"INFLUENCE OF MOTHERS" EDUCATION ON CHILD HEALTH

BY

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DECLARATION

This project is my original work and has not been presented for a degree in any other university to the best of my knowledge.

Signed: _____

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This project has been submitted for examination with approval of the university supervisors.

Signed: _____ 2/10/2002

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DR.LAWRENCE IKAMARI

DEDICATION

The research project is dedicated to the memory of my late father who gave me a good

and firm foundation for my education.

ACKNOWLEDGEMENT

ABSTRACT

This project paper highlights the effect of mother's education on the uptake of the vaccination antigens in Kenya, using the 1998 Kenya Demographic and Health Survey. The survey was conducted by the National Council for Population and Development (NCPD) in collaboration with the Central Bureau of Statistics (CBS) and the Institute of Research Development (IRD).

The main objective of the study who to determine the influence of mother's education on the uptake of complete vaccination among children born in Kenya, three years preceding the survey. The study was also to establish the variability in the uptake of the individual vaccines; by mothers education and by the other co-varieties included in the analysis namely:- age, type of place of resistance (urban/rural), marital status of mother, household economic status, region of residence, birth order.

The two main methods of data analysis that are used are cross tabulations and logistic regression.

The study has revealed that education influences the uptake of individual vaccine uptake as well as the complete vaccination. The uptake of the antigens, BCG, Oral polio, Polio 1,2,3, measles, DPT 1,2,3 increases with the level of education.

The uptake of complete vaccination also increases with the level of education; from 53.1% to 58.1% to 67.1%. Education is significantly associated with the uptake of complete vaccination.

The study established that the gross effect of education on the complete vaccination is higher but it reduces when effects of other variables are controlled for such as type of place of residence; socio-economic status, age of mother; birth order, marital status; and region of residence.

The bivariate analysis reveals that the children born to mothers with primary education were 1.19 likely to be fully immunized as compare to children born to mothers with no education.

Children born to mother's with secondary education were 1.7 times likely to be fully immunized compared to children born to mothers with no education. The results of the logistic regressions showed that the effects of other variables are controlled for. The effect of education reduces to 1.02 and 1.35 times likely to be fully immunized for children born to mothers with primary education and secondary education respectively.

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CHAPTER ONE

INTRODUCTION

The extent to which immunization influences the lives of children is not easy to determine or quantify. Complex interactions between various childhood diseases combined with low levels of nutritional status contribute to poor health in children and if not treated may lead to death (Demographic and Health surveys, World conference 1991). Inspite of these intervening factors immunization of infants and children is still one of the ways in which to prevent children from getting disease (Ministry of Health 1992).

The expanded programme for Immunization (E.P.I) has played on important role in the drive towards "Health for all by year 2000" (Kenya Expanded Programme on Immunization, 1987). The six major childhood killer diseases which affects nearly all immunized children and kills 2 million children annually are; pertussis (whooping cough) which kills some 600000 children each year and affects millions more; neonatal tetanus, contracted through contamination of umbilical cord at birth, kills at least 880,000 each year; polio is a major cause for lameness in the developing world and each year kills about 30,000 children; tuberculosis, which each year attacks 10 million can be especially severe in young children; Diptheria is less common but kills 10-15 percent of its victims (Population and Development Review, 1986). Thus increased immunization will mean reduction in child mortality and morbidity and hence better child health.

This confirms the findings of various studies carried out in Kenya concerning immunization of children under the age of 5 years which have shown that the higher the levels of immunization in any given area, the higher the chances of better health and survival of children (Ministry of Health 1987; Harvey 1992; and Waweru 1991).

1.2   INTRODUCTION TO PROBLEM STATEMENT

Cross-country comparisons using large data sets such as the World Fertility Surveys and the Demographic and Health Surveys, have shown that education in general and female education in particular exert a strong influence in reducing child morbidity and mortality. (Boerma et al.1990; Bicego and Boerma 1993; Caldwell and Caldwell 1990;Hobcraft, McDonald, and Rustein1985; Murthi, Guio and Dreze 1995). At the micro-level, more in-depth quantitative and qualitative research that examines women's health enhancing behaviour has arrived at similar conclusions ,(Bhuiya and Streatfield 1991; Bourne and Walker 1991).

A deeper understanding calls for an investigation of how maternal education affects women health seeking behaviour and its effect on child health. In investigating the pathways of influence, research confirms that the causal linkages between these two factors are far from clear and that this relationship is simply not a reflection of a co-occurrence of education with other socio-economic variables (Desai 1994; Hobcraft 1993).

Several studies have been carried out to explain how maternal education may influence child health, mostly within the conceptual framework put forward by Mosley and Chen (1984), who argue that mortality is an outcome of a combination of social, economic, biological, and environmental factors and that these factors operate through a set of proximate determinants.

Kenya's infant and child mortality rates have declined steadily between 1948 to the mid 1990. From then it took an upward trend for reasons not clearly understood. Currently infant and child mortality levels remain persistently high in Kenya despite efforts aimed at improving child health and survival through interventions such as immunizations, maternal and child health, family planning (MCH/FP) programs as well as primary health care (PHC). The child mortality level stands at 34.3% in 1989; 32.7% in 1993; and 37.1% in 1998. At the same time childhood's mortality stands at 90.9% in 1989; 93.2% in 1993 and 105.2% in 1998.

In Kenya as elsewhere in sub-Saharan Africa, the major causes of infant and child morbidity and mortality are malaria, acute respiratory infections; diarrheal diseases and several vaccine –

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preventable such as measles, polio, tuberculosis (T.B) and neonatal tetanus. And although the primary strategy for controlling the above diseases is immunization, which is carried out through the Kenya Expended on Immunization (KEPI), the immunization level has not yet achieved the universals child immunization target.

The national complete coverage of immunization stands at 72.8% in 1989, 78.7% in 1993 and 65.4% in 1998. While the level of immunization against measles stands at 78% in 1989; 84% in 1993; 81.36% in 1997; 79.2% in 1998; and 76.3% in 2000.

There are geographical variations in child mortality between the high mortality regions which comprise of Nyanza, Western and Coast and low mortality regions which comprise of Nairobi, Central and Rift Valley. This may result from varying degrees of access to immunization services and varying levels of immunization coverage.

Three broad pathways of influence, linking maternal education to child mortality, that result in greater utilization of modern health services have been suggested. That educated women are better able to break away from tradition to utilize modern means of safeguarding their own health and those of their children (Caldwell and Caldwell 1988; Cleland 1990). Educated women are better able to utilize what is available in the community to their advantage (Barrera1990; Caldwell1990; Goodburn, Ebrahim, and Senapati 1990); and educated women may be able to make independent decisions regarding their own and their children's health leading to greater utilization of modern health facilities (Caldwell 1979:Caldwell 1986).

1.3   PROBLEM STATEMENT

A few scholars are uncomfortable about concluding from the correlation between women's education being important for lowering infant and child mortality; that there is a strong causal relationship between maternal education and child health (Basu, 1994, Hobcraft 1993, Kunstadter 1995).

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Why do we expect maternal education to improve child health? Education is linked to family socio-economic situation, which in itself is a determinant of child health. But above and beyond this maternal education is hypothesized to bring about certain changes in individual behavior that result in better child health (Cleland 1990). A recent review of literature by Caldwell and Caldwell (1993) suggests two potential paths: 1, Education improves child health solely by enhancing the use of modern health services; and (2) Education results in a wide range of favorable behaviors mostly concerned with child care that play a role in improving child health.

Much recent demographic research focuses on maternal education as a precursor to improved child health. Support for this hypothesis has come from large national surveys conducted under the World fertility surveys and Demographic and Health surveys; (Bicego and Boerma 1991; Hobcraft, McDonald and Rustein 1991. Virtually all studies based on world fertility survey and demographic health surveys show strong correlations between maternal education and child health and survival.

Given the close link between education and other socio-economic conditions, researchers vary in their inclination to move beyond the correlation to argue that maternal education causes low child mortality. That if maternal education has a positive effect on child health by increasing the use of medical services, a greater effect of maternal education should be observed in the urban areas; where better quality services are located. However, empirical research shows that the effect of maternal education is greater in the rural areas than in the urban areas (Caldwell and Caldwell 1993; Schultz 1993).

The compositional analysis conducted by Cleland, Bicego and Fegan (1991) shows that between 1970s (when World Fertility Surveys were conducted) and 1980s (when the DHS were conducted, female education increased and infant mortality decreased in 7 out of 12 developing countries.

The decline in mortality occurred in all age groups with the result that differences in child mortality by maternal education remained relatively constant.

Research also documents situations in which high maternal education does not lead to differential improvements in child health; that is improvements in mortality seem to occur independent of the improvements in female education. Kunstadter 1995; while examining changes in mortality among Homing in Thailand shows that mortality can decline without current improvements in education.

In the light of these arguments, it is important to re-evaluate the link between maternal education and child health. This research sets out to investigate the broad nature of the association between maternal education and the utilization of child health services in Kenya. Using data from 1998 KDHS this study examines the relationship between maternal education and factors known to reduce the risks of child mortality.

In particular the study seeks to answer; the questions: How does the level of mother's education affect child's immunization status?

1.3.1 Objectives for the study

General objective of this study is to examine the role of mother's education on the uptake of health services.

1.3.2 Specific Objectives

The study will
  (i)   Examine the influence of maternal education on child's immunization status.
  (ii)   Establish the variability of the uptake of the vaccines.

1.4   JUSTIFICATION OF THE STUDY

Infant mortality rate influence the life expectancy and the overall mortality level of any country. In most population people die at the first year of life (Da Vanzo and Habitch 1984). For example

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37.1 percent deaths in Kenya occurred at the first four years of life (KDHS 1998).

The sheer value of life aside, reducing infant and child mortality has a high priority for developing countries because children are a major resource for both poor families and the nation (Da Vanzo and Habitch 1984). Consequently, third worlds countries like Kenya with persisting and undesirably high infant and child mortality would like to find ways of reducing childhood mortality. To this end, the study focuses on the role of mothers' education on uptake of child health.

The study of the relationship between education and health is important in order to design education related policies and health programs to improve the health status of children. An improved understanding of the role played by female education can assist in the design of health interventions and at the same time advance our knowledge of the association between maternal education and child mortality.

In a country such as Kenya such a study is important because the prevention of high infant and child mortality rate has been and remains a major pre-occupation of health authorities in Kenya and the degree of success of health programs could be ascertained on the basis of observable decline in infant and child mortality. Further in a country such as Kenya where health services are often made available by demand, it is important to identify those at high risks of infant and child death. Thus if infant deaths are heavily concentrated among certain families, it suggest that substantial improvements in child health would be achieved by adopting the more cost effective approach of focussing on the sub-groups of families at high risks of infant deaths for special intervention (Khasakhala 1998).

