BREASTFEEDING PATTERNS AND BIRTH INTERVAL ANALYSIS IN KENYA
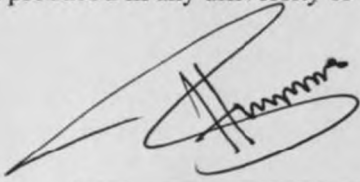
By

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
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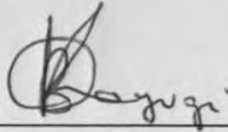
October, 2006

DECLARATION

I declare that this research project is my original work and to the best of my knowledge, it has not been produced in any university or educational institution for award of a degree.
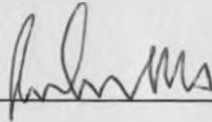
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This research project is dedicated to my dear mom, wife and children without whom it could not have been possible for me to get this far.

ACKNOWLEDGEMENTS

ABSTRACT

This study based on the 2003 Kenya Demographic and Health Survey, attempts to find the effect of breastfeeding on birth intervals. The unit of analysis for this study was the last closed birth intervals and the main methods employed were cross-tabulation and linear regression.

The study reveals that breastfeeding status of mothers played a considerable role in the determination of fertility. The numbers of live births were lower for mothers who practiced full breastfeeding compared to others. Increase in the duration of breastfeeding is associated with decline in the mean number of live births. Significant differences in the breastfeeding durations observed by place of residence, level of education and age of mothers. Birth interval analysis confirm that the longer the duration of breastfeeding the longer the birth interval and hence the lower the fertility. The multiple regression results established that age of mother, ethnicity, contraceptive use, education and the duration of breastfeeding are significant determinants the last closed birth interval.

The major conclusion derived from the study results was that breastfeeding duration is a significant proximate factor influencing birth intervals. The study recommends promotion of breastfeeding and family planning programs. Further research should be undertaken to determine the trends of breastfeeding and reasons for continuing or discontinuing breastfeeding. Regular evaluation of programs and policies to promote breastfeeding should also be put in place.

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CHAPTER ONE

INTRODUCTION

1.1   BACKGROUND

Apart from being an integral part of the reproductive process, the natural and ideal way of feeding an infant, breastfeeding is known to affect the fertility levels of a society by delaying the resumption of ovulation, particularly when coupled with postpartum sexual abstinence extending significantly beyond the usual period of postpartum amenorrhea. The incidence and pattern of these two closely linked to customs. Breastfeeding and abstinence differs not only from one country to another but also within various regions of the same country (Jainand Bongaarts, 1981).

Breastfeeding can cause a delay in the return of ovulation. This comes as a pleasant surprise to some mothers, though it's also common for mothers to wonder if something is wrong with them when it takes a long time for their period to return after a birth of a child. Many nursing mothers look upon the delay in the return of fertility as one of the blessings of breastfeeding. Some mothers for religious and or personal reasons rely on breastfeeding as their sole form of birth control or means of natural child spacing. If certain guidelines are followed breastfeeding generally spaces children about two to three years apart.

It does not always work as planned however, and some mothers get disappointed when their period returns within a couple of months after their baby's birth. Conversely, others may get discouraged when it seems to work too well and delays the return of their ovulation longer than they could like.

The type of breastfeeding that best suppresses ovulation involves frequent nursing of baby during the day, plus also nursing at night. Other important elements of the type of breastfeeding that spaces babies include demand feeding (no schedules), minimal to no separation between mother and baby, sleeping with baby at night and for a nap during the day, avoiding pacifiers or bottles, nursing for comfort, and delaying introduction of solids

and other liquids for at least six months. Breastfeeding can extend the average time a mother will start menstruating by 14.6 months after the birth of her child. This in turn lengthens the birth interval.

Some mothers, choose to use breastfeeding as one form of birth control and then complement it with other forms of birth control once they are able to answer "yes" to any of the following questions: (1) Menses returned? (2) Supplementing breastfeeding regularly? (3) Baby older than six months? Nursing mothers who are able to answer "no" to the above questions, have a 1 to 2% chance of getting pregnant. This form of birth control is called the Lactation Amenorrhea Method (LAM). If you choose to use a complementary form of birth control, please remember that some form of birth control can affect your milk supply.

Knowing the signs of returning ovulation can be helpful for mothers who are breastfeeding. A mother can get pregnant even before her period returns, though as mentioned above, during the first six months the chance is very small. But as time goes by the chances of a mother ovulating before her period returns increases. Natural family planning can help a mother be a ware of when she begins ovulating even if her period has not returned (Mykidzmom, 1996-1998).

Fertility is directly influenced by a set of socio-biological factors. These factors are often called intermediate fertility variables because they are influenced in turn by various economic, social, cultural and environmental variables (which are indirect or background determinants of fertility). A recent study of the fertility effects of the intermediate fertility variables has demonstrated that nearly all variance in the fertility levels of population is due to differences in four factors: the proportion of married among females; the prevalence of contraceptive use; the incidence of induced abortion; and the fertility inhibiting effect of breastfeeding. (Anurudh and Bongaarts, 1981).

The importance of breastfeeding in regulating individual fertility behaviour has been a matter of interest for many years. However, lack of uniform data has been limiting the scope of cross-cultural analysis of breastfeeding and its determinants. The data generated

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through world fertility surveys (recently known as demographic health surveys in most countries) provide a unique opportunity to understand the behaviour of women with respect to breastfeeding and its influence on fertility on cross-cultural comparison.

This research attempts to assess the effect of breastfeeding and birth interval effects in the Kenyan context in the light of HIV/AIDS pandemic.

1.2 Problem Statement

Breastfeeding practices in the world are generally poor, no more than 35 percent of infants worldwide are exclusively breastfed even in the first four months of life (UNICEF, 2004). However, the duration of breastfeeding is increasing in most developing countries (Haggerty, 1999). In Kenya, the practice of breastfeeding is declining (NCPD et, al, 1999; IBFAN, 2001).

Traditional African societies had more developed systems of birth spacing than there are today. Some communities placed emphasis on maturity of the child before another one was born. In such communities the practice of breastfeeding was prolonged.

However in the modern societies, it has been observed by various studies that breastfeeding among human societies is on the decline in both intensity and duration. This decline begun in Europe and America in the 1930's so that by the late 1970's and 1980's duration of breastfeeding in the region were not initiating breastfeeding at all and most of those who initiated, had given up by the time the infant was 6 months or less and on such cases infants were not breastfed at all. Such a decline is also underway in the less developed parts of the world. Most mothers in the regions initiate breastfeeding – for example 97% in Kenya (KDHS, 2003).

Various regional and socio-economic factors in Kenya are thought to influence breastfeeding practices across the country. Cultural orientations as well as women's socio-economic status are believed to have an influence on breastfeeding patterns since it has long been established that breastfeeding affects fertility, this study aims to examine the association between breastfeeding practices on various birth interval patterns in Kenya.

Additionally the study will seek to establish the impact of breastfeeding on birth interval in various HIV/ AIDS regimes in the country.

1.3 Research Questions

1. What are the regional and socio-economic patterns of breastfeeding in Kenya?

2. What is the relationship between breastfeeding and birth interval patterns in Kenya?

3. What is the impact of breastfeeding on birth interval in various HIV/ AIDS regimes?

1.4 Objectives of the Study

1.4.1 Main Objective

The study aims at exploring breastfeeding practices and their relationship with birth interval in Kenya and these in various HIV /AIDS regimes.

1.4.2 Specific Objectives

The following specific objectives were constructed:

1. Identify the regional and socio-economic patterns of breastfeeding in Kenya.

2. Examine the relationship between breastfeeding and birth interval patterns in Kenya.

3. Assess the impact of breastfeeding on birth in various HIV/AIDS regimes in the country.

1.5 Justification

Literature provides more evidence for a positive association between duration of breastfeeding and the length of the birth interval. The information obtained from the study, will be used by decision makers in tailoring interventions that will buffer against this and other hindrances including spill over effects of prevention mother to child transmission of HIV.

Since breastfeeding patterns and its effects on birth interval has a social demographic significance, findings of this study will inform policy makers and FP/ RH programs in Kenya to improve and promote methods of natural family planning which are believed to have minimal side effects as compared to modern ones.

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The study will also help to establish the effect of breastfeeding on fertility in various HIV/ AIDS regimes in Kenya.

1.6 Scope and Limitation of the Study

In the last Kenya Demographic and Health Survey (KDHS, 2003), information on breastfeeding was collected for the last three years the last closed birth interval (second last child). Although breastfeeding information during the last closed interval is regarded to be relatively more reliable since the reference births constitute fairly recent events and do not involve recall lapses, it has several limitations.

The data used might be having some non-sampling errors due to the mistakes made in carrying out the fieldwork activities such as failure to locate and interview the correct household, errors in the way questions were asked, understanding and interpretation of the question on part of the interviewee and data entry errors.

Because there was likelihood of a change in HIV prevalence rates the results obtained for the 3rd objective of the study has been applied for the entire population with caution.

CHAPTER TWO
LITERATURE REVIEW

2.0   Introduction

The effect of breastfeeding on fertility is suggested by a number of existing studies in which it is shown that in the absence of contraception the period of survival of a child is positively associated with the birth or pregnancy interval in which death occurs. It is assumed that the death of a child truncates the period of breastfeeding; this in turn leads to an early resumption of menstruation and ovulation and to an earlier conception.

A growing body of literature provides more direct evidence for positive association between duration of breastfeeding and the length of the birth interval. A birth interval can be divided into three main components; postpartum amenorrhea; in menstruating interval; time added due to foetal losses (Anrudh and Bongaarts, 1981).

It is now well established that breastfeeding is the principal determinant of the duration of postpartum amenorrhea. In the absence of breastfeeding, menses return about two to four months after birth. As the duration of breastfeeding increases so does the amenorrhea interval, approximately one additional month of amenorrhea for each two months increment of breastfeeding duration.

With long lactation, mean amenorrhea intervals from one to two years are observed in developing as well as in developed countries.

An analysis of breastfeeding patterns, 25 subgroups (population from 9 countries in a World health organization collaborative study) demonstrated that after fitting curves with four parameters of any given time postpartum variations in breastfeeding proportions explained about 85 percent of the variance between populations in proportions of menstruating women. (Anrudh and Bongaarts; 1981).

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Similarly, other studies have found a correlation between mean breastfeeding and amenorrhea durations when comparing populations or sub-populations within countries. However on the industrial level, the correlation between lactation and amenorrhea intervals is lower, though still highly significant. For example, lactation explained about 20.7 percent of the variation of postpartum amenorrhea periods among Taiwanese women, which was 92% of the total variation explained by women's age, parity, education, place of residence ownership of modern objects and lactation. The most plausible explanation for the lower correlation – aside from measuring error – is that women differ not only with respect to the duration of breastfeeding but also with respect to the type and pattern of breastfeeding. (Anrudh and Bongaarts, 1981).

It has been demonstrated that women who breastfeed fully have a lower probability of resumption of menses than women whose infants receive supplemental foods such as fluids by bottle or solids. The ovulation and menstruation inhibiting effects of breastfeeding as well as differential impact of breastfeeding types are believed to be due to a neutrally mediated hormonal reflex system initiated by the suckling of the breast nipple. (Anrudh and Bongaarts, 1981).

