DEMOGRAPHIC AND SOCIO-ECONOMIC CORRELATES OF UNDER-FIVE MORTALITY RATES IN KENYA

BY

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Dedication

To all young girls out there who, due to ignorance have become mothers before they are physically and physiologically ready.

Declaration

This project is my original work and has not been presented for award of any degree/diploma at any university.

Signature ..Fwachira...

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This project has been submitted for examination with our approval as university supervisors.

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ABSTRACT

The 1993 Kenya Demographic and Health Survey (KDHS) data was analysed using both direct and indirect methods to estimate child mortality rates according to maternal age at first birth, parity and preceeding birth interval. Trussel technique was used for analysis involving maternal age at first birth. Calculations of the proportions dead under - five years among children ever born were done for parity and preceeding birth interval. An attempt was made to explain variations in child mortality rates on the basis of education attainment and type of place of residence of the mother using of simple percentages.

The study found regional differences in under five mortality according to maternal age at first birth, parity and preceeding birth intervals. Education attainment may be correlated to child mortality only when the maternal age at first birth is 20+ years, parity 4+ and at preceeding birth interval in excess of four years. The urban advantage and related influence on child mortality is observed only when age at first birth exceeds 20 years and for preceeding birth interval 4+ years.

The study recommended intensification of education for girls, both formally and non-formally, throughout Kenya to increase participation and completion rates up to secondary level. Further

analysis should be done to determine the strength of correlation between the variables.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The death of a child is the ultimate consequence of a cumulative series of factors. It is never the result of one but all the social, economic, biological and environmental factors operating together. It is therefore a good indicator of socio-economic development and the status of health index of a country. It contributes significantly to total mortality of a developing country. The 1993 KDHS highlighted the differences in child mortality levels in the various provinces of Kenya.

In this study, analysis of under-five mortality rates in all provinces by various maternal demographic factors was done using the 1993 KDHS data. The factors considered are; age of the mother at first birth, parity and preceding birth interval. Young mothers are inexperienced in child care. They are likely to be still in school and their children will be looked after by someone else. The very young mothers are not physiologically ready for child bearing and this immaturity pre-disposes both mother and child to the risk of death. Older women on the other hand may not be in touch with modern child-rearing methods.

They may be too rigid to change to modern methods necessary to enhance child survival.

Short intervals between births are detrimental to the health of the mother and children born at both ends of the intervals (Hennin, 1986). The mother doesn't get enough time to recuperate from birth and replenish her store of nutrients. Having two very young children to care for at a time doesn't leave the mother much time to devote her full attention to either. Short intervals also mean that ovulation resumes and conception occurs more rapidly assuming post-partum abstinence also ceases. There is less breast-feeding, early weaning and an increased mortality risk.

High child mortality rates are found among first births especially for younger mothers and birth orders seven and more (usually older women). High birth orders mean that children are likely to be born to mothers physically worn out. They are likely to be affected by competition from older siblings in terms of food and other family resources. They are also more likely to be cared for by someone other than the mother (Rutstein, 1993).

1.2 Statement of the problem

The 1993 KDHS indicated that child survival in Kenya has not improved much during the last decade. One out of every ten Kenyan children still die before reaching the fifth birthday. Child-bearing begins early in Kenya and one out of every five teenage women has began child bearing with one-quarter of births taking place less that two years after a prior birth (KDHS 1993).

This study aims at finding out the associations of maternal age at first birth, parity and birth interval with under-five mortality in all provinces of Kenya. It also aims at finding out if the influence on under-five mortality by these factors is in any way related to education, region and type of place of residence of the mother.

1.3 Objectives of study

1.3.1 General objectives

a) To investigate the extent to which regional differences in childhood mortality in Kenya may be attributed to variation in maternal demographic factors.

b) To assess if the variations in maternal demographic factors may be related to region of residence, type of place of residence and educational status of the respondents.

1.3.2 Specific Objectives

a) To estimate the probability of dying by age five (5) in each province by age of mother at first birth.

b) To calculate the proportion of children dead by age 5 in each province of Kenya by parity.

c) To calculate the proportion of children dead by age 5 in each province of Kenya by interval preceding births.

d) To analyze the distribution of the respondents in each of the categories of maternal age at first birth, parity and birth intervals according to the usual region and type of place of residence and education attainment.

1.4 Justification of the Study

Freedman (1963) argued that a known mortality is one of the necessary conditions for an effective social policy to reduce population growth. Preston (1978) found that high child mortality rates contribute to high fertility rates and timing of births has important effects on annual fertility as well as maternal and child health and future economic status of the parents (Kathleen Ford, 1989)

Here in Kenya, Kibet (1981) established that the proportion surviving depends on the level of infant and child mortality. If it is established that childhood mortality differentials in Kenya are related to differences in maternal demographic factors, then it is possible to lay strategies to reduce mortality rates and thus reduce high fertility rates. This will also reduce population growth rate which is one of the goals in Kenya's population policies.

