EFFECT OF INFANT MORTALITY ON FERTLITY IN KENYA

BY

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DECLARATION

This research project is my original work and has not been presented for a degree in this or any other University.

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This research project is presented for examination with our approval as the University supervisors

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Supervisor : Dr. Samuel. Wakibi

Signature:…… Date……

DEDICATION

To my parents, brothers and sisters without whom it would not have been possible to get to this level.

ACKNOWLEDGEMENT

First, I would like to thank the University of Nairobi for giving me the opportunity to undertake this master's degree. I also acknowledge the guidance of my two supervisors Professor Murungaru Kimani and Dr. Samwel Wakibi for their guidance, encouragement and keen interest they took in my work. They tirelessly pinpointed mistakes and made constructive criticisms that have contributed to the successful completion of this work. To the entire teaching staff at PSRI Professor Agwanda, Professor Oucho, Dr. Anne, Mr. Jarabi and the rest that I have not mentioned THANK YOU.

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ABSTRACT

This study examines the effect of infant mortality on fertility. Specifically the study sought to examine whether the effect of infant mortality on fertility depends on the level of fertility and also to examine whether the effect of infant mortality on fertility varies across parity.

This study used data from birth histories of women restricted to last five years prior to 2008/9 KDHS. The method of analysis used in this study was Cox proportional hazard regression. The results indicated that the death of a child leads to a higher risk of having another birth in both regions and across parity. However effect is confounded by length of previous birth interval and duration of breastfeeding.

Breastfeeding was found to be associated with a higher risk of having another birth in both the fertility regions and also across the parities though with varying magnitudes. Short preceding intervals were also associated with a higher risk of having another birth in both fertility regions and also across the birth orders. The effect of infant mortality may be working through the curtailment of breastfeeding to affect the probability of having another birth. There is also evidence of behavioural effects through non-use of contraception after curtailment of breastfeeding. These results suggest existence of both biological and behavioural effects though more studies are needed before firm conclusions can be made regarding the distinguishing of biological and behavioural effects.

The main policy implications that can be drawn from this study are that child survival programmes should be improved as part of the strategy to lower fertility in Kenya since the death of an infant leads to a higher risk of having another birth. More emphasis should also be placed on exclusive breastfeeding since short breastfeeding durations led to higher risks of the woman having another birth. There is need for further research on the effect of breastfeeding and amenorrhea and also contraceptive use as this study didn't include the two variables because of limitations on breastfeeding data on the specific times of cessation of breastfeeding and the breastfeeding status of all children. The data on contraceptive use was also limiting as there is the need for the specific times in which there was contraceptive use in terms of adoption and discontinuation.

CHAPTER ONE: INTRODUCTION

1.1 Background

According to classic demographic transition theory, mortality change is the key factor that triggers a decline in fertility (Notestein, 1953 and Davis, 1955). The decline in mortality in the course of development of a country would be eventually followed with a decline in fertility until fertility reaches the replacement level. For this reason, the relationship between mortality and fertility has attracted special attention from both demographers and policy makers.

A widely accepted hypothesis offers two possible linkages between infant/child mortality on subsequent fertility. One is the physiological or biological effect which manifests itself in the case of a child death leading to sudden termination of breastfeeding which triggers the resumption of menses and ovulation thereby increasing the period of exposure to a new conception (Jones and Palloni, 1990).This fertility response associated with cessation of breastfeeding after an infant death is more powerful in societies where the practice of breastfeeding is highly regarded and there is infrequent use of contraception (Park et. al. 1998). Kimani, (1992) also found that breastfeeding accounted for the highest percentage of the effects of infant mortality on fertility while contraceptive use and coital frequency had the same effects of infant mortality on fertility.

The other effect is replacement effect where a child death may cause couples to make deliberate efforts to replace the dead child by bearing another one. This mechanism is thus closely related to the total number of children that parents want to have and to the use or non-use of contraception, depending on the discrepancy between the desired and realized family sizes and is evident in controlled fertility populations. The most likely situation is one in which a couple's replacement strategy and reaction to a child's death is swift and their attempts to accelerate a conception will follow shortly after the death of a wanted child and this leads to the shortening of birth intervals.(Palloni and Rafalimanana, 1999).

The relative importance of the two components (replacement and biological) may to a large extent be determined by the stage of fertility transition reached. When parents allow fertility to be determined 'naturally', child deaths may cause only a physiological mechanism and in contrast, when fertility is under perfect rational

control, whereby family planning programmes are in place and parents see the need of controlling their fertility desires then child deaths may invoke a replacement mechanism only. In a society undergoing fertility transition like Kenya, both mechanisms should be operating (UN, 1988). In recent times, Kenya has been undergoing fertility transition whereby it experienced high fertility rates of 8.1 in the late 1970s and this was followed by a decline from the late 1980s to about 4.6 currently (KNBS and ICF Macro, 2010).

The effect of infant mortality on fertility is usually analysed as it relates to the fertility dimension of the length of time between births after different survival outcomes as this contributes greatly to the level of fertility. Most studies on the effect of infant mortality (replacement and physiological effect) on fertility use either parity progression ratios or birth intervals to examine the different fertility responses, following different survival outcomes of preceding children born in succession (Chowdhury et al., 1976; Park et al., 1979; Suchindran and Adlakha 1981).This study analyses birth intervals between successive live births to examine the effect of infant mortality on fertility.

1.2 Problem Statement

Kenya is one of the African countries that has been undergoing fertility transition over the last 3 decades with variations across different regions (Westoff and Cross, 2006; Bongaarts, 2006). Currently the total fertility rate for Kenya stands at 4.6 which is a decline from 4.9 in 2003 (KNBS and ICF Macro, 2010). Despite the drop in total fertility rates in Kenya, fertility still remains high and birth intervals are still relatively shorter in the regions that have high fertility i.e. (Nyanza, Rift valley, Western, Coast and North Eastern provinces). These regions are also associated with high infant and child mortality rates (KNBS and ICF Macro, 2010). Infant mortality has an effect on fertility through two known mechanisms; one is the physiological or biological effect that is seen through curtailment of breastfeeding resulting in the shortening of the postpartum infecundable period and the other is behavioural or replacement effect where a child death may cause parents to make deliberate efforts to bear another child in the hope of replacing the lost child (Park, et al., 1979).

Several studies undertaken in Kenya on the effect of infant mortality on fertility have found the existence of behavioural effects. Kimani, (1992) found the existence of

behavioural effects with breastfeeding having the most effect while Ngure, (1999) found modest child replacement effects at national level but wide differentials between the urban and rural areas and between educational categories. Mutuku, (2001) while analysing birth intervals found that the death of the index child affected the birth interval duration with birth intervals being shorter where an infant died than when an infant survived.

However, these studies did not look at whether the effect of infant mortality varies with the level of fertility and across parity as there are studies that have suggested that the effect of infant mortality on fertility may be vary according to the level of fertility and also across parity. Mensch, (1985) and Lehrer, (1984), alluded to the fact that the response of fertility to infant mortality will depend on the level of fertility and may also vary across parity as fertility behaviour is usually linked to achieved parity. The question is; does the observations of Mensch, (1985) and Lehrer, (1984) remain when Kenya is undergoing fertility transition?

This study therefore examines the effect of infant mortality on fertility by analysing the fertility responses after different survival outcomes of children born in succession according to the level of fertility in the region the woman resides in and also whether there are variations of the effect between different parities in Kenya.
The following research questions are addressed in this study:

1. Does the effect of infant mortality on fertility vary with fertility level?
2. Does the effect of infant mortality on fertility vary with different parities?

1.3 Objectives of the Study

The overall objective of this study is to examine the relationship between infant mortality and fertility in high and low fertility areas in Kenya. Specifically the study examines:

1. Whether the effect of infant mortality on fertility varies by the level of fertility.
2. Whether the effect of infant mortality on fertility varies by parity.

1.4 Justification of the Study

In order to understand the factors that lead to high population growth rate one has to study the link between socioeconomic and demographic factors and their influence on

the effect of infant mortality on fertility. In a rapidly growing population, fertility impacts upon progress in population health, economic growth and environmental sustainability. Therefore understanding the pace of change of birth rates is important if researchers and policy makers are to facilitate an accelerated decline in birth rates in a population. The lengths of time between marriage and giving birth to the first child and the interval between births have a crucial role in women's reproductive health. Findings of this study can be used in developing strategies for integrating maternal child health programmes to family planning whereby a more synergetic approach can be made towards addressing high fertility in the form of birth spacing and child mortality together.

1.5 Scope and Limitations of the Study

The study focuses on all regions in Kenya except North Eastern Province. These regions are grouped according to high fertility level and low fertility level using the national TFR as the benchmark. The study excludes the reverse effect of fertility on infant mortality as the study will only examine the effect in one direction that is the effect of infant mortality on fertility and not bidirectional. This is because while child mortality affects fertility through biological and behavioural factors, fertility affects child mortality through inter-birth effects which is not examined in this study. The study is also limited to closed and open intervals 5 years prior to the survey. Assessment of data quality on the birth intervals was done through the use of variable B15 which checks whether a woman omitted a birth in-between the birth intervals. Out of 9583 cases less than one percent (0.9) was found to have omitted a live birth between the births and 0.2 percent of cases were missing. The ones with omitted births were however corrected for in the final data set that is used. The assessment of data quality on KDHS was done by previous studies (Mutuku, 2001; Kimani, 1992) and it was found that quality of data is high.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the relationship and effect of infant and child mortality on fertility. This literature review draws evidence from previous studies on what is known about the effects and also on the conclusions and findings on similar studies on the effect of infant mortality on fertility. This chapter is organised as follows: a review of literature on the effect of infant mortality on fertility was done in the first section; the second section involves literature on studies in Kenya; the third section involves theoretical and conceptual framework that are used in the study and the last section involves the definition of variables and their roles in the study.

2.2 Effect of Infant Mortality on Fertility

In a study of relationships in the developing world using DHS data, (Grummer-Strawn and Stupp, 1998) concluded that child death leads to the reduction of the length of a birth interval by about 30 per cent close to the replacement factor estimated before and to that calculated by Preston, (1978). They also estimated that only about 60-65 per cent of this effect was associated with cessation of lactation and therefore attributable to the physiological mechanism.

Some studies have found that the death of a child influences other components of the birth interval which reveal active volitional replacement such as resumption of sexual relations and contraception (Grummer and Stupp, 1998; Bhat, 1998; Rosero-Bixby, 1998).

