FACTORS ASSOCIATED WITH THE INCREASE IN BOTTLE FEEDING AMONG CHILDREN 0-5 MONTHS IN ZAMBIA.

By

Elizabeth Nzumba

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DECLARATION

I, Elizabeth Nzumba, do hereby declare that this dissertation entitled ‘‘Factors Associated with the Increase in Bottle Feeding among Children 0-5 Months in Zambia’’ is presented for the award of Master of Public Health. It has not already been accepted in substance for any other degree and it is not being submitted concurrently for any other degree.

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APPROVAL

This dissertation of **Elizabeth Nzumba** has been approved as partial fulfillment of the requirements for the award of the degree of Master of Public Health by the University of Zambia.

Supervisor

Name: ……...

Signatures……Date:……

Coordinator

Name: …….

Signatures……Date:……..……

ABSTRACT

The study aimed at determining factors associated with the increase in bottle feeding among children 0-5 months in Zambia. The Data used in the study was drawn from a cross sectional study design collected through Demographic Health Survey and was analyzed using Stata version 15.0. To investigate the association between the dependent variable and the independent variables, a simple binary logistic regression analysis was carried out. Then multivariate logistic regression analysis was used based on a significance level of p-value < 0.05. Thus the adjusted odds ratios were obtained by entering at once all the independent variables that were found to be significant in the bivariate analyses. The study was guided by the following research questions. a) What is the magnitude of bottle feeding? b) What are the socio-economic factors associated with bottle feeding?

The study revealed that, 3.3% of women bottle-fed their children while 96.7% did not. The study found that women with higher education had the highest percentage of bottle feeding at 21.48% followed by the richest women at 13.92% and 11.45% for women that delivered by caesarean section. It was found that richest women had higher odds of bottle feeding than the poorest women with (AOR = 7.92; 95% CI: 3.967, 15.806). It was revealed that women who delivered by C-section were1.51times more likely to bottle feed than those who did not deliver by C-section. On the other hand, Women from rural areas were 0.66 times less likely to be bottle feed compared to those in urban areas. Therefore, the study recommends:

i. The establishment of friendly breastfeeding workplace policies for working mothers.
ii. The enactment of laws to allow for six months paid maternity leave to enable employed mothers to exclusively breastfeed.
iii. For strict adherence to ARV treatment for breast feeding parents living with HIV.
iv. The need for future research on the effectiveness of interventions aimed at improving exclusive breast feeding.

DEDICATION

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVITIONS

AFASS	Acceptability, Feasibility, Affordability, Sustainability and Safety
EBF	Exclusive Breast Feeding
GIT	Gastro Intestinal Tract
HIV	Human Immunodeficiency Virus
UNICEF	United Nations Children's Fund
WHA	World Health Assembly
WHO	World Health organisation
ZDHS	Zambia Demographic and Health Survey
ZSA	Zambia Statistical Agency

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The study aimed at determining factors associated with the increase in bottle feeding among children 0-5 months in Zambia. It was a cross sectional study design and the data used was collected through Demographic Health Survey. The study extracted data for children less than 6 Months of age from the 2018/2019 Zambia Demographic Health Survey database. The 2018-19 Zambia Demographic Health survey (ZDHS) data set provided demographic estimates of the country based on a sample of 13,683 women aged 15-49 and 12,132 men aged 15-59. Four questionnaires were used in the 2018 ZDHS and for this study, the women's questionnaire was used, as it concentrated on women of child bearing age (15-49). This questionnaire contained information related to nutritional status of children, maternal health care, reproductive health history, fertility preferences and knowledge use. The study was guided by the following objectives: 1) To determine the magnitude of bottle feeding among children 0-5 months in Zambia, 2) To establish the socio-economic factors associated with the increase in bottle feeding among children 0-5 months in Zambia. Data analysis was performed using Stata version 15.0.

This chapter presents the background of the study, statement of the problem, purpose of the study, specific objectives, research question, significance of the study, delimitation of the study, limitation of the study, theoretical framework, definitions of key terms and ethical considerations.

1.2 BACKGROUND

Exclusive breastfeeding is said to be the safest and healthiest option for children everywhere. Breast milk contains all the nutrients necessary for a child's survival and development in the first few months of life as it is uncontaminated and the mother's antibodies in it provide immunity to disease (UNICEF and WHO, 2018). Yet in every region of the world, bottle feeding rates are on the rise while rates of exclusive breastfeeding decline steadily from birth. Globally, just over 40 per cent or two out of five of the world's infants below 6 months of age are exclusively breastfed (UNICEF, 2016).

BEEEBAH (2023) postulates that choosing a method for feeding babies is one of the most important decisions expectant and new parents make. This decision can be even more complicated when the birthing parent is living with HIV. The information available to mothers and other parents living with HIV can be confusing for those who may want to explore the option of breastfeeding. Therefore, the World Health Organization (WHO) recommends that in a situation where a woman living with HIV resides in an area of the world where access to resources such as clean water, refrigeration, and medical care is limited, the child must be breastfeed with adherence to HIV drugs.

According to the International Confederation of Midwives (2014), research suggests that infants born to HIV positive women should be either exclusively breastfed or bottle fed. If breastfeeding is the method chosen it should be continued for at least six months in order to reduce the risk of viral transmission. Breastfeeding is especially important in the context of poverty and when clean water and fuel resources are inadequate for safe artificial feeding.

From the aforesaid, BEEEBAH (2023) states that one reason for this recommendation is that in such settings for instance, many areas of Africa or India, infants are more likely to develop diarrhoea and other illnesses, and may die from these. Breast milk contains substances that protect and strengthen a child's immune system, even after they stop breastfeeding. Because of this, breast milk may help children to survive these health conditions.

In Sub Saharan Africa, studies have shown numerous factors connected to consistent rise in the rate of bottle feeding. Lisa (2011) states that the increase has been attributed to social economic factors such as education of the mother, place of residence, wealth quintile and type of delivery. Women with higher education and economic class are more likely to bottle feed than women without formal education and those in low wealth index class. Furthermore, women residing in urban areas are known to bottle feed than their counterparts in rural areas. This is due to the greater power of the families, women's empowerment and the right to choose, the freedom to mediate their health and have access to new technologies.

Judith et al (2020) explains that bottle-feeding is an infant feeding modality that has been in existence since ancient times, and currently, a significant number of infants are being fed via a bottle. On the other hand, Seid et al (2019) argue that bottle feeding effects are more profound in the under developed world of which Zambia is part due to economic resources, lack of clean water, unhygienic surroundings and illiteracy amongst mothers. The prevalence of unsuitable and/or low-quality bottles and teats further aggravate the situation in developing countries.

The hazards of bottle-feeding cannot be over emphasized as Hassan (2018) postulates that bottle-feeding and early initiation of complimentary foods are key factors for child morbidity and mortality in different settings. With bottle feeding, there is increased susceptibly to

diarrhoea and other Gastrointestinal Tract (GIT) infections, ear infections, allergic tendency, obesity, diabetes and dental caries. Seid et al (2019) states that lack of appropriate breast feeding practices lead to child malnutrition and many countries are experiencing a sharp increase in the prevalence of malnutrition and suffer from the double burden of both types of malnutrition. Recently a detailed comprehensive report, using data from both developed and developing countries highlighted the increased relative risk of infant mortality amongst formula fed versus breast-fed infants (UNICEF, 2016).

According to Ignunn and Engebretsen (2014), despite substantial reduction in child mortality, an almost stagnant risk of death within the first weeks of life is a reality in sub-Saharan Africa. In 2006 delayed and non-exclusive breastfeeding were described as major risk factors for neonatal deaths in a large cohort from a vitamin A trial in Ghana. In Zambia for example, Neonatal mortality increased from 24 deaths per 1,000 live births in 2013/14 to 27 deaths per 1,000 live births in 2018 hand in hand with the steady increase in bottle feeding levels that rose from 3% in 2007 through to 7% in 2018 (ZDHS, 2018).