1.5 Scope and Limitations

The study will focus only on women who were interviewed for 1993 KDHS. Though the sample was national, it was not exclusive since some districts in N.E. province were not included.

Being secondary, the data has limitations of under and mis-reporting. By sub-dividing the data according to provinces, the number of observations are reduced. Thus when analyzed using procedures meant for large sample sizes, the results may have some variations from the expected. Trussel technique is based on the assumption that fertility rate is constant. This is not so for Kenya where total fertility rates (TFR) declined from 6.7 (1989) to 5.4 (1993). The study does not consider any interrelationship existing amongst the variables like high parity being associated with early maternal age at first birth. Each of the variables is considered independent of the other in the study.

The study ignores differences in socio-economic development in the various provinces of Kenya inspite of the fact that socio-economic development has been found to have a strong influence on maternal factors (Kibet, 1981, Kichamu, 1986, Muhanda, 1988).

CHAPTER 2

LITERATURE REVIEW AND STUDY FRAMEWORK

2.1 Literature Review

The first meaningful statistical analyses of patterns of variation of mortality rates with parity and age of mother based on large samples were carried out by Yerushalmy et al (1945) using white and non-white population data in the United States of America (U.S.A). They found evidence that age of mother and birth spacing had independent effects on mortality. Another major study was carried out in England and Wales by Social Medicine Research unit and General Register office. It was based on 1.5 million children born between 1949 and 1950. Heady et al (1955) showed a similar pattern to that found by Yerushalmy.

Osborne (1972) showed that patterns of mortality according to mother's age and parity are independent of the effects of social class and region. He concluded this after analyzing data from Scotland for 1960-1964. Varva and Querec (1973) observed the same pattern like Osborne's in a study in the U.S.A. Nortman (1974) did a comprehensive review of literature on effects of parental age and birth order on the outcome of pregnancy and child development. Nortman concluded that

observations supported the hypothesis that biological processes are the main determinants of age pattern of reproductive risk while socio-cultural, economic factors determine the degree of risk of mortality.

Hobcraft et al (1983) found that the risk of dying is considerably increased for a child with a sibling born within preceding two years. They were doing comparative studies on several countries using World Fertility survey data. Slightly earlier clusters of poorly spaced births tend to increase the risk of dying for a child. This was confirmed by Cleland and Sathar (1984) in Pakistan. They found that children born after an interval of two years or less since the last birth are twice as likely to die at these ages as those born after four or more years. This, they concluded was due to the presence of a closely spaced older sibling possibly competing with the younger child for food and parental care. Winikoff (1983) stressed the importance of birth spacing for health. She found that childhood mortality has a consistently negative relationship with length of birth intervals and rates decline as intervals increase to over 3 years. Palloni and Tienda (1986) showed that a conception shortly after a birth can trigger hormonal reactions leading to premature diminution of mother's milk.

This ends breast-feeding and increases the risk of death in childhood. They also found that short birth intervals can retard foetal growth resulting in low birth weight and increased death risks.

Palloni and Pinto (1989) asserted that characteristics that entail a relatively higher risks of death were: distribution of births by age of mother at time of birth, birth order and inter-pregnancy intervals. Kashem and Majumder (1991) showed that birth intervals and subsequent pregnancy each have independent influence on early mortality risks. Boerma and Bicego (1992) showed that birth intervals greater than three years enhanced survival chances of children. They asserted that short intervals caused an overlap of gestation and lactation which is stressful to the mother and child. This stress may increase the risk of not attending pre-natal care as there is a young child to take care of. Socio-cultural reasons like embarrassment at being pregnant too soon may also affect attendance.

Here in Kenya, Mott (1982) found a significant variation in infant mortality rates by birth order and sex of the child. He used the KFS 1977/78 data. He found that the highest rates were among the first births and again at higher parities of seven and over and the most significant reductions in infant and child

mortality rates occurred amongst women with no education. He also observed regional differences in rates of child mortality with Nyanza Province having the highest and Central the lowest rates. Kichamu (1986) observed a general decline in levels with increase in mother's education. Muhanda (1988) found that exogenous factors like age at marriage, education and parity are significant determinants of mortality in Kenya.