There is also some empirical evidence that the continuation of breastfeeding beyond the resumption of menstruation suppresses the probability of conception. In some societies breastfeeding is associated with postpartum abstinence, which, if continued beyond the resumption of ovulation, will affect the length of the birth interval independent of the physiological effects of breastfeeding (Anrudh and Bongaarts, 1981).

Fertility is directly influenced by a set of behavioural and biological factors. These factors are often referred to as intermediate determinants of fertility because they are in turn influenced by various economic, social, cultural and environmental variables, which are indirect or background determinants of fertility (Davis and Blake, 1956). Breastfeeding is one of these proximate determinant factors (Marriage, contraception and abortion). Although

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the primary purpose of breastfeeding is to provide food for the infants, in all societies, it is also reported to be used in some societies because of the belief in its effectiveness in postponing conception (Klein 1984).

Decline in breastfeeding may increase fertility through other mechanisms besides its effect on fecundity. Women in some societies practice postpartum abstinence only as long as they breastfeed; thus breastfeeding indirectly prevents pregnancy through abstinence (Jellife and Jellife, 1978). The period of postpartum amenorrhea has been found to average only about two months in the absence of breastfeeding and is substantially longer among women who breastfeed for a prolonged period. (Knodel, 1977).

Breastfeeding nevertheless cannot be regarded as a highly reliable contraceptive method for individual women but its aggregate effect can be great in societies where women breastfeed for a prolonged period. The contraceptive protection provided by breastfeeding in less developed countries has probably been found to be greater than that achieved through use of contraceptive provided through family planning programs. (Anrudh and Bongaarts, 1981).

Bongaarts (1978) shows that an increase in the total natural fertility rate in Korea between 1960 and 1970 was a result of the decline in breastfeeding. However the substantial increase in the use of contraceptives and abortion, and a decline in the proportion of married women contributed to an overall decline in the total fertility rate from 6.1 in 1960 to 4.0 in 1970.

Studies in a few African countries shows that a longer duration of breastfeeding is associated with longer birth intervals. In Rwanda, only 3.7 percent of women of the women who breastfed were pregnant at the ninth month after delivery. Even at 24 months after delivery, 25 percent of these women still had not had menstrual period, whereas 74 percent of those who did not breastfeed became pregnant (Ferry and Murdot, 1978).

In a study in Nigeria, the mean breastfeeding interval was observed to be just under 24 months, and the majority of women discontinued lactation between 21 and 27 months

after birth of the child. In this situation, once menstruation was resumed, women usually had only two cycles before conception occurred.

The significance of breastfeeding as a factor of lengthening birth intervals can be seen if the same problem is viewed from the opposite direction. What rise in contraceptive prevalence is necessary to compensate for the fertility increase resulting from specific declines in the duration of breastfeeding (Lesthaeghe, 1982).

This section therefore examined the general association between breastfeeding and fertility, factors associated with decline in breastfeeding duration, breastfeeding and socio-economic factors, breastfeeding and socio-cultural factors, breastfeeding and age factors, breastfeeding and infant survival and health, breastfeeding and contraceptive use, breastfeeding, HIV/ Aids and fertility in Sub Saharan Africa, breastfeeding and mother-to-child HIV transmission and breastfeeding and HIV/Aids by regions.

2.1 Breastfeeding and Fertility

Following childbirth, every woman experiences a period of temporary infecundability, commonly referred to as postpartum non-susceptible period, during which she does not ovulate. Related to this, though not necessarily lasting exactly the same number of months, is the period of postpartum amenorrhea. Since amenorrhea is easier to observe than ovulation, it's often used as a convenient operational definition of the postpartum non-susceptible period. Breastfeeding practices appear to be the principal determinants of variations in the length of this period as revealed by the literature review already done.

Women, who are giving full (un-supplemented) breastfeeding, have lower chances of resuming menstruation, than women who are giving their children supplementary foods. (Huffman, 1978). The principle explanation of this lies in the endocrine factors that are associated with lactation (Mc Nielly, 1979). Lactation itself depends on secretion of the hormone prolactin by the interior pituitary gland. At delivery a woman's prolactin levels are high. In the absence of breastfeeding, serum prolactin concentrations tend to decline to pre

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pregnancy levels within about a week. High levels are usually maintained, however if the child is breastfed. (Lesthaeghe and Page, 1982).

It has also been suggested that even among women who have resumed menstruation; those who are breastfeeding may have slightly lower probabilities of conception than their non-nursing counterparts, and hence longer average waiting times to conception. The evidence of a significant delay in conception after resumption of menstruation is much meager than the evidence that breastfeeding has a major impact on amenorrhea (Jain, 1979).

If breastfeeding women combine it with oral contraception too soon after delivering this would probably lower the milk volume. This would in turn lead to an increase in use of supplementary feeding with a decrease in the suckling reflex. The final result may eventually lower the production of milk leading to its discontinuation earlier than it is intended. On the other hand if women wait too long before starting a modern method of contraception, they may become pregnant sooner than they would have wished (McNielly and Kennedy, 1979). This therefore underscores the need to stress on the choice of one particular contraceptive method, which involves a host of factors ranging from personal preferences and fertility motivation to the scope of contraceptive options available and its cost. From the perspective of the user, it is argued that women who are motivated to prevent the next pregnancy would generally opt for a more effective method.

Family planning programs must therefore choose whether to recruit women who have just had a child or to wait recruitment till they have resumed menstruation. The advantages of the former option is that women are typically motivated towards family limitation in the early stages of postpartum period, than at a later time, and contraception services can often be combined easily with post natal health care visits. This may be solved by use of a contraceptive method, which is perceived as a substitute for the protection that breastfeeding would otherwise provide against pregnancy and hence undermine one of the motivations of breastfeeding. Therefore, specific types of contraception in particular birth control pills with

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high oestrogen formulation are thought to inhibit the maintenance of ovulation (Millman, 1985).

2.2 Factors Associated With Decline in Breastfeeding Duration

One of the major goals of health programmes in the developing world is to improve maternal and child health. The source of the strategies adopted towards achieving this goal is the promotion of birth spacing and breastfeeding. However, both breastfeeding and abstinence are likely to decline with increasing modernization resulting in short birth intervals. Knodel (1980) lists some factors responsible for declining breastfeeding as improved transport and telecommunication, which have led to increased urbanization (rural to urban migration). This will further explain the reduction in the proportion of mothers in the developing countries practice extended breastfeeding (due to migration to developed countries).

Function of breastfeeding among women in different cultures varies widely. Western Europe and Northern America during the last century were characterized by decreasing proportion of women failed to nurse their infants at all. The mean length of both full and partial breastfeeding of those who nursed has also steadily declined during this period. Decline in breastfeeding activity has been reported in urban areas of many less developed countries with similar tendencies suggested in some rural areas as well (Mosley, 1977).

Substantial differentials in the propensity to initiate breastfeeding, the duration of breastfeeding and the intensity are evident both within and between societies. Differentials are apparent at even regional levels of aggression. The proportion ever breastfed and the duration of breastfeeding are higher in Africa and Asia than in Latin America and Caribbean (Latham M, 1981).

2.2.1 Breastfeeding and Socio-Economic Factors

According to Jellife and Jellife (1978), changes in breastfeeding behaviours are caused by social, cultural and economic influences. Preston (1978) in studies among the South Americans concluded that women in rural areas were more likely to initiate

breastfeeding and to breastfeed for longer durations than women in urban areas. The reason why urbanization is associated with lower prevalence of breastfeeding is unclear. He suggests that lifestyle in modern cities are incompatible with breastfeeding.

He further indicated that in urban areas, the main feature of modernization is the acquisition of material goods and technology of more economically favoured societies. He suggests that the shift to bottle feeding may be another instance of the acquisition of western material, culture and the reason for practicing bottle feeding may include convenience and prestige emulation. In the rural areas, on the other hand, family pressure by family members can encourage and force women to breastfeed. Mothers-in-law, husbands and the general community influence women's infant feeding practices. Such extended families are more prevalent in rural than urban area.

The same studies further suggest that in rural areas, women are exposed to others who are breastfeeding and can learn by observing the essential techniques of breastfeeding. In urban areas, the support of relatives, neighbours and other women is not available. The existence of social network in rural areas also helps to promote breastfeeding, which also does not exist in urban areas.

Urban residence has the most consistent effect and has also been found to be an important determinant of breastfeeding behaviour in a number of studies, (Akin and Bilsburrow, 1981). In Kenya the Child Nutrition Survey (1977/8) found that on average mothers in rural areas breastfed their children for 14 months while urban mothers breastfed for only in 10 months. The Kenya Demographic and Health Survey (1989) also found that rural women had long mean durations of breastfeeding than their urban counterparts. Authors cited in Huffman's review (1978) have speculated that urban residence may be negatively associated with breastfeeding because bottle-feeding is considered to be more modern, sophisticated and convenient. This often occurs if the women are better educated and working outside the home where there are fewer breastfeeding roles to emulate. The

availability of modern contraceptives methods also makes breastfeeding shorter for birth spacing purposes.

Education of mother is also an important factor, which has been found to be associated with breastfeeding. In many westernized countries, educated women are more likely to breastfeed for the longest period. While on the other hand in many developing countries, the reverse is the case with education being negatively associated with both initiation and length of breastfeeding. (McCann et al., 1984). Education particularly female education is one of the factors in the development process that has been demonstrated to have a significant effect on fertility and breastfeeding patterns. Education brings in a new set of values, new inspirations and a new outlook on life as well as skills to take advantage of new opportunities. A rise in the female level of education, can ultimately lead to a decline in fertility. In the short run, however, it can actually raise fertility by breaking down the traditional practices that have fertility suppressing effects such as prolonged breastfeeding, postpartum abstinence and polygamy (Mosley, 1981).

Mosley concludes that among women, a rise in the level of education is associated with a rise in fertility. This is a function of both rise in pregnancy progression ratio and a decline in breastfeeding and amenorrhea. However, among older women, with higher level of education the decline in breastfeeding even after the effects of other socio-economic and demographic factors were controlled has been found in several studies not to be consistent.

Jain and Bongaarts (1981) using data from the World Fer5tility Survey taken from eight countries; Bangladesh, Indonesia, Sri Lanka, Jordan, Peru, Guyana, Colombia and Panama analyzed the effect of education on breastfeeding and the results show an average duration of breastfeeding for the non educated in rural Bangladesh to be 24.5 months and 15.8 months for secondary level of education. In Indonesia, among the none educated, the duration was 21.8 months and 9.5 months for those urban educated up to secondary level. This examples show that the average duration of breastfeeding is longest for women who have no education and live in the rural areas and shortest for those who live in urban areas

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and have at least seven years of schooling. The remaining women fall between these two extremes.