From the aforesaid, the WHO (2018) recommends exclusive breastfeeding in the first six months as the benefits on infant health are well documented and are mostly dependent on whether women breastfeed, for how long and how exclusively they breast feed. For instance, infants who were exclusively breastfed during the first hour of life were nine times less likely to die than those who were initiated to mixed formula and breast milk within 72 hours of birth. Breastfeeding significantly reduces the risk of death especially from diarrhoea in infants compared to formula-fed babies (WHO and UNICEF, 2019).

While breastfeeding is common in most parts of the world, exclusive breastfeeding is not the norm as most infants are given other foods or liquids due to various reasons such as cultural

practices, HIV infection, livelihood or employment barriers and the misguided belief that breast milk alone is not enough. UNICEF (2016) states that in the context of HIV, mothers may fear their breast milk is harmful to their child. Yet mothers living with HIV can breastfeed safely when they adhere to treatment.

Despite the WHO recommendation for exclusive breastfeeding in the first six months, the scenario in reality is different. Thus, the purpose of this study is to determine factors associated with the increase in bottle feeding among children 0-5 months in Zambia.

1.3 STATEMENT OF THE PROBLEM

Despite the recommendations by WHO and UNICEF for children to be exclusively breastfed during the first six months of life, bottle feeding rates have consistently been increasing in Zambia. According to ZDHS (2018), bottle feeding rates increased from 3% in 2007 to 4% in 2014 through to 7% in 2018. This trend is worrying and is against the recommendation by WHO for children to be introduced to solid or semi-solid complementary food after exclusive six months of breastfeeding in addition to continued breastfeeding from 6 months until age 24 months (or more) when the child is fully weaned (WHO, 2018).

According to ZDHS (2007), regulations regarding breast milk substitutes in Zambia discourage the use of bottles with nipples. The use of a bottle with a nipple, regardless of the contents (breast milk, formula, or any other liquid), requires hygienic handling to avoid contamination that may cause infection in the infant. First, it exposes infants to pathogens and increases their risk of infection. Second, it decreases infants' intake of breast milk and

therefore suckling, which reduces breast milk production. Third, in low resource settings, supplementary food is often nutritionally inferior.

Although studies on Infants and Young Child Feeding (IYCF) have been conducted in Zambia, studies on factors associated with the increase in bottle feeding among children 0-5 months are limited. This gap creates loss of prospects to learn from past trends in order to provide remedial action. If this trend is ignored and left unattended without proper interventions in place; the country is likely to score alarming rates in the nearest future that may be difficult to reverse, creating inappropriate allocation of scarce resource in the struggling economy due to an increase in total health expenditure.

1.4 PURPOSE OF THE STUDY

To determine factors associated with the increase in bottle feeding among children 0-5 months in Zambia.

1.5 SPECIFIC OBJECTIVES

1. To determine the magnitude of bottle feeding among children 0-5 months in Zambia.
2. To establish the socio-economic factors associated with the increase in bottle feeding among children 0-5 months in Zambia.

1.6 RESEARCH QUESTIONS

1. What is the magnitude of bottle feeding among children 0-5 months in Zambia?

2. What are the socio-economic factors associated with bottle feeding among children 0-5 months in Zambia?

1.7 SIGNIFICANCE OF THE STUDY

The study focused on the magnitude and factors associated with the increase in bottle feeding among children 0-5 in Zambia. Therefore, this study may provide insights about the prevailing factors contributing to the increase in bottle feeding among children 0-5 months in Zambia. This information may be used to aid relevant authorities to come up with policies and more appropriate, evidence based and specific strategies to lower the rates of bottle feeding in the country. The findings of this study are also expected to greatly contribute to the already existing knowledge of bottle feeding. The information generated will also meet academic requirements. It is therefore important that these factors are identified, analyzed and finally suggest solutions to address the identified and stated problem.

1.8 DELIMITATIONS OF THE STUDY

The study site for this study was Zambia. The country was divided into 10 provinces which included Southern, Western, Central, Lusaka, Muchinga, Northern, Luapula, North Western, Copperbelt and Eastern provinces. Therefore, the survey sample was representative at the national and provincial levels, and for urban and rural areas. The Survey followed a stratified two-stage sample design with the first stage involving selecting sample points consisting of standard enumeration areas (SEAs) and the second involving systematic sampling of households. To generate statistics that were representative of the country as a whole and the

10 provinces, the number of women, men and children surveyed in each province contributed to the size of the total (national) sample in proportion to size of the province. This was achieved by weighting the distribution of the women and men in the sample such that it resembled the true distribution in the country. Sampling errors for the 2018 ZDHS were calculated for selected variables considered to be of primary interest (ZDHS, 2018). Since the study was done across the country, results are generalized.

1.9 LIMITATIONS OF THE STUDY

The limitations in this study included the use of cross-sectional data that makes drawing causal inferences difficult because of the snapshot nature. It was also difficult to breakdown classifications of certain variables because the study was limited to variables in the ZDHS.

1.10 THEORETICAL FRAMEWORK

The Social Theory

The social theory can be used to shed light on increase of bottle feeding practices. This theory postulates that clinicians, public health advisors, nutritionists and others have been attempting to increase breastfeeding rates, with varying degrees of success. However, health-related behaviors do not occur in isolation, there exists 'lay knowledge'- that is the meanings and experiences influenced by the social circumstances in which people live (Lisa, 2011). Therefore recognizing the importance of social circumstances can improve the understanding of infant feeding; hence improve the ability to increase breastfeeding in communities.

According to Lupton (2000), most women know breastfeeding is best for the baby. However, knowledge does not translate into action as people's preferences tend to take up a collective way of behaving or knowing. Most of people's daily lives are accomplished in a practical, unreflective fashion just as cultural norms are passed on to the next generation through unconscious memories of attitudes and practices.

If women have grown up in communities where bottle feeding is the norm, these norms of attitude and practices form unconscious memories. The promotion of breastfeeding in hospital encourages new mothers to begin breastfeeding however at home, mothers may turn to bottle feeding as this is how their community sees infant feeding - milk in bottles (Lisa, 2011). These unconscious memories may be more influential than education and advice from hospital staff. In the same vein, women whose family and social environment is characterized by anti-breastfeeding discourses are more likely to abandon breastfeeding and adopt bottle feeding to protect their physical and emotional wellbeing.

Societies with most mothers facing various setbacks such as poverty, HIV, employment, lack of support and cultural beliefs "bottle feeding is seen as a pragmatically advantageous option for feeding babies hence it becomes normative for these women. For too long public health nutritionists have paid more attention to a universal, science-based understanding of infant feeding which they attempt to impart to mothers and communities without an appreciation of social influences, its origin and the role it plays in structuring societal views.

1.11 DEFINITION OF KEY TERMS IN THE STUDY

The use of clear terminologies is essential for every study. Therefore, in this study, the following definition of terms was used.

Antiretroviral therapy: the use of a combination of three or more ARV drugs for treating HIV infection. ART involves lifelong treatment (WHO, 2016).

Bottle Feeding- any liquid (including breast milk) or semi-solid food from a bottle with nipple/teat (WHO, 2018).

Exclusive Breastfeeding – giving breast milk only to the infant, without any additional food or drink, not even water in the first six months of life, with the exception of mineral supplements, vitamins or medicine (UNICEF, 2018).

Social Determinants of Health – these are conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life (WHO, 2015).

1.12 ETHICAL CONSIDERATIONS

During this research, the researcher submitted the proposal to The University of Zambia Biomedical Research Ethics Committee (UNZABREC) for ethical clearance and permission to conduct the study and was given with **REF.3060-2022**. Permission was also obtained from the Zambia Statistics Agency to use the 2018/19 ZDHS dataset for the study. There was no unauthorised access of the dataset and it was strictly used for the purpose of research. Furthermore, certification as a health researcher was given by the National Health Research Authority with Registration Number **NHRAR-R-1115/10/09/2022.**

1.13 SUMMARY

This chapter gave a brief explanation on bottle feeding practices. The chapter also provided the statement of the problem, purpose, objectives and research questions which guided the present study. Further, the chapter provided the significance, delimitations, limitation of the study and has also discussed the theoretical framework on the social theory before providing key operational terms used in the study. The chapter also discussed the ethical considerations in the study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 OVERVIEW

In this chapter, literature related to factors associated with the increase in bottle feeding among children 0-5 months in Zambia was reviewed. The socio-economic factors associated with the increase in bottle feeding among others discussed were education level, wealth quintile, employment status, residential location, mother's age, child is a twin, delivery by C-Section, mother being currently pregnant and counsel on breast feeding.