The study is important, as its primary purpose is to examine and evaluate the validity of investments in maternal education as a strategy for improving child health.

1.5   SCOPE AND LIMITATIONS OF THE STUDY

This study attempts to identify the factors through which maternal education influences infant and child health, with data from KDHS 1998 in a country where infant mortality rate is very high, the level of fertility remains high, utilization of health services is low and the level of literacy and social development is low. It also examines how much the survival of infants could be improved by health services within the given educational and social context.

The study targets children born three years preceding the survey. The focus is on one dependent variable: whether children aged 12-23months at the time of interview are fully vaccinated.

The study focuses on all districts covered by KDHS (1998). The survey has a national in scope except in districts in North Eastern province, two districts in Rift Valley province and two districts in Eastern province which account for 4% of Kenya's population.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

1 INTRODUCTION

has been noted that most developing countries of the world have experienced striking declines in
ortality over the recent years and that two views have generally been advanced to explain the
uses of rapid decline. One view is that these declines were due to socio-economic factors
odgers and Preston). On the other hand, other researchers (Stontnizt, G.J.; 1955: 1974) contend
lat the decline was largely independent of socio-economic factors and was mainly due to factors
ssociated with government action, such as disease control, improved medical technology,
ncreased availability of medical facilities, as well as development of community sanitation through
ublic health education.

The debate between economic development and medicine as the prime mover in mortality decline
s of long standing and whichever side one takes in the argument, the fast decline in mortality
cannot be attributed to one single determinant, rather on both the state of the standard of living, the
environment and public health measures of the country under study.

Research on the determinants of infant and child mortality especially relating to demography of
developing countries point to a number of factors both demographic as well as socio-economic that
influence mortality at vulnerable ages.

An examination of their respective contributions to infant and child mortality changes has laid an
overwhelming emphasis on mother's educational attainment, income and health services.
Differences have also been found between regions, ethnicity, and racial and religious groups by
labour force and occupation status. While it may not be possible for us to exhaust all the literature
on child survival, this chapter will among other things attempt to review the literature which
directly or indirectly bears relationship to be explored. Attempts will be made to develop a
conceptual framework to be applied in the study.

2.2 FACTORS ASSOCIATED WITH INFANT AND CHILD HEALTH / MORTALITY

SOCIO-ECONOMIC FACTORS

2.2.1 Education

Education is often cited as being very significant in the improvement of living standards. The educational attainment of a population is an indicator of its rising aspirations and consciousness. The resulting rise in aspirations has the effect of improving health awareness and thereby, increasing investments at household and public level. Mother's formal education when considered further is an indicator of knowledge and skills that mothers have to effectively take care of their children. A number of studies carried out in many developing countries have pointed the significance of education in mortality decline.

Farah and Preston (1982) in their study in the Sudan showed that maternal education plays a major role in influencing levels of infant and child mortality. For example additional years of schooling was associated with proportionate reduction of 0.036 in proportion dead among children so that five years of schooling is expected to reduce child mortality by 18%. Children whose fathers were employed were found to experience lower mortality. Children of employed women however, had higher mortality than those whose mothers are housewives. The reasons give for this is that; employment reduces the mothers' time for childcare, interrupts breastfeeding, increases the probability of accidents occurring and thus leads to high child mortality.

Caldwell and Macdonald (1981), found that education of women while controlling for other correlated factors in general, showed an inverse relationship with infant and child mortality. Education probably changes both familial and maternal factors and reduces malnutrition and infection among infants i.e. educated mothers may give up traditional cultural practices and may employ traditional birth attendance at time of delivery. When the mother is educated on food preparation and preservation procedures for the infant may be safer with respect to infections. More educated women are less likely to practice detrimental food taboos, either during their pregnancies or during illness of their infants. However, educated women seem to breastfeed less

frequently and may again expose the infants to malnutrition and infection.

The question as to what underlies this association has been raised by several authors beginning with Caldwell (1979), who observed in his Nigerian study that maternal education – much more so than paternal education or occupation – was strongly associated with increased child survival. He gave three possible reasons for this. First, mothers become less fatalistic, break with tradition and adopt new childcare behaviours. Second, educated mothers become more capable of manipulating the modern world. Third and most importantly, there is a change in the traditional balance of family relations in a family in which the mother is educated. This change leads to "child-centred" families.

Palloni (1981), in his analysis of infant and child mortality differentials among Latin American countries, noted the strong influence of the level of literacy and eating high protein foods such a chicken and eggs which are prohibited during pregnancy in traditional societies on infant and child death. He further noted that in Nigeria, those who attended "koranic" schools had a high morbidity than those who had not received any education at all. This may give some support to the view that traditional attitudes towards disease and those who attended religious schools adhere to health practices more closely.

Blacker (1988); notes that mortality differentials in Africa are obviously as a result of differences in socio-economic development among different regions. Using female education level to explain the child mortality differential among the different regions of Africa, he observed that there was a contrast between the figures for higher mortality countries of West Africa (Gambia, Mali and Sierra Leone) where only a small minority of women have received any schooling and those for low mortality countries for Eastern and Southern Africa, Botswana, Kenya and Zimbabwe) where less than half of the females in the peak child bearing age groups have never been to school. Education has once again been cited as a major factor influencing child survival.

Samoza (1980) after analysing the causes and levels of infant and child mortality in Columbia noted that infant mortality was high among the children of women with lower education within the same age of women. He found that there was relatively higher infant mortality for mothers

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between 25-30 years old and an increasing infant mortality for older mothers. He concluded that the age of the mother could have an influence on neonatal mortality, the older the mother the higher the probability of her being anaemic or suffering from such diseases as diabetes, heart attack etc.

In India, Kerala state has the lowest infant mortality rate than any other states, although it ranked seventh in per capita calorie consumption. The experience in Kerala led the United nations (1975, chapter 10), to conclude that the most important single factor to which the better levels of health in Kerala could be attributed might well be the spread of, and accessibility of medical care in the state. In a similar study it was found that in Indonesia the infant mortality varied from a high value of 160 per thousand live births for urban women with no schooling to a low value of 47 per 1000 for urban women with upper secondary education.

Gwatkin (1980) using regression analysis of education and mortality data estimates that a rise in adult literacy from 50% to 90% could be expected to be accompanied by a fall in infant mortality rate of 15% greater than the next 20 years than if no literacy improvements were seen.

Researches done in Kenya have also found education as a significant factor in explaining mortality differential. Kibet (1982) used 1979 census and the available, health disease data to analyse infant and child mortality differentials in Kenya. He found the variations in child mortality by districts are partly as a result of the existing educational differentials among the districts. Indeed, the socio-economic factors such as women's education, urbanization, agriculture, available hospital beds and number of kilometres of tarmac ked road were found to be inversely related to child mortality although the regression analysis results suggested a direct relationship between hospital beds and child mortality levels.

KO'Oyugi (1982) studied mortality situation in Siaya district. His study confirmed the existence of mortality differentials particularly in education, residence and marital status. He found that infant and child mortality was higher in rural areas than in urban areas and it decreases as the level of education increased. The observed pattern of mortality was lower as a result of better sanitation, housing facilities, shorter distance to health centres and higher income level in urban areas. His

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study confirms that educated mothers especially those who attained the secondary and above level of education could be said to have better knowledge of childcare. Mothers in this category are likely to be wage employed and therefore supplementing the family income thereby enabling them to have better meals and hence good health care.

Schultz (1984) posits five possible explanations in presenting his general framework for analysis of mortality. First, education may increase the productivity of health inputs. For example, educated mothers may know how to boil water in order to kill water-borne pathogens. Second, it may reduce costs of information about the optimal use of health inputs. Where information about what is "best is scarce, educated mothers may be at an advantage in seeking out such information. Third, education may increase family income. Fourth, education may increase the mother's time costs. To the extent that mother's time is an input in child health, such a result would serve to decrease child health. Fifth, education may change preferences for child health and family size

Mutai (1987) used the 1979 census data to estimate q (2) value of the locations in Kericho District. The differentials considered were education, place of residence and marital status. He found that in all the locations both urban and rural infant mortality was higher in the urban centre. This could be so because these locations have a higher agricultural potential and on the whole have a better-developed infrastructure and therefore the rural population is better nourished than the urban. He also found that in regard to differential by education, the highest infant and child mortality was among the mothers with no education and lowest among mothers with secondary education and above.

Mosley (1985) has show that the female education and family incomes are two most important determinants of infant and child mortality. Using the probability of dying before attaining age two, he observed that infant mortality change over time in Kenya were mainly due to education whereas provincial variations could be explained by percentage above poverty line. After controlling for maternal education, there appeared to be no difference in infant and child mortality between urban and rural areas. Nairobi the capital city is shown to have a higher mortality than the neighbouring rural districts in central province. Mosley also argues that the highly successful immunization

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programme is selective with respect to education and other social characteristics. He admits that the success of primary health programme will depend on better understanding of low socio-economic determinants operate through intermediate variable to affect infant and child mortality.

2.2.2 Household Economic Status

Household economic status influence infant and child survival through access to the goods and services that affect the health of children. Such goods and services include access to adequate food supply, health and medical services, clothing; good shelter and ownership of certain goods. Household economic status is often measured in terms of household per capita income (Jain 1985), Ruzicku and Kane (1990) and De Carvalho and Wood (1978) observed that poverty had a positive effect on infant and child mortality.

The Indian National Family Health Survey of 1998 collected information on the ownership of household goods and constructed a composite score, which ranged from 0-27. The score was regarded as an indicator of household economic status and was found to have a negative effect on both infant and child mortality. Nearly all states showed sharp declines in neonatal and postnatal mortality with increasing ownership of household goods. In general the economic status of a household as measured by ownership of household goods appeared to be an important determinant of infant and child mortality particularly as the child grew older.

The score used in this case can also be an indicator of income. Higher incomes can enable families to afford better medical care and better nutrition (which reduces fatality rate from diseases). Growth of incomes between the years 1946 and 1975 in Malaysia was found to contribute to significant portion of the decline in infant and child mortality over the period but much of the effect was absorbed in the education variable.

2.2.3 Bio-demographic Factors

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Maternal age at birth

Age of the mother at childbirth has been found to be closely related to infant and child mortality (Rustein, 1984). For example Rustein (1984), a cross-national comparative study based on the world fertility (WFS) data drawn from developing countries, found that the age of the mother parity and child mortality relationship had a U-shaped pattern; mortality risks were highest among children born to very young mothers and those born to older mothers and at first and highest parities.