A study conducted by the CBS (1979) using the Kenya Fertility Survey data of 1978 analyzed channels through which education may stimulate fertility in many ways by awakening the observance of traditional customs and practices which serve to limit fertility and space pregnancies by rising fecundity and by discouraging polygamy. The KFS data shows that this had broken down due to education. This data indicated that Kenya women breastfed for 15.7 months and experienced a period of lactation amenorrhea due to breastfeeding, which accounted for 25% of interval between live births. Educated women were found to breastfeed for only 6-7 months. The resulting negative correlation between education and breastfeeding curtails postpartum amenorrhea. The corresponding period of amenorrhea results from these were 12.0 months for women with no education and 6.5 months for those with secondary education.

Several countries have attempted to implement nationwide programmes to reverse the trend in breastfeeding decline by promoting the socio-cultural environment in favour of breastfeeding. In Brazil and Philippines for example, school curriculums include information on the appropriateness and benefit of breastfeeding (Solon, 1982).

Education campaigns have also been shown to influence breastfeeding. In India and Kenya, nutrition education campaigns associated with primary health care programmes have increased the average duration of breastfeeding. (Kleinman et al., 1978 and Shampebwa, 1981).

Knodel and Debavaya (1980) found that women working in the family farm were more likely to breastfeed longer than those working outside their own farms. Apparently logical work that is closer to household appears to be compatible with breastfeeding and childcare activities. (WHO, 1979).

Effects of breastfeeding depends on the type of work undertaken (Debavaya and Lee, 1978). Women who were involved in sales or production activities, including dressmaking,

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food and beverage makers or weavers were more likely to breastfed for longer durations than those involved in other types of activities, including professional occupations, management, clerical work and service occupation in Malaysia. However, Jain and Bongaarts (1981), using World Fertility Survey data for eight countries found that after adjusting for age, parity, education, place of residence and husband's occupation, work status of the mother had only a very small effect on the duration of breastfeeding. Winikoff et, al. (1988), found that breastfeeding initiation was substantially the same among women who did not work, those who worked at home and those who worked away from home. Work therefore appeared to affect duration of breastfeeding much more strongly than it affected initiation.

2.2.2 Breastfeeding and Socio-Cultural Factors

Huffman (1984) found that women in polygamous unions have lower fertility than women in monogamous union due to living arrangements and prolonged breastfeeding. This is because women in polygamous unions are not exposed to sexual contact frequently as those in monogamous unions. Studies conducted on marital fertility and birth interval components by education of women in monogamous and polygamous unions found out that, women in latter have lower fertility at every educational level. Among women in polygamous unions, fertility tends to decline with increase in duration of breastfeeding. (Ochola Ayayo, 1991).

Caldwell (1970) found that any practice to family limitation usually seems to be aimed at preventing conception at certain times (for some Women), that are undesirable than limiting the ultimate size of the family. Such undesired conceptions may be those that could result from pre-marital or extra-marital relations where a woman is too young and the relation incestuous, where insufficient time has passed since the last birth and where a woman has reached a stage in life where either her age or circumstances such as achieving grand maternal status means that reproduction should cease.

Shoemather et, al. (1981) indicate that breastfeeding when accompanied by lactation taboo plays a major role in inhibiting fertility in Africa. This postpartum taboo was virtually a universal principle for the whole traditional in Sub-Saharan Africa. Lewis (1973), in his study among the Somalis found out that abstention from sexual relations is normally practiced for at least 40 nights after the birth of a child. Parents are not allowed to resume sexual relations until after the shaving of the child's head, which takes place between the fourth and fifth month of the child's third a year.

This in effect made possible long birth intervals thus reducing fertility. In addition is its physiological impact; breastfeeding can also have a socially mediated impact on fertility. In a number of populations, most notably tropical Africa, sexual intercourse is traditional, either prescribed or at least restricted for the new mother for a period that may vary from several months to several years after each delivery (Lasthaeghe and page, 1982).

Therefore these societies protected each infant's breastfeeding through abstinence. In some other societies like in Rwanda, Zaire, Ankole in Uganda where cows milk was plentiful, sexual abstinence was almost non existent and if it did this was mainly for hygienic reasons (Shampebwa, 1981).

Among the Yoruba for example, Caldwell and Caldwell, (1977) found an abstinence period that extends for several months after the child is full weaned. It would be therefore, an over simplification to think of this practice simply as a lactation taboo for the association is not perfect and there are a number of other socio-cultural factors that underlie postpartum abstinence and tradition.

2.2.3 Breastfeeding and Age Factor

Mothers age as a positive influence on the duration of breastfeeding (Jain and Bongaarts, 1981; Pallano and Millman, 1986). Maternal age has been found to exert an influence on the duration of lactation and lactational amenorrhea as evidenced by studies carried out by Jain and Sun (1972) in India and Potter et al. (1984 in Bangladesh. Chen et al. (1974) in their studies in India have also documented that young women have a shorter

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period of postpartum amenorrhea as compared to old ones. In Bangladesh for example, women under thirty years had a mean duration of breastfeeding of 16.4 months as compared to 23.2 months for women aged over thirty years.

Bongaarts (1972), using the World Fertility Survey (WFS) data documented that age increase in Bangladesh has corresponding effect on the duration of breastfeeding. It was found that about three years increase in mother's age adds about one month to the duration of breastfeeding. Using these findings, he concluded that older women are more prone to breastfeeding their infants for longer durations than younger women, probably because of more social commitments and secondly, because younger women who have not completed their family size might not need to use breastfeeding as a method to limit their number of births as compared to older women.

2.2.4 Breastfeeding and Infant Survival and Health

The relationship between breastfeeding and infant and child mortality has been extensively documented. Although the magnitude of the estimate differs from study to study across cultures, most research in developing countries attest to the importance of breastfeeding as a determinant of child survival. In general, the literature indicates that those children, who are breastfed, are less susceptible to the risk of infant and child death related diseases as compared to those who are artificially fed. In addition, even among breastfeeding women, this relationship is influenced by the duration as well as the intensity of breastfeeding. Thus, wholly breastfed children tend to have lower risk of dying than partially breastfed ones (Knodel and Dabavalya, 1980; Palloni and Millman, 1986).

Buchaman (1975) provides an exposition on how breastfeeding is related to infant health. Breast milk usually meets all the nutritional requirements, both in quantity and quality, for the first few months of life. Even after 4-6 months when supplementary foodstuffs become increasingly needed, it can still meet a substantial part of the child's nutritional requirement. This is because unlike other foods, breast milk is uncontaminated

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and it therefore reduces the child's risk of disease, harmful agents such as those responsible for many potentially serious gastrointestinal crises among infants.

Secondly, breast milk unlike most artificial infant feeds contains cellular components capable of ingesting potentially harmful bacteria and also has some useful bacteriaostatic compounds, therefore actively combating potential bacterial infection. Moreover, breast milk may perhaps transfer to the child, via the antibodies it contains, some of the immunity to infection already acquired by the mother, thereby providing it with defensive reinforcements against infections at the stage when the immunities it requires are declining. (King, S; 1985).

2.2.5 Breastfeeding and Contraceptive Use

Contraceptive use is consistently associated with a lesser likelihood of initiating breastfeeding and with shorter durations (Akin et al., 1986). In his studies he demonstrated clearly that the timing of initiation of breastfeeding and weaning are closely related, either because some women think that breastfeeding and contraceptive use are incompatible or because they view contraception as a substitute for lactational sub-fecundity.

However, Millman (1985) has interpreted the analysis of Taiwanese data as providing support for the notion that women substitute contraception for breastfeeding. Effect of oestrogen in oral contraceptive on the quantity of breast milk is not a major determinant of weaning.

Nevertheless, there is still concern that women using hormonal contraceptives while lactating should be advised. Longer breastfeeding women are most likely to be younger, more educated, and live in urban areas. The health challenge is to educate both women and family planning advocators that progestin only contraception (Minipill, injectibles or implant) is preferable to combined oral contraception for breastfeeding women, because combined pill reduce the volume of milk and deliver a large dose of steroids to the infants (Trussel and Stewart, 1990).

Data from Winikoff 1981-1982 Surveys of Infant Feeding Practices in three developing countries: Kenya, Thailand and Colombia were used to analyze the relationship

of amenorrhea lactation and time since birth using contingency table analysis and then logistic analysis was performed to control for the effects of background variables. The analysis showed a strong independent and consistent negative relationship between amenorrhea and contraceptive use. Women with less than 4 months of postpartum amenorrhea were less likely to use contraceptives. A negative relationship between breastfeeding and contraceptive use was only found for users of contraceptives. It is therefore, possible that women in immediate postpartum period especially those who are lactating and amenorrheic are not motivated to use modern contraceptives.

2.3 Breastfeeding, HIV/ Aids and Fertility in Sub Saharan Africa

Post-partum behaviour is extremely important means of fertility regulation in Sub Saharan Africa. Any shortening of durations of breastfeeding and abstinence, if not substituted by contraception, has the potential to increase levels of fertility substantially (Stecklov, 1999). Breastfeeding is one channel for vertical transmission of HIV infection, a fact that is increasingly widely known and is the rationale for recommendations that HIV-positive women (or, more broadly, all women in communities characterized by high HIV prevalence) refrain from breastfeeding. The period of post-partum abstinence might be, curtailed in order to decrease the incentive for male partners to seek other sexual partners (Gregson 1994, Carael 1995), a rationale far more compelling for the uninfected segment of the population (see discussion in section II). There is virtually no empirical data on whether any of these hypothesized behavioural trends is occurring. In some countries, trends in breastfeeding can be determined through comparison of successive DHS surveys, but it is not straightforward to attribute any reduction in breastfeeding that is observed to concerns about HIV transmission. In the Rakai data from Uganda, HIV positive women are significantly less likely to be breastfeeding at the follow-up review (roughly 10 percent less likely), without adjustment for other confounding variables. How post-partum behaviour responds to HIV-status is a topic that requires further empirical research.

There is further non-volitional mechanism that hypothetically could link HIV status and post-partum behaviours. If seropositive increases infant and early childhood mortality, in most African populations this will truncate breastfeeding and abstinence, thereby reducing their fertility-suppressing effects. Under the assumption that the increase in infant and child mortality amounts to 25 percent, Palloni and Lee (1992) estimate that this could translate into a 9 percent increase in fertility, everything else being equal.

In summary the behavioural mechanisms through which HIV positive status might affect fertility, the balance of the empirical research to date suggests limited and non-consequential behavioural responses to knowledge of HIV-positive status. Moreover, the potential demographic effect of this response is further reduced because only a minority of the seropositive persons in developing countries knows that they are infected. There is some evidence that, as the pandemic matures a view is beginning to take hold that the wise and the responsible decision (for the well being of the reproductive age, couple, and for the well being of their children) is to curtail further reproduction. But to date there is little evidence that seropositive individuals are acting in accordance with this view. With a few exceptions, empirical studies detect no significant responses to HIV infection through either sexual behaviour or contraceptive behaviour.

The discussed changes in post-partum behaviours among those infected with HIV, in particular reduction in breastfeeding in an effort to avoid passing the virus to the child. This same concern can motivate reductions in breastfeeding among the non-infected segment of the population, to the extent that women are uncertain about their HIV-status or incorrectly suspect that they are seropositive. In rural Zimbabwe Gregson and others (1997) find that breastfeeding is less likely among those women who perceive their risk of HIV infection to be higher. Undoubtedly many of these women who perceive themselves to be at higher risk are infact uninfected. Decreases in breastfeeding will lead to increases in fertility everything else being equal. Because average breastfeeding durations are relatively long in most African societies, the potential increase in fertility is surprisingly large (Stecklov, 1999).