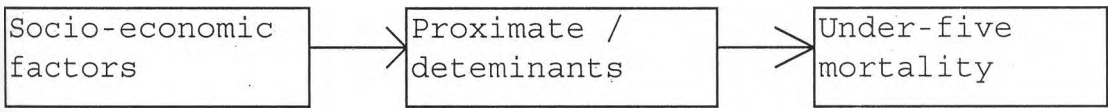
Several other surveys have identified children most at risk of dying as those whose mothers are; very young, older women as well as those with many children and closely spaced births. K'Oyugi (1992), using KDHS (1989) and Rural nutrition survey (1987) data, found that children born by mothers at their prime reproduction ages (20-34) have significantly lower mortality compared to those born to women in non-prime ages (less than 20 years and over 35 years). Birth order was found to be significant in determining the risk of death for under five year children. Birth orders 2 to 5 and over 6 were found to have significantly lower mortality risks compared to those of birth order 1. Births with preceding intervals of twenty four months and over have statistically significant lower mortality rates at 99% confidence level. K'Oyugi based his study on rural Kenya.

Ikamari(1996) using KDHS(1989) data found factors with significant net effects on child mortality to be : Province of residence; preceding birth interval; year of birth of the child; succeeding birth interval; ever-use of modern contraception; household economic status and availability of a toilet facility. These factors had effects in high and low mortality regions.

2.2 **Conceptual Framework**

This is based on Mosley and Chen (1984). According to Mosley and Chen, socio-economic factors must operate through proximate determinants to influence the incidence of disease (morbidity) and even death.

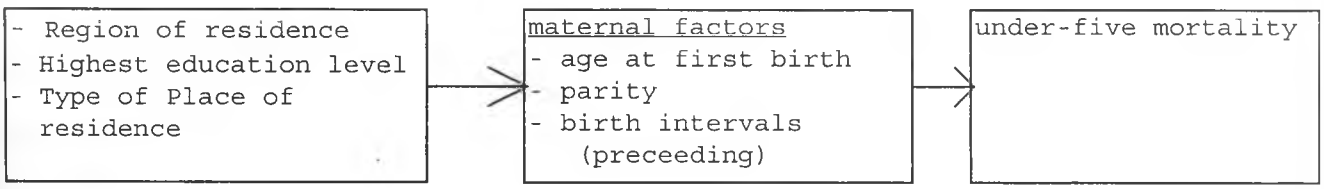
The framework may be represented as:



The proximate/intermediate factors were grouped as: maternal fertility factors, environmental contamination, nutrients deficiency, injury and personal illness control factors. These factors may be individual level variables, household level or community level variables. In this study, the maternal factors studied at individual and provincial level are: age of mother at first birth; parity; preceding birth interval.

2.3 Operational Framework and Hypothesis

The operational framework derived from the Mosley and Chen model (1984) framework may be represented as:



Operational hypothesis

1. There are regional differences in under-five mortality according to age of the mother at first birth
2. There are regional differences in under-five mortality according to parity
3. There are regional differences in under-five mortality according to interval preceding births.
4. The regional differences in under-five mortality may be correlated to mother's education status and mother's residence (rural/urban) within the region.

2.3 Variables and their Categorization

Age at first birth : This refers to the numerical age at which the respondent reportedly gave birth after the first ever pregnancy. It was categorized into three as : equal to or less than 15 years, 16-19 years, 20-49 years.

Parity : Refers to birth order. A mother who has one child is said to be of parity one, and so on. In the study the respondents were categorized as being of: parity 1, parity 2,3, parity 4+.

Preceding Birth Interval : This refers to the period after a birth and before the succeeding one. Only second births and higher can have a preceeding birth interval. In this study the preceeding birth interval is categorised in years as : less than 2 years, 2-4 years, 4+ years.

Education : This refers to the highest education level attained by a respondent. In this study, only three levels are considered i.e. primary, secondary and higher.

Residence : Refers to usual place of habitation and is categorised in two as either : urban or rural.

CHAPTER 3

SOURCES OF DATA AND METHODOLOGY

3.1 SOURCES OF DATA

The data for this study was drawn from the Kenya Demographic and health survey(KDHS) of 1993. This was a nationally representative survey of 7540 women aged 15-49 years and 2336 men aged 20-54. It was conducted by the National council for population and development (NCPD) and Central Bureau of Statistics(CBS) to provide information on levels and trends of: infant and child mortality; family planning knowledge and use; maternal and child health and knowledge of HIV/Aids.

The sample was national in scope except it excluded all the three(3) North- Eastern Province Districts and four other districts in the Northern part of Kenya (Samburu,Turkana,Isiolo and Marsabit). The excluded areas account for only less than 4% of Kenya's population.

3.2 Quality of data (KDHS 1993)

Several measures were taken in the planning, implementation and processing of the survey data to ensure that it was of high quality. Some of the measures include:

(i) Use of a nationally representative sample drawn from National Sample Survey and Evaluation Programme(Nassep-3) Master-Sample maintained by central bureau of statistics;

(ii) There were four(4) well-designed questionnaires (woman's, man's household schedule and services availability);

(iii) The questionnaires were translated into eight(8) major local languages. The translation was of a high quality.