2.2 FACTORS ASSOCIATED WITH BOTTLE FEEDING

The HIV burden coupled with other factors has been cited to exacerbate the magnitude of bottle feeding in most settings. As a public health approach, all mothers in Zambia are encouraged to practice exclusive breastfeeding for 6 months regardless of their HIV status. According to the World Health Organization infant feeding guidelines, pregnant women and mothers known to be living with HIV should be informed of the infant feeding practice recommended by the national or subnational authority to improve the HIV-free survival of HIV-exposed infants and the health of mothers living with HIV and informed that there are alternatives that mothers might want to adopt (WHO, 2016).

Furthermore, the WHO recommends that in a situation where a woman living with HIV resides in an area of the world where access to resources such as clean water, refrigeration, and medical care is limited, the child must be breastfed with adherence to HIV drugs (BEEEBAH, 2023). Therefore, the WHO recommendations and Ministry of Health provide

guidelines to assess Acceptability, Feasibility, Affordability, Sustainability and Safety (AFASS) of infant feeding alternatives that mothers might want to adopt.

A study by Hazemba et al (2016) in urban settings of Lusaka revealed that although formula feeding was discussed, the emphasis was to assist mothers to exclusively breastfeed. On the other hand mothers reported that they were not assisted step by step in making their decision on how to feed their babies. Consequently, mothers were reported as doubting the risk of mother-to-child transmission would be reduced while they were on antiretroviral therapy (ARV) and exclusively breastfeeding.

According to the WHO and UNICEF (2016), breastfeeding is one of the foundations of child health, development and survival, especially where diarrhoea, pneumonia and under nutrition are common causes of mortality among children younger than five years. For these reasons, exclusive breastfeeding for the first six months of life is the recommended way of feeding infants, followed by continued breastfeeding with appropriate complementary foods for up to two years or beyond.

In southern and eastern Africa, where child mortality rates are among the highest in the world, HIV infection is common and a leading cause of death. In these settings, use of commercial breast-milk substitutes and other replacement feeds among infants not exposed to HIV is associated with significantly increased morbidity and mortality. Moreover, the evidence for the long-term benefits of longer duration of breastfeeding for both maternal and child health outcomes, including child development and prevention of non-communicable diseases, highlights the relevance of supporting breastfeeding in high- and low-income settings alike (Gerardo, 2012).

Although infant feeding by HIV-infected women remains a public health dilemma for developing countries, Hazemba et al (2016) states that research has shown that breastfeeding especially exclusive breastfeeding, limited to breast milk only, plus any minerals, vitamins and prescribed medicines that may be needed for the first six months after birth reduces the risk of postpartum transmission of HIV from an infected mother to her baby. Nonexclusive breastfeeding, on the other hand, more than doubles the risk of vertical transmission of HIV.

Despite the recognized importance of exclusive breastfeeding and the recommendation by WHO to exclusively breast feed in the first six months, bottle feeding rates are still on the rise. Therefore this study looked at the following socio economic factors associated with the increase in bottle feeding among children 0-5 months in Zambia. These included education level, wealth quintile, employment status, residential location, mother's age, child is a twin, delivery by C-Section, mother is currently pregnant and counsel on breast feeding as discussed below.

2.3 SOCIO-ECONOMIC FACTORS

Mothers educational level and bottle feeding

Education has been noted as a factor that plays an important role in shaping the future as it influences the decisions people make and widens resources. Particularly, a mother's level of education has an influence on bottle feeding as Ayunda (2017) postulates that in Indonesia, mothers with high education levels are more likely to find employment and have higher family incomes that will make them afford formula milk than those with low family incomes. The better the economy of a family, the higher the purchasing power of the family needs.

Other prominent findings in Namibia confirm that education plays a significant role in bottle feeding of infants. Anselm (2018) argues that as the education status of the women increase, the use of bottle feeding on their infants' increases. This study found that mothers with an educational level of college diploma and above were more likely to practice bottle feeding for their child as compared to those with primary education and below. This is because time availability is a necessity for mothers to breastfeed their children. Since educated mothers might have busy work schedules as compared to housewives (unemployed), they may not have time to breastfeed. On the other hand, this reflects that having awareness and understanding of the advantages of breastfeeding does not depend on a mother's educational status.

In Zambia, children whose mothers have no education have a higher prevalence of early initiation of breastfeeding and lowest among mothers with a higher education (ZDHS, 2018).

Wealth Quintile and Bottle feeding

According to Ayunda et al (2017), bottle feeding is a function of household earning from the fact that the richer households with better earnings were statistically able to access significant threshold levels of income. Affluent families with high socio-economic status have access to a number of important socioeconomic factors such as education, employment, which considerably affect feeding practices of children.

A Path analysis by Ayunda et al (2017) in Indonesia reviewed that there is a positive influence between family income and formula feeding behavior. Mothers with high family incomes were more likely to bottle feed with formula milk than mothers with low family income. The study revealed that as many as 89.3% of research subjects with high incomes

tended to buy and provide infant formula to their infants compared to low-income research subjects.

In Bangladesh a study found that bottle feeding was high because formula feeding was treated as higher social status in the community as women who are wealthier have an increased capability to buy infant formula (Rahman and Akter, 2019). Therefore, the fact that rich people feed formula milk and it seems not harmful to the health of the child becomes a motivation for mothers from all walks of life to bottle feed. It then becomes difficult to motivate women and other female family members about the benefits of breastfeeding as well as demerits of formula feeding. Equally, a study in Namibia revealed that because rich families were able to access breastfeeding alternatives, the odds of having bottle feeding among children from a rich family were higher than a child from a poor wealth family (Anselm, 2018).

Residential location and bottle feeding

Rosemary and Cyril (1985) argue that for most Nigerians, urban existence is synonymous with extreme individual and community poverty. Implicit in this was a great pressure on mothers to spend more time trying to augment the family income at the expense of caring adequately for their children. This study revealed that breast feeding had not lost its prestige among the economically underprivileged labouring classes in metropolitan Lagos, but is accorded lower priority because of the overwhelming competing factors of urban existence resulting from poverty. The crucial issue was how to promote breast-feeding in the presence of extensive poverty characteristic of urban life in many parts of the developing world.

From the aforesaid, until this major structural defect of urban life in the developing world was eliminated or controlled, any nutrition education programme that solely emphasizes and extols the virtues of breast feeding, was bound to achieve minimal results in terms of reversing the current trend towards increasing displacement of breast feeding by bottle feeding. Findings in the present study were consistent with the view that childhood malnutrition was more a result of objective conditions of people's lives than ignorance on the mother's part. It is suggested that economic and social pressures under which the low-income group live in urban areas, rather than serious ignorance on the part of the women, were responsible for the critical change in traditional infant feeding practices and the African image of mothering (Rosemary and Cyril, 1985).

According to Daniel et al (2022) children living in rural residences of Ethiopia were 51% less likely to have bottle feeding practice than urban residents of cities like Addis Ababa and Dire Dawa. This was comparable with a study conducted in Namibia which also showed children who live in urban residence were more bottle fed than rural children. This was attributed to the fact that mothers in urban areas were more likely to be of higher socioeconomic status compared with those from rural areas and that could have made it easier to get information and access on substitutes for breast milk.