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Perhaps more likely is that adherence to the long periods of postpartum abstinence that are normative for many ethnic groups in the region (Lesthaeghe, 1989; Lesthaeghe and Eelens, 1989) will weaken. There is anecdotal evidence, confirmed by focus group discussions (Gregson and others, 1997), that post partum abstinence is a significant factor motivating men to engage in extramarital sex (Cleland and others, 1999, Ali and Cleland, 2001). Hence, women may be prepared to abbreviate the period of postpartum abstinence in order to decrease the risk that their male partners will become HIV infected through extramarital sexual liaisons during this period (Gregson, 1994, Carael, 1995). The logic is relatively simple and straightforward and it reinforces tensions about postpartum abstinence that long precede the AIDS pandemic.

2.3.1 Breastfeeding and Mother-To-Child HIV Transmission

Current strategies on HIV/ Aids in Kenya are geared towards improving the health of HIV infected mother and reducing the transmission to their children during pregnancy, labour, delivery and post delivery through breastfeeding as outlined in the National HIV/ AIDS strategic plan 2000 – 2004 and the National Prevention of Mother-to-Child Transmission Strategic Plan (Ministry of Health, 1999). Increasing the level and general knowledge of the transmission of the virus from mother to child and of the risk of transmission by use of antiretroviral drugs is critical to achieving this goal (KDHS, 2003)

Kenya Demographic and Health Survey, 2003 indicates that almost three-quarters of women (72%) and two-thirds of men (68%) know that HIV can be transmitted through breastfeeding, only one –third of women (33%) and 38% of men know that the risk of mother to child transmission can be reduced by mother taking certain drugs during pregnancy. Only 28% of women and 30% of men know that HI can be transmitted through breastfeeding and that the risk can be reduced with drugs.

The knowledge of transmission through breastfeeding and knowledge of antiretroviral drugs is lower for the youngest women and men, as well as those who have never had sex. It

is also lower for rural women and men and sustainability lower among women and men in northeastern province, than elsewhere.

Kenyans with no education and those who have not completed primary education are less likely to know about the transmission of HIV through breastfeeding than those who have completed primary or have some secondary or higher education. The data also shows that wealth is positively associated with knowledge of HIV transmission (KDHS, 2003).

2.3.2 Breastfeeding and HIV/Aids by Regions

Although, HIV/AIDS cases have been identified in nearly all countries in the world, its prevalence or the scale of infection varies widely between and within countries. The virus reached global regions at different times and spread faster or slower in various populations according to differing risk factors. Hence even in a country, several epidemic patterns arise (Jackson, 2002).

The simplest national categorization of HIV/AIDS into different regimes may be categorically put into three group's i.e. low, intermediate, and high prevalence. This is categorized basing on adults as a major unit of study where low level is taken as adult prevalence of below 1-5%, intermediate prevalence as of below 6-10%, and high prevalence as of above 10% among the adults of the age group 15-49 years (WHO/UNAIDS, 2000).

In Kenya, there is both intercommunity and regional variation in HIV/AIDS prevalence. Nyanza province is the hardest hit in terms HIV/AIDS as compared to other provinces. Urban areas are also hard hit as compared to rural areas with high prevalence at the coastal towns and other port towns of Kenya such as Mombassa, Kisumu and many more. Among the communities, the Luo's are the hard hit by the virus due to their cultural practices while the Kikuyu's are the least affected.

2.4   Breastfeeding Patterns by Age (Months) In Kenya

It is recommended that infants should be exclusively breastfed for the first six months. Exclusive breastfeeding in early months of life is correlated strongly with increased child survival and reduced risk of morbidity, particularly from diarrhoeal diseases. Table 2

and figure 1 show that only 29.3% of children under the age of two months are exclusively breastfed. This represents no change in breastfeeding patterns when compared with (KDHS 1998). The propensity to feed infants less than two months with plain water (26%), water-based liquids/ juices (14%), other milk (15%), and food (16%) is high. At two to three months, almost all children are given complementary foods. By six to seven months, 94.3% of infants have been introduced to these foods.

Overall, only 13% of infants fewer than six months are exclusively breastfed. The complication of this duration is important since it is to be recommended that all infants be exclusively breastfed for six months.

Figure 2.1: Breastfeeding by Age
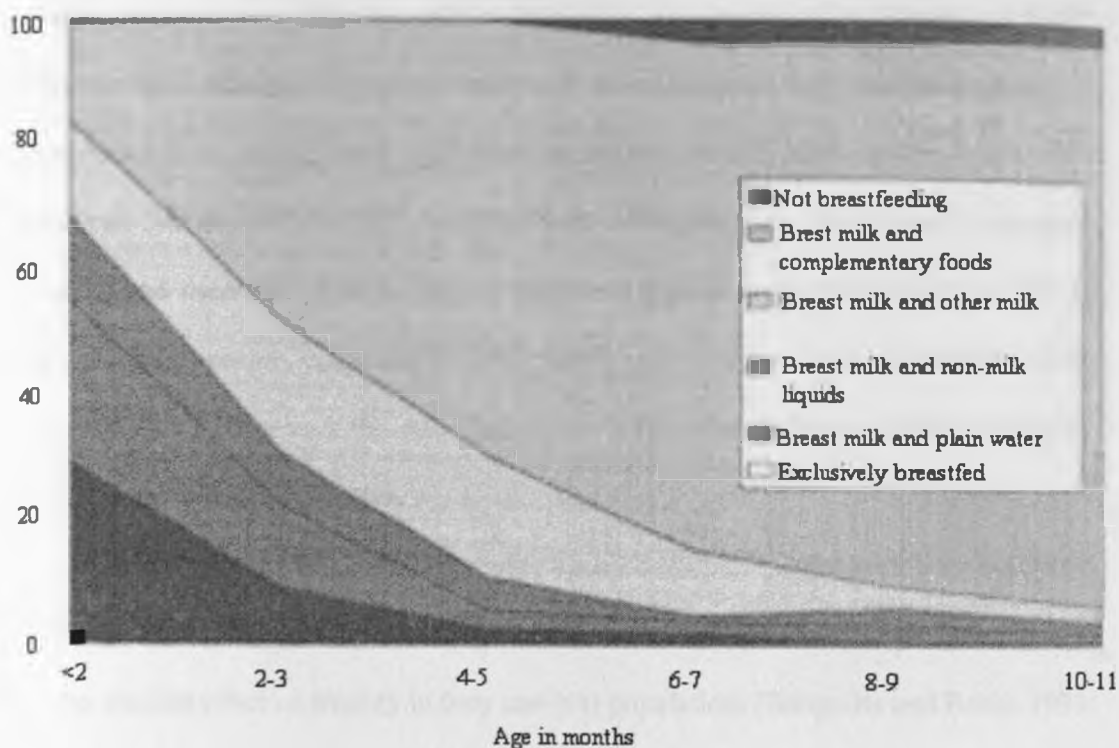
source: Adopted from KDHS 2003.

2.5 Summary of Literature Review

Even though earlier studies showed postpartum infecundability to be the most important among the other proximate determinants (marriage, contraceptive and abortion) of fertility, however in recent years its contribution to fertility decline has been less important.

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Recent years study indicates that this has been due to the recent rise in contraceptive use and effect of HIV/ AIDS pandemic on breastfeeding (DHS Regional Analysis Workshop for Anglophone Africa).

2.6 Theoretical Statement

Although natural fertility variation is primarily determined by intermediate variables such as breastfeeding, contraceptive, marriage and abortion, it is also affected, modified and even promoted by socio-economic, socio-cultural and demographic factors prevailing in a given society.

2.6.1 Theoretical Framework

Analysing the determinants of fertility requires a framework. The earliest and most consistent endeavour to introduce such a framework was introduced by Davis and Blake (1956). In this changes in fertility behaviour were attributed to differences in social organizations of societies. Davis and Blake identified eleven different factors which were labeled as intermediate fertility variables, later collapsed into three broad categories embracing the necessary socially and culturally recognized steps of reproduction, briefly these were the exposure, deliberate fertility control and the natural marital fertility factors. According to this framework the other factors can only and do influence fertility indirectly through the intermediate variables.

Bongaarts(1978), by way of improving upon Davis and Blake's work later quantified the effects of six of the factors, called proximate determinants of fertility, and showed this to have the greatest effect on fertility in forty one (41) populations (Bongaarts and Potter, 1993; Bongaarts et al., 1984). Further Bongaarts and associates established that variations in only four factors- marriages, contraception, induced abortion and lactational (postpartum infecundability) - were the primary proximate causes of fertility differences among populations. The other two factors namely natural sterility and spontaneous abortions tended to be fairly constant across populations in general, and therefore did not make a large

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contribution to explaining differences in fertility levels between populations or over time in the same population.

This study therefore tends to adapt the Bongaarts model as a principal framework, for the study of determinants of fertility in Kenya, from which the effects of breastfeeding on fertility can be established as the major concerns of the study. In other words Bongaarts framework recognizes that the two different populations with the same level of fertility may have different numerical values of the proximate determinants and vice versa owing to the differential influence, the background factors, such as education, female employment, age composition, etc exert on the proximate determinants. Thus, during a period of change, the various proximate determinants may respond to the same general set of factors, perhaps with varying effects, and sometimes even in opposite directions. Further Bongaarts framework has the added advantage of decomposing the TFR into birth interval major constituents in addition to helping to make quick and easy comparisons of these components between various populations or sub-populations. (Bongaarts, 1978).

The advent of the world fertility surveys carried out in some countries offered a benchmark database for the application of Bongaarts model and other techniques to explain fertility levels, patterns, trends and differentials, the world over. The African experience with the model can be seen in the works of Mosley et al. (1982), Lesthaeghe et al. (1983) and Ferry and Page (1984) (Where they adopted an extension to the Bongaarts framework in their Kenyan study which used more detailed decomposition of the total fecundity and more specification of the calculation of the indices, Garside (1984) for Ghana, and Mbiti and Kalule –Sabiti (1985) for Lesotho.

Figure 2.2: Bongaarts and Potter fertility analysis model, 1982

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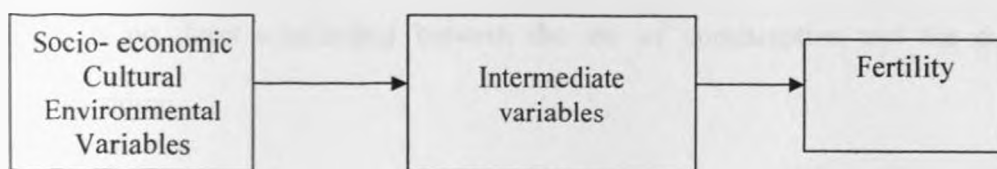
Figure 2.3: Conceptual framework:

Conceptual framework Modified from the above theoretical framework for studying Socio-economic, socio-cultural and demographic variables and the intermediate variables that determine fertility levels.