(iv) Interviewers and field supervisors were carefully selected and adequately trained for 3 weeks.

Inspite of these precautions, some common errors associated with survey data including that of KDHS (1993) are:

- misreporting of age;
- omissions in children ever born or dead;
- non-response;
- misunderstanding of questions on the part of the interviewer or respondent;
- data entry errors;

- failure to locate and interview the correct households.

Although the 1993 data may name some of these errors, they are not large enough to adversely affect the results of this study.

3.3 **Methods of Data Analysis**

The method used is the Trussel technique for indirect estimation of infant and child mortality rate.

3.3.1 **Data Required**

(i) CEB and children reported dead (CD) for:

- Age of mother at first birth for years less of equal to 15 years, 16-19, 20-49 years.
- Parity (1, 2-3, 4+)
- Births intervals (<2 years, 2-4 years, >4 years)

(ii) Total female population for each category named in (i).

(iii) Number of respondents for each of the above by:

- rural - urban residence
- highest level of education attainment

3.3.2 **Procedures for calculating q5 by age of mother at first birth**

(i) Average parity (P) is calculated as:

$$P = \frac{\text{CEB}}{\text{number of women interviewed for category in question}}$$

(ii) Average number of children dead for each category (CD)

$$CD = \frac{\text{number of children reported for category}}{\text{CEB for category}}$$

(iii) Calculation of multipliers using Trussels variant of original Brass method from Coale Demeny North model of mortality (manual x, page 77). The multipliers have the functional form

$$K(i) = a(i) + b(i).\frac{Pi}{p2} + c(i).\frac{P2}{P3}$$

Where a(i), b(i), c(i) are Trussel's coefficients for estimating child mortality.

K(i) is used as an adjustment factor for proportion dead for non-mortality factors determining the value of CD.

(iv) Calculation of probability of dying at age 5 for each category using formula:

$$q(x) = K(i).d(i)$$

x = 1,2,3,5,10,15 and 20 years

(i) = 1,2,3,4,5,6 and 7 for age groups 15-19 .....45-49, etc.

This procedure was carried out with the help of Q-five computer software programme of United Nations.

3.3.3 **Calculation of Proportion dead before age 5** for birth order and birth intervals was done using the direct method as:

$$\text{Proportion dead} = \frac{\text{Children reported dead (CD)}}{\text{Children ever born (CEB)}} \times 1000$$

3.3.4 **Analysis for residence and education status** was done by calculating the percentage of respondents for each of the categories of the usual region of residence, type of place of residence and level of educational attainment.

CHAPTER 4

DEMOGRAPHIC AND SOCIO-ECONOMIC CORRELATES OF UNDER-FIVE MORTALITY

4.1 Introduction

This chapter presents and discusses results of analysis of data to correlate under-five mortality to demographic and social economic factors. Cross-tabulation and simple percentages are used to examine the results.

4.1.1 Number of cases and percent distribution of study variables

There were 5415 respondents for maternal age at first birth and parity. Majority of them were in Rift Valley and Nyanza Provinces while only 4.5% of them were in Nairobi. For the maternal ages chosen (<=15 years,16-19years,20+ years) majority of the respondents were in the category of 16-19years (53.1%) and minority in the category of equal or less than 15 years. For the categories of parity chosen (parity 1,2-3,4+) most of the respondents were in the category of parity 4+ (51.4%).

Table 4.1 **Number of Cases and Percentage Distribution of study variables,Kenya, KDHS 1993**

VARIABLE	F.P	%	CEB	%	CD	%
1. Age at first birth						
a) =>15 years	791	14.6	4415	18.7	704	26.5
b) 16-19 years	2876	53.1	12645	53.5	1391	52.4
c) 20+	1748	32.3	6568	27.8	561	21.1
TOTAL	5415	100%	23628	100%	2656	100%
2. Parity						
a) Parity 1	832	18.6	1664	7.24	120	4.6
b) Parity 2,3	1343	30	4666	20.32	362	13.9
c) Parity 4+	2306	51.4	16635	72.44	2120	81.5
TOTAL	4481	100%	22965	100%	2602	100%
3. Region						
Nairobi	242	4.5	656	2.8	50	1.9
Central	773	14.3	3088	13.1	187	7.0
Coast	733	13.5	2992	12.7	414	15.6
Eastern	796	14.7	3535	15.0	327	12.3
Nyanza	929	17.1	4419	18.7	806	30.3
Rift Valley	1276	23.6	5804	24.6	448	16.9
Western	666	12.3	3134	13.3	424	16.0
TOTAL	5415	100%	23628	100%	2656	100%

FP = Female population
CEB = Children ever born
CD = Children dead

Source : Primary analysis of the 1993 KDHS data

The data relating to distribution of births according to preceeding birth interval is presented in Table 4.2 below. It is quite clear from the information that under-five mortality was negatively associated with the length of the preeceding birth interval. The proportion of children dead dropped from a high of 66.3% among children with a preceeding birth interval of less than 2 years to a low of 9.2% among children with a preceeding birth interval of at least 4 years.