Caesarean section delivery and bottle feeding

Caesarean section (C-section) is an important medical procedure for saving infant and maternal lives in emergency obstetric circumstances and has helped reduce maternal and neonatal morbidity and mortality particularly when medically indicated. UNICEF and WHO (2018) found that, while caesarean section rates almost doubled in the Dominican Republic, increasing from 31 per cent in 2002 to 58 per cent in 2014, the rate of early initiation of

breastfeeding decreased from 62 per cent to 38 per cent during the same period showing a relationship between bottle feeding and caesarean section delivery.

Alemnesh (2021) states that in Ethiopia mothers who gave birth by caesarean section were more likely to feed formula milk as compared to those who gave birth vaginally. This may be due to post-operative conditions, as mothers with cesarean sections were less likely to have had skin-to-skin contact with their infants and felt fatigued and less relaxed after birth in the delivery room.

Mahama (2020) argues that when caesarean section is medically indicated, it undeniably saves lives but the high prevalence of low-risk women taking the surgery was unnecessary. It implies that women and neonates are being exposed to avoidable risks as well as increasing the burden of cost on health systems. Mahama further state that emerging evidence in Ghana indicates that caesarean section brings about late initiation of breastfeeding and early cessation of breastfeeding.

Currently pregnant and bottle feeding

Many women worry about breastfeeding while pregnant as it is believed that breast feeding while pregnant can cause mild uterine contractions. A study in the United States by Molitoris (2019) suggested that a hormonal mechanism may link breast feeding during pregnancy and miscarriage. When infants stimulate the nipple and areola, they trigger the release of oxytocin in the mother, which causes a series of reactions that force milk toward the nipple. Oxytocin is also known to cause uterine contractions, which, if occurring in a pregnant woman, may result in either preterm birth or miscarriage.

Eli et al (2008) states that mothers tend to stop breast feeding immediately they discover they are pregnant and opt to bottle feed as it is believed that the milk would become 'bad' after conception. Bad milk is considered dangerous for the child who might get sick and die. Often it is not the mother herself who would want to stop breastfeeding but it is usually decided by a close relative, the father of the child or the nurse.

Judith (2020) argued that mothers too can benefit from exclusive breastfeeding as it delays ovulation, thereby empowering them with greater reproductive autonomy, especially in settings with limited access to quality contraception. Breastfeeding can therefore help prevent pregnancy but not always. It depends on how often one breastfeeds and the age of the baby. As a result, it is possible to become pregnant again while breastfeeding another child.

Counsel from health workers and bottle feeding

According to Whitney (2020) Pediatricians, obstetricians, and other healthcare workers are usually the most trusted and credible source on infant health and nutrition. The practices of maternity hospitals regarding breastfeeding and the recommendation of health providers contribute to a mother’s decision to breastfeed. New mothers may lack the confidence or relevant knowledge regarding breastfeeding and health workers play an important role by providing lactation guidance and helping to resolve challenges. The support of healthcare providers enables women to attain the confidence and skills needed to successfully and optimally breastfeed.

Sharon (2016) postulates that health-care professionals need to be consistent in the messages they are providing regarding infant feeding. Many women indicate that they wanted to bottle feed with formula but would have been willing to try breastfeeding, until their pediatrician

told them that both were healthy choices. It is unknown whether it would have made a difference in the mother's decision if their pediatrician would have more actively supported breastfeeding.

A comparative study conducted by Anna and Regina (2021) in the UK identified a lack of sufficient knowledge and professional support from healthcare workers about infant feeding, determined by a lack of time and resources to provide quality support. The study revealed that mothers faced inconsistent advice, lack of postnatal support and mixed messaging regarding infant feeding practices which caused confusion. When health workers give mixed messages, then family's advice would be listened to and trusted, such as when to stop breastfeeding and add solid foods. Keith et al. (2019) also found that mothers trusted health workers for infant feeding information; however most preferred the family, internet sources and friends' advice because of ease of access.

The community in which one lives also has an influence on infant feeding practices as Lisa (2011) states that the promotion of breastfeeding in hospital encourages new mothers to begin breastfeeding however at home, mothers may turn to bottle feeding according to how their community value infant feeding milk. Thus these unconscious memories may be more influential than education and advice from hospital staff.

A study by Eli et al (2008) in Southern Zambia also revealed that health personnel are highly trusted in the area as they are considered educated and knowledgeable. Hence mothers actively seek advice from them and clearly express their motivation to follow health guidance. This position of authority makes health personnel key resources in the promotion of good infant feeding practices, including EBF. However, scarcity of resources and nursing staff in rural areas limits the potential of health care professionals.

Maternal employment and bottle feeding

According to Joseph (2010), maternal employment likely shapes infant feeding because nearly twice as many mothers of infants are engaged in the labour force today compared to 30 years ago. This makes employed mothers less likely to initiate and sustain exclusive breast feeding and thus decide on bottle feeding as an option.

In London, employed mothers, particularly those who work 30 hours per week and over, are less likely to initiate and sustain EBF due to lack of time, tiredness, or lack of support (Anna and Regina, 2021). A mother's employment is more likely to shape other infant feeding practices as well, and thus affect the formation of eating habits in later life due to maternal inability to dedicate enough time for child feeding and care.

Daniels et al. (2015) concluded that early initiation of complementary foods (often perceived as a convenient feeding option) due to mothers' employment might interfere with breastfeeding intensity and lead to early termination of breastfeeding. More so, a study in Ethiopia found that mothers return to work was the main reasons for initiation of bottle feeding by the mothers who started bottle feeding practice (Seid et al, 2019).

Age of mother and bottle feeding

According to Moiseeva et al (2020), a study in Russia revealed that there was a direct strong correlation between the age of the mother and the proportion of refusals to breast feed due to the need to go studying or working. As maternal age increases the proportion of refusals of breastfeeding grows due to the lack of milk and with the need to study or work, but the proportion of refusals related to the unwillingness of the mother to continue breastfeeding decreases.

Horodynski et al (2007) states that adolescent mothers, particularly those from Black families, often live with their own mothers and share infant care giving responsibilities. It is established that not only did the grandmothers share in the care giving responsibilities, but they also play the dominant role in deciding when the baby should be introduced to solid foods. In the Black community, research has consistently found that grandmothers, sisters, and cousins typically play a more influential role in the introduction of solids than health care providers.

Young maternal age at childbirth is associated with increased risk of bottle feeding, infant mortality and poor child growth. According to USAID (2018) childbearing begins early in Zambia. By the age of19, 59 % of adolescent girls had begun childbearing in 2013–2014, which was an increase from 55 percent in 2007. This has serious consequences because, relative to older mothers, adolescent girls are more likely to bottle feed the baby who is more likely to become malnourished, and be at increased risk of illness and death than those born to older mothers.

Age of child and bottle feeding

According to Anselm (2018), as the age of the child increase the chance of having bottle feeding increases. In Namibia a study revealed that children aged 6-23 months were more likely to use bottle feeding as compared to children aged 0-5 months. This is because, as a child gets older, they may have more feeding options, such as consumption of water, tea, and processed milk which may lead to a higher rate of bottle feeding. On the other hand, children who are found aged 0-5 months had no well-matured gastrointestinal systems then bottle feeding during this age may be associated with problems in digestion and absorption, which

eventually lead to diarrhea, vomiting, and infections. Therefore mothers who had such previous experience, may not start bottle feeding their child at an early age

The ZDHS (2018) shows that exclusive breastfeeding declines with increasing age, from 91% among children age 0-1 months to 76% among those age 2-3 months and 42% among those age 4-5 months. Therefore, 17% of children under age 6 months receive complementary foods in addition to breast milk, a practice that tends to reduce the exclusive breastfeeding rate. A study in Southern Zambia concluded that the average age at which mixed feeding is introduced is 2–3 months, with the perception of insufficient milk being the main reason for introducing complementary feeds (Eli et al, 2008). The main supplement given is light mealie-meal porridge that is put in a feeding bottle though it is of poor nutritional value. It generally gets over-diluted to achieve an appropriate viscosity. Its energy content alone is lower than breast milk.