In Rosero-Bixby's, (1998) study of Costa Rica and Frankenberg's, (1998) study of Indonesia, there is a suggestion of weak relation between infant and child mortality on fertility. Estimates obtained by Frankenberg pointed to the existence of replacement effects not exceeding those associated with the physiological mechanism. In Costa Rica the decline in child mortality did not affect the fertility trends therefore the decline in child mortality experienced in the 1960s did not lead to a decline in fertility. However, a decline in child mortality may facilitate fertility transition and high child mortality may delay the transition.

In a study using cross-sectional data from India, Bhat, (1998) showed that relations estimated indicated about 10 per cent to 13 per cent of the variance in total fertility rates was explained by differences in child mortality rate.

Much of the empirical research on the mortality fertility relationship has concentrated on the replacement effect. The replacement effect may not show up in terms of differences in length of the birth interval but rather in subsequent fertility. Thus the replacement effect may be captured fully by relating the child deaths prior to some specific parity to subsequent fertility to avoid confounding effects of prior fertility levels on child mortality (UN, 1987).

Kuate, (1998) found a strong relationship between infant mortality and fertility in a study of reproductive patterns in Cameroon where fertility and desired family size are high, response to mortality were observed at later parities. It was also found out that response to a death or birth of a first or second birth was seen in the third birth interval in the cases of low fertility. Women who had lost a child between the first and second birth were more likely to have a third birth. The effect of infant mortality on birth intervals of higher order was small, because few women wished to go on to high parities, and the behaviour of those who did was unlikely to be affected by the loss of previous children. In this study the focus was more on the role of the death of the first two children on subsequent fertility than on estimation of overall replacement effects.

Mensch, (1985) stated that if fertility is uncontrolled, differences in reproductive behaviour of mothers who had lost children and those whose children survived would be caused by differences in fecundity and length of breastfeeding. In trying to distinguish intentional replacement effect from the physiological effect by analysing the birth interval associated with a particular parity according to the child death experience occurring prior to the preceding parity i.e. the probability of giving birth within the five years after the child birth is related to whether or not the woman experienced child death of her first or second child. The analysis in this study was restricted to women whose child opening the birth interval had survived .Thus the impact of child deaths on postpartum infecundable period was removed from the analysis. By comparing the behaviour of women who use contraceptives to the ones who do not use contraceptives; no volitional effect was found among non users. The replacement effect among women who use contraceptives was found to be more

apparent in the 3rd birth interval for Costa Rica, the fourth birth interval for Korea and not at all for Columbia. The results were consistent with the hypothesis that the timing and degree of child replacement are linked to a country's stage in its transition from high to low fertility. The replacement effect was unlikely to affect the pace of child bearing until the desired number of children had been achieved.

Chowdhury et al., (1976) using Bangladesh household data analysed child spacing in Pakistan where the replacement influences were isolated by comparing the median birth intervals between parities i and i+1 for women with differential experience of child loss. There were no behavioural effects in that previous child loss had no impact between parity i and i+1. Lehrer, (1984) while examining the impact of child mortality on spacing and its variations across parities using Malaysia family life survey found that deaths of an infant before first birthday had a substantial negative impact on spacing but the effects associated with the deaths of an older child were small and attributed most of the decrease in the interval were due to biological factors. She also pointed to the fact that behavioural effects of infant mortality on fertility may be parity dependent such that the replacement effects may be negligible in the earlier parities but stronger in the middle parities. The Survival status of the previous child was used as an indicator of timing of subsequent births since there is the other possible link of the effects of length of previous birth interval on child mortality.

Hobcraft et. al., (1983) found that a birth within 12 months after the index birth raises the overall average risk of infant mortality by 77 per cent. It was noted that while the first child in a closely spaced pair may be more vulnerable because of the premature termination of breastfeeding, the second in the pair may be more vulnerable to other forms of differential care.

Park, et al., (1979) while analysing parity progression ratios using three subsamples according to whether the last child was born before 1955 or from 1955 to 1964 or from 1965 to 1971 found out that the differences in parity progression ratios between those whose previous child had survived and those whose previous child had died were negligible for previous births occurring in the first period, small in the second period and greater in the last period. This would suggest that there was the strengthening of the replacement effect as family planning practice became more widespread.

Nur, (1985) using Jordanian fertility survey data compared differences in mean number of additional children ever born between women with and without previous infant deaths according to whether women were contraceptive users or not. The measured replacement effects were stronger among contraceptive users than non-users which confirms the hypothesis that intentional responses to infant mortality require that parents have control over their fertility. These results suggested that at least 50 per cent of the replacement among contraceptive users were at higher parities.

Heer and Wu, (1975) in a study focusing on the reduction of the level of infant/child mortality and fertility by comparing results of a survey conducted in Taiwan found out that differences in the community level of infant and child mortality could affect the behaviour and attitudes of both the married couples who lose a child and married couples who do not. This is because when mortality is high; all couples may fear the loss of a child and may decide to have additional children as an insurance against the possibility of future child loss. There was also the perception that children's better chances of survival were associated with substantially lower fertility.

Knodel, (1982) while comparing subsequent fertility behaviour of couples that have reached similar stages in childbearing according to their previous experience in child loss while controlling for several factors found that direct personal experiences of a child loss can influence a woman's subsequent reproductive behaviour. The fear of losing subsequent children and indirect experiences like knowledge of child deaths among friends and relatives or in the community could affect a woman's reproductive behaviour.

Singh and Chakrabarty, (1976) did a study on the relationship between infant mortality and fertility based on individual data. Their analysis was limited to the physiological and replacement effects and used demographic data from the demographic survey of Varanasi in rural India with the household as the unit of analysis. It was revealed that infant mortality affects the length of birth intervals through lactation and no effect of infant mortality on fertility was found after the third birth based on the couple's fertility behaviour.

The length of the previous birth interval may also represent past fertility behaviour in terms of fertility decisions. However since the death of an infant is closely related to

the length of the birth interval, the length of the preceding birth interval may serve as a proxy for survival status of previous child if the biological factors are predominant since replacement effects are mainly in the earlier parts of the birth interval and this implies that previous birth intervals may imply biological effects. Replacement may be greatest for children who die soon after birth with the attempt to replace being concentrated in the early part of the birth interval. However timing of replacement makes the separation of the net effects of breastfeeding difficult because if breastfeeding is used consciously as a form of contraception then this effect cannot be theoretically separated from volitional (Agwanda, 1999).

Based on historical data and world fertility surveys there is evidence that birth intervals are usually shorter when an infant dies than when it survives. In a study in Bangladesh using the world fertility survey data (Sufian and Johnson,1989) found out that the median birth intervals between successive birth orders i^{th} and i^{th} +1 were found not to be shorter when some siblings of order to i+1 had died than when all the siblings had survived. There were also differentials according to the place of residence i.e. urban and rural areas whereby the intervals were shorter for urban mothers which was attributed to the duration of breastfeeding and also a lack of desire to replace a dead offspring.

Chai et. al., (1998) noted that the differences in birth intervals following different survival outcomes of preceding children represent the physiological effect and the difference in the number of subsequent births represent the total and that the two fertility measurements were functionally related. Therefore According to the theory of survival analysis, if the hazard of childbirth is constant, the reciprocal of the average birth interval is the risk of an additional birth. Thus, a shorter birth interval results in a higher parity progression ratio and consequently a larger number of subsequent births

However the separation of the physiological effect from the behavioural effect is considered to be difficult (Trussel and Olsen, 1983). The reduction in birth intervals via cessation of breastfeeding are often attributed to the physiological effect but whether or not they represent the intention on part of the couples to replace the lost child is difficult to understand (Kuate, 1998; Palloni and Rafalimana, 1999).

Several empirical observations demonstrate that a short preceding birth interval is closely associated with a higher mortality of infants and children (Hobcraft et. al., 1983; Park et. al., 1986). Thus a vicious circle is formed whereby an infant death causes a shorter birth interval, and a shorter birth interval in turn causes a higher risk of mortality for the next child.

Gyimah and Fernando, (2002) using the 1998 demographic and health surveys for Ghana and Kenya conducted a comparative study on the impact of infant deaths on subsequent births. They study examined the conditions under which there might be a strong or weak relationship between infant mortality and fertility at the micro level using Cox proportional hazard ratios to examine the effects of the relevant covariates on the risk of births they estimated the relative risk of the second, third and fourth births controlling for the survival status of the index child. Women with prior infant deaths were found to have more subsequent births than those without mortality experience, suggesting both a physiological and behavioural response. Comparing Ghana and Kenya, there were significant differences in the effects of childhood mortality on subsequent births. At all parities, the fertility response to mortality was found to be larger in Ghana, perhaps suggesting a negative relationship between fertility response and the stage of fertility transition.

2.3 Studies in Kenya

Ronoh, (1992) in a study of the effect of mortality on fertility in Kenya using selected demographic, health and socio-economic variables for selected districts in Kenya found out that the influence of total fertility rate on future infant mortality rate was more profound than the influence of infant mortality rate on future total fertility rate even after the influence of the health and socio-economic variables were controlled for.

Kimani, (1992) using the 1989 KDHS examined whether behavioural effects on fertility the replacement effect following an infant or child death in Kenya was independent of biological effects and whether the measured values of such effects depended on the method utilized for analysis. The magnitude of these effects was tested using the ordinary least squares and hazard models. Birth interval was used as the dependent variable and also as a measure of fertility while seven variables were defined for the assessment of the effects. Several socioeconomic, cultural and

demographic variables were used as control variables. In the assessment of the replacement and insurance effects it was found out that shorter birth intervals associated with infant and child deaths were in part explained by differences in coital frequency, contraceptive use and breastfeeding. In this study breastfeeding was found to explain the highest percentage of the differences in birth intervals. In addition, the study found the existence of both replacement and insurance effects respectively.

Agwanda, (1999) while studying the timing and spacing of births in Kenya pointed that an infant death increased the chances of the woman having another birth. In his study it was found that women in the middle age cohorts have longer durations to the next births compared to women in the older cohorts. The effect of the previous birth interval on subsequent interval was only important when it was extremely short (18 months or less) and at higher parities the effects became insignificant or changed direction.

Ngure, (1999) utilized the 1998 Kenya Demographic and Health Survey to examine the differential effects of infant and child mortality on fertility in Kenya. At national level the study found that the relationship between fertility and child mortality appear small but consistent with results from literature given the stage of the demographic transition. The Replacement rate was also found to increase as education increases ranging from 0.073 for those women with no education to 0.695 for women with complete secondary education and above. The results indicated modest child replacement effects at national level but wide differentials between the urban and rural areas and between educational categories but the divide between regions with high and low mortality was found to be negligible. However, study was at an aggregate level.

2.4 Theoretical Framework

The theoretical framework utilised for this study conceptualises the relationship between fertility and infant mortality. Birth interval (Fertility) is treated as the dependent variable and other factors treated as the independent variables for the study. This study involves the effect of infant mortality on fertility thus the framework for this study is adopted from Bongaarts, (1978) framework for the analysis of fertility.

