maternal age, marital status and parity were significant predictors of breastfeeding. Maternal age was found to be a significant predictor of breastfeeding at six, 12 and 24 months. Women aged 20-34 months were 40% less likely to be breastfeeding at six months relative to women aged less than 20 years. Women aged 35 and above were 50% less likely to be breastfeeding at six months relative to women aged below twenty years. The results confirmed that women aged less than 20 years tend to stop breastfeeding at six months compared to women aged above 20 years. The results further revealed that at 12 months, women aged 35 and over were 90% more likely to be breastfeeding their last born child compared to women aged less than 20 years. At 24 months, women aged 35 and above were 8.5 times more likely to breastfeed their last born child compared to women aged less than 20 years. The findings further show that women aged 20-34 years and 35 and above were more likely to breastfeed for a longer duration compared to women aged less than 20 years. The findings revealed that marital status was positively associated with breastfeeding at 24 months. Women who were married were 30% more likely to be breastfeeding at 24 months relative to women who were not married.

Place of residence was positively associated with breastfeeding at six and 12 months. Women from rural areas were 30% less likely to breastfeed their last born child for only six months compared to women in urban areas. At 12 months, women in rural areas were 20% more likely to be breastfeeding their last child compared to women who stayed in urban areas. The results signify that women in rural areas tend to breastfeed longer than women in urban areas. The higher odds of urban women breastfeeding at six months means that a lot of women stop breastfeeding at six months compared to women in urban areas.

After controlling for confounding variables (health sector) in the multivariate analysis, region of residence was found to be not significant to duration of breastfeeding. The number of children

ever born per woman (parity) was found to be a significant predictor of breastfeeding at 12 months. As observed in table 12, women with two to four children were 20% less likely to be breastfeeding at 12 months relative to women with only one child. Similarly, women with five or more children were 30% less likely to be breastfeeding at 12 months compared to women with a single child. The findings showed that the higher the parity, the lower the probability of continued breastfeeding.

Among the health sector variables, modern contraceptive use, and place of delivery were found to be significant predictors of the duration of breastfeeding. Modern contraceptive use was found to be a significant predictor of breastfeeding duration at 12 and 24 months, as observed in table 12. In the 12 and 24 months models, women not using any modern contraception were 20% less likely to be breastfeeding relative to women using modern contraception. In Swaziland women on modern contraceptives have a higher propensity to breastfeed than women not using modern contraceptives.

Place of delivery was also found to be a positive predictor of the duration of breastfeeding at six, 12 and 24 months. Women who delivered in a health facility presented higher odds of breastfeeding at six, 12 and 24 months relative to women who delivered at home. For example by 12 months, mothers who gave birth in a health facility were 20% more likely to be breastfeeding their children relative to those who delivered at home. Similarly, in the 24 months model, women who delivered at a health facility were 40% more likely to be breastfeeding than women who delivered at home. The results demonstrate that women who deliver in a health facility breastfeed longer than those who delivered at home.

Chapter five

Discussion and conclusion

5.1 Introduction

This chapter seeks to provide a synthesis of the results obtained from the study. It seeks to map the major socioeconomic and demographic factors while controlling for health sector variables that influence the rate (ever breastfeeding) and duration of breastfeeding in Swaziland. Therefore a synthesis based on the findings of the study and the literature was established. Recommendations and conclusions based on the study findings are also presented in the chapter.

5.2 Discussion

It has been established that breastfeeding for two years and beyond is beneficial for the growth and health of the child (WHO, 2006). However, to the knowledge of the researcher, this is the first study that endeavours to model the socioeconomic and demographic correlates of the rate (ever breastfed) and duration of breastfeeding in Swaziland.

The multivariate binary logistic model adopted by this study was used in California by Langellier and Chaparro (2012) seeking to find the factors that affect breastfeeding duration at six, 12 and 24 months. Additionally, Hafizan and Sutan (2014) also adopted the binary logistic regression to understand the association of socio-demographic factors on the duration of exclusive breastfeeding up to six months in Malaysia.