Child is a twin and bottle feeding

According to Daniel (2022) being multiple births was 4.3 times more likely to have bottle feeding than those who were singleton. Being multiple births was more likely to have bottle feeding as compared to singleton in line with a study conducted in Japan as inadequate breastfeeding and competition for nutritional intake, occur more frequently in children of multiple births than in children of single births.

Rafatu (2020) states that the majority of mothers in Ghana were not confident of producing adequate breast milk to satisfy their infants till they turned six months and hence introduced other foods and liquids particularly formula and porridge before six months. The perception

of breast milk insufficiency was also reported by other researchers to be a major barrier to exclusive breastfeeding even among singletons.

Eli et al (2008) found that breast milk insufficiency was perceived a problem apparently experienced by most mothers. Most mothers did not think their children would be satisfied by breast milk alone, and hence would start giving other feeds as it was assumed that when a child is crying, it means that it is not satisfied and is hence crying for more food. Therefore, Eli states that in this area, mixed feeding is the conventional way to feed an infant. In particular, water and other fluids are given at an early age, mainly because of this misconception. Owing to the physiological need for suckling to maintain milk production, this easily develops into a vicious cycle where the mother introduces an infant to complementary food making breastfeeding less frequent leading to decreased production of breast milk.

2.4 SUMMARY

This chapter reviewed literature using thematic approach. Literature on socio-economic factors associated with bottle feeding among children 0-5 months was revealed and these included: education level, wealth quintile, employment status, residential location, mother's age, child is a twin, delivery by C-Section, currently pregnant and counsel on breast feeding.

CHAPTER 3

METHODOLOGY

3.1 OVERVIEW

In research, the methodology and research design direct the researcher in planning and implementing the study in a way that is most likely to achieve the intended goal. Therefore, this chapter covered the research design that was used in the study. This includes target population, sample size and sampling procedure. It also covered the type of instruments to be used in data collection procedures that was used in data collection and how data was analysed.

3.2 RESEARCH DESIGN

This was a cross sectional study because it aimed at determining factors associated with the increase in bottle feeding among children 0-5 months in Zambia. The study used already available data collected through the 2018/2019 Zambia Demographic and Health Survey (ZDHS). In this study, there was no manipulation of data because there was no need to introduce a stimulus or an intervention.

3.3 STUDY POPULATION

The population of interest in this research constituted children below 6 months of age which is the age for exclusive breastfeeding. Therefore the study extracted data for children (< 5 years of age) from the 2018/2019 Zambia Demographic Health Survey database. The survey data used a reference person respondent who reported on behalf of the children. The dataset

provided data on child anthropometric measurements, socio-economic variables, food types and other variables (ZDHS, 2018).

3.4 SAMPLE SIZE

The sample size was a nationally representative sample of 13,683 females aged 15-49 in 13,595 selected households for the 2018 Zambia Demographic Health survey data set. The updated list of enumeration areas (EAs) for the 2010 Population and Housing Census provided the sampling frame for the survey (ZDHS, 2018). The survey data used a reference person respondent who reported on behalf of the children.

3.4.1 SAMPLE DESCRIPTION

The 2018-19 Zambia Demographic Health survey data set provided demographic estimates of the country based on a sample of 13,683 women aged 15-49 and 12,132 men aged 15-59. The survey data used a reference person respondent who reported on behalf of the children. These were participants who were usual residents of the selected households, or who slept in the households the night before the survey.

3.4.2 OPERATIONALISATION OF VARIABLES

Variable Description	**Operational Definition**	**Indicator**	**Scale of Measurement**
Dependent Variable			
Bottle feeding	any liquid (including breast milk) or semi-solid food from a bottle with	No Yes	Nominal

	nipple		
Independent Variables			
Educational level	School attendance in complete years	No education Primary Secondary Higher	Ordinal
Wealth quintile	Household's cumulative living standards	Poorest Poorer Middle Richer 5. Richest	Ordinal
Maternal Employment status	Work performed by individual for which they received pay	1. Employed 2. Not employed	Nominal
Residential location	Urban / rural residence	Urban Rural	Nominal
Mother's age	Age of infant's mother	Ages 15-49 (reproductive interval age group)	Ordinal
Child is a twin	A pair at one birth fro same mother	0. No 1. Yes	Nominal
Delivery by C-section	Delivery by a surgical incision into the mother's	No Yes	Nominal

	abdomen and uterus.		
Age of child	current age of the child in months	Ages 0-5 months (Exclusive breastfeeding interval age group)	Ordinal
Mother is currently pregnant	Containing a developing fetus within the body	No Yes	Nominal
Counsel on breastfeeding by health provider	Support of mother and infant by health care provider to implement optimal feeding practices	No Yes	Nominal

3.5 SAMPLING PROCEDURE

The Zambia Demographic and Health Survey adopted the sampling frame from the 2010 Census of population and Housing of Zambia. Therefore, the sampling frame used for the 2018 ZDHS was based on the Census of Population and Housing of the Republic of Zambia (CPH) conducted in 2010, provided by the Zambia Statistics Agency. The survey sample was representative at the national and provincial levels, and for urban and rural areas. The sample was designed to represent the national population age of women 15-49. The Survey followed a stratified two-stage sample design with the first stage involving selecting sample points consisting of standard enumeration areas (SEAs) and the second involving systematic sampling of households. To generate statistics that were representative of the country as a whole and the 10 provinces, the number of women surveyed in each province contributed to the size of the total (national) sample in proportion to size of the province. This was achieved by weighting the distribution of the women in the sample such that it resembled the true

distribution in the country. Sampling errors for the 2018 ZDHS were calculated for selected variables considered to be of primary interest (ZDHS, 2018).

3.6 INSTRUMENTS FOR DATA ANALYSIS

The ZDHS uses sample survey data and four questionnaires were used in the 2018 ZDHS: the Household Questionnaire, the Woman's Questionnaire, the Man's Questionnaire, and the Biomarker Questionnaire. For this study, the women's questionnaire was used, as it concentrated on women of child bearing age (15-49). This questionnaire contained information related to nutritional status of children, maternal health care, reproductive health history, fertility preferences and knowledge use, and source of family planning methods. The 2018 Zambia Demographic Health Survey provided good quality data as it adhered to the standard quality control protocols as stipulated by measure DHS (ZDHS, 2018).

3.7 DATA COLLECTION PROCEDURE

The Zambia Demographic health survey collected information on variables in question, therefore the study only extracted data pertaining to each variable of interest. The data was collected on anthropometric measurements for children 0–5 months using a proxy adult respondent who reported on behalf of the children. Various socio-economic variables were collected from the women. For this study the data was extracted using Stata version 13 and a data extraction tool. Questions considered in answering the objectives of the study focused on the determinants under study were included in the data extraction tool. These included variables like education, age, residence among others. A review of the ZDHS data was done to check if any inconsistencies were not identified in the ZDHS original editing and

document the missing data for record purposes. This was conducted systematically and logically to ensure consistency.

3.8 DATA ANALYSIS

Data analysis was performed using Stata version15.0 and before analysis, the data was cleaned and weighted to account for women who bottle fed compared to those who did not. Descriptive statistics for both groups and socio-economic variables were presented as frequency distributions and percentages. Weighting was performed to account for the complex sampling design and allowed us to generalize our findings to all women in Zambia. Weighted percentages of the national population from the original sample were calculated. The association between bottle feeding and its determinants were assessed by calculating un-adjusted odds ratios and adjusted odds ratios with 95% confidence intervals. A simple binary logistic regression analysis was carried out to assess the relationship between the dependent variable bottle feeding and the independent variables. In the multivariate logistic regression analysis, the inclusion of independent variables was based on a significance level of p-value < 0.05. All the independent variables that were found to be significant in the bivariate analyses were then obtained by entering them at once in order to obtain the adjusted odds ratios.