The higher risk of dying among children born to older mothers may be as a result of decline in the efficacy in the reproductive system with age and the economic pressure in the family, while the excess risk at young maternal ages is partly due physical immaturity, lack of child care skills and access to health care services (Da Vanzo et al., 1983; Pebley and Stupp. 1987). Pebley and Stupp (1987) were of the opinion that, irrespective of age of mother. First born children may be at greater risk of mortality because their mothers' reproductive system is in the process of adapting to pregnancy or because their mothers are less likely to receive adequate prenatal care and to know how to care for themselves during pregnancy.

Birth Order

The relationship between birth order and mortality at early ages typically takes a U-shaped form. Mortality has been found to be high to the first-born children and births of very high order and is relatively low for births of order 2 or 3. First order births are likely to have difficult birth processes than latter births, the increasing the risk of neonatal mortality. In addition first born children are likely to be raised by mothers with limited experience in child bearing thus increasing the risk of infant and child mortality.

Births of very high order may have mothers who are physically depleted at the time of the conception and throughout pregnancy. Their children are thus more likely to suffer from conditions associated with high mortality risks such as fatal growth retardation and low birth weights, than other children. High order births are also likely to be borne into families who already have many children who compete for resources and parental care. The effects of first

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order births are likely to be strongest during the neonatal period while the effects of high order births are likely to be strongest at older ages (Pandey et al 1998).

2.2.4 Type and place of residence

Rural-Urban residence differential in infant and child mortality have been documented in several studies in Kenya; rural residence has been associated with slightly higher mortality than residence in the urban areas (Muganzi, 1984; Ewbank et al., 1986). The analysis carried out by Ewbank et al., (1986) showed that rural-Urban differentials in infant mortality disappeared in the presence of controls for a variety of factors. NCPD (1989) indicated that although rural infant mortality was slightly higher than urban infant mortality, rural and urban child mortality rates were more or less equal (34.2 and34.3 for rural and urban areas respectively).

2.2.5 Maternal/child health factors

Maternal and child health is a priority in many developing countries and has for along time been the subject of major resource expenditure and research effort. Jellife (1987) noted that some of the key factors that have been shown to have an effect on the health of mother and her offspring relate to circumstances of pregnancy and childbirths. In particular both antenatal intrapartum care have been found to have important explicators as predictors of subsequent events such as neonatal mortality.

D'Souza and Bhuiya (1982) in their study in rural Bangladesh considered the socio-economic differentials of mortality using the variables of education, occupation of parents, size of dwelling, ownership of cows, and health practice. They noted that there was a clear inverse relationship between education and mortality levels. The mortality rates also showed a decline with socio-economic status. The lowest level of economic group paid the highest price in terms of mortality.

Palloni (1983) in his study on Latin America on determinants of infant mortality observed that is not only the lack of health facilities that perpetuates mortality at these vulnerable ages but a

whole series of events and processes that can be traced to the individuals well being as socio-economic and environmental conditions. He cited social development, which includes educational campaigns and socialized medicine working through nutrition, maternal care, and sanitation as well as disease prevention in reducing mortality among infancy. Palloni sees social development and what he called non-vertical interventions working through individual households and community conditions to reduce mortality in infancy.

Isenman (1978) found that the widespread decrease of mortality in Sri Lanka was due to the wide population coverage achieved through primary health care facilities stuffed by paramedics and with increased number of clinics and hospitals. The eradication of malaria and improvement in the provision of safe drinking water and sewerage systems, which mainly benefited those living in towns, the estates and prosperous class in the rural areas, had a major impact on mortality.

UNICEF (1986) observed that it was encouraging that several nations have doubled and trebled their levels of immunization against vaccine preventable diseases which were killing almost four million a year and leaving another four million permanently disabled. Immunization and Oral Rehydration Therapy (ORT) are therefore beginning to lead the way towards the revolution in child survival.

2.3   CONCEPTUAL FRAMEWORK

Maternal and child health care depends primarily on the socio-economic and cultural milieu in which a woman lives. The world Health Organization Expert Committee on Maternal and child health CMCH stated that if MCH care programs are to be effective; they must concern themselves not only with immediate causes of morbidity and mortality but with types of social organizations and values that characterize the populations (WHO, 1997). This is because pregnancy and childbirth in Africa are surrounded by beliefs and customs that affect health and healthcare sought.

The resources available both to the family and community determine the access to which women have to maternal and child heath care services. The cultural set up too influences the health care

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behavior and use of health services. The modern child health care services may be available but if culture prohibits some practices, then women may not make use of them.

The theoretical framework of Kasl and Cobb 1966 states that health-seeking behavior is a function of the perception of threat and the attractiveness of value of behavior. The act of seeking health is a function of: -

1.   The unpleasantness of cost `taking action compared to taking no action and suffering the consequences.
2.   The perceived probability that the action will lead to desired prevention of threat.

The model however has been criticized for difficulty in specifying its limits. Individuals who desire to prevent disease may not be inclined to treat an illness (Nginya 1980).

There are wide ranges of factors that shape health-seeking behavior. McKinley (1972, cited in Ward et al 1997) identified six approaches. These are economic relating to financial barriers to seeking help. Second the socio-demographic, which relate to the significance of characteristics such as age, parity, gender, education for utilization, geographic (proximity of health services and use), the social-psychological (individual motivation, perception and learning and use behavior). The social-cultural, (association between norms, values, beliefs lifestyles and use of services).
Kroeger (1983) identified two broad frameworks for analyzing health-seeking behavior. The pathway model that uses qualitative methods of investigation is anthropological. The method identifies a sequence of steps from recognition of complications to use of health facilities and the social and cultural steps that affect the sequence.

Education is expected to affect the use of child health care services. Educated people are more likely to use maternity care and child health care services. Living in the rural areas restricts the social network of a woman since a woman operates within some rather predetermined circle of friends and relatives.

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Figure 2.1. Conceptual frameworks for influence of maternal education on child health status
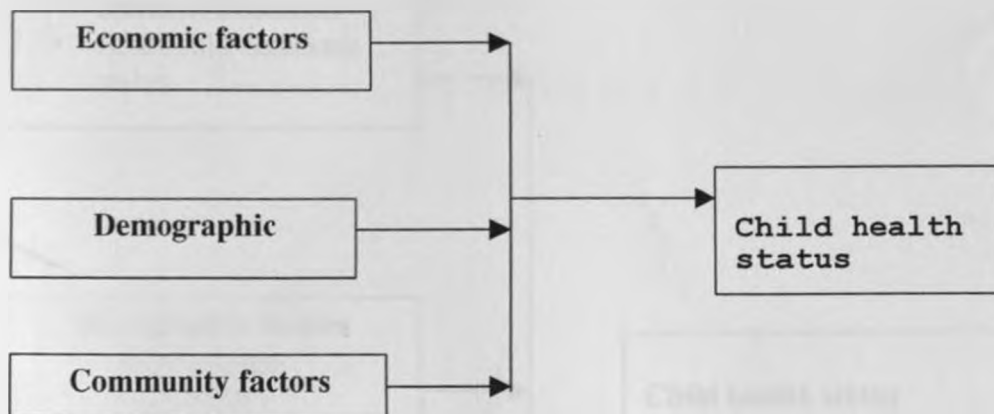
Adopted from Kroeger, (1983).

2.4 DEFINITION OF KEY CONCEPTS

Demographic factors

These are factors, which are inherent in a mother or child. These are factors which may positively or negatively influence the presentation of a child for health service .In this study mother's age, birth order, marital status have been considered.

Economic factors

These are factors that; reflect the social and economic status of individuals in society. The study will consider mother's education, household economic status and mother's work status.

Community factors

These are factors in the greater environment of the child. They represent the external factors the children are exposed to once born. In this study rural-urban residence, region of residence has been used.

Figure 2.2   Operational Framework
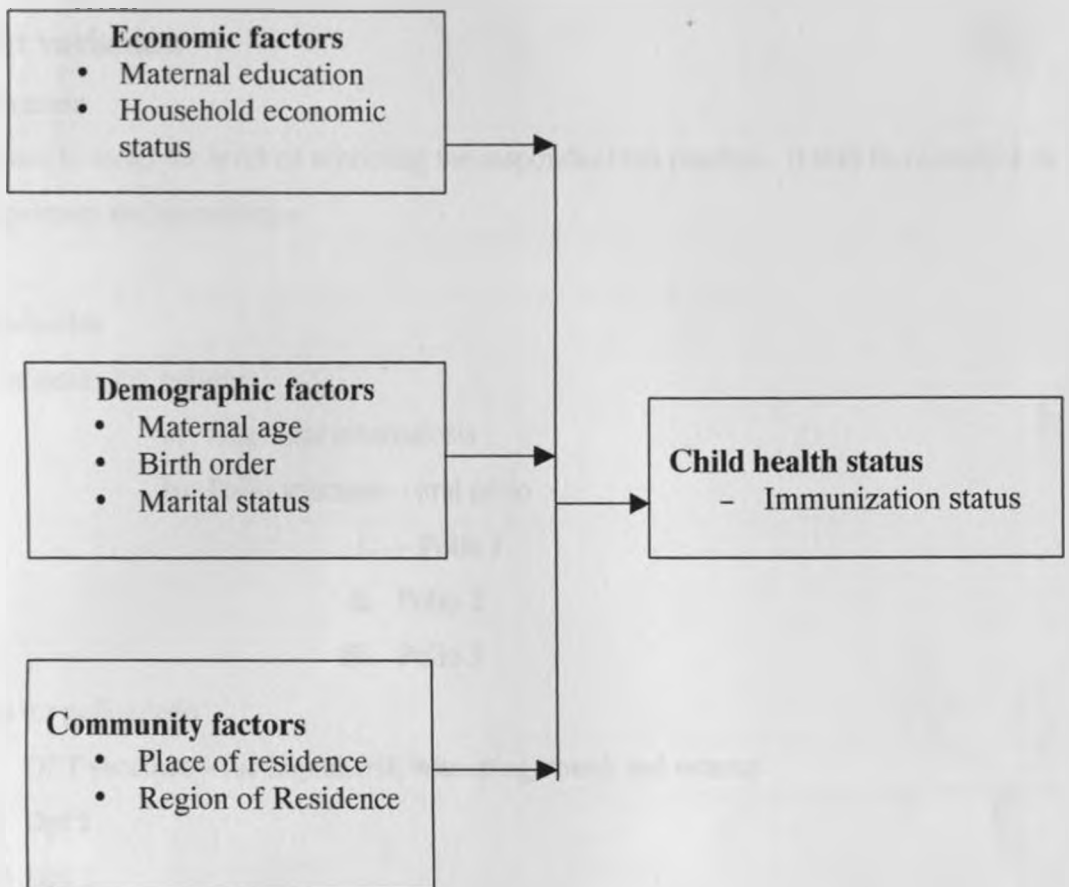
Variables of the study are:

Maternal education.