Table 4.2: **Number and Percentage distribution of births, deaths by preceeding birth intervals**

INTERVAL(years)	Number of children	%	Children reported dead	%
< 2 years	7,322	39.8	517	66.3
2 - 4 years	9,172	49.9	191	24.5
4+	1,887	10.3	72	9.2
TOTAL	18,381	100	780	100

Source : Primary analysis of the 1993 KDHS data

4.2.0 Under five mortality rates by age of mother at first birth

Table 4.3 shows that there are regional differences in under-five mortality by maternal age at first birth. The probability of dying by age 5 decreases as the maternal age at first birth increases. The only exception is in Eastern,Western and Rift Valley

Provinces. In Eastern Province the highest mortality values are associated with maternal age 20+ years. The highest mortality values in the other provinces are associated with maternal age equal or less than 15 years. The highest under-five mortality rates are found in Nyanza and Coast Province for all maternal ages at first birth and the lowest are in Central Province. Nairobi had the lowest under-five mortality rates at Maternal age 20+ years.

Table 4.3 **Probability of dying by age 5 (q5) according to age of mother at first birth, Kenya, 1993 KDHS**

REGION	MATERNAL AGE AT FIRST BIRTH		
	<= 15 YEARS	16 -19 YEARS	20+ YEARS
Nairobi	0.114	0.112	0.022
Central	0.062	0.044	0.035
Coast	0.174	0.160	0.086
Eastern	0.071	0.072	0.107
Nyanza	0.203	0.182	0.146
Rift Valley	0.083	0.098	0.051
Western	0.150	0.101	0.138
National	0.144	0.111	0.091

Source : Primary analysis of the 1993 KDHS data

4.2.1 Under five mortality by age at first birth and highest education attainment

Table 4.4 shows that there are regional differences in education status of respondents for age at first birth.

For all maternal ages, high illiteracy levels are observed for Coast Province. Nairobi and Central Provinces have more respondents with Secondary and higher education. According to Hennin (1986) illiteracy of the mother predisposes the child to high mortality risks. In, the absence of other variables, a child's probability of dying is inversely related to the mother's years of schooling (Caldwell; 1979, Cochrane; 1980).

When the age at first birth is equal to or less than 15 years, there's no clear pattern correlating child mortality to mother's education attainment. Coast Province, with the highest illiteracy levels, does not have the highest child mortality rate. In Nairobi and Western Provinces where those with Secondary and higher education are more, the mortality rates are not lowest.

At 16 -19 years, Central Province with the lowest illiteracy level and a considerable proportion of respondents with Secondary and higher education has the lowest child mortality values. Elsewhere, there is no clear pattern linking

education to child mortality. At 20+ years, a higher level of education corresponds to low child mortality except in Western Province.

Table 4.4 **Percent distribution of respondents by highest education level and age at first birth and associated q(5)values**

REGION	HIGHEST EDUCATION LEVEL			Associated regional q(5) values
	None	Primary	Secondary	
A: Age at first birth equal to or less than 15 years				
Nairobi	22.2	55.6	22.2	0.114
Central	29.9	61	9.1	0.062
Coast	57.7	39.2	3.1	0.174
Eastern	39.5	54.4	6.1	0.071
Nyanza	30.8	61.6	7.6	0.203
Rift Valley	38.3	57.5	4.1	0.083
Western	27.7	60	12.3	0.150
B: Age at first birth 16-19 years				
Nairobi	5.5	61.8	32.7	0.112
Central	9.1	69.8	21.1	0.044
Coast	36.5	51.3	12.2	0.160
Eastern	16.9	67	16.1	0.072
Nyanza	21.9	63.1	15	0.182
Rift Valley	22.1	65.6	12.3	0.098
Western	17.5	66	16.5	0.101
C: Age at first birth 20+ years				
Nairobi	11.4	30.5	58.1	0.022
Central	9.3	43	47.7	0.035
Coast	29.7	39.1	31.2	0.086
Eastern	16.8	54.4	28.8	0.107
Nyanza	23.4	50.5	26.1	0.146
Rift Valley	22.8	44.7	32.5	0.051
Western	11.4	44.8	43.8	0.138

Source : Primary analysis of the 1993 KDHS data

4.2.2 Under - five mortality by age at first birth and type of place of residence.

Table 4.5 shows that there are regional differences in child mortality rates by age at first birth and urban - rural residence.