However, missing data may be a challenge in the study. Antenatal care visit was excluded from the overall analysis due to a large number of missing values. The exclusion of the missing data

may result in a decrease in power and an increase in variability of the results due to a decrease in the sample size (EMEA, 2001). In most instances where large parts of data are missing, generalizability of the results may be compromised (EMEA, 2001). Therefore, when interpreting the results, bias that may result from missing values need to be taken into cognisance. The limitation is that information on maternal morbidity (in general) was missing

Although this study found that the rate of ever breastfeeding was high at 94.3 % in Swaziland. It should be noted that the reported rate of ever breastfeeding in the study is slightly higher than the one reported in the 2007 SDHS which is 87% (Central Statistical Office and Micro International Inc, 2008). The difference may be due to the fact that this study excluded the number of mothers with missing data on their child breastfeeding status and this study modelled breastfeeding for children up to 55 months as opposed to the SDHS which analysed breastfeeding for children aged 36 months. The results indicate that the rate of ever breastfeeding is common in Swaziland.

5.3 Factors affecting the rate of ever breastfeeding in Swaziland

5.3.1 Socioeconomic variables

Among the socioeconomic variables examined in this study, only the maternal education level was found to influence the rate of breastfeeding. The findings revealed that mothers with the highest level of education had 60% lower odds of ever breastfeeding, relative to women without education. The results imply that as the education levels increased the rate of ever breastfeeding children at some point decreased. The findings of the study are consistent with the literature. Evidence in developing countries such as the Philippines revealed that education instils modern values that oppose traditional feeding practises that advocate for breastfeeding as the optimal

nutrition for children. Increased education has an inverse relationship to the rate of breastfeeding (Abada, Travato and Lalu, 2001).

5.3.2 Demographic variables

The object of the study was also to find the effect of the demographic variables on the rate of breastfeeding. The study found that among the demographic factors, place of residence and region of residence were significant predictors of the rate (ever breastfeeding) of breastfeeding in Swaziland. The evidence accrued from the analysis is that women who reside in rural areas were 100% more likely to ever breastfeed their last born child relative to women who were residing in urban areas. In their cross sectional study, Mazumder and Hossain (2012) found that in Bangladesh rural women had higher odds of ever breastfeeding and longer duration of breastfeeding compared to women in urban areas. Thulie and Mercer (2005) concur with the disadvantage of urban areas over rural areas, argued that women in urban areas were more likely to be involved in paid employment thus weakening the propensity to ever breastfeed. In Swaziland approximately 70% of the population reside in rural areas and thus are more likely to breastfeed.

Region of residence was found to be significant he participants was found to be positively associated with the rate of breastfeeding. Among the four regions of Swaziland, women from the Manzini region had 40% lower odds of ever breastfeeding their lastborn child relative to women from the Hhohho region. Worth mentioning is that women from the poorest region (Lubombo) were 10% more likely to ever breastfeed their children compared to the Hhohho region. Disparities of breastfeeding by region of residence have been documented by some studies, such as Akter and Rahman (2010) in Bangladesh. Similarly, women residing in the poorest Lubombo region had the highest probability of ever breastfeeding their last born child compared to the

other regions. The underdeveloped region of residence (Lubombo) is associated with poor modernisation hence more women are unemployed thus favouring breastfeeding. Therefore, the results suggest that there is the disparity of breastfeeding according to the level of development of the regions, which underscore the importance of the region of residence in predicting the rate of ever breastfeeding.

5.3.3 Health sector variables

Among the confounding variables (health sector variables), mode of delivery and modern contraceptive use were found to be significant predictors of the rate of breastfeeding. Women not using any modern contraceptive were found to be 30% less likely to ever breastfeed their last born child relative to women using modern contraceptives. A study conducted in Mexico by Perez-Escamilla, Maulen-Radovan and Dewey (1996) found that the effect of not using modern contraceptives was evident through lower rate of women ever breastfeeding their children. Mothers who delivered vaginally were found to be 2.3 times more likely to ever breastfeed their lastborn children than women who delivered through cesarean section. The literature suggests that women who deliver through cesarean section in Saudi Arabia had a higher probability of terminating breastfeeding and lower rate of breastfeeding than women who delivered vaginally (Shawky and Abalkhail, 2003).

5.4 Socioeconomic, demographic and health sector variables influencing duration of breastfeeding at six, 12 and 24 months

5.4.1 Socioeconomic variables

One of the principal objectives of the study was to model the impact of the socioeconomic and demographic factors on breastfeeding duration while controlling for health sector variables. The multivariate analysis revealed that among the socioeconomic variables, higher maternal education was positively associated with breastfeeding at six and 12 months, while the household wealth index was significant at 24 months. At six months, women with higher education level were found to have greater probability of breastfeeding their children relative to women with no education. In fact, women with higher education level were 120% more likely to breastfeed up to six months. The results suggest that non educated women had longer breastfeeding duration. This is true primarily because highly educated women tend to be involved in formal employment. Thi Le and Nang (2013) emphasized that women are expected to take maternity leave and return to work after five months (or less) thus negatively affecting breastfeeding. However at 12 months, women with higher levels of education were 40% less likely to breastfeed relative to women with no education. The findings of the study are consistent with the literature that women with no or lower education level breastfeed longer than women with higher level of education. In a study conducted in Canada, Dubois and Girard (2003) found that the higher the education level of the mother, the lower the rate and duration of breastfeeding.