Co-variates

Household economic status

Maternal age

Birth order

Place of residence

Region of residence

Outcome Variables

Vaccine antigens: Bcg; Dpt; polio, and Measles.

Complete/Incomplete vaccination.

2.5 DEFINITION AND MEASUREMENT OF VARIABLES

Independent variables: -

Mother's education

This will be taken to mean the level of schooling the respondent has reached. It will be classified as no education; primary and secondary+

Dependent variables

I)   The immunization antigens

    a) Bcg – for tuberculosis

    b) Polio vaccines – oral polio

        i. – Polio 1

        ii. Polio 2

        iii. Polio 3

Polio vaccines for poliomletis

    (c)   DPT vaccines – for Diphtheria, whooping cough and tetanus

    (i) Dpt 1

    (ii) Dpt 2

    (iii)Dpt 3

    (d) Measles vaccines for measles

All these measured as not receive vaccine 0; received vaccine 1

- Received vaccine refers to those who had vaccination date on card; has vaccination reported by mother; those that had vaccination marked on card.

Complete, /Incomplete vaccination.

- This was computed from all the 9 vaccines namely oral polio 1, polio 2, polio 3, DPT 1 ,2, 3 and measles Bcg

Those children who received atleast 8 and above vaccines were regarded as having completed, while those who received less than 8 vaccines were regarded as having not

completed.

Control variables

Region of residence

This will mean the Kenyan region where the respondent stays. This variable is classified into 2 regions: -

High mortality region comprising of, Nyanza, Coast and Western.

Low mortality region comprising of Nairobi, Eastern, Rift Valley and Central.

- This variable is intended to capture the level of structural development

Place of Residence

This is the type of area the respondents were staying at the time of the interview either in rural or urban.

Birth Order

This means the position in which a child is born in relation to the age of mother. This variable is intended to capture, the relative chances of a child being immunized based on his position of birth in the family.

It is measured as; 1 birth order 1, 2 birth order 2 and 3rd birth order – 3; birth order 4+

Age of mother

This will mean the number of years the mother has lived since birth as at the time of the interview

Age is measured as

      15- 19 - young

      20 – 34- middle Ages

      35+ years- older

Marital status

This will mean the current marital status. It will be categorized as ever married and never married

Ever married was used to include all those mothers who were currently married and those who had

been in stable unions but were living apart during the interview. These were divorced, widowed or separated.

Socio-economic status

These will be the assets and resources available for the child's healthcare and hence it will act as a proxy for the standard of living in the household. The variable was computed by combining various household items together with the main floor material, and main roof material. The household items were radio, television, refrigerator, bicycle, motorcycle, car and electricity.

This variable was then categorised into low socio-economic status <5; Medium socio-economic status 5-9; High socio-economic status >9+

2.6   HYPOTHESIS (CONCEPTUAL HYPOTHESIS)

(i)   There is an association between mother's education and the uptake of health services.

2.6.1 Operational hypothesis

(i)   There is a positive relationship between the level of mother's education and the number of children who receive full immunization.

(ii)   There is a positive relationship between mother's education and the uptake of the Bcg vaccine.

(iii)   There is a positive relationship between mother's education and the uptake of the Measles vaccine.

(iv)   There is a positive relationship between mother's education and the uptake of the Polio vaccines.

(v)   There is a positive relationship between mother's education and the uptake of the Dpt vaccines.

CHAPTER THREE

STUDY DESIGN DATA AND METHODOLOGY

3.1   SOURCES OF DATA AND METHODS OF DATA COLLECTION

The data for the study were drawn from the 1998 Kenya demographic and health survey (KDHS). The KDHS is a nationally representative survey of 7881 women age 15-49 and 3407 men age 15-54.The KDHS was carried out jointly by the National Council for Population and Development (NCPD), and the Central Bureau of Statistics (CBS), with significant technical and logistic support from the ministry of health and various other governmental and non-governmental organizations. Macro international inc. of Calverton Maryland USA provided technical assistance through out the course of the project in the context of worldwide Demographic and health surveys (DHS) programme while financial assistance was from USAID- U.S Agency for international development and the department for international development (DFID/UK). Data collection was conducted from February to July 1998.

3.1.1 Survey Design

The 1998 KDHS is national in scope with the exclusion of three districts in north-eastern province and four other districts (Samburu and Turkana in Rift valley and Isiolo and Marsabit in Eastern province). Together the excluded regions account for less than 4% of Kenya's population.

3.1.2 Sampling procedures

The KDHS utilized a two stage, stratified sampling approach. First step involved selecting sample points or "clusters", the second stage involved selecting households within sample points from a list

compiled during a special KDHS household listing exercise.

The 1998 KDHS sample points were the same as those used in the 1993 KDHS and were selected from a national master sample (i.e. sampling) frame maintained by the central bureau of statistics. From this master sample called NASSEP-3 were drawn 536 sample points, 444 rural and 92 urban. Selected districts were over sampled in the 1998 KDHS in order to produce reliable estimates from certain variables at the district level. 15 districts namely-Bungoma, Kakamega, Muranga, Kericho, Kilifi, Kisii, Machakos, Meru, Nakuru, Nandi, Nyeri, Siaya, South Nyanza, Taita Taveta and Uasin Gishu-were targeted in both 1993 and 1998 KDHS.

Due to this over sampling, the 1998 KDHS is not self-weighting (i.e. sample weights are needed to produce national estimates). Within each of the over sampled districts, about 400 households were selected. In all other rural areas combined about 1400 households were selected, and 2000, households were selected in urban areas. The total number of households targeted for selection was thus approximately 9400 households.

3.1.3 Selection of households and individuals

CBS began a complete listing of households in all sample points during November 1997 and finished the exercise in February 1998. In the end 6 of the 536 sample points could not be completed (and were thus not included in the survey) due to problems of inaccessibility. All women aged 15-49 years were targeted for the interviews in the selected households.

3.1.4 Data Quality

Two types of errors affect estimates, from sample surveys,

a) Non-sampling errors, and, (b) sampling errors.

Non sampling (measurement) errors are due to shortcomings in the implementation of data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions (on the part of either the interviewer or the respondent) and data entry errors. Although numerous efforts were made during the implementation of the 1998 KDHS, to minimize this type of error, non sampling errors are impossible to entirely avoid and difficult to evaluate statistically.

Sampling errors on the other hand can be evaluated statistically. The sample of respondents selected in the 1998 KDHS is only one of the many samples that could have been selected from the same population, using the same design and expected size. Each of these samples could yield results that differ somewhat, from the results of the actual sample selected. Sampling errors are a measure of the variability between all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results.

A sampling error is usually measured in terms of the standard error for a particular statistic (mean, percentage etc), which is the square root of the variance. The standard error can be used to calculate confidence intervals within which the true value for the population can reasonably be assumed to fall. For example, for any given statistic calculated from a sample survey, the value of that statistic will fall within a range of plus or minus two times the standard error of that statistic in 95% of all

possible samples of identical size and design.

Sampling errors were analyzed for the national woman sample and for 2 separate estimates, (1) means and proportions and (2) complex demographic rates. The relative standard errors for the means and proportions range between 0.2% and 22.5% within an average of 4.2%. In general the relative standard errors for most estimates for the country as a whole are small except for the estimates of very small proportions (i.e. rare occurrences) (NCPD et al 1999). In this respect, KDHS data is of relatively high quality.

3.1.5 Scope of KDHS

The KDHS survey targeted females of reproductive ages 15-49 and males of ages 20-54. The female's questionnaire was used to collect information from the female respondents. The female respondents were asked questions relating to the following issues. The questionnaire included questions designed to determine the aggregate number of ever born to a woman. In addition questions relevant to direct estimation of mortality rates are collected using a complete maternal history. The sex and date of birth of every live birth, survival status current age (surviving children and age at death of dead children) was also recorded. The information on age at death were collected in days for children dying after the first month of birth, in months for children dying after the first month but before the second birthday, and in years for deaths occurring at or after the second birthday. Other information collected include, background characteristics such as age religion, education, reproductive history, knowledge and use of family planning methods, antenatal and delivery care, breastfeeding and weaning practices, vaccination and health of children under

age 5, marriage fertility preferences, Husbands background and respondents work status and awareness of HIV/AIDS. In addition there was a household questionnaire, which was administered to head of the household.

For the purpose of this study data relating to all live births that occurred during the three years preceding the survey has been used. The reason for limiting analysis to this period is that most explanatory variables used in the analysis relate to this period, and that since this data was collected retrospectively, information relating to births that occurred in the distant past may not be very accurate.

3.2 METHOD OF DATA ANALYSIS

Analysis of data will be done using cross tabulation and logistic regression

3.2.1 Cross tabulation

Cross-Tabulation is used in this study to obtain background characteristics of children and uptake of immunization that occurred to children in the study sample during the three years preceding the survey. This method yields percent distribution of immunized and non-immunized children to women by various background characteristics namely age, education, Type and place of residence socio-economic status birth order marital status and region of residence.

The Chi-square test is used in the study to determine the strength of the association between the independent variables and the dependent variable (uptake of immunization). It is also used to test whether the observed relationship is significant or not. The test thus determines the degree of association between the uptake of complete immunization and the independent variables. The significance level is set at alpha = 0.05

3.2.2 Logistic Regression

Standard logistic regression is applied to assess the effect of factors that are theoretically said to be associated with the likelihood of complete immunization. The method will help in explaining the relationship between the explanatory variables and the dependent variable. Logistic regression method has been chosen because the dependent variable (i.e. complete vaccination) is dichotomous denoting whether or not a child was fully vaccinated. Also from a mathematical point of view, it is an extremely flexible and easily used function, which lends itself to a biologically meaningful interpretation compared to other methods.