Contraceptives and Marriage

Socio-Cultural,
Socio-economic   Breast-feeding   Fertility
and demographic   Behaviour   outcomes
Factors

Other intermediate
Variables (e.g. Abortion)
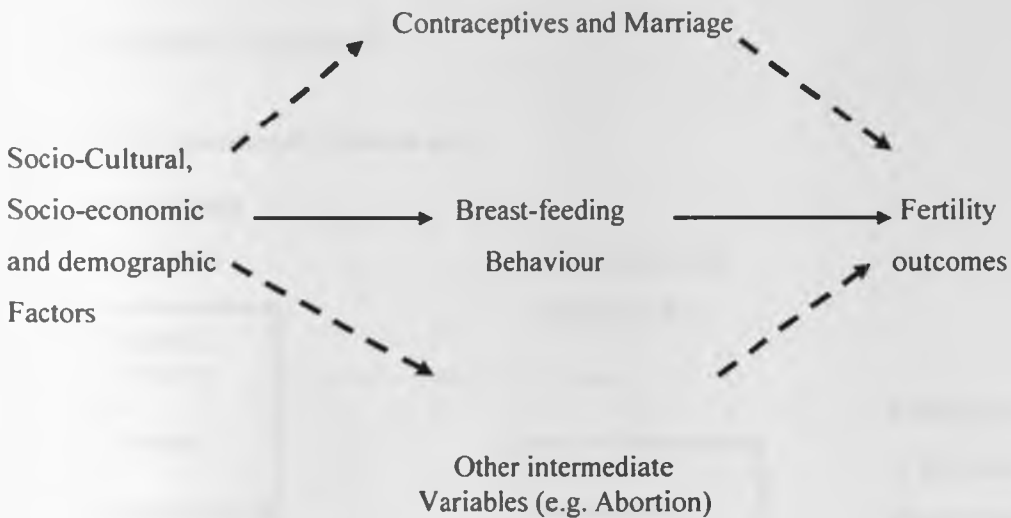
Adopted and modified from, Bongaarts (1982)

To trace the effects of social and demographic factors on birth interval and to asses the relative importance of contraception, breastfeeding, and other intermediate variables, we used the model defined in figure 2.2. The arrows to and from other intermediate variables are shown in broken lines, because these variables are believed to be less important. Using this model we will test three premises: the length of birth interval is primarily determined by the duration of breastfeeding and the use of contraception; the effects of other demographic and social factors on the birth interval are transmitted primarily through the use of contraception and the duration of breastfeeding , but could also be transmitted through other intermediate factors such as fecundability, intra-uterine mortality, and separation between spouces; and there is no direct relationship between the use of contraception and the duration of breastfeeding.

2.6.2 Conceptual Hypotheses

i.   Socio-economic factors are likely to have an impact on fertility through breastfeeding.

ii.   Demographic factors are likely to influence fertility through breastfeeding.

iii.   Fertility is likely to be affected by socio-cultural factors through breastfeeding.

2.6.3 Operational Framework

Figure 2.4: Operational Framework

BACKGROUND
VARIABLES

INTERMEDIATE
VARIABLES

DEPENDENT
VARIABLE

Socio – Economic
Level of education
Work status
Type of residence
Region

Socio –Cultural
Type of union
Ethnicity
HIV prevalence

Demographic
Age of mother at start
of interval

Duration of
breastfeeding
Marriage
Contraceptive
use
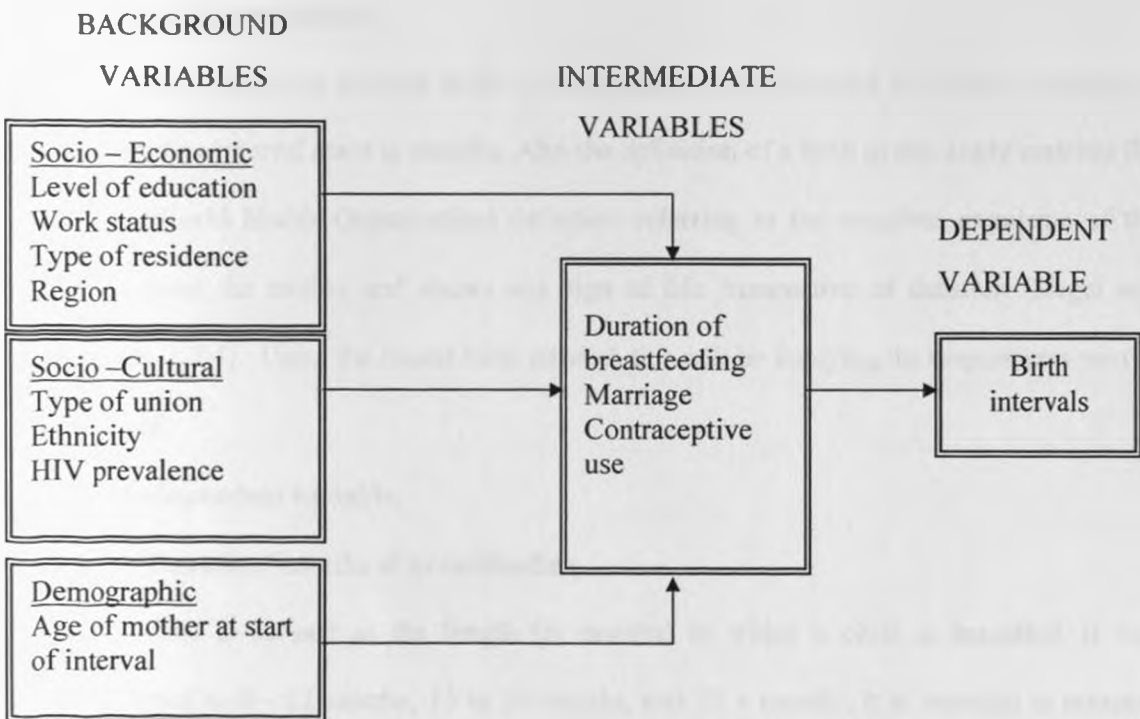
Birth
intervals

Adopted and modified from, Bongaarts (1982)

2.6.3.1 Operational Hypotheses

i.   Shorter durations of breastfeeding are associated with shorter birth intervals.

ii.   Children of working mothers, highly educated mothers and mothers from urban areas are more likely to be breastfed for shorter durations consequently reduced birth intervals.

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iii.   The higher the age of women the longer the duration of breastfeeding thus longer birth intervals.

iv.   Women in monogamous type of marriages have longer breastfeeding durations than those in polygamous type of marriages thus longer birth intervals and vise versa.

v.   Longer durations of breastfeeding are associated with low HIV/AIDS regimes consequently longer birth intervals.

2.7 Definition of variables

2.7.1 Dependent variable

The dependent variable used in this study is the last closed birth interval which is measured as interval scale in months. Also the definition of a birth in this study matches the WHO (World Health Organization) definition referring to the complete expulsion of the foetus from the mother and shows any sign of life irrespective of duration (Siegel and Swason, 2004). Using the closed birth interval, this will be implying the respondents next to last child.

2.7.2 Independent variable.

2.7.2.1 Duration/ months of breastfeeding

This is defined as the length (in months) in which a child is breastfed. It was categorized as 0 – 12 months, 13 to 24 months, and 25 + months. It is intended to measure the relative level of birth interval, which in turn will reflect the level of fertility rate. Longer breastfeeding durations are expected to be associated with longer birth intervals and hence lower fertility levels.

Conceptually the following socio-cultural, socio-economic and demographic factors will be used to assess the impact of breastfeeding practices on fertility. They will include the following:

2.7.2.2 Ethnicity

This refers to the ethnic group that the mothers belong to. It is intended to measure cultural attitudes, beliefs and practices that may affect breastfeeding to influence fertility. It is categorized as Kamba, Kikuyu, Kisii, Luhya and Luo, Mijikenda and Swahili, and other tribes.

2.7.2.3 Maternal age at the start of interval

This refers to the number of completed years at which the mother gave birth to the child. It is categories as; under 25, 25 –34 and 35 +.

2.7.2.4 Mothers working status

This variable is measures access to resources in addition to being proxy for household economic status and time allotted to breastfeeding. This will be categorized as working and not working.

2.7.2.5 Mothers' education

Mothers' education refers to the level of formal education attained by the mother. It will be categorized into no education, primary education and secondary above. It is intended to measure the knowledge and the skills of mother in breastfeeding. Here no education category will be used as the reference category.

2.7.2.6 Type of place of residence

This is measured in terms of the following two categories; rural and urban depending on the place of residence of the respondent.

2.7.2.7 Type of region of residence

This is categorized into eight provinces (regions) of the country (Kenya); Nairobi, Central, Western, Eastern, Nyanza, Coast, Rift Valley and North Eastern provinces.

2.7.2.8 Type of Marriage

The variable is categorized to respondent's polygamous or monogamous unions.

2.7.2.9 HIV/AIDS regimes

The variable categorizes HIV/AIDS into different regimes as follows; low, intermediate and high prevalence.

CHAPTER THREE

DATA AND METHODOLOGY

3.0 Introduction

This chapter provides a description of the data source, the quality of data and the methods of analysis used. The incidence/ prevalence method was used to calculate the mean duration of breastfeeding, and frequencies and cross tabulation together with chi-square tests were used to show the distribution/ regional patterns. The impact of breastfeeding on birth interval in the various HIV/ AIDS regimes was established using the multiple regressions.

3.1 Data source

The data for this study was obtained from the core questionnaires of the 2003 KDHS. This included Information on median duration of breastfeeding among children born in the three years preceding the survey. Only data for last but one live birth were used in the analysis. This was done because the interview truncated the women's reproductive history and the information about breastfeeding in the open birth interval was not complete. However, the data has been used to estimate the median duration of breastfeeding in the open birth interval i.e. women who had at least one birth were asked how long they breastfed their last child, unless they were breastfeeding by the time of the interview. Taking the average value of these reported durations of breastfeeding yields a mean that is biased downwards, because women who tend to breastfeed for short periods have a higher than average of being included in the estimate. In addition, cases with at least data on one of the variables in the analysis were excluded.

The unavailability of data for some women made it necessary to limit the analysis to women who had initiated breastfeeding at the time of the interview, at two or more live births, had reported the duration of breastfeeding, were not pregnant at the interview had their last but one live birth between 3 and 15 years, preceding the date of the interview. The

above restriction is used to minimize the effect of truncation and memory biases on the reported duration of breastfeeding and the length of the birth intervals.

The effect of breastfeeding on fertility was analyzed using the last closed birth interval. The last closed birth interval is defined as the period in months between the last-but-one live birth and the last live birth preceding the interview. KDHS surveys also collected information about the date of resumption of menstruation, which is, used in this study to analyze the mechanism through which breastfeeding affects the length of the birth interval.

For breastfeeding to be used deliberately to limit family size, the number of children already born should affect its duration. A study done by Jain et.al (1981) on Taiwanese women, found that in a multiple regression analysis, women's parity did not have any significant effect on the duration of breastfeeding after controlling for the effects of such factors as women's age, education and place of residence.