3.9 TRUSTWORTHINESS

The ZDHS is a nationwide survey and it was designed to produce reliable estimates for key indicators at a national level as well for urban and rural areas and each of the 10 provinces. The 2018 ZDHS was the sixth in a series of demographic health surveys in Zambia and in all the surveys the ZDHS has adhered to the set standards by demographic health surveys. In this

study, validity and reliability concerns were strictly monitored as stipulated in the methodology and circumstances of the survey standardized.

3.9 SUMMARY

This chapter discussed the research design used which is the cross sectional design. It also looked at the study population, sample size and the sampling procedure. The instruments for data collection have also been discussed. Lastly the data collection procedure and how data has been analysed were also discussed.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.0 OVERVIEW

In this chapter, the findings from the cross sectional analysis study of factors associated with the increase in bottle feeding among children 0-5 months in Zambia is presented based on the objectives. The research objectives that were explored were:

1. To determine the magnitude of bottle feeding among children 0-5 months in Zambia.
2. To establish the socio-economic factors associated with the increase in bottle feeding among children 0-5 months in Zambia.

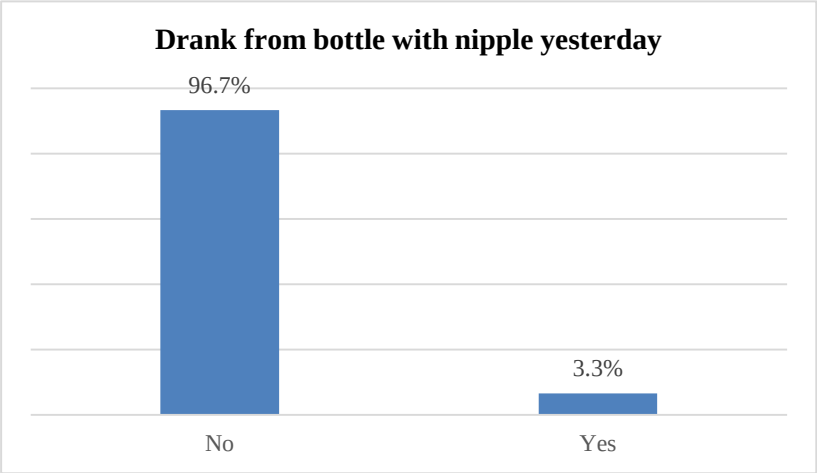
4.1 THE MAGNITUDE OF BOTTLE FEEDING AMONG CHILDREN 0-5 MONTHS IN ZAMBIA

Complementary feeding is one of the many nutrition interventions considered to have a great bearing on a child's quality of health as Moiseeva et al (2020) state that proper nutrition of children can be considered as a guarantee of the future health of every nation. Despite this, children below the age of six months are recommended to be exclusively breastfed. Therefore, the first objective of this study wanted to establish the magnitude of bottle feeding among children between 0-5 months in Zambia.

4.1.1 DRANK FROM BOTTLE WITH NIPPLE YESTERDAY

To measure the magnitude, the study checked in the database on those who indicated that their children had drank from the bottle with nipple the previous night. The results showed that 3.3% had done so whereas 96.7% had not. The results are shown in the figure below.

Figure 1: Magnitude of bottle feeding



4.2 SOCIO-ECONOMIC FACTORS ASSOCIATED WITH BOTTLE FEEDING

In this section, a brief summary of socio-economic factors associated with the increase in bottle feeding among children 0-5 months in Zambia is given. The description of the population is summarized in Table 1 below and the results showed that single birth children were the majority at 96.9% followed by women with non-caesarean section delivery at 95.6%. On the other hand, 91.76% of women were unsure or not pregnant at all. The lowest respondents at 0.08% came from those that did not know if counsel on breast feeding was given to them by a health provider. With regards to the type of place of residence, 69.9% of respondents lived in rural areas while 30% were from urban areas. Additionally, 52.3% of the respondents were not employed and 47.7% were employed. In terms of the level of education, 52.1% attained primary education, followed by 33.2% with secondary education and 10.7% had no education whilst 4.1% had higher education. For wealth index, the percentage of respondents decreased uninterrupted from the poorest at 28.2% to the richest at to 12.9% respectively.

Table 1: Socio-Economic factors associated with the increase in bottle feeding among children 0-5 months

Variables	No	Percentage
Education Level		
No education	1028	10.7
Primary	5018	52.1
Secondary	3198	33.2
Higher	391	4.1
Wealth Index		
Poorest	2718	28.2
Poorer	2335	24.2
Middle	1898	19.7
Richer	1434	14.9
Richest	1250	12.9
Maternal Employment		
No	5037	52.3
Yes	4598	47.7
Type of Place of Residence		
Urban	2894	30
Rural	6741	69.9
Mothers Age		
15-19	797	8.3
20-24	2535	26.3
25-29	2275	23.6
30-34	1889	19.6
35-39	1313	13.6
40-44	657	6.8
45-49	169	1.8
Child is a Twin		

Single Birth	9343	96.9
1st of Multiple	146	1.5
2nd of Multiple	146	1.5
Delivery by Caesarean Section		
No	9207	95.6
Yes	428	4.4
Currently Pregnant		
No or Unsure	8841	91.76
Yes	794	8.24
During first 2 Days Health Provider:		
Counsel on Breastfeeding		
No	2953	41.33
Yes	4186	58.59
Don’t Know	6	0.08
Current age of Child		
0-6 Months	1190	12.35
7-23 Months	2751	28.55
24-40 Months	2752	28.56
41-59 Months	2942	30.35

4.3 INDEPENDENT VARIABLES AND BOTTLE FEEDING

This section highlights results of the association between bottle feeding and independent variables. The results in Table 2 indicate the distribution of bottle feeding by the independent variables which are education level, wealth quintile, maternal employment, residential location, mother’s age, child is a twin, delivery by C-Section, age of a child, mother is currently pregnant and counsel on breast feeding by a health provider.

From the findings, Table 2 below shows that respondents with higher education levels had the highest percentage of bottle feeding at 21.48% followed by the richest in the wealth index at 13.92% and 11.45% for women that delivered by Caesarean section. On the other hand, women that did not know whether they received counsel on breastfeeding from a health provider during the first 2 days had the lowest percentage at 0%, followed by poorest in the wealth index at 0.85% and 1.26% for those without education. Furthermore, education level, wealth index, type of place of residence, mothers age, delivery by caesarean section and the current age of the child all show a P-value of 0.001 (P<0.05) which indicate statistical significance and a strong association of these variables with bottle feeding.

Table 2: Distribution of bottle feeding by background characteristic (Chi – Square Test)

Independent Variable	Bottle Feeding		P - Value
	No	Yes	
Highest Educational Level	**%**	**%**	
No Education	98.74	1.26	
Primary	98.55	1.45	
Secondary	95.15	4.85	
Higher Education	78.52	21.48	<0.001
Wealth Index Combined			
Poorest	99.15	0.85	
Poorer	98.59	1.41	
Middle	98.1	1.9	
Richer	95.89	4.11	
Richest	86.08	13.92	<0.001
Respondent Currently Working			
No	97.08	2.92	

Yes	96.63	3.37	0.010
Type of place of Residence			
Urban	92.26	7.74	
Rural	98.5	1.5	<0.001
Age			
15-19	96.61	3.39	
20-24	97.2	2.8	
25-29	96.09	3.91	
30-34	95.29	4.71	
35-39	97.33	2.67	
40-44	98.48	1.52	
45-49	97.63	2.37	<0.001
Child is Twin			
single Birth	96.65	3.35	
1st of Multiple	95.89	4.11	
2nd of Multiple	95.89	4.11	0.778
Delivery by Caesarean Section			
No	97	3	
Yes	88.55	11.45	<0.001
Currently Pregnant			
No or Unsure	96.61	3.39	
Yes	96.85	3.15	0.715
During First 2 Days Health Provider: Counsel on Breastfeeding			
No	97.19	2.81	
Yes	95.84	4.16	
I Don’t Know	100	0	0.010

Current age of Child			
0-6 Months	94.62	5.38	
7-23 Months	94.95	5.05	
24-40 Months	97.93	2.07	
41-59 Months	97.79	2.21	<0.001

4.4 LOGISTIC REGRESSION ANALYSIS

The study used simple binary logistic regression to analyse associations between the dependent variable (bottle feeding) and independent variables (education level, wealth quintile, maternal employment, residential location, mother's age, child is a twin, delivery by C-Section, age of a child, mother is currently pregnant and counsel on breast feeding by a health provider). The table below shows both adjusted and unadjusted ratios.