When the age at first birth is equal to or less than 15 years, there's no urban advantage reflected for Nairobi and Coast. However Nyanza with lowest urbanization has highest child mortality rate.

At 16 -19 years again urbanization in Nairobi and Coast Province is not an important factor in child mortality. At age 20+ years, urbanization is a definite advantage especially when it is over 7% for all Provinces except Western.

Table 4.5 **Percent distribution by type of place of residence and age at first birth**

REGION	TYPE OF PLACE OF RESIDENCE		ASSOCIATED q(5) VALUES
	Urban	Rural	
A: =< 15 years			
Nairobi	100	0	0.114
Central	6.5	93.5	0.062
Coast	33.8	66.2	0.174
Eastern	5.3	94.7	0.071
Nyanza	0.5	99.5	0.203
Rift Valley	4.7	95.3	0.083
Western	1.5	98.5	0.150
B: Age at first birth 16-19 years			
Nairobi	100	0	0.112
Central	4.1	95.9	0.044
Coast	31.8	68.2	0.160
Eastern	7.3	92.7	0.072
Nyanza	3.0	97	0.182
Rift Valley	6.0	94	0.098
Western	6.0	94	0.101
C: Age at first birth 20+ years			
Nairobi	100	0	0.022
Central	7.2	92.8	0.035
Coast	31.6	68.4	0.086
Eastern	4.2	95.8	0.107
Nyanza	6.9	93.1	0.146
Rift Valley	12.7	87.3	0.051
Western	9.0	91	0.138

Source : Primary analysis of the 1993 KDHS data

4.3 **Under-five mortality rates by parity**

As shown in table 4.6, there are regional differences in under-five mortality by parity. Nyanza province has the highest under-five mortality levels at all parities, while Central province has the lowest levels. At parity 1, Rift Valley province has the lowest level of under-five mortality. At

parity 2,3 and 4+, Central province has the lowest values. Generally, high under-five mortality levels are associated with parity 4+ and the lowest levels with parity 1.

Table 4.6 **Under-five mortality rates by parity**

REGION	PROPORTION DEAD PER 1000 EVER BORN CHILDREN		
	Parity 1	Parity 2,3	Parity 4+
Nairobi	57	76	93
Central	34	31	70
Coast	62	72	147
Eastern	68	54	103
Nyanza	153	156	190
Rift Valley	32	47	80
Western	100	92	140
National	72	78	127

Source : Primary analysis of the 1993 KDHS data

4.3.1 Under five mortality by parity and highest education attainment

Table 4.7 shows regional differences in education attainment of respondents according to their parity. At parity 1 there is no clear pattern linking education of respondents to child mortality. This is also the case with parity 2-3. At parity 4+ except in Rift Valley, higher education attainment is associated with lower child mortality.

Table 4.7 **Percent distribution of Respondents by education levels and associated child mortality rates**

REGION	EDUCATION LEVEL			PROPORTION DEAD
	None	Primary	Secondary and Higher	
A: Parity 1				
Nairobi	5.7	41.5	52.8	0.057
Central	5.6	58.7	35.7	0.034
Coast	29.4	48.7	21.9	0.062
Eastern	6.5	65	28.5	0.068
Nyanza	9.2	68.3	22.5	0.153
Rift Valley	12.1	59.1	28.8	0.032
Western	15.0	49.5	35.5	0.100
B: Parity 2.3				
Nairobi	7.7	50.8	41.5	0.076
Central	6.6	60.8	32.6	0.031
Coast	33.7	45.7	20.6	0.072
Eastern	13.0	64.8	22.2	0.054
Nyanza	15.0	59.5	25.5	0.156
Rift Valley	14.8	62.8	22.4	0.047
Western	11.4	60	28.6	0.092
C: Parity 4+				
Nairobi	27	54	18.9	0.093
Central	22.9	60.9	16.2	0.070
Coast	53.5	39.4	7.1	0.147
Eastern	33.5	57.3	9.1	0.103
Nyanza	38.3	55	6.7	0.190
Rift Valley	41	53	6.0	0.080
Western	23.4	58	18.6	0.140

Source : Primary analysis of 1993 KDHS data

4.3.2 Under-five mortality by Parity and type of place of Residence.

Table 4.8 shows that there are regional differences in type of place of residence of respondents by parity. However, there is no clear pattern linking residence to child mortality rate for all parities considered.