One possible reason for the highly educated women to be more likely to breastfeed up to six months is due to the fact that the WHO guidelines recommended exclusive breastfeeding for both HIV infected and uninfected mothers for six months (UNHCR, 2009). The Swaziland guidelines followed the recommendation of the WHO at the time of the survey that HIV positive

mothers should exclusively breastfeed up to six months and then cease breastfeeding (Swaziland Ministry of Health and Social Welfare and WHO, 2006). Although there are insufficient questions in the SDHS to determine whether breastfeeding was exclusive, it is likely that better educated women would get knowledge of breastfeeding from the messages. However, the 2013 WHO breastfeeding guidelines states that in developing countries HIV positive mothers should breastfeed exclusively for six months, and introduce supplementary feeding up to 12 months when breastfeeding is stopped. In addition mothers should receive HIV treatment, either lifelong or until one week after breastfeeding is discontinued, depending on the national policies. Infants of HIV positive mothers who are breastfed should receive daily doses of Nevirapine for six weeks (WHO, 2013).

The household wealth index was found to be a significant predictor of breastfeeding at 24 months. Women from the richest households were reported to be 70% more likely to breastfeed up to 24 months relative to the poorest women. Women who reside in the poorer households also had 70% higher chances of breastfeeding up to 24 months relative to women in the poorest households. The results of the study deviate from other studies that found that women from the richest households tend to breastfeed for a shorter duration relative to women from the poorer and the poorest households. The contradictory results of the study may be attributed to the prevalent use of modern contraception among women in the richest households, which increase the birth spacing, as opposed to women from the poorest households. The results of the study are supported by Adair *et al.* (1993) cited by Kyi Kyi (2000) argued that the impact of the household wealth index varies from society to society., Adair *et al.* (1993) argued that a small variation between the mean duration of breastfeeding of women from poorer and richest households was observed in Outer Islands 1 (16.5 months and 15.3 months) respectively.

However, the limitation of the household wealth index is apparent in this study in that it does not explain an individual socioeconomic status but rather the households' standard of living. Howe, Hargreaves and Huttly (2008) argued that the PCA is not designed for discrete datasets rather assumptions of the models support normally distributed and continuous data. Additionally, one can argue that the household wealth index may poorly present the standard of living in a household since it's assume the household economy was shared equally among the household members, which may not be the case primarily in developing countries where there is power disparity in the households.

5.4.2 Demographic variables

Among the demographic variables, maternal age, marital status, place of residence and parity were found to be significant to breastfeeding duration. Maternal age was significant at six, 12 and 24 months. Women aged 20-34 were 40% less likely to breastfeed their last born child at six months, while women aged 35 and above were 50% less likely to breastfeed their children at six months relative to women aged less than 20 years. The results imply that women aged less than 20 years reported a higher probability of terminating breastfeeding at six months. However at 12 months, women aged 35 and above were 90% more likely of ever breastfeeding their last born children relative to women aged less than 20 years. At 24 months, women aged 35 and above were 9.6 times more likely to breastfeed their last born children compared to women aged less than 20 years. A study conducted in Bangladesh reported that an increase in maternal age resulted in an increase in the duration of breastfeeding (Giashuddin and Kabir, 2004). Traditional norms in Swaziland are still greatly pronounced thus older women may be resistant to adopt the contemporary child feeding practices but opt for breastfeeding as the ideal child feeding practice.

Abada, Trovana and Lalu (2001) argue that societal norms and values are conflicting with modern child nursing practices primarily in developing countries.

Women who reside in rural areas were found to be 20% more likely to breastfeed up to 12 months relative to those in urban areas. A large number of women who lived in urban areas reported to be breastfeeding up to six months thus women who stayed in rural areas were 20% less likely to breastfeed up to six months. Possible explanation for these finding is the 'Diffusion of Innovation' theory which proposes that behaviours are more quickly adopted by those in urban areas and with a higher socio-economic status (Rogers, 1995) than in those in rural areas with lower socio-economic status thus negatively affecting breastfeeding. Essentially, women who stayed in rural areas were more likely to breastfeed for a longer duration than women in urban areas. Thulie and Mercer (2005) argued that women in urban areas are more likely to be in paid work, and thus more likely to return to work before six months, thus weakening the propensity to breastfeed up to two years and beyond.