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In addition Logistic regression is an efficient way to institute necessary control when the dependent variable(s) are recorded in a dichotomous scale. The dependent variable is immunization (partial or full);

Logistic regression is derived from the principle of odds ratio. That is, the ration of the probability that an event will occur (p), to the probability that it will not occur (1-P) is called odds. Thus logistic regression is often expressed in the form:-

$$\text{Logit } p = \text{In}(p/1-p) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots\ldots\beta_n X_n + E$$

Where:

P	-	is the probability that the event will occur
In	-	is the natural logarithm
(1-P)	-	is the probability that the event will not occur
α	-	is a constant or the intercept of the model
βs	-	are the logistic co-efficient
Xs	-	are the explanatory variables
E	-	is the error term

The statistical package for social sciences (SPSS) will be used to run logistic regression. The logistic co-efficient will be obtained at different points in time and their differences tested using significance tests.

CHAPTER FOUR

VARIABILITY AND COMPLETE UPTAKE OF VACCINATION

4.1   INTRODUCTION

This chapter deals with the presentation and analytical interpretation of results of cross-tabulations and logistic regression as tools of data analysis. Child survival is usually determined by many factors among them immunization of infants and children. The study aims at establishing the effect of education on immunization of children. The dependent variables were immunization antigens received by the respective children.

The analysis concentrated on the percentage distribution of immunized by selected socio-economic, socio-cultural and demographic factors. The immunization antigens considered were BCG for tuberculosis, DPT-3 for Diphtheria, Whooping cough and tetanus, polio-1-3 for poliomyelitis and measles antigen for measles.

TABLE 4.1   TOTAL NUMBER OF WHOM GOT AND DID NOT GET THE VARIOUS VACCINES

Vaccines	No	Yes	Total
BCG	245	3029	3274
POLIO 0	1204	2070	3274
DPT1	385	2882	3267
POLIO 1	378	2894	3272
DPT 2	658	2604	3262
POLIO 2	642	2628	3270
DPT 3	1043	2219	3262
POLIO3	1217	2053	3270
MEASLES	1293	1964	3257

Out of a sample of 3954 children a total of 3274 got Bcg and Oral Polio, 3267 children gotDpt1, 3272 got Polio 1,3262 children got Dpt2 and Dpt3, 3270 children got polio 2 and Polio 3,while 3257 got measles.

4.1.1 DPT 1

Total number of children eligible to receive the vaccine was 3267. Out of these 395 children did not receive (11.8%); 1674 had the vaccination date on the card (51.2%); 1159 had the vaccine reported by mother (35.5%) and 49 children had vaccination marked on the card (1.5%). The total number of children who received the vaccine is 2882 which translates to 88.2%

4.1.2 Polio 1

Table number of children eligible to receive the vaccine was 3272. Out of these 378 children did not receive (11.6%); 1681 had the vaccination date on the card (51.4%); 1168 had the vaccination reported by mother (35.7%); and 45 had the vaccine marked on the card (1.4%)

4.1.3 DPT 2

The total number of children eligible to receive the vaccine is 3262. Out of these 658 did not receive (20.2%); 1554 children had the vaccination date marked on the card (47.6%); 1015 had the vaccination reported by mother (31.1%); 35 had the vaccination marked on the card (1.1%).

The total number of children who received the vaccine was 2604 which translates to 79.8%

4.1.4 Polio 2

The total number of children eligible to receive the vaccine was 3270. Out of these 642 children did not receive (19.6%); 1539children had the vaccine date marked on card (47.1%); 1045 children had the vaccine reported by mother (32.0%). 44 of the children had the vaccine marked on the card (1.3%). The total number of children who received the vaccine was 2628 that translates to 80.4%.

4.1.5 DPT 3

The valid number of children eligible to receive the vaccine was 3262. Out of these 1043 did not receive the vaccine (32.0%); 1386 children had the vaccine date on card (42.5%); 796 children had the vaccine reported by mother (24.4%) and 37 had the vaccine marked on the card (1.1%).

The total number of children who received the vaccine was 2219 that translates to 68.0%.

4.1.6 Polio 3

The valid number of children eligible to receive the vaccine was 3270. Out of these 1217 children did not receive the vaccine (37.2%); 1355 had the vaccine date marked on the card (41.4%); 658 had the vaccine reported by the mother (20.1%) and 40 had the vaccine marked on the card (1.2%). The total number of the children who received the vaccine was 2053 that translate to 62.8%.

4.1.7 Measles

The total number of children eligible to receive measles was 5257. Out of these 1293 children did not receive (39.7%); 1004 children had the vaccine date on the card (30.8%); 922 children had the vaccine reported by mother (28.3%) and 38 children had the vaccine marked on the card (1.2%).

4.1.8 BCG

The total number of children eligible to receive the vaccine was 3274. Out of these 245 children did not receive (7.5%); 1739children had the vaccine date marked on card (53.1%); 1219 children had the vaccine reported by mother (37.2%). 77 of the children had the vaccine marked on the card (2.2%). The total number of children who received the vaccine was 3029 that translates to 92.5%. (See appendix 1and 2)

4.1.9 Oral Polio

The total number of children eligible to receive measles was 3274. Out of these 1204 children did not receive (36.8%); 1487 children had the vaccine date on the card (45.4%); 486 children had the vaccine reported by mother (14.8%) and 97 children had the vaccine marked on the card (3.0%).

4.2 VARIABILITY IN THE UPTAKE OF THE VACCINES

TABLE: 4.2   PERCENTAGE OF CHILDREN WHO DID NOT/RECEIVED VACCINATION BY EDUCATION LEVEL

	NONE			PRIMARY			SECONDARY			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	49.2	50.8	376	39.4	60.6	2087	24.2	75.8	811	1204	2070
										36.8	63.2
Polio 1	13.9	86.1	375	11.9	88.1	2086	9.5	90.5	811	11.6	88.4
										378	2894
Polio 2	21.6	78.8	375	20.2	79.8	2084	17.1	82.9	811	642	2628
										19.6	80.4
Polio 3	38.7	61.3	375	36.9	63.1	2084	37.5	62.5	811	1217	2053
										37.2	62.8
DPT 1	14.4	85.6	376	12.4	87.6	2082	9.0	91.0	809	385	2882
										11.8	88.2
DPT 2	24.6	75.4	374	20.8	79.2	2079	16.6	83.4	909	658	2604
										20.2	79.8
DPT 3	36.9	63.1	374	33.1	66.9	2079	26.7	73.3	809	1043	2210
										32.0	68.0
BCG	10.1	89.9	376	8.2	91.8	2088	4.3	95.7	810	245	3029
										7..5	92.5
Measles	42.1	57.9	373	41.6	58.4	2074	33.8	66.2	8.10	1293	1964
										39.7	60.3

4.2.1 Education level and uptake of polio vaccination

Table 4.2 above shows the percentages of children who received and those that did not receive polio 0,1,2,3. It can be observed that the percentages of the children who received the polio vaccines increased with mother's educational level. For polio0, the percentage increased from 50.8 for mothers with no education to 60.6 for those with primary education and further increased to 75.8 for mothers with secondary+ education. Similar pattern is observed for polio 1 where the percentages increased from 86.1 to 88.1 and then to 90.5 and for polio2, 78.8 percent for mothers with no education, 79.8 for those with primary education and 82.9 for mothers with secondary+ education. Polio3 is the exception where the percentages increased from 61.3 for mothers with no education to 63.1 for those with primary education and then down to 62.5 for those with secondary education.

Education level and uptake DPT

Table 4.2 shows the percentages of children who received and those that did not receive Dpt1, 2,3. It can be observed that the percentages of the children who received the Dpt vaccines increased with mother's educational level. For dpt1, the percentage increased from 85.6 for mothers with no education to 87.6 for those with primary education and further increased to 91.0 for mothers with secondary+ education. Similar pattern is observed for dpt2 where the percentages increased from 75.4 to 79.2 and then to 83.4 and for polio3, 63.1 percent for mothers with no education, 66.9 for those with primary education and 73.3 for mothers with secondary+ education.

Education level and BCG

Table 4.2 shows the percentages of children who received and those that did not receive Bcg. It can be observed that the percentages of the children who received the Bcg vaccine increased with mother's educational level. The percentage increased from 89.9 for mothers with no education to 91.8 for those with primary education and further increased to 95.7 for mothers with secondary+ education.

Education level and uptake of measles

Table 4.2 shows the percentages of children who received and those that did not receive Measles. It can be observed that the percentages of the children who received the Measles vaccine increased with mother's educational level. The percentage increased from 57.9 for mothers with no education to 58.4 for those with primary education and further increased to 66.2 for mothers with secondary+ education. It is noted that the percentage of those who received the measles vaccine are the lowest out of all the vaccines.

Education is significantly associated to the uptake of all the vaccines.

TABLE 4.3: PERCENTAGE OF CHILDREN WHO DID NOT/RECIVED VACCINATION BY MOTHER'S AGE

	< 20			20 –34			35+			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	34.1	65.9	314	35.9	64.1	2436	42.4	57.6	524	1204 36.8	2070 63.0
Polio 1	17.9	82.1	313	10.6	89.4	2435	12.2	87.8	524	378 11.6	2894 88.4
Polio 2	24.9	75.1	313	19.4	80.4	2434	17.4	82.6	523	642 19.6	2628 80.4
Polio 3	39.6	60.4	313	36.7	63.3	2434	38.0	62.0	523	1217 37.2	2053 62.8
DPT 1	17.5	82.5	314	11.0	89.0	2439	12.0	88.0	524	385 11.8	2882 88.2
DPT 2	25.6	74.4	313	19.6	80.4	2428	19.4	80.6	521	658 20.2	2604 79.8
DPT 3	38.0	62.0	313	30.7	69.3	2428	34.4	65.6	521	1043 32.0	2219 68.0
BCG	10.8	89.2	315	6.8	93.2	2435	8.8	91.2	524	245 7.5	3029 92.0
Measles	50.0	50.0	312	38.0	62.0	2424	41.5	58.5	521	245 39.7	3029 60.3

4.2.2 Mother's age and uptake of polio vaccination

Table 4.3 shows the percentages of children who received and those that did not receive polio 0,1,2,3. It can be observed that the percentages of the children who received the polio vaccine decreased with mother's age, for polio0. For polio1, the percentage increased from 82.1 for young mothers who are below 20 years to 89.4 for middle aged mothers who are between 20 – 34years and then decreased to 87.8 for old mothers aged 35 years and above. Similar pattern is observed for polio 3 where the percentages increased from 60.4 to 63.3 and then decreased to 62.0. For polio2, the uptake of the vaccine increased with mother's age from 75.1 percent for young mothers to 80.6 for middle-aged mothers and 82.6 for old mothers.