3.2 Methods of data analysis

Percentage distribution, bivariate analysis and multiple regression analysis were the main statistical tools employed in this study. The dependent variable (birth interval) consists of the duration of birth interval women experienced before getting the next child. The study used preceding birth interval as a proxy for fertility.

3.2.1 Descriptive statistics

Descriptive measures such as frequency distribution and percentage were used. The aim was to condense data within manageable proportions. Descriptive statistics were used to examine the basic distribution characteristics of each of the variable and their differences.

3.2.2 Cross-tabulations analysis

Cross tabulation tables and chi-square tests were used to determine the association between duration of breastfeeding and background and proximate factors.

To determine whether these associations were significant, a chi-square test was undertaken. The chi-square describes the degree of differences between theory and observation. If the chi-square value is zero, this implies that the observed and the expected frequencies completely coincided. The greater the value of chi-square the greater will be the

discrepancies between observed and expected frequencies. Chi-square test determines the statistical significance of the association where the null hypothesis and alternative hypothesis are stated as follows;

H_0 – *states that the two variables are independent*

H_1 – *states that the two variables are dependent*

The researcher then confirms or fails to confirm H_0 at a given level of significance by comparing the computed chi-square value with the table value of chi-square for given degrees of freedom. The observed level of significance is $\alpha = 0.01$ and $\alpha = 0.05$ for a two tailed test, the null hypothesis of independence is rejected and the alternative hypothesis is accepted as chi-square value at these chosen levels falls within the rejection area.

3.2.3 Simple Linear Regression

The simple linear regression focused on measuring the association between each of the independent variables and the dependent variable. This expresses a linear relationship between the dependent variables and the independent variables as expressed in the equation below:

$$Y = A + b_x + e$$

Where

Y = the dependent variable

A= the intercept (constant of x and y)

B = the gradient/regression coefficient is gives the effect of x on y

E = error component in the model.

The regression analysis focused to the study of relationship between only two variables at a time as defined earlier is simple linear regression.

3.2.4 Assumptions underlying simple linear regression

In the simple linear regression model two variables, X and Y, are of interest. The variable X is usually referred to as the independent variable, since frequently the investigator controls it, the investigator may select i.e. the value of X and, corresponding to each pre-selected value of X, one or more values of Y are obtained. The other variable, Y accordingly,

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is called the depending variable. Thus when we speak of regression of Y on X, the following, assumptions are important:

(i)   The values of independent variable X are said to be "fixed" this means that the values of X are pre-selected by the investigator so that in the collection of the data they are not allowed to vary from these pre-selected.

(ii)   The variables X is measured without, errors. This implies that since no measuring procedure is perfect, the magnitude of the measurement error in x is negligible.

(iii)   For each value of x there is a sub-population of Y values.

(iv)   The variances of sub population of Y are all equal.

(v)   The means of the sub populations of Y all lie on the same straight line. This is known as assumption of linearity.

(vi)   The Y values are statistically independent i.e. in drawing the sample, it is assumed that the values of Y chosen at one value of X is no way depend on the values of Y chosen at another value of X.

(vii)   The error (e) is normally and independently distributed with mean 0 and variance 0_2.

3.2.5 Estimation of regression coefficient

The purpose of regression analysis is to estimate the regression coefficients a and b using the available data and estimation equation used assumes the form;

$Y = \hat{a} + b_x$

Here, two methods are used i.e.

Estimation of the coefficients was undertaken using the least square method using SPSS and the equation for estimating the coefficients is given by the formula;

$A = y - (B_1 X)$

$$B = \frac{\sum (X - x)(Y - y)}{\sum (X - x)^2}$$

The fit of the overall model was determined using the R2 and the significance of the variable was undertaken using the F-test while individual dummies was undertaken using the T-test. The constant in the model gives the average birth interval for the reference category. The coefficient of determination was determined using the formula;

R2 = $\sum$ (x-x) (Y-Y)

$\sqrt{\sum}$ (x-x)^2 $\sum$ (Y-Y)^2

3.2.6 Evaluating the regression line

This is where the regression equation is tested as to whether or not it describes relationship between the two variables and sees whether or not it can effectively be used for estimation or prediction purposes. This is done using R^2, which is called coefficient of determination (R^2) which is much useful and a better measure for interpreting the value determination. The sample coefficient of determination measures the closeness of fit of the sample regression equation which is the observed values of Y. hence it gives the ratio of the explained variance to the total variance.

$$R^2 = \frac{Explained}{Total} \frac{Variance}{Variance}$$

Coefficient of determination (R^2) is much useful and a better measure for interpreting the value of R. The largest value R^2 can assume 1 that only occurs when all of the variation in the y is explained by regression line. When R fall on the regression line, the lower limit of R^2 =0. The Y coincidence in this situation and none of the variation in Y is explained by the regression.

When R^2 is large, then the regression has accounted for a large proportion of the total variability is the observed values of Y, thus we favour the regression equation. On the other

hand, a small R^2, indicates a failure of the regression to account for a large proportion of the total variation in the observed values of Y, thus tends to cast doubt on the usefulness of the regression equation.

3.2.7 Testing for goodness of the fit of linear regression models

Where R^2 is large or small, the judgment to be for it or against it is normally reached after it has been subjected to an objective statistical test. This test is accomplished by means of analysis of variance, which enables us to test null hypothesis of no linear relation between x, and y. here t- test is employed.

Interpretation here is that, if the computed value of t is equal to or exceed the value of t tabulated at 0.05 significance level, and at appropriate number of degrees of freedom, then we reject the null hypothesis (H_o) that Y is not related to X and accept the alternative hypothesis (H_1) that Y is related to X.

3.3 Multiple regression

Multiple linear regressions were used to explain variations in the dependent variable on the independent variables. This is an extension of simple linear regression, which expresses common relationship between the dependent variable and several independent variables. We assume that a linear relationship exists between some variables Y, which we call dependent variables and K independent variables X_1, X_2----X_k which are more than two. The independent variables are sometimes called explanatory variables because of their use in explaining the variation in Y, and predictor variables because of their use in predicting Y.

Multiple regressions in a linear model may be quantitative in nature that is the independent variables assume only value 1 and 0 and represent a classification and we called dummy variables.

Multiple linear regression of studying such relationship p is denoted by the following equations; -

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$Y = a + b_1 x_1 + b_2 x_2 + \text{-----------------} b_k x_k + e$

Where

Y = the dependent variable

a = the intercept/constant

b_1 = regressive coefficient/Gradient

$X_1 x_2$— xr = particular independent variables

e= Error component in the model

Multiple regression models are just an extension of simple regression where now prediction is made on many variables instead of one to one.

Testing and fitting of regression model was undertaken in a similar manner as was done in simple linear regression.

3.3.1 Assumption of multiple linear regressions

(i)   The x are non random variables

(ii)   For each set of x values there is a sub population of Y values.

(iii)   The variance of the population of Y and all equal.

The y values are independent is the values of Y selected for one set of x values do not dependent on the values of Y selected at another set of x values. Percentage distributions were used in the study in order to determine the results. This is important in explaining and describing the selected socio-economic, socio-cultural and demographic environment used in the study.

CHAPTER FOUR

BREASTFEEDING PATTERNS AND BIRTH INTERVAL CORRELATES

4.1 Introduction

This chapter presents the frequency distribution of variables used in the analysis. The chapter is important in giving the differentials of birth interval and duration of breastfeeding in Kenya and also a quick look at some of the significant factors affecting birth interval in Kenya.

The study population consists of a sub-sample of 1527 births. The births, which occurred between 2000 and 2003 among women, aged 15 – 49 years of 8195 respondents.

4.2 Quality of the Study Data

In order to determine the quality of both fertility (dependent variable) and breastfeeding data, the extent of heaping was determined by examining the plotting of the percentage distribution by duration of both birth interval and breastfeeding using excel computer package.

Children Age distribution
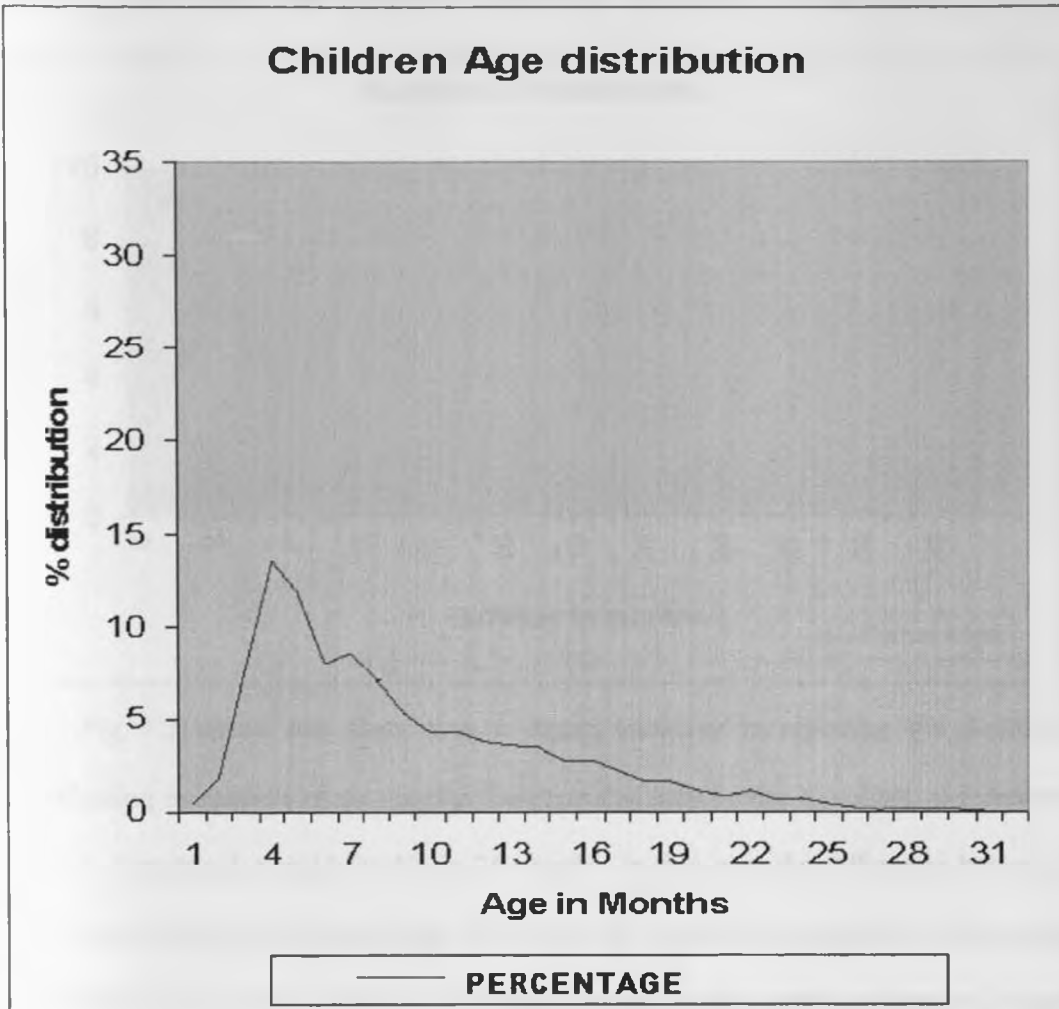
In the study, the extent of age heaping among children is assessed by investigating the percentage distribution of living children by their current age in months. (Fig. 3.1 shows that heaping is at the fourth month and is observed to be lowest at ages 28 and 31 months.