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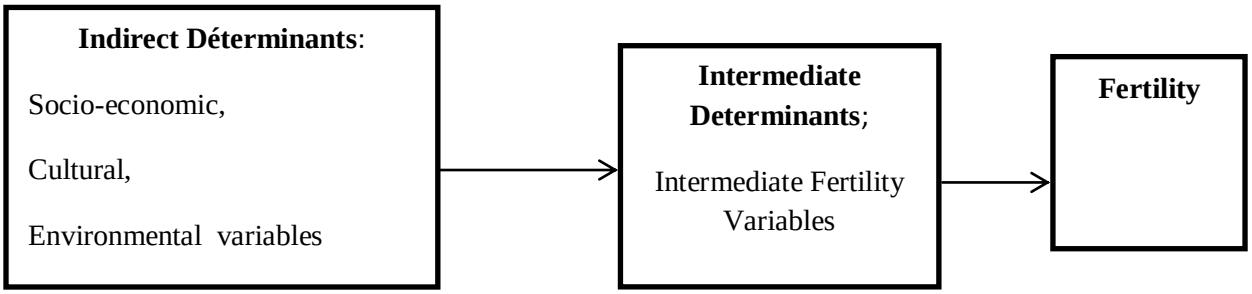
2.5 Bongaarts Framework for Analysing Fertility

According to Bongaarts (1978), fertility is influenced directly by a number of immediate biological and behavioural factors which are in turn influenced by socioeconomic and cultural factors. The cause of variations and changes in fertility levels between populations and over time can be best understood by analysing the mechanisms through which various factors influence fertility through the proximate determinants.

The biological and behavioural factors through which social, economic, cultural and environmental variables influence fertility are known as intermediate fertility variables. The intermediate fertility variables have a direct influence on fertility. These relationships can be represented as follows:



Source, Bongaarts, (1978)

Bongaarts identified 8 proximate determinants also known as the intermediate fertility variables also known as the intermediate fertility variables can be used to explain the variations in fertility across different societies as the scope for variation differs among the variables and also the degrees of influence within societies and also over time. From these eight proximate determinants of fertility Bongaarts, (1983) found out that only 4 determinants are the most important when explaining variations in fertility levels of populations. The four proximate determinants were the most important because they differed greatly between populations and because fertility is highly sensitive to changes in the proximate determinants included:

- Proportions of women married or in sexual union
- Contraceptive use and effectiveness
- Duration of postpartum infecundability
- Induced abortion

The length of the birth interval depends on the length of its four components; postpartum amenorrhea, the waiting time to conception; periods of pregnancy, and the gestation period associated with live births.

Postpartum amenorrhea is a primary function of breastfeeding and is referred to as the period after the pregnancy when the woman cannot ovulate. The stimulation of the nipple by the baby during breastfeeding inhibits ovulation by reducing the release of the hormone responsible for ovulation (Bongaarts and Porter, 1983).

The waiting time to conception/ fecundable interval is determined by the frequency of sexual intercourse and the use of contraception which may also be influenced by the monthly probability of conception and also the underlying fecundity of a woman. These factors may depend on other characteristics of the woman. When coital frequency is high and non-use of contraceptives makes the waiting time to conception be short.

Postpartum amenorrhea associated with still births and abortion depends on the number of such losses and the gestation lengths associated with them and the periods of amenorrhea associated with termination. Indeed induced abortion averts less than one birth because a spontaneous abortion or still birth may have prevented the pregnancy from ending in a live birth. However after an abortion ovulation resumes much faster thereby leading to the reduction in the length of birth interval.

The main proximate determinants of birth interval are; duration of breastfeeding, contraception, coital frequency, fecundity and foetal loss. All other factors must operate through these in order to influence fertility and other birth interval dynamics and therefore fertility.

Studies show that the death of an infant may result in shorter birth intervals which can be as a result of either voluntary or involuntary mechanisms and the effects can only be realised through the proximate determinant factors. The involuntary mechanism also referred to as biological/physiological effect of an infant death on fertility can occur as a result of the cessation of breastfeeding after a child death. The disruption of

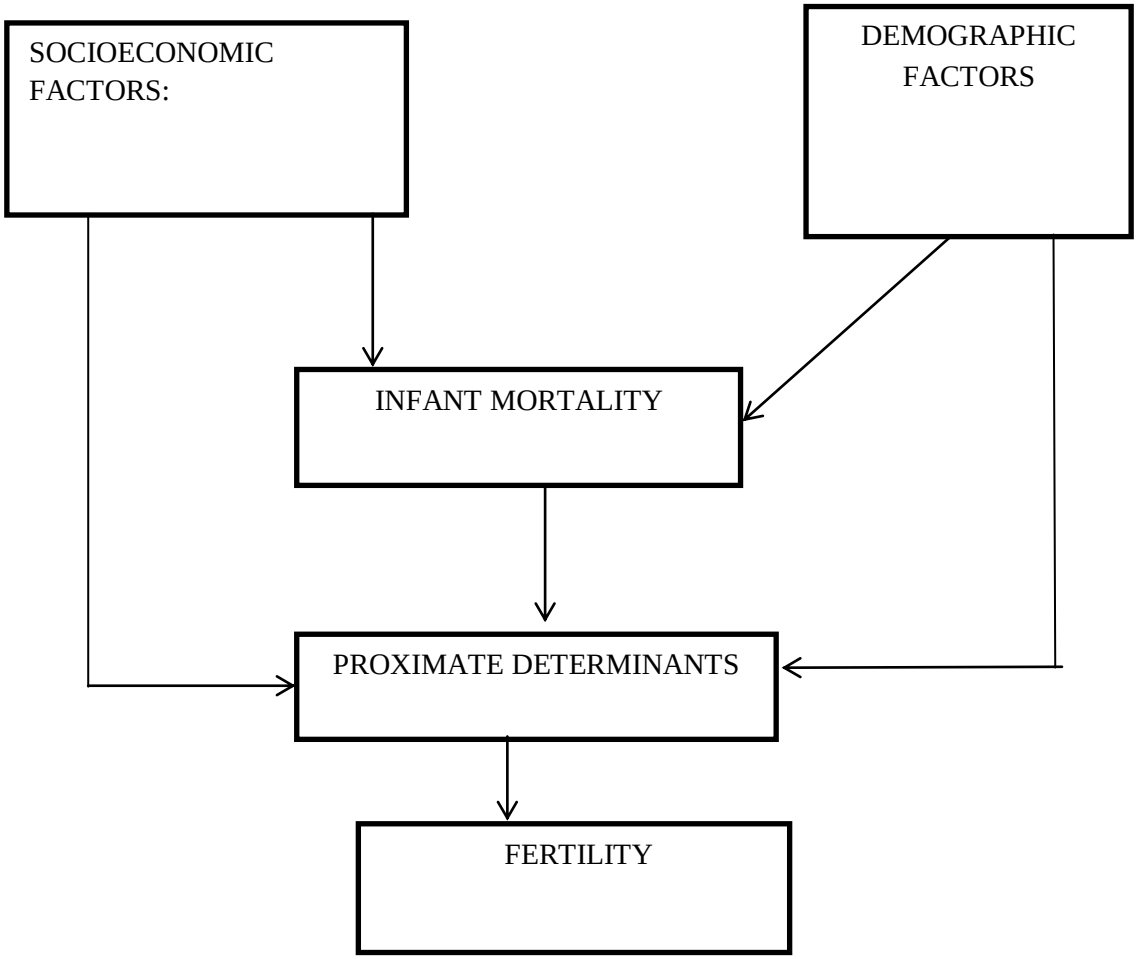
the breastfeeding pattern after a child death shortens the period of postpartum amenorrhea thereby increasing the probability of conception which may lead to the shortening of birth interval (Bongaarts, 1978).

As already noted (Chowdhury et al.,1975; Suchindran and Adlakha, 1984), pointed to the fact that the death of an infant or child act by interrupting breastfeeding which shortens the period of postpartum amenorrhea and this increases the probability of conceiving which leads to the shortening of the birth interval. Thus the physiological effect would be reflected in the postpartum component of the birth interval.

The voluntary mechanism/behavioural effects on the other hand would result from couples modifying their behaviour in response to actual infant deaths. These behavioural effects would be seen through couples changing their coital frequency, the use and non-use of contraception this was similar to (Mensch, 1985), where a woman's use of contraception was influenced by her past mortality experience.

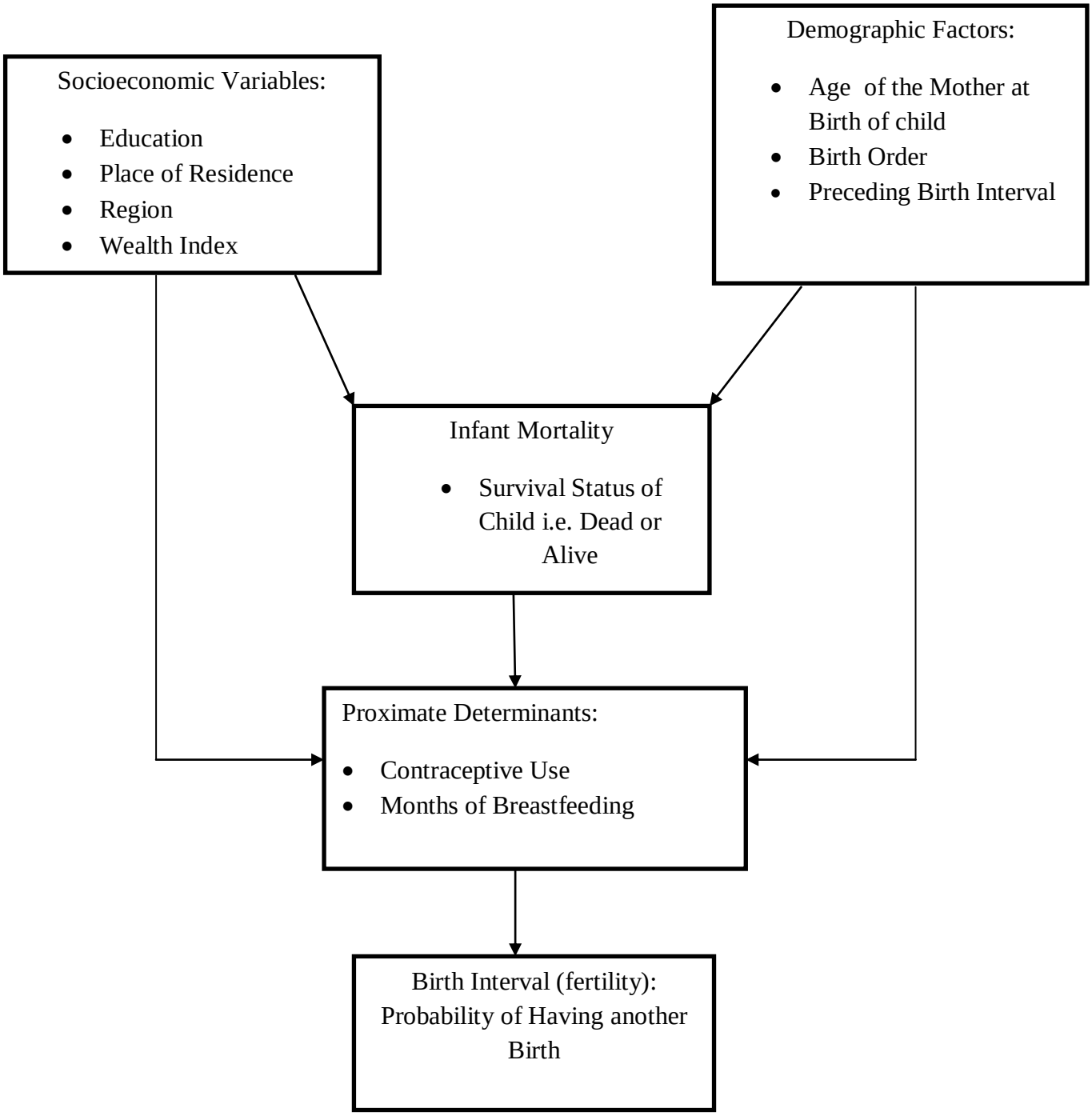
It should be noted that several empirical observations demonstrate fertility also influences infant mortality. For example, a short preceding birth interval is closely associated with a higher mortality of infants (Hobcraft et. al., 1983; Park e. Al., 1986). A vicious circle is formed whereby an infant death causes a shorter birth interval, and a shorter birth interval in turn causes a higher risk of mortality for the next child. Since this study is not intended to estimate the reverse effect, this problem is excluded from the analysis.