Mother's age and uptake of DPT vaccination

Table 4.3 shows the percentages of children who received and those that did not receive Dpt1, 2,3 by mother's age. It can be observed that the percentages of the children who received the Dpt vaccine increased then decreased with mother's age, for Dpt 1,2. For Dpt1, the percentage increased from 82.5 for young mothers below 20 years to 89.0 for middle-aged mothers and then decreased to 88.0 older mothers above 35 years and above. Similar pattern is observed for Dpt3 where the percentages increased from 62.0 to 69.3 and then decreased to 65.6. For Dpt2, the uptake of the vaccine increased with mother's age from 74.4 percent for young mothers to 80.4 for middle-aged mothers and 80.6 for older mothers above 35 years.

Mother's age and uptake of BCG vaccination

Table 4.3 shows the percentages of children who received and those that did not receive Bcg. It can be observed that the percentages of the children who received the Bcg vaccine increased then decreased with mother's age. The percentage increased from 89.2 for young mothers below 20 years to 93.2 for middle-aged mothers who are 20-34 years and then decreased to 91.2 for older mothers above 35 years.

Mother's age and uptake of Measles vaccination

Table 4.3 shows the percentages of children who received and those that did not receive Measles by mothers' age. It can be observed that the percentages of the children who received the Measles vaccine increased then decreased with mother's age. The percentage increased from 50.0 for young mothers, who are below 20 years to 62.0 for middle-aged mothers and then decreased to 58.5 for older mothers above 35 years.

Mother's age is significantly associated with the uptake of all these vaccines except polio3. The results here show that there is a tendency towards young mothers and older mothers having their children with the lowest uptake of the vaccines. The peak is seen in the age group 20-34.This covers the age group of 20-24 that was identified by the National Coverage Survey by KEPI, 1987.

PERCENTAGES OF CHILDREN WHO GOT AND DID NOT GET POLIO 0,1,2,3 BY MOTHER'S BIRTH ORDER

Vaccines	Birth order 1			Birth order 2 and 3			Birth order 4+			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	28.2	71.8	801	34.6	65.4	1138	43.7	56.3	1335	1204 36.8	2070 63.2
Polio 1	11.4	88.6	799	10.0	90.0	1138	13.0	87.0	1335	378	2894
Polio 2	18.0	82.0	799	19.1	80.9	1138	21.1	78.9	1333	642 19.6	2628 80.4
Polio 3	34.9	65.1	799	37.3	62.7	1138	38.6	61.4	1333	514 37.2	819 62.8
DPT 1	11.0	89.0	800	10.8	89.2	1134	13.1	86.9	1333	385 11.8	2882 88.2
DPT 2	18.8	81.2	799	18.8	81.2	1133	22.2	77.8	1330	658 20.2	2604 79.8
DPT 3	28.7	71.3	799	30.0	70.0	1133	35.6	64.4	1330	1043 32.0	2219 68.0
BCG	6.7	93.3	801	5.7	94.3	1138	9.4	90.6	1335	245 7.5	3029 92.5
Measles	34.3	65.7	798	37.1	62.9	1130	45.1	54.9	1329	1293 39.7	1964 60.3

4.2.3 Mother's birth order and uptake of polio vaccination

Table 4.4 shows the percentages of children who received and those that did not receive Polio0, 1,2,3 by mother's birth order. It can be observed that the percentages of the children who received the Polio vaccine increased then decreased with birth order, only for Polio1, where the percentages increased from 88.6 to 90.0 and then decreased to 87.0. For the rest of the Polio vaccines the percentages decreased with birth order. For Polio0 the percentage decreased from71.8 for birth order1 to 65.4 for mothers with birth order 2and 3 and further decreased to 56.3 for mothers with birth order 4+. For Polio2, the uptake of the vaccine decreased from 82.0 to 80.9 and down to78.9.For Polio3 the percentages decreased from65.1 to62.7 and down to61.4.

Mother's birth order and uptake of DPT 1 vaccination

Table 4.4 shows the percentages of children who received and those that did not receive Dpt1, 2,3. It can be observed that the percentages of the children who received the Dpt vaccine

increased then decreased with birth order, only for Dpt1where the percentages increased from 89.0 to 89.2 and then decreased to 86.9. For the rest of the Dpt vaccines the percentages decreased with birth order. For Dpt2 the percentage decreased from81.2 for birth order1 stayed constant at 81.2 at birth order 2and3 and further decreased to77.8 birth order 4+. For Dpt3 the uptake of the vaccine decreased from 71.3 to 70.0 and down to64.4. Mothers with high order births tend to be older, they may forget the subsequent booster vaccines or may not see the need for them.

Mother's birth order and uptake of BCG vaccination

Table 4.4 shows the percentages of children who received and those that did not receive Bcg by mother's birth order. It can be observed that the percentages of the children who received the Bcg vaccine increased then decreased with birth order. The percentage increased from 93.3 for birth order 1 to 94.3 for birth order 2and 3 and then decreased to 90.6 for birth order 4+. Mothers with high order births tend to be older, therefore if the first order births survived it is likely that the subsequent children would not be taken for vaccination.

Mother's birth order and uptake of measles vaccination

Table 4.4 shows the percentages of children who received and those that did not receive Measles by mother's birth order. It can be observed that the percentages of the children who received the Measles vaccine decreased with birth order. The percentage decreased from 65.7 for birth order 1 to 62.9 for birth order 2and 3 and then decreased to 54.9 for birth order 4+. Mothers with high order births tend to be older and also due to the time interval between the first doses at birth and the measles at nine months, mothers are likely to forget to take their children to the clinic after the first vaccination.

Mother's marital status and uptake of DPT vaccination

Table 4.5 shows the percentages of children who received and those that did not receive Dpt1, 2,3 by mother's marital status. It can be observed that the percentages of the children who received the Dpt vaccines increased with the mother's marital status, from 85.6 to 88.5 for Dpt1, from 77.3 to80.9 for Dpt2 and from 65.1 to68.3 forDpt3. Dpt vaccine is given from 6weeks and soon after this age. Therefore mothers who attended postnatal clinics for their personal health were likely to remember to go with their children for immunization. This is because six weeks after delivery the mothers were due for personal medical checkup

Mother's marital status and uptake of BCG vaccination

Table above shows the percentages of children who received and those that did not receive Bcg by mother's marital status. It can be observed that the percentages of the children who received the Bcg vaccine increased for ever married women to be 92.7 and 90.8 for ever married and never married women respectively. This phenomenon is similar to the DPT vaccine above. This shows that most of the children of ever-married mother's seem to have delivered in the health institution more than the never married. This is consistent with what was found by Waweru (1994).It is assumed that married women were more economically secure hence could afford to take their children for treatment and immunization..

Mother's marital status and uptake of Measles vaccination

Table 4.5 shows the percentages of children who received and those that did not receive Measles by mother's marital status. It can be observed that the percentages of the children who received the Measles vaccine increased with the mother's marital status, from 58.3 to 60.5 for never married and ever married respectively. More stable unions provide a scenario where the mothers are able to remember this last vaccine. Among never married mothers the children are sometimes living elsewhere, probably with the grandparents, thus not all of them will be immunized.

TABLE 4.6: PERCENTAGE OF CHILDREN WHO GOT AND DID NOT GET VACCINATION BY MOTHER'S REGION OF RESIDENCE

Vaccines	HIGH MORTALITY			LOW MORTALITY			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	45.7	54.3	1481	29.4	70.6	1793	1204 36.8	2070 63.2
Polio 1	14.7	85.3	1480	8.9	91.1	1792	378 11.6	2894 88.4
Polio 2	24.5	75.5	1480	15.6	84.4	1790	642 19.6	2628 80.4
Polio 3	42.5	57.5	1480	32.8	67.2	1790	1271 37.2	2053 62.8
DPT 1	15.3	84.7	1476	8.9	91.1	1791	385 11.8	2882 88.2
DPT 2	25.4	74.6	1474	15.8	84.2	1786	658 20.2	2604 79.8
DPT 3	39.2	60.8	1474	26.0	74.0	1788	1043 32.0	2219 68.0
BCG	10.7	89.3	1481	4.8	95.2	1793	245 7.5	3029 92.5
Measles	45.2	54.8	1473	35.1	64.9	1784	1293 39.7	1964 60.3

4.2.5 Mother's region of residence and uptake of polio vaccination

Table 4.6 shows the percentages of children who received and those that did not receive polio 0,1,2,3. It can be observed that the percentages of the children who received the polio vaccine were higher in the Low mortality region as compared to the High mortality region. Polio 0 the percentages ranged from 70.0 in the low mortality region to 50.3 in the high mortality region. For polio1, the percentage ranged from91.1 and85.3 in the low and high mortality regions respectively. Similar pattern is observed for polio2 and 3 where the percentage range84.4 to 75.5 and 67.2 and57.5 for low and high mortality respectively. This is attributed to presence of health infrastructure, high level of literacy, in the low mortality region of compare to high mortality region.

Mother's region of residence and uptake of DPT vaccination

Table 4.6 shows the percentages of children who received and those that did not receive Dpt1, 2,3. It can be observed that the percentages of the children who received the Dpt vaccine were higher in the Low mortality region as compared to the High mortality region. For dpt1 the percentages ranged from 91.1 in the low mortality region to 85.3 in the high mortality region. For dpt2, the percentage ranged from84.2 and 74.6 in the low and high mortality regions respectively. Similar pattern is observed for dpt3 where the percentages range70.0 to 50.8 respectively for low and high mortality regions.

Mother's region of residence and uptake of BCG vaccination

Table 4.6 shows the percentages of children who received and those that did not receive Bcg. It can be observed that the percentages of the children who received the Bcg vaccine were higher in the Low mortality region as compared to the High mortality region. The uptake of the vaccine ranged from 95.2 in the low mortality region to 89.3 in the high mortality region respectively. The Bcg vaccine is given at birth it means that in the low mortality region more babies are delivered in the hospitals, the health institutions are nearer the people and the level of literacy is high. This contrasts with the high mortality region

Mother's region of residence and uptake of measles vaccination

Table 4.6 shows the percentages of children who received and those that did not receive Measles by mother's region of residence. It can be observed that the percentages of the children who received the Measles vaccine increased with the mother's region of residence, from 54.8 to 64.9 for high and low mortality respectively. However it is noted that the uptake of the measles vaccine is lowest compared to the other vaccines, within regions.