Table 4.8 **Percent distribution of respondents by type of place of residence, parity and associated child mortality rate**

REGION	TYPE OF PLACE OF RESIDENCE		PROPOTION DEAD
	Rural	Urban	
A: Parity 1			
Nairobi	0	100	0.057
Central	88.9	11.1	0.034
Coast	58	42	0.062
Eastern	95.9	4.1	0.068
Nyanza	91.7	8.3	0.153
Rift Valley	85.9	14.1	0.032
Western	87.1	12.9	0.100
B: Parity 2,3			
Nairobi	0	100	0.076
Central	93.4	6.6	0.031
Coast	65.2	34.8	0.072
Eastern	92.7	7.3	0.054
Nyanza	96.9	3.1	0.156
Rift Valley	91.1	8.9	0.047
Western	93	7	0.092
C: Parity 4+			
Nairobi	0	100	0.093
Central	98.9	1.1	0.070
Coast	75.8	24.2	0.147
Eastern	95.3	4.7	0.103
Nyanza	99.3	0.7	0.190
Rift Valley	96.5	3.5	0.080
Western	95.5	4.5	0.140

Source : Primary analysis of the 1993 KDHS data

4.4 Under-five mortality rates by preceeding birth interval

As shown in table 4.9, there are regional differences in under-five mortality due to interval preceeding births. At all intervals chosen, the highest under-five mortality levels are in Nyanza, then Coast and Western provinces. At intervals less than 2 years, the lowest levels were in Rift Valley Province while at intervals 2-4 years and more than 4 years, the lowest values for under-five mortality were in Nairobi, Central and Rift Valley.

The table shows also that under-five mortality levels are highest when the preceeding interval is less than 2 years but then decreases with increase in birth interval except in Eastern, Rift Valley and Western Provinces. In these provinces, it would appear that other factors and not birth interval are better correlates of under-five mortality. As stated in the introduction, closely spaced births shorten breast feeding period, deplete the mother and increase competition between siblings. All these factors increase the risk of mortality before age five.

Table 4.9 **Under-five mortality rates by preceeding birth interval**

REGION	PROPORTION DEAD / 1000 children		
	Intervals less than 2 years	2-4 years	4+ years
Nairobi	103.33	76.40	62.27
Central	136.14	73.38	69.66
Coast	196.81	161.08	117.10
Eastern	124.72	91.80	115.10
Nyanza	230.20	191.63	178.56
Rift Valley	97.99	76.64	89.44
Western	162.88	158.38	172.85
National	152.76	122.38	119.89

Source : Primary analysis of the 1993 KDHS data

4.4.1 Under five mortality by preceeding birth interval and highest education attainment

Table 4.10 shows that there are regional differences in educational attainment of respondents for interval preceeding births. At interval less than 2 years; there's no clear pattern linking education to child mortality rates. At 2-4 years interval, again there is no apparent link between education and child mortality. When the interval is more than 4 years, lower

mortality rates occur where more mothers have secondary and higher education with the exception of Rift Valley and Western Provinces.

Table 4.10 **Percent distribution of respondents by education level and interval preceeding births**

REGION	EDUCATION LEVEL None	Primary	Secondary and Higher	PROPORTION DEAD PER 1000
A: Interval less than 2 years				
Nairobi	20.73	56.10	23.17	103
Central	22.08	58.78	19.14	136
Coast	48.30	41.61	10.09	197
Eastern	32.48	58.04	9.47	125
Nyanza	35.53	55.11	9.36	230
Rift Valley	39.18	51.28	9.54	98
Western	24.52	55.89	19.59	163
B: Interval 2-4 years				
Nairobi	19.77	50.28	29.94	76
Central	20.79	61.79	17.41	73
Coast	52.56	39.08	8.36	161
Eastern	30.38	59.96	9.66	92
Nyanza	35.34	54.54	10.12	192
Rift Valley	36.03	55.65	8.32	77
Western	25.06	59.12	15.82	158
C: Interval more than 4 years				
Nairobi	16.42	44.78	38.81	62
Central	20.88	53.48	25.64	70
Coast	50.90	36.46	12.63	117
Eastern	36.39	47.47	16.14	115
Nyanza	42.14	51.57	6.29	179
Rift Valley	40.92	49.88	9.20	89
Western	28.70	52.91	18.39	173

Source : Primary analysis of the 1993 KDHS data

4.4.2 Under-five mortality by preceeding birth interval and type of place of residence

Table 4.11 shows that there are regional differences in rural-urban residence of respondents for interval preceeding births. At intervals less than 2 years; there's an urban advantage reflected in low child mortality rate for Nairobi. Nyanza with lowest urbanization rate has the highest child mortality level. At 2-4 years interval, there's no urban advantage for Nairobi and Coast Province especially in view of the very low levels of child mortality in Central and Rift Valley Provinces. When the interval is 4+ years, there's an urban advantage for Nairobi only which is reflected in a low child mortality rate.