Figure 2.1 Conceptual Framework for Analyzing Fertility



Source: Kimani, (1992)

The operational framework derived from the above conceptual framework is provided below.



The operational hypotheses will be:

1) Effect of Infant mortality on the probability of having another birth depends on the level of fertility.
2) Effect of infant mortality on fertility depends on parity.

2.6 Definition of Variables Used in the Study and their Roles

Dependent Variable

The dependent variable used for this study is the birth interval which is used as a measure of fertility. Most studies on the effect of infant mortality on fertility use birth intervals to examine the different fertility responses, following different survival outcomes of preceding children born in succession (Park et. al., 1979). Santow and Bracher, (1984) also noted that it becomes possible to identify the causal chain linking infant mortality with fertility if there is knowledge of events occurring between one birth and the next.

Independent Variables

Main independent

Survival Status of Child

This variable measures whether the child is dead or is still alive. This will indicate the fertility response of the respondent and check for the reaction of the mother after the death or survival of the previous child.

Region

This variable is used to indicate the region of fertility the respondent is in. The regions are categorised into high fertility and low fertility region. The national fertility average will be used as the benchmark whereby regions that have fertility rates higher than 4.6 will be considered as high fertility regions and regions with fertility rates lower than 4.6 will be considered as low fertility regions. The high fertility regions comprise of: Nyanza, Western, Rift valley and Coast and the low fertility regions will comprise of Nairobi, Central and Eastern regions.

Birth Order

This variable is used to measure parity and will be used to measure the risk of subsequent birth at certain parities and also the length of birth interval at certain parities. This are divided into groups and categorised into: 3-4, 4-5 and 6+.

Demographic Factors

Age of Mother at Birth of the Child

This variable is used to measure the age of the respondent at the birth of the child and also act as a proxy for fecundity related differences in child bearing since onset of secondary sterility rises with age. This was calculated by subtracting the age of the mother at the time of survey from the age of the child at the time of the survey to give the age of the mother at the birth of the child. This was grouped into different categories: under 20 years, 20-34, and 35+.

Preceding Birth Interval

This variable is used to measure the length of the preceding birth interval. This variable was categorised into: <2 years, 2-3 years, and > 3 years (Kimani, 1992). The previous birth interval may also reflect the effect of other factors which may be biological or behavioural. The close relation between birth spacing and child mortality and the fact that the length of the preceding birth effects are significant only when it is extremely short (less than 18 months) and this supports the hypothesis that it might be acting as a proxy for the effects of previous child deaths. Since replacement is assumed to be greatest for children who die soon after birth with attempts to replace being concentrated in the early part of the interval (Agwanda, 1999). Therefore in this study the length of the previous interval gives an indication of both replacement and biological effect.

Socioeconomic Variables

Education

The education variable was used to measure the level of education of the respondent. This is categorised into: no education, primary complete, secondary and upper.

Residence

This variable is used to measure place of residence of the respondent and will be categorised into rural or an urban area.

Wealth Index

This variable is used as a proxy for measuring the standard of living of the individual based on characteristics that relate to the individuals socioeconomic status. This is recoded and categorised into: poor and non-poor.

Proximate Determinants

Contraceptive Use

This variable is used to measure whether the respondent is using contraception or not. This is categorised into: not using contraception and using contraception.

Months of Breastfeeding

This variable is used to measure both the biological and replacement effect brought about by cessation of breastfeeding. This is grouped into: 0=never breastfed, 1= breastfed for 1 to 6 months, breastfed for 7 to 59 months. The death of an infant shortens the interval to the next birth through its effect on breastfeeding which prolongs the sterility after birth (Agwanda, 1999). The grouping of 1 to 6 months is because the effect of breastfeeding on birth interval is only important in the first 6 months. The other reason is to avoid heaping which occurs at months 3, 6, 9, and 12.

Table 2.1: Specifications of variables and their importance to this study

variable	Operational Definition	Role of Variable
Dependent Variable		
Birth Interval	Length of Birth Interval	Dependent
Independent Variables		
Survival Status of Previous Child	0=Dead(no) 1=Alive (yes)(Ref)	Main Independent
Region	1=Low Fertility Region 2=High Fertility Region (Ref)	Main Independent
Birth Order	1=3-4 2=5-6 3=7+ (Ref)	Main Independent
Demographic Factors		
Age Group of Mother at Birth of Child	1=<20 2=20-34 3=35+ (Ref)	
Previous Birth Interval	1=<2 years 2=2-3 years 3=>3 years (Ref)	Control

Socioeconomic Factors		
Education	1=None 2=Primary Complete 3=Secondary +(Ref)	Control
Place of Residence	1=Rural 2=Urban(Ref)	Control
Wealth Index	1=Poor 2=Non- Poor(Ref)	Control
Proximate factors		
Contraceptive Use	1=Not Using 2=Using (Ref)	Control
Months of Breastfeeding	1=Never Breastfed 2=1 to 6 Months 3=7 to 59 Months (Ref)	Control

CHAPTER THREE: DATA AND METHODOLOGY

3.1 Introduction

This chapter examines the sources of data, selection of birth intervals and the methods of analysis that were employed on the data.

3.2 Data Source

The data used in this study is drawn from the Kenya demographic and health survey (KDHS) 2008/2009. The Kenya Demographic and Health Survey (KDHS) is a national survey that Kenya conducts every five years. It was designed to provide data to monitor the population and health situation in Kenya. The Women's Questionnaire was used to capture information from all women age 15-49 years and covered the following topics: respondent's background characteristics (e.g., education, residential history, media exposure).

- Reproductive history
- Knowledge and use of family planning methods Breastfeeding Fertility preferences
- Husband's background characteristics and woman's work
- Marriage and sexual activity
- Infant and child feeding practices
- Childhood mortality

The study used the child file and focused on the children born in the last five years prior to survey utilizing birth history covering live births for each woman in last five years. The child file has information for each individual child. This includes; the survival status of the child at the time of the survey previous birth interval, succeeding birth interval following next birth, breastfeeding, age of the mother, education, residence, her use of contraception.. However information on breastfeeding was only available for the last child. The analysis will also be restricted to children whose mothers were married at time of survey.

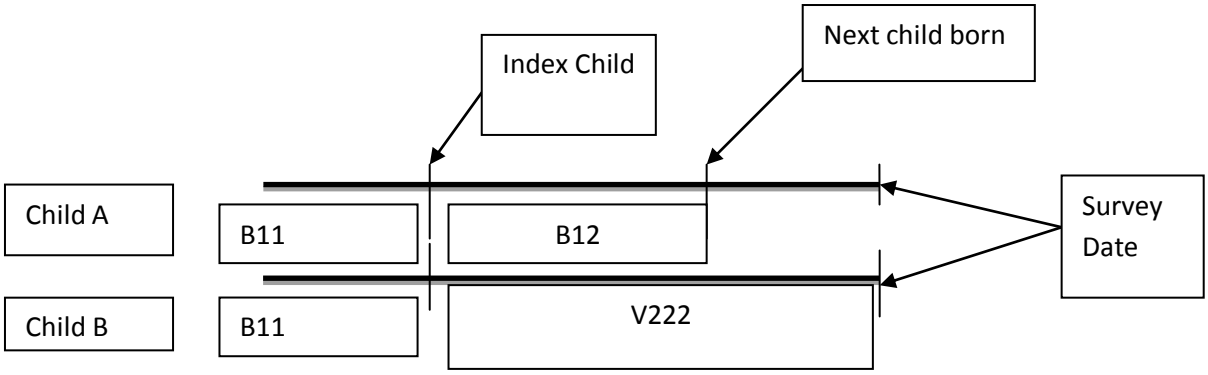
3.3 Selection of Birth Intervals for Analysis

Birth interval analysis is usually faced with two major problems, the problem of selectivity and censoring. Censoring arises in the cases where the birth intervals that are measured by intervals between successive live births (closed intervals) are often biased as some of the women have completed childbearing while others are still engaged in childbearing or haven't completed childbearing. Therefore observations from such women are censored by the date of the survey. In this study the problem of censoring is resolved by the use Cox hazard regression which usually combines information from both the open and closed birth intervals.

The study utilises intervals that were initiated in the last five years of the survey. The study also excluded birth intervals of higher order births thereby utilising birth intervals from order 3 to order 7+ to eliminate the bias of intervals that began many years before the survey.