Figure 4.2 Percentage Distribution of Children by Duration of Breastfeeding in Months
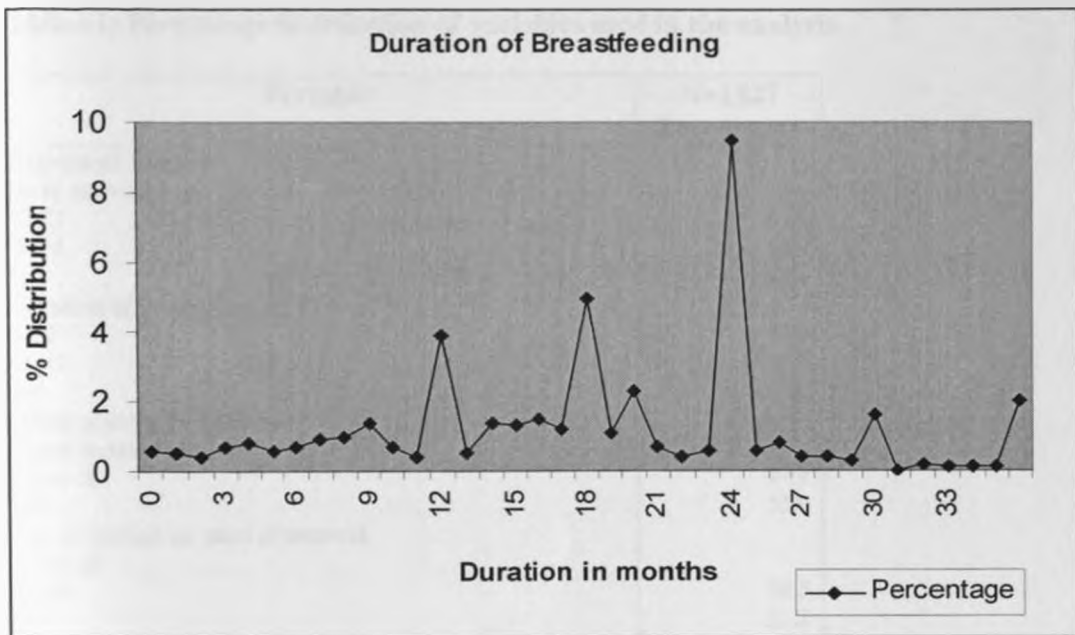
Fig 3.2 shows that there was a strong tendency in reporting the duration of breastfeeding in multiple of six months; however this may be due to cultural preferences or norms to breastfeed a child for 12 or 24 months. In this case the difference between the observed and the expected percentage of women who reported the duration of breastfeeding in multiple of six months cannot be attributed entirely to the digital preferences. However depending on the magnitude of the bias the study did not estimate the duration of breastfeeding by year of birth of the child, and did not estimate the time trends in preference or duration of breastfeeding. However generally speaking, the KDHS 2003 data is among the newly high quality data sets ever to have been collected among developing countries. This is because it is recognized and recommended for use internationally by world bodies as UNFPA and United Nations World Population Council. As such the quality of this data is unquestionable and holding inferences was drawn from its analysis.

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4.3 Description of Variables

Table 4.1: Percentage distribution of variables used in the analysis

Variable	N=1527 Percentage
Dependent Variable	
Birth interval	
10-23	30.9
24-35	50.0
36+	19.1
Duration of breastfeeding	
0-12	37.0
13-24	55.7
25+	7.2
Other proximate Variables	
Contraceptive use	
Never use	47.0
Use	53.0
Age of mother at start of interval	
Under 25	
25-34	38.5
35+	51.2
Socio-Economic variables	10.3
Level of education	
No Education/ Pre-school	21.5
Primary	61.2
Secondary +	17.3
Type of Place of Residence	
Rural	78.0
Urban	22.0
Respondents currently working	
No	43.1
Yes	56.9
Region of Residence	
North Eastern	8.0
Nairobi	6.5
Central	9.5
Coast	11.5
Eastern	11.7
Nyanza	14.1
Rift Valley	22.3
Western	16.1
Type of marriage	
Polygamous	24.3
Monogamous	75.7
Ethnicity	
Luhya/ Luo	30.6
Mijikenda/Swahili/ Taita/ Taveta	9.2
Kikuyu /Kamba/ Meru/ Embu	26.1
Kalenjins/ Masai	14.9
Others	19.3
HIV Regimes	
Low regime	42.7
Intermediate regime	44.5
High regime	12.9

Source: Author's computation from KDHS 2003

Table 4.1 presents the percentage distribution of women under study from each variable. There were 8195 women interviewed in the KDHS out of which 1527 were utilized for the study.

The table shows that the majority of the children are born in what is regarded as medium interval of 24 – 35 months. This category registered the highest percentage distribution of 20 and above the other categories. It also indicates that about a quarter of the total women in Kenya practice long birth interval of at least 36 plus months.

Based on duration of breastfeeding the table shows that majority of the women breastfeed their children between 13 – 24 months, which is considered as a medium duration of breastfeeding. Less than ten percent of the Kenyan women are also reported to practice long duration of breastfeeding.

Use and non-use of contraceptives depicted a marginal difference of about three percent. This is an indication that the campaign on the use of contraceptives has achieved a fifty-fifty influence on the Kenyan women.

Majority of the Kenyan women who were covered during the interview were found to have primary level of education. This implies that a large number of the Kenyan women are literate, i.e. they at least know how to read and write.

Distribution by background characteristic of the mother indicates that majority of the Kenyan women resides in rural areas as compared to their urban counterparts. About three quarters of the women covered during the survey were reported as rural dwellers, while the minority one quarter was for urban place of residence.

Most of the respondents in the study were found to be in the monogamous type of marriage, i.e. about 75.4% reported that their spouses had only one wife. While 24.6% included those who did not know and those whose spouses had more than one wife.

Ethnically, Luhya's/ Luo's reported majority of the women covered in the survey, while the least were from the coast region which included Mijikenda/ Swahili/ Taita/ Taveta

category. Distribution by HIV regimes indicated that high HIV regime has the least proportion.

4.4 Breastfeeding Patterns

Cross tabulations and the chi-square tests were used to assess the association between the duration of breastfeeding and the independent variables. The chi-square technique is employed to test the null hypothesis that there is no relationship between the duration of breastfeeding and the other independent variables. The chi-square tests level of significance was set at $\alpha = 0.05$. where if significant level is less than 0.05 then the alternative hypothesis was accepted meaning that there is a relationship between the response and the explanatory variables.

Table 4.2: Percentage Distribution of Duration of Breastfeeding and Background Factors

Variable Categories	0-12	13-24	25+
SOCIO-ECONOMIC			
1 Level of Education			
No education	44.5	53.0	2.4
Primary	34.0	57.5	8.4
Secondary +	38.6	52.0	8.7
Chi-square 22.04			
DF 4			
Significance 0.000			
2 Respondent currently working			
No	40.5	54.0	5.5
Yes	43.5	57.0	8.4
Chi-square 8.793			
DF 2			
Significance 0.012			
3 Type of Place of Residence			
Urban	46.7	47.9	5.7
Rural	34.3	57.9	7.7
Chi-square 17.604			
DF 2			
Significance 0.000			
4 Region of residence			
North Eastern	53.3	41.0	5.7
Nairobi	29.0	65.0	5.5
Central	29.7	60.0	10.3
Coast	36.5	50.0	13.5
Eastern	37.0	57.9	5.1
Nyanza	34.7	58.2	7.1
Rift Valley	36.6	56.5	6.9
Western	51.6	46.7	1.6
Chi-square 50.304			
DF 14			
Significance 0.000			
5 Ethnicity			
Kalenjin/ Masai	38.1	54.2	7.7
Kikuyu/ Kamba/ Meru/ Embu	27.1	62.1	10.7
Luhya/ Luo	33.4	57.0	9.5
Mijikenda/Swahili/ Taita/ Taveta	34.6	59.6	5.7
Others	46.9	50.3	2.7
Chi-square 31.407			
DF 8			
Significance 0.000			
6 Type of marriage			
Polygamous	37.4	55.5	7.1
Monogamous	36.1	56.3	7.5
Chi-square 0.231			
DF 2			
Significance 0.891			
7 Age at the start of interval			
Under 25	40.2	52.9	6.9
25-34	31.1	60.0	8.9
35+	41.7	53.0	4.6
Chi-square 11.458			
DF 4			
Significance 0.022			

Table 4.2 shows the association of background variables and duration of breastfeeding. Duration of breastfeeding has been categorized into three main categories namely: shortest (0 – 12 months), medium (13 – 24 months) and longest (25 + months).

Based on mother's level of education background, it was found that women with secondary plus level of education breastfed for longer duration as compared to those who had

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no education or primary level of education. This unexpected result may be explained by the increased realization of the importance of breastfeeding to educated women. While reduction on duration of breastfeeding among women with no education can also be due to low birth interval practiced by women with less or no education.

The relationship between place of residence and duration of breastfeeding shows that majority of the rural women in Kenya practice longer duration of breastfeeding as compared to their urban counterparts. The table shows a high degree of association between place of residence and duration of breastfeeding as depicted by the level of significance.

Similar studies undertaken by Jellife and Jellife (1978), Laker (1992) found out that rural women had longer mean durations of breastfeeding than urban women. Also from Kenya Demographic and Health Survey of 1989 revealed similar findings.

Results based on the women's work status showed that working women breastfeed for long durations as compared to those who were not working. This unexpected result may be explained by the fact that working women have high birth intervals as compared to non working women. However it should be noted that the association between female employment and breastfeeding is multidimensional. The type of work, work place and the relationship with the employer are also aspects that need to be considered.

Results on the table show that Mijikenda/ Swahili/ Taita/ Taveta led in breastfeeding for longest duration as compared to other tribes in the country.

Table 4.3: Percentage distribution of duration of breastfeeding and the proximate variable

Variable	Duration of breastfeeding		
	0 – 12	13 – 24	25 +
Contraceptive use			
Never use	38.8	55.0	6.2
Ever use	35.5	56.4	8.1
Chi-Sq. 3.141			
DF 2			
Sign. 0.088			

Association between breastfeeding and use of contraception has to be analyzed from two scenarios. That is, if breastfeeding is not used deliberately to increase the interval between two births but contraception is used for this purpose, then the two forms of behaviour should be independent of each other. In that case, the observed correlation between the two should be entirely due to joint associations with the preceding social and demographic factors.

For example, modernization (as indicated by mother's education and her place of residence) can simultaneously result in a decrease in the preference and the duration of breastfeeding and in an increase in the use of contraception. Under these circumstances the observed correlation between contraception and breastfeeding is spurious. The results presented on the table suggest that there is no association between breastfeeding and contraception.