The unadjusted analysis in Table 3 reviews that women with higher level of education are 21.36 times more likely to bottle feed compared to those with primary education. In the same vein, respondents in the richest wealth index were 18.95 times more likely to bottle feed than those in the poorer wealth index. Caesarean section delivery was also another variable that indicated increased likelihood to bottle feed at 4.18 times more than those without C-section delivery. Meanwhile respondents in rural areas were 0.18 times less likely to bottle feed compared to those living in urban areas. More so, mothers in the age group of 45-49 were 0.69 times less likely to bottle feed. Regression results show that richest women had 8.56 odds to bottle feed their children. This shows that richest women are more likely to bottle feed children than the poorest women. In relations to education level, women with higher education were 2.55 times more likely to bottle feed children compared to those without

education. Furthermore, results indicate that the odds of women bottle feeding children increase uninterrupted from the poorest to the richest index.

Table 3: unadjusted and adjusted odds ratios of the effect of independent variables on bottle feeding

Predictor	odds ratio (95% CI)	P-Value	adj. odds ratio (95% CI)	P-Value
Education Level				
No Education			1	
Primary	1.153(0.636,2.087)	0.639	0.682(0.349,1.336)	0.265
Secondary	3.977(2.248,7.0349)	<0.001	1.291(0.657,2.538)	0.458
Higher	21.363(11.749,38.846)	<0.001	2.553(1.210,5.384)	0.014
Wealth Index				
Poorest			1	
Poorer	1.679(0.983,2.869)	0.058	1.786(0.918,3.369)	0.089
Middle	2.265(1.338,3.835)	0.002	1.819(0.931,3.556)	0.080
Richer	5.028(3.092,8.176)	<0.001	3.466(1.751,6.859)	<0.001
Richest	18.948(12.196,29.437)	<0.001	8.562(4.258,17.217)	<0.001
Employment Status				
No			1	
Yes	1.339(1.073,1.673)	0.010	1.227(0.926,1.624)	0.154
Place of Residence				
Urban			1	
Rural	0.181(0.143,0.230)	<0.001	0.661(0.456,0.959)	0.030
Mothers Age				
15-19			1	
20-24	0.822(0.254,1.289)	0.393	0.747(0.452,1.234)	0.225
25-29	1.161(0.749,1.799)	0.504	0.944(0.572,1.557)	0.820
30-34	1.410(0.909,2.187)	0.125	0.833(0.493,1.407)	0.494
35-39	0.781(0.469,1.301)	0.342	0.686(0.375,1.252)	0.219
40-44	0.441(0.212,0.917)	0.028	0.534(0.234,1.220)	0.137
45-49	0.691(0.239,2.002)	0.496	1.269(0.355,4.536)	0.713

Child is a Twin				
Single Birth			1	
1st of Multiple	1.236(0.542,2.821)	0.614		
2nd of Multiple	1.234(0.542,2.821)	0.614	0.969(0.359,2.613)	0.951
Caesarean Delivery				
No			1	
Yes	4.184(3.036,5.766)	<0.001	1.544(1.021,2.337)	0.040
Mother is Pregnant				
No or Unsure			1	
Yes	0.926(0.611,1.401)	0.715	2.014(1.199,3.383)	0.008
Breastfeeding Counsel				
No			1	
Yes	1.499(1.149,1.956)	0.003	1.081(0.814,1.436)	0.591
Don't Know	1		1	
Child Age				
0-6 Months			1	
7-23 Months	0.936(0.691,1.269)	0.671	0.981(0.702,1.373)	0.913
24-40 Months	0.372(0.259,0.535)	<0.001	0.291(0.187,0.451)	<0.001
41-59 Months	0.397(0.279,0.565)	<0.001	0.205(0.119,0.350)	<0.001

4.5 PREDICTORS OF BOTTLE FEEDING

The best predictors were gotten by considering the variables significant in the unadjusted model. Hence variables child is twin and mother is pregnant were thus left out. Therefore, the results in table 4 below show those women in the richest wealth index were 7.92 times more likely to bottle feed compared to those in the poorest index. Also women with higher education had higher odds of bottle feeding than those without education (AOR = 2.77; 95% CI: 1.322-5.813). The women that delivered by C-section were 1.51 times more likely to

bottle feed than those who did not deliver by C-section. On the other hand, women from rural areas were 0.66 times less likely to be bottle feed compared to those in urban areas.

Table 4: Best predictor model

Predictor	*adj. odds ratio (95%CI)	P-Value
Education		
No Education	1	
Primary	0.69(0.357,1.358)	0.288
Secondary	1.35(0.696,2.624)	0.374
Higher	2.77(1.322,5.813)	0.007
Wealth		
Poorest	1	
Poorer	1.75(0.914,3.351)	0.092
Middle	1.75(0.899,3.425)	0.100
Richer	3.36(1.700,6.628)	<0.001
Richest	7.92(3.967,15.806)	<0.001
Employment Status		
No	1	
Yes	1.18(0.898,1.545)	0.238
Residence		
Urban	1	
Rural	0.66(0.455,0.954)	0.027
Caesarean Section Delivery		
No	1	
Yes	1.51(1.003,2.272)	0.049
Breast Feeding Counsel		
No	1	
Yes	1.09(0.281,1.446)	0.552
Don’t Know	1	

Child Age		
0 to 6 Months	1	
7 to 23 Months	0.98(0.701,1.362)	0.890
24 to 40 Months	0.31(0.202,0.473)	<0.001
41 to 59 Months	0.22(0.134,0.376)	<0.001

4.6 SUMMARY OF THE CHAPTER.

This chapter is about the findings of the study whose main objective was to determine factors associated with the increase in bottle feeding among children 0-5 months in Zambia. Results revealed that 3.3% of women bottle-fed their children while 96.7% did not. Women with higher education had the highest percentage of bottle feeding at 21.48% followed by the richest in the wealth index at 13.92% and 11.45% for women that delivered by Caesarean section. It was found that women with C-section delivery had higher odds of bottle feeding than women with virginal delivery with AOR = 7.92; 95% CI: 3.967, 15.806. On the other hand, Women from rural areas were 0.66 times less likely to be bottle feed compared to those in urban areas.

CHAPTER 5

DISCUSSION OF FINDINGS

5.1 OVERVIEW

The study endeavoured to determine factors associated with the increase in bottle feeding among children 0-5 in Zambia. In this chapter, the results obtained in chapter 4 are further discussed.

5.2 DISCUSSION OF RESULTS

Results of this study showed that the magnitude of bottle feeding was at 3.3%. As 3.3% of women bottle-fed their children while 96.7% did not. The study also revealed that education level, wealth index, delivery by C-Section, type of place of residence, age of child, breastfeeding counsel and employment status were significant predictors of bottle feeding.

The study results show that there was a significant association between level of education and bottle feeding among child 0-5 months in Zambia. Therefore, results revealed that women with higher education were more likely to bottle feed compared to those without education with the odds ratio of 2.6 and this was statistically significant with a p-value less than 0.001. This is in line with the results obtained from a study in Indonesia by Ayunda (2017) which revealed that mothers with high education levels were more likely to find employment and have higher family incomes that would make them afford formula milk. A study in Namibia also revealed that an increase in maternal education level leads to bottle feeding as time availability is a necessity for mothers to breastfeed their children but educated mothers might have busy work schedules (Anselm, 2018).