Table 4.11 **Percent distribution of respondents by type of place of residence and birth interval**

REGION	TYPE OF PLACE OF RESIDENCE		ASSOCIATED PROPORTION DEAD /1000
	Rural	Urban	
A: Interval less than 2 years			
Nairobi	0	100	103
Central	96.9	3.1	136
Coast	74.5	25.5	197
Eastern	96.0	4.0	125
Nyanza	98.5	1.5	230
Rift Valley	95.1	4.9	98
Western	93.7	6.3	163
B: Interval 2-4 years			
Nairobi	0	100	76
Central	97.9	2.1	73
Coast	22.9	77.1	161
Eastern	95.9	4.1	92
Nyanza	98.9	1.1	192
Rift Valley	96.4	3.6	77
Western	96.2	3.8	158
C: Interval 4+			
Nairobi	0	100	62
Central	95.2	4.8	70
Coast	36.5	63.5	117
Eastern	93.0	7.0	115
Nyanza	98.4	1.6	179
Rift Valley	93.5	6.5	89
Western	94.6	5.4	173

Source : Primary analysis of the 1993 KDHS data

C H A P T E R 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of findings

The results confirm the hypothesis that there are regional differences in under-five mortality rates according to maternal age at first birth; parity and preceeding birth interval. The Nyanza, Coast and Western Provinces have the highest mortality rates, while Nairobi and Central provinces have the lowest rates. The results also indicate that education attainment and rural-urban residence may be correlated to child mortality only when age at first birth is 20+ years.

There is no clear pattern of association between child mortality and type of place of residence for all parities considered. At parity 4+, there is correlation between higher education attainment and child mortality rates in all provinces except Rift Valley. There's an urban advantage reducing child mortality levels at preceeding intervals less than 2 years and over 4 years.

There is correlation between higher education and child mortality rates when the preceeding birth interval is over 4 years except in Rift Valley.

5.2 CONCLUSIONS

Age at first birth, parity and preceeding birth interval are correlated to regional differences in under-five mortality. Education attainment is a correlate of under-five mortality in Kenya only when; age at first birth is 20+ years, parity is 4+ (except in Rift Valley) and preceeding birth interval is over 4 years (except in Rift Valley).

Urban-rural residence is a correlate of under-five mortality in Kenya when: age at first birth is 20+ years and preceeding birth interval is less than 2 and greater than 4 years.

5.3 Recommendations

The results highlight the influence of maternal factors on under-five mortality. The factors considered i.e. age at first birth, parity and birth interval are also fertility determinants. Thus by targeting the mother, it may be possible to achieve a desired family size and hence family stability which is one of the goals of the population policy.

Intensification of relevant education programmes to in-school and out of school youth in the context of primary health care to help them make informed decisions.

Education is a correlate of child mortality only in the group 20+ years. This in the Kenyan context is the group who have been through secondary school. Kenya's Education Policy should be geared towards increasing not only participation but also completion rates for girls in the education system in order to influence population growth.

Further analysis such as use of linear regression should be done to determine the strength of correlation between the variables.

Research into what is the dominant factor influencing under-five mortality in Rift Valley Province.

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ANNEX 1

MEAN AGE AT FIRST BIRTH AS AT 1993

REGION	MEAN AGE AT 1ST BIRTH(YEARS)
Kenya	18.80
Nairobi	19.65
Central	19.01
Coast	18.71
Eastern	18.59
Nyanza	17.83
Rift valley	18.36
Western	18.51

ANNEX 2

CHILDREN EVER BORN AND CHILDREN DEAD BY AGE OF MOTHER

AT FIRST BIRTH

Age at first birth	Age group as at 1993						
	15-19	20-24	24-29	30-34	35-39	40-44	45-49
>= 15 years							
CEB	98	408	671	896	833	958	584
CD	16	55	79	126	146	181	117
Female Population	61	140	141	146	118	119	66
16-19 years							
CEB	266	1395	2126	2900	2373	2153	1624
CD	28	105	183	300	271	279	225
Female Population	235	696	566	545	355	281	198
20+ years							
CEB	-	390	977	1319	1297	1442	1179
CD	-	29	68	106	100	118	144
Female Population	-	304	415	374	247	237	171

ANNEX 3

CHILDREN EVER BORN AND CHILDREN DEAD BY Parity

PROVINCE	PARITY 1		PARITY 2,3		PARITY 4+	
	CEB	CD	CEB	CD	CEB	CD
Nairobi	106	6	224	17	239	22
Central	252	9	788	26	1940	145
Coast	238	17	624	51	2023	337
Eastern	246	17	670	37	2555	266
Nyanza	240	38	805	130	3198	629
Rift valley	396	14	1060	55	4221	372
Western	186	19	495	46	2459	349
Kenya	1664	120	4666	362	16635	2120

KEY
CEB = Children Ever Born
CD = Children Dead