TABLE 4.7: PERCENTAGE OF CHILDREN WHO GOT AND DID NOT GET VACCINATION SOCIO-ECONOMIC STATUS

	LOW			MEDIUM			HIGH			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	39.1	60.9	2641	26.4	73.6	530	31.1	68.9	103	1204	2070
										36.8	63.2
Polio 1	12.2	87.8	2639	8.3	91.7	530	12.6	87.4	103	378	2894
										11.6	88.4
Polio 2	20.2	79.8	2637	16.4	83.6	530	22.3	77.7	103	642	2628
										19.6	80.4
Polio 3	37.3	62.7	2637	35.7	64.3	530	43.7	56.3	103	1217	2053
										37.2	62.8
DPT 1	12.2	87.8	2633	8.9	91.1	531	15.5	84.5	103	385	2882
										11.8	88.2
DPT 2	20.5	79.5	2630	17.5	82.5	530	26.5	73.5	102	658	26.4
										20.2	79.8
DPT 3	32.2	67.8	2630	30.0	70.0	530	36.3	63.7	102	1043	2219
										32.0	68.0
BCG	8.1	91.9	2647	4.3	95.7	533	7.4	92.6	94	245	3029
										7.5	92.4
Measles	40.6	59.4	2627	37.2	63.8	527	35.0	65.0	103	1293	1964
										39.7	60.3

4.2.7 Mother's socio-economic status and uptake of polio vaccination

Table 4.7 shows the percentages of children who received and those that did not receive polio 0,1,2,3 by mother's socio-economic status. It can be observed that the percentages of the children who received the polio vaccines increased then decreased. For polio0, the percentage increased from 60.9 to 73.6 and down to68.9 for low medium and high socio-economic status respectively. For polio1, the percentage increased from 87.7 to 91.7 and down to 87.4. For polio 2, the percentage increased from 79.8 to 83.6 and down to77.7. For polio 3, the percentage increased from 62.7 to 64.3 and down to56.3.Apart from the oral Polio (Polio 0), the percentage of children who get the Polio vaccines are higher in the low socio-economic group than the high socio-economic group. This could be as a result of relatively fewer numbers in the high socio-economic group.

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Mother's socio-economic status and uptake of DPT vaccination

Table 4.7 shows the percentages of children who received and those that did not receive Dpt1, 2,3 by mother's socio-economic status. It can be observed that the percentages of the children who received the Dpt vaccines increased then decreased. For Dpt1, the percentage increased from 87.8 to 91.1 and down to84.5 for low medium and high socio-economic status respectively. For Dpt2, the percentage increased from 79.5 to 82.5 and down to 73.5. For Dpt 3, the percentage increased from 67.8 to 70.0 and down to63.7.Similarly, the percentages of children who get the Dpt vaccines are higher in the low socio-economic group than the high socio-economic group.

Mother's socio-economic status and uptake of BCG vaccination

Table 4.7 shows the percentages of children who received and those that did not receive Bcg by mother's socio-economic status. It can be observed that the percentages of the children who received the Bcg vaccine increased then decreased. The percentage increased from 91.9 to 95.7 and down to92.6 for low medium and high socio-economic status respectively. The percentages of children who get the Bcg vaccines are higher in the high socio-economic group than the low socio-economic group. Bcg vaccine is given at birth thus it appears that most of the children born to mothers in the high socio-economic group were gotten in hospital.

Mother's socio-economic status and uptake of measles vaccination

Table 4.7 shows the percentages of children who received and those that did not receive Measles by mother's socio-economic status. It can be observed that the percentages of the children who received the Measles vaccine increased with socio-economic status. The percentage increased from 59.4 to 63.8 and down to 65.0 for low, medium and high socio-economic status respectively. This is a marked difference from the outcomes in particular category. The results show that the children born to mothers in the high socio-economic group benefit from their mothers knowledge of the importance of immunization in the community.

TABLE 4.8: PERCENTAGE OF CHILDREN WHO GOT AND DID NOT GET VACCINATION BY MOTHER'S TYPE OF RESIDENCE

Vaccines	URBAN			RURAL			GRAND TOTAL	
	No	Yes	Total	No	Yes	Total	No	Yes
Oral Polio	28.5	71.5	492	38.2	61.8	2782	1204	2070
							36.8	63.2
Polio 1	7.3	92.7	492	12.3	87.7	2780	378	2894
							11.6	88.4
Polio 2	17.7	82.3	492	20.0	80.0	2778	642	2628
							19.6	80.4
Polio 3	39.0	61.0	492	36.9	63.1	2778	1217	2053
							37.2	62.8
DPT 1	8.4	91.6	490	12.4	87.6	2777	385	2882
							11.8	88.2
DPT 2	21.2	78.8	490	20.0	80.0	2772	658	2604
							20.0	79.8
DPT 3	34.3	65.5	490	31.6	68.4	2772	1043	2219
							32.0	68.0
BCG	4.3	95.7	492	8.1	91.9	2780	245	3029
							7.5	92.5
Measles	32.9	67.1	489	40.9	59.1	2768	1293	1964
							39.7	60.3

4.2.8 Mother's type and place of residence and uptake of polio vaccination

Table 4.8 shows the percentages of children who received and those that did not receive the Polio vaccines by mother's type and place of residence. It can be observed that the percentages of the children who received the Polio vaccines were higher in the urban areas compared to the rural areas, with an exception of Polio3. For Polio 0,1,2 the percentages are 71.5 and 61.8, 92.7 and 87.7, 82.3 and 80.0, for urban and rural respectively. The exception is Polio3 where the rural uptake of the vaccine is higher in the rural areas with percentages of 61.0 and 63.1 for urban and rural respectively.

Mother's type and place of residence and uptake of DPT vaccination

Table 4.8 shows the percentages of children who received and those that did not receive the Dpt vaccines by mother's type and place of residence. It can be observed that the percentages of the

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children who received the Dpt vaccines were higher in the urban areas compared to the rural areas for only Dpt 1 where the percentages were 91.6 and87.6 respectively. For Dpt 2,3 the percentages are 78.8 and80.0, 65.5 and68.4 for urban and rural respectively. This shows that the rural uptake of the vaccine is higher than in the urban areas. There is a decline in the uptake of the subsequent doses of Dpt. This can be attributed to the fact that mothers either forgot or they did not know the value of the booster doses, while others may have lacked bus fare to the clinic, if it is far.

Mother's type and place of residence and uptake of BCG vaccination

Table 4.8 shows the percentages of children who received and those that did not receive the Bcg vaccines by mother's type and place of residence. It can be observed that the percentages of the children who received the Bcg vaccines were higher in the urban areas compared to the rural areas with the percentages of 95.7 and 91.9 respectively. However the rural uptake is also quite high being over 90%. This shows that a majority of the children in the rural areas were born in the health facilities, since Bcg is usually given at birth. The urban percentages could also be higher because their totals are much lower than the rural totals.

Mother's type and place of residence and uptake of measles vaccination

Table 4.8 shows the percentages of children who received and those that did not receive the Measles vaccines by mother's type and place of residence. It can be observed that the percentages of the children who received the measles vaccines were higher in the urban areas compared to the rural areas with the percentages of 67.1 and 59.1 respectively. However the rural uptake is also quite low falling below 60%. This is generally a worrying trend of low uptake of the measles vaccine. The low Percentages could be due to the fact that Measles is given at 9 months (KEPI 1987). This is usually a long interval from birth where the first vaccines (Bcg and Oral Polio) were given. Again many children in the rural African homes had suffered from Measles before attaining 9 months (Ghana 1988 and Dondi 1988). As a result some mothers had sought treatment and hence did not see the need for a vaccine at 9 months.

According to Muller (1984), a Machakos study showed that the antigens could not be

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administered earlier than 9 months as the maternal antibodies interfered with its effectiveness in the body. Consequently, the revised 1987 KEPI schedule policy is still the guiding factor as to when the antigen should be given.

Mothers do forget the clinic dates, while others argue that if the child has survived upto 9 months then the child would not suffer from Measles in life and hence, do not take the child for Measles immunization (Measles Initiative 1992).

4.3 COMPLETE VACCINATION

For all vaccines, the total number of cases was 3954 but the valid cases were 3227. This represents 81.6% of the total number of cases. 727 cases were missing which represents 18.4% (See appendix 3)

TABLE 4.9   EDUCATION AND COMPLETE VACCINATION

			ALL VACCINES		Total
			Incomplete	Complete	
Education	No education	Count	172	195	367
		% Within No Education	46.9%	53.1%	100.0
		% Within complete/Incomplete	13.3%	10.1%	11.4%
	Primary Education	Count	860	1192	2052
		% Within Primary Education	41.9%	58.1%	100.0
		% Within complete/Incomplete	66.3%	61.8%	63.6%
	Secondary+	Count	266	542	808
		% Within Secondary Education	32.9%	67.1%	100.0
		% Within complete/Incomplete	20.5%	28.1%	25.0%
Total		Count	1298	1929	3227
		% Within Education	40.2%	59.8%	100.0
		% Within ALL Vaccines	100.0%	100.0%	100.0

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4.3.1 Education and Complete Vaccination

This table 4.9 shows that among women with no education 46.9% of the children did not complete their vaccination while 53.1% completed; whereas 41.9% of the children had incomplete vaccination among women with primary education and 58.1% had complete vaccination. Among women with secondary education 32.9% of the children had incomplete while 67.1% had complete vaccination. On the whole 40.2% of the children had incomplete vaccination while 59.8% had complete vaccination.

This is consistent with the literature that presupposes that more education instills into the mothers positive health values which is then translated to better health for their children. The chi-square tests show that education is significant as far as the uptake of complete vaccination is concerned.

The results show that mothers with secondary education are associated with higher uptake of complete vaccination. This is consistent with what (Hill 1990) found out that mothers with secondary education were associated with high immunization. Therefore, a child of mother with secondary education or further is more likely to have been fully vaccinated than a child of a mother with no or primary education.

High level of Education is very crucial in the understanding of immunization and its benefits. These Mothers are more likely to protect their children against diseases, since the concepts of health becomes so clear in their minds. The educated mother is ready to make sacrifices and find alternative ways to ensure that the child has been immunized. The same view was shared by (Dondi1992) in South Nyanza where he found out that mothers who understood the role of immunization would get round the difficulties they encountered to have their children immunized

TABLE 4.10:   SOCIO ECONOMIC STATUS AND COMPLETE VACINATION

Socio economic status		All vaccines given		Total
		Incomplete	Complete	
Low	Total number of children vaccinated	1170	1676	2846
	% Of children received vaccine	41.1%	58.9%	100.0%
	%Within complete/Incomplete	90.1%	86.9%	88.2%
Medium	Total number of children	109	225	334
	% Of children received vaccine	32.6%	67.4%	100.0%
	% Within complete/Incomplete	8.4%	11.7%	10.4%
High	Total number of children	19	28	47
	% of children received vaccine	40.4%	59.6%	100.0%
	% Within complete/Incomplete	1.5%	1.5%	1.5%
Total	Overall column total	1298	1929	3227
	% Of overall	40.2%	59.8%	100.0%
		100.0%	100.0%	100.0%

4.3.2 Socio-economic Status and Complete vaccination

Among women with the low socio-economic status 41.1% of their children had incomplete vaccination while 58.9% had complete vaccination.