The analysis for this study is restricted to both closed and open birth intervals particularly the last closed and open birth interval. The last closed birth interval was described as the difference in months between the index birth and the following birth (B12 Succeeding birth interval) and in the case where the woman didn't have another birth the duration to the next birth is measured from the date of the birth of last child to the survey date (v222). The open interval is described as a birth that does not have a succeeding birth. The figure below illustrates how the birth intervals were selected.. In the DHS the last closed birth interval is represented by the variable B12 (succeeding birth interval) and for child A the woman had a closed birth interval since there was a succeeding birth after the index child. In the case where the woman did not have a closed birth interval like in the case for child B, the last birth to the interview (V222) was used and this meant that the woman had an open interval.

Figure 3.1 Selection of Birth Intervals



1) Child A has a closed interval measured by B12 (variable code in DHS programs).
2) Child B no child is born so has an open birth interval measured by V222 (variable code)

In this study there were 6414 closed birth intervals and 3169 open intervals giving a total of 9583 closed and open intervals.

3.4 Data Quality

The information utilized is derived from birth history. However, there often data issues that arise from birth history data. One of them is reporting of ages of the children and possible omission of births or deaths. About 95 per cent of cases had year and month information about 5 per cent had either, year or age or month imputed. The completeness of information was high enough to enable analysis of factors influencing birth intervals. However, Completeness does not necessarily imply accuracy of information however, periodic assessments by MEASURE evaluation (Pullum, 2008) to monitor quality of data suggest despite minor displacements of births and deaths, and data from birth history is of high quality to enable analysis of birth interval data. In addition, birth dates of children are imputed if missing and therefore birth dates do not have missing values (Rutstein, and Rojas, 2006).

Table 3.1: Completeness of Age Information.

	Frequency	Percent	Valid Percent	Cumulative Percent
Month and year	9117	95.1	95.1	95.1
Year and Age – Month Imputed	364	3.8	3.8	98.9
Year - Age, Month Imputed	80	.8	.8	99.8
Age – Year , Month Imputed	15	.2	.2	99.9
Month –Age , Year Imputed	1	.0	.0	99.9
None - All Imputed	6	.1	.1	100.0
Total	9583	100.0	100.0	

Assessment of data quality was also done on birth intervals by the use of variable B15 which checks whether a woman omitted a birth in-between the birth intervals. A frequency distribution was undertaken and results are shown in table 3.2 below. Out of 9583 cases less than one per cent (0.9) was found to have omitted a live birth between the births and 0.2 per cent of cases were missing. The ones with omitted births were however corrected for in the final data set that is used.

Table 3.2: Omission of a Live Birth Between Birth Intervals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9483	99.0	99.1	99.1
	Yes	82	.9	.9	100.0
	Total	9565	99.8	100.0	
Missing	9	18	.2		
Total		9583	100.0		

3.5 Methods of Analysis

This section describes the methods of analysis utilised in this study. The analysis was undertaken at 3 stages frequency distributions, bivariate and multivariate cox regression.

3.5.1 Frequency Distributions

This was used to examine the distribution of the open and closed birth intervals by the background characteristics of the child and her mother.

3.5.2 Bivariate Analysis

The bivariate analysis involves the use of the Cox regression to examine the effect of each variable on the probability of having another birth.

3.5.3 Multivariate Analysis

Cox hazard regression was used to examine the risk of having another birth given the survival status of the previous child while controlling for the socioeconomic and demographic factors. Cox hazard regression is used to estimate the hazard of an event occurring at a particular time *t,* given that the event did not yet occur (probability of having another birth). In this study this will refer to the risk or hazard of having live birth (t) months since last birth. Larger values of the hazard function usually indicate greater potential for the event to occur.

Cox hazard regression is useful for modelling the time to a specified event based on the values of given covariates. It assesses the relationship between survival time and the covariates and one is able to compare survival time between two or more groups. Cox regression also takes into account the problem of censoring, censoring involves the Intervals that began before the start of the survey and haven't had another birth interval before the date of the survey.

Cox hazard regression is denoted by a baseline hazard function λ_0 (t) which represents the hazard for a person with the value 0 for all the predictor variables then:

λ (t)=f(t)/s(t)

where f(t) are the failures at t, and S(t) is the survival function which in this study will be the number of women who gave birth t months earlier who haven't had another birth.

The model proposed by Cox assumes that the risk can be related to the independent variables in a log linear manner. $\boldsymbol{\lambda(t,x)=\lambda_0(t)e^{xt}\beta}$ therefore this translates to ;

$\boldsymbol{Ln((h(t)/h_0(t))=\beta_1x_1+\beta_2x_2+\ldots\ldots+\beta_kx_k}$

Whereby $(h(t)/h_0(t)$ is the baseline hazard ratio and is regarded as the relative risk of the event occurring at a given time t and x represents the set of variables to which the risk is assumed to depend on while $b_1$and b_k the coefficients that are estimated using the maximum likelihood. Cox regression and can be interpreted in a similar manner to that of the multiple logistic regression.

One of the assumptions of the hazard regression is that the hazard for any individual is a fixed proportion of the hazard of any individual .e.g. if λ_0 (t) is the hazard function for a subject with all the predictor values equal to zero and λ_1(t) is the hazard function for a subject with other values for the predictor variables, then the hazard ratio depends only on the predictor variables and not on time t. This means that if a covariate doubles the risk of the event on day one, it also doubles the risk of the event on any other day.

CHAPTER FOUR: EFFECT OF INFANT MORTALITY ON FERTILITY

4.1 Introduction

This chapter provides a distribution of closed and open birth intervals birth intervals across all the variables and also a bivariate and multivariate analysis of the effect of infant mortality on the main independent variables using Cox hazard regression.

4.2 Distribution of Closed and Open Birth Intervals

Table 4.1 presents distribution of closed and open birth intervals by background characteristics of the child and her mother. There were 6414 closed birth intervals and 3169 open birth intervals. However there are discrepancies in the number of cases which are caused by variables that have missing values. In terms of the survival status of the child, 20 per cent of the children dead were for women that had open intervals (no child born after them) while about 80 per cent were in the closed birth intervals. Thirty four percent of the children that were alive were for women that had open intervals while 65.6 per cent were for women with closed birth intervals.

Thirty nine per cent of the open birth intervals were for children whose mothers resided in low fertility regions while 60 per cent had closed birth intervals. About 31 per cent of open intervals were for children whose mothers resided in high fertility regions. Children of birth order 3-4 had a higher proportion of closed intervals.

Table 4.1: The Distribution of the Birth Intervals by Background Characteristics of the Child

Variables		**Open Intervals (%) N=3169**	**Closed Intervals (%) N=6414**
Survival Status of Child	Dead	6	11
	Alive	94	89
Birth Order	3-4	49	58
	5-6	28	28
	7+	23	14
Region	Low Fertility	30	23
	High Fertility	70	77

Demographic Factors			
Age Group of the Mother at Birth of Child			
	<20	1	3
	20-34	71	86
	35	28	10
Previous Birth Interval	<2 years	24	39
	2-3 years	29	32
	>3 years	47	29
socioeconomic			
Education of Mother	None	23	33
	Primary	56	55
	Secondary +	21	12
Wealth Index	Poor	65	78
	Non poor	35	22
Place of Residence	Rural	81	89
	Urban	19	11
Proximate Determinants			
Contraceptive Use	Not Using	58	66
	Using	42	34
Months of Breastfeeding			
	Never Breastfed	68	32
	1 to 6 Months	81	19
	7 to 59 Months	69	31

44 per cent of the children in birth order 7+ had open intervals while 55.2 per cent had closed birth intervals. 12 per cent of the children born to women aged less than 20 years at the birth of their children had open birth intervals while about 87 per cent had closed birth intervals. 29 per cent 0f the children born to women aged between 20 and 34 years had open intervals while 70 per cent had closed birth intervals. Children born to women aged 35 years and above had 57 per cent of the open intervals while 42 per cent of them had closed birth intervals.

29 per cent of open the intervals were for children born to women with no education while 74 per cent had closed intervals. 33 per cent of the open intervals were for children born to women with primary complete education while 67 per cent had closed birth intervals. 45 per cent of the open intervals were for children born to women with secondary + education while 55 per cent had closed birth intervals. In terms of wealth index 29 per cent of the open intervals were amongst children born to poor women and 71 per cent had closed intervals. Children born to women who were non-poor had 44 per cent open intervals while 56 per cent had closed intervals. Children born to women in rural areas had 31 per cent open intervals while 69 per cent were closed intervals and children born to women in the urban areas had 45% per cent open intervals while 55 per cent were closed birth intervals.

Children whose mothers did not use contraceptives had 31 per cent of the open intervals while 70 per cent of the intervals were closed. 38 per cent of the open birth intervals were for children born to mothers who were using contraceptives while 62 per cent of the intervals were closed. 68 per cent of the open birth intervals were amongst children born to women who never breastfed were while 32 per cent of the intervals were closed. Among children whose mothers' breastfed for between 1 to 6 months 81 per cent of the birth intervals were open while 19% of the intervals were closed. Amongst children whose mothers' breastfed for between 7 to 59 months 69 per cent of the birth intervals were open while 31 per cent of intervals were closed.

23 per cent of the open birth intervals were amongst children with a preceding birth interval less than 2 years while 87 per cent of the birth intervals were closed. 31 per cent of the open birth intervals were amongst children with a preceding interval of between 2 to 3 years while 69 per cent of the intervals were closed. Forty five per cent of the open birth intervals and 55 per cent of the closed birth intervals were for children with a preceding birth interval of more than 3 years.

4.3 Bivariate Analysis of Factors Influencing the Risk of Another Birth

In order to test for the effect of each independent variable on the risk of having another birth, Cox proportional hazards regression models was fitted and results presented in Tables 4.2 below. From the bivariate analysis all of the variables were significant**.**

According to the survival status of the child, the risk of having another birth is higher when the child is dead compared to when the child is alive. In terms of birth order women in birth order 3-4 and 5-6 have a higher risk of having another birth compared to women in birth order 7+. Women in the low fertility region are 0.6 times less likely to have another birth compared to women in the high fertility region. When it comes to age of the mother, younger women i.e. less than 20 years have a higher risk (2.3 times) of having another birth compared to women of age 35+ years while women aged between 20-34 years are 1.8 times more likely to have another birth compared to women aged 35 years and above. Women with a short preceding birth interval less than 2 years are 1.7 times more likely to have another birth compared to women with a preceding birth interval of more than 3 years while women with a preceding birth interval between 2-3 years are 1.5 times more likely to have another birth compared to women with preceding birth interval of more than 3 years.