Wealth index was another significant predictor of bottle feeding. The study revealed that there was a significant association between wealth index and bottle feeding with a P-value of <0.001 (P< 0.05). Findings show that the odds of involvement in bottle feeding for women in the richest wealth index were 7.9 times more than those in the poorest index. Similar results were found in a study conducted in Bangladesh by Rahman and Akter (2019) which found that bottle feeding was high because formula feeding was treated as higher social status in the community as women who are wealthier have an increased capability to buy infant formula. The odds of involvement in bottle feeding went up with increasing socio economic status.

The study results also revealed a significant relationship between place of residence and bottle feeding as women that bottle feed their children in urban areas were at 7.74% compared to 1.5% in rural areas. Also, regression results showed that women in urban areas had higher odds (1.00) of bottle feeding compared to those in rural areas. Further, the Pearson chi-square test p= 0.001 (P<0.05) validates the significant relationship between type of place of residence and bottle feeding.

These results are consistent with findings of a study conducted in Ethiopia by Alemnesh (2021) which revealed that children living in rural residences of Ethiopia were less likely to have bottle feeding practice than urban residents of cities like Addis Ababa and Dire Dawa. The study findings confirm the primary assumption that the place of residence had a significant effect on bottle feeding practices in Ethiopia. Anselm (2018) revealed that infants born to families residing in urban areas of Namibia were at higher risk of bottle feeding as this could be attributed to the greater availability in urban areas of infant formulas at pharmacies as well as the promotion of these products by pharmaceutical companies through media.

Furthermore, caesarean section delivery was a significant predictor of bottle feeding with a p-value of 0.001 ($P< 0.05$) from the statistical test. According to study results, the percentages of women who bottle fed and had undergone caesarean section were 11.4% compared to 3% without caesarean. Equally, a study in Ghana done by Mahama (2020) revealed that caesarean section brings about late initiation of breastfeeding and early cessation of breastfeeding. Alemnesh (2021) states that in Ethiopia mothers who gave birth by caesarean section were more likely to bottle feed as compared to those who gave birth vaginally. This may be due to post-operative conditions, as mothers with caesarean sections were less likely to have had skin-to-skin contact with their infants and felt fatigued and less relaxed after birth in the delivery room.

However, it is worth noting that there was no association between bottle feeding and being pregnant. This is contrary to pieces of research that have demonstrated that the chance of bottle feeding is higher in pregnant mothers. For example a study in the United States revealed that mothers tend to stop breast feeding immediately they discover they were pregnant and opt to bottle feed as it was believed that the breastfeeding during pregnancy cause miscarriages (Molitoris, 2019). Although most studies have shown an influence of being pregnant on bottle feeding, findings in this study showed opposing results as there was no significant association between being pregnant and bottle feeding. This was evident from the statistical test which showed a p-value of 0.715 ($P>0.05$).

There is increasing evidence that being a twin may have an adverse effect on breast feeding. In women who had twins, bottle feeding was higher than in women with a single child and a study in Japan revealed that being multiple births increased the likelihood to bottle feed as compared to singleton as inadequate breastfeeding and competition for nutritional intake,

occur more frequently in children of multiple births than in children of single births (Yoshie et al, 2006). Despite a number of studies showing an association of being a twin on bottle feeding, this study did not show this association as it was evident from the statistical test which showed a p-value of 0.778 ($P>0.05$).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The purpose of this study was to determine factors associated with the increase in bottle feeding among children 0-5 months in Zambia. Thus it was revealed that the magnitude of bottle feeding stood at 3.3% as exclusive breastfeeding during the first six months remains a challenge. After data analysis by use of all appropriate statistical tests; level of education, wealth index, delivery by C-section, type of place of residence, age of the child and counsel on breastfeeding and employment status were found to be significant predictors of bottle feeding. More so, the percentage of bottle feeding increases uninterrupted from the poorest to richest in wealth index. Women with higher education, richest wealth index and those who delivered by C-section had an increased chance of bottle feeding while controlling for all other variables in the model. Findings revealed that there was no significant association of bottle feeding and being a twin as well as being pregnant.

6.2 RECOMMENDATIONS

With the magnitude of bottle feeding at 3.3%, there is need for mores interventions to reduce the scourge in order to work towards achieving the recommendation by WHO for exclusive breastfeeding of children during the first six months of life. Based on study findings, the following are the recommendations:

i. The establishment of friendly breastfeeding workplace policies for working mothers.

ii. Enactment of laws to allow for six months paid maternity leave to enable employed mothers to exclusively breastfeed.

iii. Strict adherence to ARV treatment for breast feeding parents living with HIV.

iv. The need for future research on the effectiveness of interventions aimed at improving exclusive breast feeding.

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APPENDICES

Research Schedule

Appendix 1: The table below shows the timeline for all the research project.

Date started (2021)	Task	Expected outcome
April	Formulation of research tittle	Tittle formulated
May	Writing the research proposal	Research proposal to be written.
July	Design of the research instruments	Instruments to be prepared
September (2022)	Data collection	Data to be collected
September	Data analysis	Data to be analysed
October	Draft report	Draft report to be written
November	Writing research report	Report to be written
December	Submission for checking	Report checked
January (2023)	Final submission of the report	Report submitted

Appendix 2: Research Budget

S/N	Activities	Amount in kwacha
1	Proposal Development (printing)	K300.00

2	Communication	K200.00
3	Internet	K700.00
4	Ethics	K500.00
5	Data Analysis/ Interpretation	K2000.00
6	Report writing	K400.00
7	Photocopying	K300.00
8	Other	K300.00
	Total	**K 4, 700.00**

Appendix 3: University of Zambia Biomedical Research Committee Approval Letter

UNIVERSITY OF ZAMBIA
BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: +260 977925304
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia
E-mail:unzarec@unza.zm

Federal Assurance No. FWA00000338 IRB00001131 of IORG0000774 NHRAR-REC No 2021-05-0002

29th August, 2022

Your REF. No 3060-2022

Ms. Elizabeth Nzumba,
University of Zambia,
School of Public Health,
P.O Box 50110,
Lusaka.

Dear Ms. Nzumba,

RE: FACTORS ASSOCIATED WITH THE INCREASE IN BOTTLEFEEDING AMONG CHILDREN 0-5 MONTHS IN ZAMBIA (REF. NO. 3060-2022)

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 26th August, 2022. The proposal is **approved**. The approval is based on the following documents that were submitted for review:

a) Study proposal
b) Questionnaires
c) Participant Consent Form

APPROVAL NUMBER : REF. 3060-2022

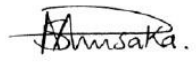
This number should be used on all correspondence, consent forms and documents as appropriate.

- **APPROVAL DATE : 29th August 2022**
- **TYPE OF APPROVAL : Standard**
- **EXPIRATION DATE OF APPROVAL : 28th August 2023**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the UNZABREC Offices should be submitted one month before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All SAEs and any other serious challenges/problems having to do with participant welfare, participant safety and study integrity must be reported to UNZABREC within 3 working days using standard forms obtainable from UNZABREC.
- **MODIFICATIONS**: Prior UNZABREC approval using standard forms obtainable from the UNZABREC Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the UNZABREC using standard forms obtainable from the UNZABREC Offices.
- **QUESTIONS**: Please contact the UNZABREC on Telephone No. +260977925304 or by e-mail on unzarec@unza.zm.
- **OTHER**: Please be reminded to send in copies of your research findings/results for our records. You are also required to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study. Use the online portal: unza.rhinno.net for further submissions.

Yours sincerely,



Sody Mweetwa Munsaka, BSc., MSc., PhD
CHAIRPERSON
Tel: +260977925304
E-mail: s.munsaka@unza.zm

Appendix 4: National Health Research Authority -Certificate of Registration as Health Researcher

NATIONAL HEALTH RESEARCH AUTHORITY
The Health Research Act
(Act No. 2 of 2013)

CERTIFICATE OF REGISTRATION

THIS IS TO CERTIFY THAT

Nzumba Elizabeth

has been registered as a Health Researcher
Dated this 9th Day of September 2022
Registration Number NHRAR-R-1115/10/09/2022

DIRECTOR
PROF. GODFREY BIEMBA