Table 4.4: percentage distribution of duration of breastfeeding by last closed birth interval

Variable	Duration of breastfeeding		
	0 – 12	13 – 24	25 +
Birth interval			
10 – 23	62.7	35.8	1.5
24 – 25	27.4	66.1	6.6
36 +	20.9	61.0	18.2
Chi-Sq. 243.748			
DF 4			
Sign. 0.000			

Table 4.4 presents the association between duration of breastfeeding and closed birth interval. From the analysis it is witnessed that the longer the duration of breastfeeding the longer the duration of birth interval, and this association is highly significant.

4.5 Correlates of Closed Birth Intervals

Simple linear regression analysis was conducted for each of the independent variables on closed birth interval that was measured by preceding birth interval as a proxy of fertility. The results are presented on table 4.5

The average birth interval per woman is represented by the regression coefficients. This is used to predict the relative change in dependent variable on the basis of specified changes in each independent variable by measuring the strength of birth of that relative change in the dependent variable as per change in the independent variables.

The accuracy of the regression equation in the table is shown by the standard error denoted by 'e', which demonstrates the actual values of the dependent variable required to deviate from the predicted scores.

The measure of the difference between coefficients of reference category and other categories show the average deviation in the birth interval according to individual variables. Because of the small sample used t-test was used to level of significance at the level of 0.05.

Table 4.5: The Relationship between Independent Variables and Closed Birth Interval

Variables	Coefficient (B)	Standard error (e)
Breastfeeding duration		
35 + months **(ref)**	37.264	0.876
0 - 12 months	-12.930***	0.957
13 – 24 months	-7.281***	0.931
Contraceptive use		
Never used **(ref)**	27.972	0.367
Ever used	0.838	0.506
Age of mother at start of interval		
35 + **(ref)**		
Under 25	27.997	0.406
25 – 34 years	-0.513	0.637
Region of residence	1.570***	0.588
North Eastern **(ref)**		
Nairobi	27.829	0.514
Central	-0.505	1.090
Coast	1.668	0.966
Eastern	1.748***	0.905
Nyanza	1.716	0.900
Rift Valley	-0.556	0.845
Western	0.624	0.741
Level of Education		
No Education **(ref)**		
Primary	28.095	0.545
Secondary/ Higher	0.172	0.634
Place of residence	1.235	0.816
Rural **(ref)**		
Urban	28.556	0.286
Work status	-0.648	0.610
Working **(ref)**		
Not Working	28.219	0.335
Ethnicity	0.451	0.511
Other tribes **(ref)**		
Luo/ Luhya	28.146	0.575
Mijikenda/ Swahili/ Taita/ Taveta	-0.452	0.735
Kikuyu/ Kamba/ Meru/ Embu	1.489	1.012
Kalenjin/ Masai	1.233	0.758
Type of Marriage	-0.352	0.870
Polygamous **(ref)**		
Monogamous	29.580	0.512
	-1.541***	0.588

**P <0.05, ***P <0.01

The result of the simple linear regression of the duration of breastfeeding which is the key variable of the study on birth interval indicates that the longer the duration of

breastfeeding the longer the birth interval. This is in accordance with what was expected in the operational hypothesis of this study.

The average length birth interval for reference category is given by the constant while the other coefficients give the difference. For example the length of birth interval associated with duration of breastfeeding of more than 25 + months. The negative coefficients for the others reflect the shorter birth interval as expected. Length of closed birth interval in North Eastern Province has the longest birth interval compared to other regions.

There are no statistically significant influences on lengths of birth intervals by region, education, ethnicity and work status. Although the use of contraceptives and closed birth intervals show a positive relationship as expected, the relationship is not significant.

Based on the type of marriage, the results show that women in polygamous unions have longer birth intervals as compared to those in monogamous ones. This is consistent with what is expected due to higher quintal frequency with women in monogamous type of marriage as compared to their counterparts.

Table 4.6: Multiple regression on birth interval by selected independent variables

Variables	Model 1	Model 2	Model 3
Duration of breast feeding (months)			
0-12			
13-24	-12.885***	-12.846***	-12.877***
	-7.251***	-7.249***	-7.297***
Contraceptive use			
Ever use	0.515	0.453	0.462
Age at start of interval			
Under 25		-0.436	-0.369
25 – 34		0.788	0.724
Level of Education			
Primary		-0.232	-0.223
Secondary +		0.952	0.963
Region of residence			
Nairobi		0.683	0.693
Central		2.113	2.035
Coast		1.506	1.536
Eastern		1.736	1.648
Nyanza		0.652	0.640
Rift Valley		1.769	1.729
Western		1.701	1.692
Place of Residence			
Urban		0.186	0.170
Work Status			
Not working.		1.049***	1.061***
Type of marriage			
Monogamous		-1.507***	-1.497***
Ethnicity			
Luo/ Luhya		-1.690	-1.671
Mijikenda/ Swahili/ Taita / Taveta		-1.033	-1.081
Kikuyu/ Kamba/ Meru/ Embu		-1.038	-0.969
Kalenjin / Masai		-1.990	-1.944
HIV Regimes			
HIV medium regime			-0.321
HIV high regime			-1.010
Constant	36.959	37.238	37.459
R^2	0.139	0.153	0.154
F	79.890	12.942	11.881
Significance	0.000	0.000	0.000

**P < 0.05, ***P < 0.01

4.6 Results of Multiple Regression

The effect of the background and proximate variables on closed birth intervals are summarized in table 4.6 which shows the three regression models. The three multiple regression models shown are: one for proximate variable on birth interval and, the second model added background factors on birth intervals. The third model included the different HIV regime variable to check the impact of breastfeeding on birth interval in different HIV regimes.

A simple additive model without any interaction term was used. The relationship between the last closed birth interval and proximate and background factors is expressed in terms of a constant (intercept), a series of partial regression coefficients and error term.

The results on table 4.6 show that the duration of breastfeeding increase with increase in birth interval. This is as by expectation of the study. Use of contraceptive by women of reproductive age increases the length of birth interval, this is shown by the positive partial regression coefficient of ever use of contraceptive. Young and middle age mother at the start of interval does not have an important and consistent effect on birth interval. This is evidenced by both negative and positive partial regression coefficient for the age group under 25 and 25 – 34 years. The positive partial regression coefficient for education and place of residence indicate that women with high education or those who live in urban areas give birth to next children after long birth interval.

Socio-cultural factors such as ethnical backgrounds or type of marriage of the women shortened their birth interval as explained by the negative partial regression coefficients for ethnicity and type of marriage. Evidence from the negative partial regression for high HIV regime implies that duration of birth interval is shortened if a child is born in a high HIV region.

Further analysis from the table shows that breastfeeding and contraception are the most important factors accounting for the differences between populations in their marital fertility levels. On the individual level it is very difficult to explain the large proportion of the variance in the birth interval because of stochastic nature of the productive process. As the regression results indicate the percentage variation in the birth interval explained by breastfeeding, contraception, and the seven social and demographic factors vary by 14 percent. The variation is due to just two factors – breastfeeding and use of contraception (compare the value of R^2 in the two models I & II with and without social and demographic factors.) although the other intermediate variables play some role. This is further substantiated by the partial regression.

Coefficient for the seven social and demographic factors indicating that in most cases the independent variable effects of these factors are either small or are not statistically significant.

However, the initial negative observation of the association between the duration of breastfeeding and the use of contraception (as established by cross tabulations) is not entirely accounted for by their joined relationship with the seven social and demographic factors such as women's age, education, and place of residence. The partial correlation coefficients vary in magnitude and direction but are statistically significant.

The marginal change of the model measured by R^2 with the introduction of HIV regime variable indicates that there is virtually no change in the birth interval when the variable is included in the models.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study aimed to examine how selected socio-economic, demographic and proximate determinants affect the duration of breastfeeding and birth interval analysis in Kenya. Another objective was to examine the relationship between breastfeeding and fertility (measured in terms of closed birth intervals) findings of the study is expected to be used to reveal, modify and suggest appropriate recommendations for policy makers and planners regarding breastfeeding and fertility. Further the study's objective was to see the impact of breastfeeding on birth intervals in the various HIV regimes.

The study considered various determinants which were conceptually classified as background and proximate factors. Background variables included in the study were age of mother at the start of interval, level of education, place of residence, region of residence, work status, type of marriage and ethnicity. Under the proximate determinants the study included breastfeeding (as the key variable) and contraceptive use.

The methods of analysis were univariate, bivariate analysis and multiple regressions. Findings as presented in chapter four indicated that duration of breastfeeding increased with increase in birth intervals. As expected use of contraceptive by women of reproductive age increases the duration of birth interval, this is as indicated by the positive partial regression coefficients for ever use of contraceptives.

Results further showed that women with high education or those who live in urban areas give birth to next children after a long birth interval as indicated by the positive partial regression coefficients for education and place of residence.

In the multiple regression, inclusion of HIV regime variable virtually added no change to the models.

In summary most of the variables seemed to be statistically insignificant to lengths of birth interval. However, the insignificance may be due to multicollinearity or non linear relationship with the dependent variable.

5.2 Conclusion

Just like findings from other earlier studies, the results of the univariate, bivariate analysis and multiple regression presented in chapter four showed that breastfeeding and closed birth interval were highly correlated.

Socio-economic and demographic variables were also found to be highly related to breastfeeding in the closed birth intervals. Urban residency was found to be associated with longer breastfeeding durations.

Increase in the level of education was observed to be highly related to longer breastfeeding durations, which also implied longer birth intervals and vice versa. Demographic factors of age in the higher age group of 35 plus years were related to longer breastfeeding durations implying lower birth intervals.

Mijikenda/ Swahili/ Taita/ Taveta ethnic group was found to be associated with longer breastfeeding durations as compared to other tribes implying longer birth intervals for the Kalenjins/ Masai and lower birth intervals for others such as Kikuyus and Luhyas ethnic group categories.

5.3 Recommendations

This study entirely operated within what Kenya Demographic and Health Survey was able to capture, thus all the main KDHS problems were inherited into this study. KDHS was known to have not collected data exclusively for breastfeeding or fertility analysis but with other variables. Variables such as HIV prevalence was highly underestimated to a level of high biasness of any conclusion made on the basis of this variable.

5.3.1 For policy makers

i. Policies on breastfeeding still seem to be weak, hence strong and practical policies and programs on both breastfeeding and HIV need to be put in place for visible impacts to be realized. These policies and programs should involve proper trainings, implementation, monitoring and evaluation of activities articulated on papers.

ii. Intensive family planning education should be undertaken especially to reach breastfeeding mothers who are educated or working and those living in urban areas, in order for them to increase contraceptive use since they tend to observe shorter breastfeeding periods and are therefore more at risk of pregnancy than their rural counterparts.

5.3.2 For future research

i A wider primary research is needed to reveal more on breastfeeding, birth interval and HIV relationships. This will not only benefit researchers but also to the whole population in knowing why the effect of breastfeeding on fertility has started declining and if still women continue to use breastfeeding to space their birth intervals.

ii Exclusive study on breastfeeding and birth intervals in the era of HIV and AIDS.

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