Table 4.2 Bivariate analysis factors influencing the risk of another child(fertility)

VARIABLE	B	S.E	Significance	EXP (B)
Survival Status of Child Child Alive (Ref) Child Dead	.386	0.40	0.000	1.471
Birth Order 7+ (Ref) 3-4 5-6	.270 .223	.037 .041	0.000 0.000	1.310 1.250
Region High Fertility (Ref) Low Fertility	-.397	.030	0.000	.672

Demographic Factors				
Age of Mother at Birth of Child 35+ (Ref) <20 20-34	 .841 .608	 .081 .041	 0.000 0.000	 2.318 1.836
Preceding Birth Interval >3 years (Ref) < 2 years 2-3 years	 .502 .391	 .031 .032	 0.000 0.000	 1.652 1.478
Socioeconomic Factors				
Education of the Mother Secondary+ (Ref) None Primary Complete	 .696 .437	 .042 .039	 0.000 0.000	 2.006 1.549
Wealth Index Non Poor (Ref) Poor	 .512	 .030	 0.000	 1.668
Place of Residence Urban (Ref) Rural	 .399	 .039	 0.000	 1.491
Proximate Factors				
Contraceptive Use Using (Ref) Not Using	 .328	 .026	 0.000	 1.389
Months of Breastfeeding 7 to 59 Months (Ref) Never Breastfed 1 to 6 Months	 .651 .792	 .154 .110	 0.000 0.000	 1.918 2.208

Women who have no education are 2 times more likely to have another birth compared to women with secondary and above education while women with primary education are 1.5 times more likely to have another birth compared to women with secondary and above education. Poor women are 1.7 times more likely to have

another birth compared to women who are non-poor. Women who reside in rural areas are 1.5 times more likely to have another birth compared to women residing in urban areas. Women who do not use contraceptives are 1.4 times more likely to have another birth compared to women who use contraceptives. Women who breastfed for a short duration (1 to 6 months) are 2.2 times more likely to have another birth compared to women who breastfed for long (7 to 59 months).

4.4 The Effect of Infant Mortality on the Risk of Having Another birth Controlling for Fertility Region and Birth Order

In order to test whether effect of infant mortality on fertility varies by level of fertility and parity, Cox proportional hazards regression models were fitted and results presented in Tables 4.3 and 4.4 respectively.

In this regression breastfeeding duration and previous birth interval were not included which are factors that affect child survival as well as fertility. The risk of having another birth is high if the child is dead compared to when the child is alive in all the regions and parities except at higher parities in the low fertility region.

In birth order 3-4 the risk of having another birth was 1.2 times more likely to occur when the child is dead compared to when the child is alive in the high fertility region while in the low fertility region the woman is 1.5 times more likely to have another birth when the child is dead compared to when the child is alive. Younger women are more likely to have another birth in both regions in birth order 3-4 though the risk is much higher in the low fertility region than in the high fertility region. In the high fertility region the risk of having a birth was the same for both the women aged less than 20 and those aged between 20-34 years (2.4 times). In the high fertility region the risk of having another birth was 2.8 times higher amongst the women aged less than 20 years compared to the women aged 35+ years.

In parity 5-6 women aged between 20-34 years are more likely to have another birth compared to women aged 35+ in both regions though women in high fertility region had a slightly higher risk (1.7 times more) compared to the women of the same age group in the low fertility region (1.5 times). In parity 7+ age wasn't significant.

Table 4.3: Cox Proportional Hazards Regression on the Risk of Having Another Child Controlling Region and Birth Order

	Birth Order					
	3-4		**5-6**		**7+**	
VARIABLE	High Fertility Region	Low Fertility Region	High Fertility Region	Low Fertility Region	High Fertility Region	Low Fertility Region
Survival Status of Child (Child Alive Ref) Dead	1.237**	1.548**	1.412**	1.615**	1.447 **	1.514
Age Group of Mother at Birth of Child(35+ ref) <20 20-34	2.490** 2.495**	2.879** 2.623**	1.926 1.425	1.743** 1.500**	n/a 1.519	n/a 1.136
Education of Mother (Sec+) None Primary Complete	1.571** 1.293**	1.691** 1.486**	1.595** 2.020**	1.570** 1.306**	1.292 .927	1.087 1.096
Wealth Index (Non-poor Ref) Poor	1.405**	1.416**	1.449**	1.261	1.185	1.132
Place of residence (Urban ref) Rural	1.239**	908	1.078	1.404	1.108	.919
Contraceptive Use (Using Ref) Not Using	1.033	1.395**	1.123	1.210	1.145	1.938**

** means p<.05

Women with no education have a higher risk of giving birth compared to women with secondary+ education in both regions. In the high fertility region women with no education are 1.6 times more likely to have another birth compared to women with secondary+ education while women with primary education are 1.3 times more likely to have another birth compared to women with secondary+ education. Women in the

low fertility region with no education are 1.7 times more likely to have another birth compared to women with secondary+ education while women with primary education are 1.4 times more likely to have another birth than women with secondary+ education. In birth order 5-6 women with no education have a higher risk of having another birth compared to women with secondary + education in both regions. Education wasn't significant in birth order 7+.

Poor women are 1.4 times more likely to have another birth than non-poor women in both fertility regions in birth order 3-4. In birth order 5-6 poor women in the high fertility region had a higher risk of having another birth than non-poor women. Wealth index wasn't significant in birth order 7+.

Place of residence was not significant across parities in both regions except for parity 3-4 where the risk of having another birth was higher amongst women living in rural areas compared to urban women. Contraceptive use was also not significant in the high fertility areas in all the birth orders except for parity 3-4 and 7+ where the risk of giving birth was higher for people who do not use contraception in the low fertility regions.

4.5 The Effect of Infant Mortality on the Risk of Having Another Birth Controlling for Birth Order

Table 4.4 shows the results of the hazard/risk of giving birth following a child death by birth order. The hazard/risk of giving birth was present across the birth orders though it was stronger at higher birth orders. In birth order 3-4 the risk of having another birth was 1.3 times more likely to occur when the child is dead compared to when the child is alive. In birth order 5-6 the risk of having another birth was 1.4 times more likely to occur when the child is dead compared to when the child is alive. This also confirms our second hypothesis that the effect does vary by parity.

Women in the low fertility region are 0.7 times less likely to have another birth compared to women in the high fertility region. This was the same in birth order5-6 however in birth order 7+ fertility regions were not significant.

Table 4.4: Cox proportional hazards regression on the risk of having another birth controlling for birth order only

	Birth Order		
Variables	**3-4**	**5-6**	**7+**
Survival Status of Child (Child Alive Ref) Dead	1.292**	1.440**	1.449**
Region (High Fertility Region Ref) Low Fertility Region	.714**	.885**	.854
Demographic Factors			
Age Group of Child (35+ Ref) <20	2.614**	1.737	n/a
20-34	2.579**	1.654**	1.515**
Socioeconomic factors			
Education of mother (Secondary+ Ref) None	1.597**	1.697**	1.252
Primary Complete	1.340**	1.375**	1.109
Wealth Index (Non-poor Ref) Poor	1.420**	1.389**	1.198
Proximate Factors			
Place of Residence (Urban Ref) Rural	1.129**	1.153	1.058
Contraceptive Use (Using Ref) Not Using	1.125**	1.148**	1.251
** means p<.05			

Younger women are more likely to have another birth in birth order 3-4 compared to older women aged less than 20 and those aged between 20 and 34 were 2.6 times more likely to have another birth compared to women aged 35+. In parity 5-6 women aged between ages 20 and 34 are 1.7 times more likely to have another birth than women aged 35+ this was also evident in birth order 7+ where women aged between 20-34 were more likely to have another birth compared to women aged 35+.

Women with no education are 1.6 times more likely to have another birth compared to women with secondary+ education while women with primary complete education are 1.3 times more likely to have another birth compared to women with secondary education in birth order 3-4. In birth order 5-6 women with no education and those

with primary complete are 1.7 and 1.4 times more likely to have another birth compared to women with secondary education. In birth order 7+ education wasn't significant.

Poor women are more likely to have another birth across all the birth orders except for birth order 7+ where the wealth index isn't significant. i.e. 1.4 times more likely for both birth order 3-4 and 5-6.women in rural areas are also more likely to have another birth compared to women in urban areas in birth order 3-4 while in birth order 5-6 and 7+ place of residence wasn't significant.

Women who do not use contraception are more likely to have another birth compared to women who use contraception both in parity 3-4 and 5-6 but contraceptive use wasn't significant in parity 7+.

4.6 The Effect of Infant Mortality on the Risk of Having Another Birth Controlling for Birth Order

The effect of infant mortality was analysed with the inclusion of breastfeeding duration and previous birth interval. This was to test whether the effect of child mortality occurs through these factors. The results of the analysis are presented in Table 4.5 and 4.6 below.

From the results in Table 4.5 below (detailed results are in appendices 1a, 2a, 3a), the survival status of the child was not significant in all the birth orders. Women in parity 3-4 and residing in the low fertility region are 0.8 times less likely to have another birth while fertility region wasn't significant in parity 5-6 and 7+.

Table 4.5: The effect of infant mortality on the risk of having another birth controlling for birth order

Variable	Birth Order		
	3-4	**5-6**	**7+**
Survival Status of Child (Alive Ref)			
Dead	1.457	1.038	1.027
Fertility Region (High Fertility Region Ref)			
Low Fertility Region	.757**	.909	1.143
Demographic Factors			
Age of Mother at Birth of Child (35+ Ref)			
< 20	2.749**	8.260**	n/a
20-34	1.734**	1.892	1.660**
Preceding Birth Interval (> 3 years Ref)			
< 2 years	2.034**	1.941**	1.215
2-3 years	1.337**	1.446	.866
Socioeconomic factors			
Education of the Mother (Secondary+ Ref)			
None	1.231	.999	.952
Primary Complete	1.359**	1.311	.911
Wealth Index (Non- poor Ref)			
Poor	1.478**	1.235	1.319
Place of Residence (Urban Ref)			
Rural	.944	.505**	.977
Proximate Factors			
Contraceptive Use (Using Ref)			
Not Using	1.361**	2.476**	1.788**
Duration of Breastfeeding (7 to 59 months Ref)			
Never Breastfed	1.203	3.672	2.714
1 to 6 Months	2.039**	2.758**	1.562
2 log likelihood	5117.412	898.220	1711.195

** means p<.05

Women aged less than 20 years had a higher risk of having another birth compared to women aged 35 and above in the earlier parities i.e. 3-4 and 5-6. In parity 5-6 women aged between 20 to 34werent significant. However at higher parities women aged

between 20 and years 34 had a higher risk of having another birth compared to women aged 35+. Preceding birth intervals that were less than 2 years had a higher risk of having another birth compared to women who had intervals longer than 3 years in parity 3 to 4 and 5 to 6. Women with preceding birth intervals of between 2 to 3 years had a high risk of having another birth in the birth order 3-4. However at higher parities preceding birth interval wasn't significant.