Marital status is another demographic variable that was found to have a positive association on duration of breastfeeding at 24 months. Married women were found to be 30% more likely to breastfed their last child relative to women not married. Callen and Pinelli (2004) conducted a comparative analysis in Africa, Europe, Canada and the United States and found that married women breastfeed longer than unmarried women. The study showed that marriage played a role in sustaining and encouraging breastfeeding. This could be attributed to the fact that in Swaziland extended families are still greatly pronounced, thus older women act as role models for the younger girls to assimilate breastfeeding behaviour. Authors such as Abada, Trovana and Lalu (2001) argued that women in rural areas mainly work at home which result in more time being available for breastfeeding. Specifically, Swaziland is a patriarchal society in which most

married women are housewives not involved in formal employment thus have more time to care for children. Among the women aged 15 to 65 in Swaziland only a third (30%) were reported involved in formal employment by year 2000 (Singwane and Gama, 2012).

The number of children a woman has (parity) was found, in this study, to be positively associated with duration of breastfeeding at 12 months. Women with only one child were found to breastfeed for longer duration in the multivariate analysis. For example, women with five or more children were found to have 30% lower odds of breastfeeding at 12 months relative to women with only one child. The literature confirm that the higher the parity, the lower the duration of breastfeeding among women. Akter and Rahman (2010) conducted a study in Bangladesh and found that as the number of children a woman has increased, the probability of terminating breastfeeding increased. Women with high parity or many children tend to have shorter birth spacing which negatively affects the duration of breastfeeding because a woman cannot breastfeed while pregnant (Bhalotra and Soest, 2006).

5.4.3 Health sector variables

Finally, among the confounding variables (health sector variables), modern contraceptive and place of delivery were found to be significant predictors of breastfeeding duration. Women using modern contraceptives were more likely to breastfeed for longer duration at six, 12 and 24 months. Women not using modern contraceptive among women in Swaziland was found to be associated with 20% lower odds of breastfeeding their lastborn children at 12 and 24 months. Previous studies support the study's findings. Akter and Rahman (2010) did a study in Bangladesh using the 2004 SDHS and found that women who used modern contraceptives had higher average duration of breastfeeding than women who were not. Women who used modern contraceptives breastfed their lastborn child for a longer duration than those who did not use any

form of modern contraceptive. This study also found that women who delivered at a health facility were more likely to breastfeed for a longer duration at six, 12 and 24 months. At 24 months, women who delivered at a health facility were 40% more likely to breastfeed than women who delivered at home. Breastfeeding awareness and information given during delivery may explain the higher breastfeeding duration among women who deliver in health facility. A study done from the Philippines DHS revealed that women who delivered at home had higher odds of terminating breastfeeding than women who delivered in a health facility (Abada, Trovato, and Lalu, 2001).

5.5 Recommendations

The study contains important findings germane to policy on breastfeeding. Delivery in a health facility should be encouraged to benefit women through appropriate breastfeeding practices. The Government of Swaziland should strive to increase the number of health facilities to encourage more women to access health facilities closer to their communities. Access to health facilities by women can greatly facilitate the use of modern contraceptives that can widen the birth spacing thus breastfeeding for longer duration instead of relying on lactation amenorrhea as a natural birth control. The findings offer a starting point for government to monitor these predictors to get positive breastfeeding outcomes.

5.6 Conclusions

The study found that the rate of ever breastfeeding in Swaziland is common; however more attention needs to be focused on duration of breastfeeding. The analysis of the 2007 SDHS showed that among the socioeconomic factors, demographic and the health sector variables were statistically significant to the rate and duration of breastfeeding. Maternal education, region of

residence, place of residence, mode of delivery and modern contraceptive use were found to be significant predictors of the rate of breastfeeding. Factors that affect breastfeeding duration in Swaziland were found to be maternal education, household wealth index, maternal age, place of residence, marital status, parity, modern contraceptive and place of delivery. The findings of the study are very informative given that in order to attain the WHO recommendations of breastfeeding for two years and beyond, it is necessary to identify the major predictors of breastfeeding.

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