In all the parities education wasn't significant except for the birth order 3-4 where women with primary complete have a higher risk of having another birth compared to women with at least some education. The wealth index wasn't significant across the birth orders except for the birth order 3-4 where the non-poor women had a higher risk of having another birth compared to the non-poor women. Place of residence was not significant except for birth order 5-6 where women from the rural areas had a higher probability of having another birth compared to women in the urban areas.

Contraceptive non- use was significant in all the birth orders whereby women who do not use contraceptives have a higher risk of having another birth than women who use contraceptives in all the parities.

In parity 3-4 women who breastfed from between 1 to 6 months had a higher risk of having another birth compared to women who never breastfed and those who breastfed for more than 6 months in all the parities.

From these results it appears that the mortality effect may be acting through breastfeeding. In Table 4.4, the survival status was significant across all the birth orders but in Table 4.5 the effect was not significant. The survival status of the child was not significant in all the birth orders thereby signifying that the effect may be seen through cessation of breastfeeding and the lack of contraceptive use this may suggest the existence of both the biological and replacement effects in all the parities.

4.7 The Effect of Infant Mortality on the Risk of Having Another Birth Controlling for Fertility Region and Birth Order

In order to test whether effect of infant mortality on fertility varies by level of fertility and parity, Cox proportional hazards regression models were fitted and results are

presented in Table 4.6 (detailed results are in appendices 1b, 1c, 2b, 2c, 3b, 3c). The purpose of this analysis was to check whether the effect of infant mortality may be acting through breastfeeding.

The survival status of index child was not significant in both regions and also across the birth orders.

Table 4.6: The effect of infant mmortality on the risk of having another birth controlling for fertility region and birth order

Variable	**Birth Order**					
	3-4		**5-6**		**7+**	
	High fertility	**Low fertility**	**High fertility**	**low fertility**	**High fertility**	**Low fertility**
Survival Status of Child Child alive (Ref) Dead	1.572	1.038	1.040	2.794	1.027	n/a
Demographic Factors						
Age group of Mother at Birth of Child (35+ Ref) < 20 years 20-34 years	2.557** 1.672	8.260** 1.892	1.440 1.857**	2.095	n/a 1.660**	n/a 2.128
Preceding Birth Interval (>3 years Ref) < 2 years 2-3 years	1.944** 1.233	1.941** 1.446	1.528** 1.640**	3.287** 3.245**	1.215 .866	1.370 .947
Socioeconomic Factors						
Education of Mother (Secondary+ Ref) None Primary Complete	1.400 1.502**	.999 1.311	.944 1.021	1.811 1.212	.911 2.087	.952 2.757
Wealth Index (Non -poor Ref) Poor	1.626**	1.235	2.207**	1.393	1.319	1.449
Place of Residence (Urban Ref) Rural	1.141	.505**	.823	2.205	.977	.301

Proximate Determinants						
Contraceptive Use (Using Ref)						
Not using	1.191	2.476**	1.411**	1.793	1.788**	2.190
Duration of Breastfeeding (7 to 59 Ref)						
Never Breastfed	1.021	3.672	1.481	1.493	2.714**	n/a
1-6 Months	1.811**	2.758**	2.064**	7.442**	1.562	5.643**
2log likelihood	3770.098	898.220	2624.513	307.031	1711.195	209.375

** means p< .05

Women aged less than 20 years had a higher risk of having another birth compared to women aged above 35 years in both regions. In parity 3-4 women between the ages of 20 to 34 were not significant in both regions and in parity 5-6 women aged less than 20 years were also not significant in both regions. In parity 3-4 women in the low fertility regions had a higher risk of having another birth than women in the high fertility region in both age groups while in parity 5-6 and 7+ women aged between 20 and 34 years in the high fertility regions had a higher risk of having another birth compared to women in the low fertility region.

Preceding birth interval was significant in all the birth orders and also in both regions. In parity 3-4 and 5-6 women who had preceding birth intervals that were less than 2 years had a higher risk of having another birth compared to women with preceding intervals between 2-3 years in both fertility regions and in parity 3-4 and 5-6. Preceding intervals between 2-3 years were not significant in parity 3-4.The risk of having another birth was higher in the low fertility regions than in the high fertility regions in the earlier and middle parities. However in the higher parity preceding birth interval was not significant in both regions.

Education was not significant except for women with primary complete education and residing in the high fertility regions who have a higher risk of having another birth compared to women with secondary and above education. Wealth index was only significant in the first 2 parities in the high fertility region where poor women in high fertility regions had a higher risk of having an additional birth compared to non -poor women. Place of residence was not significant in both regions and in all the parities

except for parity 3-4 low fertility region where women living in the rural areas had a higher risk of having another birth.

In parity 3-4 contraceptive use was only significant in the low fertility region where women who do not use contraceptives have a higher risk of having another birth compared to women who use contraceptives and in parity 5-6 women who do not use contraceptives and reside in the high fertility region have a higher risk of having another birth compared to women who use contraceptives. In the higher parity women in the high fertility region and aren't using contraceptives have a higher risk of having another birth compared to women who use contraceptives.

Women who breastfed for between 1 to 6 months had a higher risk of having another birth compared to women who never breastfed and those who breastfed for more than 6 months in the first two parities. However women in the low fertility regions and who breastfed between 1 to 6 months had a higher risk compared to women in the high fertility region who breastfed for the same duration. In parity 7+ women in the high fertility region who never breastfed have a higher risk of having another birth compared to women who breastfed for between 1 to 6 months while in the low fertility region women who breastfed for between 1 to 6 months had a higher risk of having another birth compared to women who breastfed for more than 6 months.
From these results it appears that the mortality effect may be acting through breastfeeding which confirms the findings in Table 4.5. In Table 4.3, the survival status was significant across all the birth orders and in all fertility regions but in Table 4.6 the survival status wasn't significant.

4.8 Discussion

From the results of the analysis, the effect of infant mortality on fertility was present in all the birth orders and also in both regions. However the magnitude of the effect varied in the two fertility regions. In the low fertility regions the risk of having another birth was found to be higher compared to the high fertility region this is seen in Tables 4.3 and 4.6. However, when breastfeeding and previous birth interval were included in the analysis, the effect of infant mortality disappears. This suggests that the effect of infant mortality is confounded by these two variables.

When analysis (Table 4.3 and 4.4) was undertaken without the inclusion of breastfeeding the effect of survival status of index child in influencing the probability of having another birth was most important whereby the risk of having another birth was higher when the child was dead compared to when the child was alive in both fertility regions and also across all birth orders with women in the low fertility region having a higher risk. However with the introduction of breastfeeding (Table 4.5 and 4.6) the effect of infant mortality on the probability of having another birth was accounted for by differences in duration of breastfeeding where in cases where the breastfeeding duration was short the risk of having another birth was higher in both regions and also across birth orders. These results are similar to previous studies in Kenya such as Kimani, (1992) and Gymah and Fernando, (2002).

The effect of infant mortality on fertility accounted for by duration of breastfeeding and contraceptive non-use in the first two parities and also in both fertility regions may suggest the existence of both behavioural and biological effects brought about by the cessation of breastfeeding and the non-use of contraception.

When the birth order was controlled for, women with short breastfeeding duration and also short preceding birth intervals in parity 3-4 and 5-6 had a higher risk of having another birth this may suggest the existence of behavioural effects brought about by cessation of breastfeeding and also short preceding birth intervals that are below 2 years (24 months) which may be indicative of past fertility behaviour and also the effect of previous child deaths. These are similar to Agwanda, (1999) whereby short preceding intervals that are less than 18 months and may be equated to symbolise replacement effects since it may be acting as a proxy for previous child deaths and also past fertility behaviour of the woman. However at higher parities the breastfeeding duration and the preceding birth interval were not significant.

The age of the mother was also found to be significant in all the parties. At lower parities women aged less than 20 years were observed to have a higher risk of having another birth compared to older women. However at higher parities women aged between 20 and 34 had a higher risk of having another birth compared to women aged 35 and above and also those aged less than 20 years. This may be explained by the fact that with the increase in age the higher risk women may select themselves and

proceed to the next parities while the low risk women remain at the same parity or take a longer time to the next parities (Agwanda, 1999).

Contraceptive non-use and the cessation of breastfeeding by women across the parities as seen in Table 4.5 may be indicative of the replacement effect since the non-use of contraception and the cessation of breastfeeding may represent motivation from the woman to have another birth following a child death (Park e.t. al., 1996; Mensch, 1985).

CHAPTER FIVE: SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter is divided into 3 sections. The first section summarizes the study its design and implementation. The second section involves a summary of the key findings and conclusions drawn from the key findings and the last section will involve recommendations for both policy and research that can be drawn from the findings of the research.

5.2 Summary

This study examined whether the effect of infant mortality on fertility may vary according to the level of fertility and also across the different parities. Several studies have in the past examined the effect of infant mortality on fertility in Kenya however none has looked at whether the effect may vary by the level of fertility and also by parity. The study set out to achieve two main objectives:

1) Whether the effect of infant mortality depends on the level of fertility.
2) Whether the effect of infant mortality on fertility varies by parity.

The conceptual framework used for this study was based on the Bongaarts framework for analysing fertility. The method of analysis employed in this study was the Cox hazard regression. The effect of infant mortality on fertility was found to be present in both fertility regions and across the parities when duration of breastfeeding and length preceding birth interval were not included in the analysis. The effect was also found to vary according to parity where at higher parities the effect of infant mortality varies by the level of fertility region and at lower parities the effect was present in both fertility regions. There are variations in the magnitude of the effects whereby women in the low fertility region had a higher odds ratio/risk of having another birth compared to women in the high fertility region.

On the inclusion of breastfeeding and previous birth interval in the analysis, effect of infant mortality ceased to be significant. Women who breastfed for short durations had a higher risk of having another birth in both the fertility regions and also across the birth order. Women with short preceding birth intervals were also significantly related to the risk of having another birth in both fertility regions and across the

parities. The short breastfeeding duration and the non-use of contraception may be indicative of replacement effect since replacement is usually realised when there is a death of a child and there is non-use of contraception. The inclusion of previous birth interval may a proxy for previous fertility and previous child deaths. Thus effect of breastfeeding and previous interval may suggest both biological and behavioural factors.

5.3 Conclusions

From the results of the analysis the effect of infant mortality on fertility has several implications. At higher parities the effect of infant mortality varies by the fertility level of the region but at lower parities the effect of infant mortality is the same in both fertility regions. In low fertility regions the risk of having another birth was found to be higher compared to the high fertility region.

Breastfeeding was found to be associated with a higher risk of having another birth in both of the fertility regions and also across the parities though with varying magnitudes. This emphasises the effect of cessation of breastfeeding on the higher risk of having another birth. Short preceding birth intervals were also associated with a higher risk of having another birth in both fertility regions and also across the birth orders. There is also evidence of behavioural effects brought about by cessation of breastfeeding and the non-use of contraception which results in a higher risk of having another birth.

These results support the notion that careful considerations are needed before firm conclusions can be made regarding the distinguishing of biological and behavioural effects because of the difficulty in the separation of biological and behavioural effects (Trussell and Olsen, 1983). On the other hand the timing of replacement makes the separation of the net effects of breastfeeding difficult because if breastfeeding is used consciously as a form of contraception then this effect cannot be theoretically separated from replacement (Agwanda, 1999).

It can be concluded that the effect of infant mortality in fertility can be seen through the effect of the proximate determinants mainly breastfeeding regardless of parity and stage in fertility transition. However, since previous birth interval was also an important factor which may be related to previous fertility behaviour.

5.4 Recommendations for Policy

From the findings of this study there is need for the government to put more emphasis on child survival programs that aim not only reducing infant deaths since the death of an infant is related to a higher risk of the woman having another birth. More emphasis should also be placed on exclusive breastfeeding since short breastfeeding durations led to higher risks of the woman having another birth.

5.5 Recommendations for Research

There is also the need for further research on the effect of breastfeeding and amenorrhea and also contraceptive use as this study did not include the two variables because of limitations on breastfeeding data on the specific times of cessation of breastfeeding and the breastfeeding status of all children. The data on contraceptive use was also limiting as there is the need for the specific times in which there was contraceptive use in terms of adoption and discontinuation.

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APPENDICES

Appendix1a: the effect of infant mortality on probability of having another birth in birth order 2

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			16.597	2	.000	
Never breastfed	.185	.271	.464	1	.496	1.203
Breastfeeding for 1 to 6	.713	.176	16.462	1	.000	2.039
Preceding Birth Interval			31.369	2	.000	
< 2 years	.710	.128	30.680	1	.000	2.034
2-3 years	.291	.126	5.311	1	.021	1.337
Survival status of child Child dead	.376	.228	2.738	1	.098	1.457
Contraceptive use Not using	.308	.115	7.210	1	.007	1.361
Fertility region Low fertility region	-.279	.128	4.770	1	.029	.757
Age group of mother at birth of child			8.227	2	.016	
<20 years	1.011	.354	8.169	1	.004	2.749
20-34 years	.550	.274	4.044	1	.044	1.734
Education of the mother			4.507	2	.105	
None	.208	.175	1.407	1	.235	1.231
Primary	.306	.147	4.365	1	.037	1.359
Wealth index poor	.391	.148	6.995	1	.008	1.478
Place of residence Rural	-.058	.168	.117	1	.732	.944

Appendix1b: the effect of infant mortality on probability of having another birth in birth order 2 high fertility region

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			9.200	2	.010	
Never breastfeeding	.021	.299	.005	1	.944	1.021
1 to 6 months	.594	.204	8.512	1	.004	1.811
Preceding Birth Interval			23.027	2	.000	
<2years	.665	.145	21.069	1	.000	1.944
2-3 years	.210	.145	2.092	1	.148	1.233
Age group of mother at birth of child			4.892	2	.087	
<20 years	.939	.455	4.254	1	.039	2.557
20-34 years	.514	.392	1.719	1	.190	1.672
Education of mother			5.757	2	.056	
None	.337	.198	2.897	1	.089	1.400
Primary	.407	.170	5.755	1	.016	1.502
Wealth index						
Poor	.486	.180	7.314	1	.007	1.626
Place of residence						
Rural	.132	.204	.414	1	.520	1.141
Contraceptive use						
Not using	.175	.130	1.819	1	.177	1.191
Survival status Child dead	.452	.254	3.165	1	.075	1.572

Appendix1c: the effect of infant mortality on probability of having another birth in birth order 2 low fertility region

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			8.909	2	.012	
Never breastfeeding	1.301	.787	2.731	1	.098	3.672
1 to 6 months	1.014	.393	6.676	1	.010	2.758
Contraceptive use						
Not using	.907	.246	13.625	1	.000	2.476
Preceding Birth Interval			5.734	2	.057	
< 2 years	.663	.284	5.470	1	.019	1.941
2-3 years	.369	.265	1.932	1	.165	1.446
Age group of mother at birth of child			6.376	2	.041	
< 20 years	2.111	.851	6.153	1	.013	8.260
20-34 years	.638	.400	2.536	1	.111	1.892
Education of mother			1.165	2	.559	
None	-.001	.414	.000	1	.998	.999
Primary	.271	.313	.747	1	.387	1.311
Wealth						
Poor	.211	.294	.518	1	.472	1.235
Place of residence						
Rural	-.683	.333	4.222	1	.040	.505
Survival status of child						
Child dead	.037	.711	.003	1	.958	1.038

Appendix2a: the effect of infant mortality on probability of having another birth in birth order 3

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			8.909	2	.012	
Never breastfed	1.301	.787	2.731	1	.098	3.672
1 to 6 months	1.014	.393	6.676	1	.010	2.758
Contraceptive use						
Not using	.907	.246	13.625	1	.000	2.476
Preceding Birth Interval			5.734	2	.057	
< 2 years	.663	.284	5.470	1	.019	1.941
2-3 years	.369	.265	1.932	1	.165	1.446
Age group of mother at birth of child			6.376	2	.041	
< 20 years	2.111	.851	6.153	1	.013	8.260
20-34 years	.638	.400	2.536	1	.111	1.892
Education of the mother			1.165	2	.559	
None	-.001	.414	.000	1	.998	.999
Primary	.271	.313	.747	1	.387	1.311
Wealth index						
Poor	.211	.294	.518	1	.472	1.235
Place of residence						
Rural	-.683	.333	4.222	1	.040	.505
Survival status of child						
Child dead	.037	.711	.003	1	.958	1.038

Appendix2b: The effect of infant mortality on probability of having another birth in birth order 3 high

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			10.386	2	.006	
Never breastfed	.392	.360	1.190	1	.275	1.481
1 to 6 months	.724	.226	10.255	1	.001	2.064
Contraceptive use Not using	.344	.171	4.070	1	.044	1.411
Preceding Birth Interval			10.125	2	.006	
< 2 years	.424	.167	6.449	1	.011	1.528
2-3 years	.495	.166	8.861	1	.003	1.640
Age group of mother at birth of child			8.627	2	.013	
< 20 years	.365	.745	.239	1	.625	1.440
20-34 years	.619	.212	8.556	1	.003	1.857
Education of mother			.281	2	.869	
None	-.058	.293	.039	1	.843	.944
Primary	.021	.274	.006	1	.939	1.021
Wealth index						
Poor	.792	.245	10.405	1	.001	2.207
Place of residence						
Rural	-.194	.289	.453	1	.501	.823
Survival status of child						
Child dead	.039	.306	.016	1	.899	1.040

Appendix2c. The effect of infant mortality on probability of having another birth in birth order 3 low

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			10.749	2	.005	
Never breastfed	.401	.995	.162	1	.687	1.493
1 to 6 months	2.007	.614	10.689	1	.001	7.442
Contraceptive use						
Not using	.584	.406	2.067	1	.151	1.793
Preceding Birth Interval			7.229	2	.027	
< 2 years	1.190	.513	5.386	1	.020	3.287
2-3 years	1.177	.470	6.279	1	.012	3.245
Age group of mother at birth of child						
20-34	.740	.450	2.706	1	.100	2.095
Education of mother			1.038	2	.595	
None	.594	.707	.706	1	.401	1.811
Primary	.192	.620	.096	1	.756	1.212
Wealth index						
Poor	.332	.458	.525	1	.469	1.393
Place of residence						
Rural	.791	.613	1.661	1	.197	2.205
Survival status of the child						
Child dead	1.027	1.430	.516	1	.472	2.794

Appendix3a. The effect of infant mortality on probability of having another birth in birth order 4

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			4.595	2	.101	
Never breastfed	.998	.534	3.490	1	.062	2.714
1 to 6 months	.446	.277	2.591	1	.107	1.562
Contraceptive use						
Not using	.581	.226	6.637	1	.010	1.788
Preceding Birth Interval			2.782	2	.249	
<2 years	.195	.200	.950	1	.330	1.215
2-3 years	-.144	.216	.447	1	.504	.866
Age group of mother at birth of child						
20-34	.507	.167	9.265	1	.002	1.660
Education of mother			.113	2	.945	
None	-.049	.366	.018	1	.894	.952
Primary	-.093	.349	.072	1	.789	.911
Wealth index						
Poor	.277	.327	.720	1	.396	1.319
Place of residence						
Rural	-.024	.402	.003	1	.953	.977
Survival status of child						
Child dead	.026	.423	.004	1	.950	1.027

Appendix3b. The effect of infant mortality on probability of having another birth in birth order 4 high fertility

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			4.595	2	.101	
Never breastfed	.998	.534	3.490	1	.062	2.714
1 to 6 months	.446	.277	2.591	1	.107	1.562
Contraceptive use						
Not using	.581	.226	6.637	1	.010	1.788
Preceding Birth Interval			2.782	2	.249	
< 2 years	.195	.200	.950	1	.330	1.215
2-3 years	-.144	.216	.447	1	.504	.866
Age group of mother						
20-34	.507	.167	9.265	1	.002	1.660
Education of mother			.113	2	.945	
None	-.049	.366	.018	1	.894	.952
Primary	-.093	.349	.072	1	.789	.911
Wealth index						
Poor	.277	.327	.720	1	.396	1.319
Place of residence						
rural	-.024	.402	.003	1	.953	.977
Survival status of child						
Child dead	.026	.423	.004	1	.950	1.027

Appendix3c. The effect of infant mortality on probability of having another birth in birth order 4 low fertility

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
Months of breastfeeding			5.196	2	.074	
Never breastfed	18.673	199.746	.009	1	.926	n/a
1 to 6 months	1.730	.760	5.188	1	.023	5.643
Contraceptive use						
Not using	.784	.562	1.945	1	.163	2.190
Preceding Birth Interval			.636	2	.728	
<2 years	.315	.534	.347	1	.556	1.370
2-3 years	-.054	.539	.010	1	.920	.947
Age group of mother						
20-34	.755	.546	1.910	1	.167	2.128
Education of mother			.761	2	.684	
None	1.014	1.256	.651	1	.420	2.757
Primary	.736	1.190	.382	1	.536	2.087
Wealth index						
Poor	.371	.769	.233	1	.630	1.449
Place of residence						
Rural	-1.199	.991	1.465	1	.226	.301
Survival status of child						
Child dead	-12.977	199.739	.004	1	.948	.000