Among the women medium socio-economic status; 32.6% of the children had incomplete while 67.4% of the children had complete vaccination.

Within the high socio-economic status 40.4% of the children had incomplete while 59.6% of the children had complete vaccination respectively.

The socio-economic status is also significantly associated to the uptake of the vaccines (with x^2 of 0.011). The scenario depicted here shows that the uptake of complete vaccination increases within the medium socio-economic status to 67.4% but decreases to 59.6% in the high socio-economic status, although it is still higher than the low socio-economic, status.

Generally, it appears that women with higher socio-economic status are more likely to avail their children for vaccination, because they may be able to travel long distances to take their children to the clinic, moreover even where there is cost sharing, women in the high socio-economic status may be in a position to afford payment.

In addition the women in the high socio-economic group live in areas where the health infrastructure is developed; thus encouraging them to take the children for vaccination. The results here also show that a child of a mother with a higher socio-economic status benefited from immunization services in the community. Such a mother knows that good health achieved immunization reduces visits to the doctors for common colds and other diseases

TABLE 4. 11:   MARITAL STATUS AND COMPLETE VACCINATION

Marital status		All vaccination given		Total
		Incomplete	Complete	
Never married	Total number of children vaccinated	121	180	301
	% of children vaccinated	40.2%	59.8%	100.0%
	% within complete/Incomplete	9.3%	9.3%	9.3%
Ever married	Total number of children vaccinated	1177	1749	2926
	% of children vaccinated	40.2%	59.8%	100.0%
	% within complete/Incomplete	90.7%	90.7%	90.7%
Total	Overall column total	1298	1929	3227
	% of overall	40.2%	59.8%	100.0%
		100.0%	100.0%	100.0%

4.3.3 Marital Status and complete Vaccination

The table 4.11 that the percentages of children within, the never married and ever married are similar within 40.2% and 59.8% for incomplete and complete vaccination respectively On the whole the results show that marital status is not significantly associated with full vaccination; since the x^2 is 0.993.

TABLE 4.12:   COMPLETE AND INCOMPLETE VACCINATION BY REGION

			All vaccination given		Total
			Incomplete	Complete	
Regions 2	High Mortality region	Total number of children vaccinated	711	752	1463
		% of children vaccinated	48.6%	51.4%	100.0
		% within complete/Incomplete	54.8%	39.0%	45.3%
	Low mortality region	Total number of children vaccinated	587	1177	1764
		% of children vaccinated	33.3%	66.7%	100.0
		% within complete/Incomplete	45.2%	61.0%	54.7%
Total		Overall column total	1298	1929	3227
		% of overall	40.2%	59.8%	100.0
			100.0%	100.0%	100.0

4.3.4 Region of Residence and Complete Vaccination

Table 4.11 shows the percentage distribution of the uptake of full vaccination by regions. Within the high mortality region the percentage of children who had incomplete vaccination are 48.6% compared to 51.4% children who received full vaccination.

Within the low mortality region the percentage of children are 33.3% and 66.7% for incomplete and complete vaccination respectively.

The percentage of children who received full immunization is higher in the low mortality region with 66.7% compared to 51.4% in the high mortality region. Region of residence is significantly associated with to the full vaccination of the child.

This is consistent with the facts as it is depicted in the literature. The low mortality regions have the regions Nairobi, Central, Eastern, and Rift Valley. These are the regions that the health infrastructure is developed, especially Nairobi and central province. The level of literacy is also high and as such the mothers spend more time in school hence being able to internalize the health values necessary for the realization of a better health for their children.

Mother's who are literate would also understand that the child vaccination has other advantages other than that of their children's health. For example in the urban areas, when applying for a preschool place for the child (Waweru 1991) adds the card needs to be produced and also when seeking a birth certificate later when the child is older or in adulthood the card is also necessary. In this country where most deliveries take place outside health facilities (Dondi 1992), the clinic card is the most reliable document for establishing age when and individual applies for birth certificate. With the above acknowledge a significant number of mothers are pressurized to bring their children to the clinic regularly and to keep the card safely.

TABLE 4.13:   COMPLETE AND INCOMPLETE VACCINATION BY BIRTH ORDER

| | | | All vaccination given | | Total |
			Incomplete	Complete	
Birth order	Birth order 1	Total number of children	273	519	792
		% Of total children vaccinated	34.5%	65.5%	100.0%
		% Within complete/Incomplete	21.0%	26.9%	24.5%
	Birth order 2 - 3	Total number of children	430	692	1122
		% Of children vaccinated	38.3%	61.7%	100.0%
		% Within complete/Incomplete	33.1%	35.9%	34.8%
Total		Overall column total	1298	1920	3227
		% Of overall	40.2%	59.8	100.0%

4.3.5 Birth Order and Complete Vaccination

Mothers with birth order I have 34.5% and 65.5% their f children having incomplete and complete vaccination respectively while those mothers with birth order 2 and 3 have 38.3% and 61.7% of children having incomplete and complete vaccination respectively. In addition those mothers with birth order 4+ and above have 45.3% and 54.7% of children had incomplete and complete vaccination respectively.

On the whole the percentage of children who got full vaccination decrease downwards from birth order 1 at 65.5% to 61.7% for birth order 2 and 3 and down to 54.7 for birth order 4 and above. Birth order is significantly related to the uptake of full vaccination (chi-square of 0.000). Thus the higher the order of birth a child the lesser the chances of such a child being fully immunized. Children born later are less likely to be exposed to complete vaccination as compared to those children born in the lower order.

There are several possible explanations for the differences in the uptake of complete vaccination by birth order. On the one hand mothers may be fully concerned about first born children and hence more likely to see that they are fully vaccinated; also mothers with many children may have less time to make sure that their children are completely vaccinated. The results shown here are consistent with that for most developing countries (Somme felt A, E 1997), that uptake of full vaccination is lowest for children of higher birth order and higher for children of lower birth order.

| | | | All vaccinations | | Total |
			Incomplete	Complete	
Age	< 20	Total number of children	139	169	308
		% Of total children vaccinated	45.1%	54.9%	100.0%
		% Within complete/Incomplete	10.7%	8.8%	9.5%
	20-34	Total number of children	931	1472	2403
		% of children vaccinated	38.7%	61.3%	100.0%
		% Within complete/Incomplete	71.7%	76.3%	74.5%
	35+	Total number of children	228	288	516
		% of children vaccinated	44.2%	55.8%	100.0%
		% Within complete/Incomplete	17.6%	14.9%	16.0%
Total		Overall column total	1298	1929	3227
		% Of overall	40.2%	59.8%	100.0%
			100.0%	100.0%	100.0%

4.3.6 Mothers Age and Complete Vaccination

Among the mothers< 20 years 45.1% and 54.9% of the children had incomplete and complete vaccination respectively. Among the mothers who are between 20-34 years 38.7% of the children had incomplete vaccination while 61.3% of the children had complete vaccination. Among the mothers of age group 35+ years 44.2% and 55.8% of the children had incomplete and full vaccination respectively.

Out of all the children who had incomplete vaccination 10.7% are within the mothers with age <20 years while 71.7% are within the middle aged mothers of between 20 – 34 years while 17.6% are within the older mothers 35 years and above. Out of all the children who had complete vaccination

8.8% were among mothers who are below 20 years of age, 76.3% are among the mothers who are between 20 – 34 years and 14.9% are among the older mothers of 35 years and above. This shows that complete vaccination is higher among the middle reproductive age. Mothers age is significantly related to the uptake of all vaccines with a(x^2 of 0.013).

Differentials in the uptake of complete vaccination by mother's age tend to be relatively small; less than 1o percentage points.

4.3.7 Type of place of residence

The percentage of children who had the uptake of the vaccine was similar in both the urban and the rural areas standing at 40.2% for incomplete and 59.8% complete both for rural and urban areas. Type of place of residence is not significantly related to the uptake 0.977.

TABLE 4.15:   COMPLETE AND INCOMPLETE VACCINATION BY TYPE OF PLACE OF RESIDENCE

			All vaccination given		Total
			Incomplete	Complete	
Type of place of residence	Urban	Total number of children	196	292	488
		% of total children vaccinated	40.2%	59.8%	100.0%
		%Within complete/Incomplete	15.1%	15.1%	15.1%
	Rural	Total number of children	1102	1637	2739
		% of children vaccinated	40.2%	59.8%	100.0%
		% Within complete/Incomplete	84.9%	84.9%	84.9%
Total		Overall column total	1298	1929	3227
		% of overall	40.2%	59.8%	100.0%
			100.0%	100.0%	100.0%

4.4 RESULT OF BIVARIATE MODEL WITH COMPLETE VACCINATION

TABLE 4.16   EDUCATION AND COMPLETE VACCINATION

Variable	β	SE	df	Sign.	Expβ
No education[..]			2	.0000	
Primary education	.1768	.1179	1	.1337	1.1934
Secondary education	.5851	.1397	1	.0080	1.7952
Constant	.1233	.1085	1	.2558	

- This analysis shows the gross effect of education on the uptake of immunization. It shows that children born to mother's with primary education are 1.19 times likely to be fully immunized compared to children born to mothers with no education

- Children born to mothers with secondary education are 1.7952 times likely to be fully immunized compared to children with no education.

This results shows that secondary education is a very significant determinant of complete vaccination. Mothers with secondary education, increases her children's chances of being fully immunized, and hence better health.

4.5 LOGISTIC REGRESSION ANALYSIS

TABLE 4.17: RESULTS OF LOGISTIC REGRESSION

Variable	B	S.E	Df	Sig	Expβ
1. Type of place of Residence Urban**					
Rural	.0309	0.0989	1	0.7544	1.0314
Socio-economic status Low**			2	0.1531	
Medium	0.1934	0.1167	1	0.937	1.2134
High	-0.2229	0.2841	1	0.4326	0.8002
Age of mother < 20**			2	0.1934	
20-34	0.2100	0.1258	1	0.0950	1.2336
35+	.1366	. 1614	1	.3973	1.1464
Birth Order 1**			2	.0014***	
2 and 3	-. 0879	0.0938	1	0.3486	0.9158
4+	-. 3409	0.1033	1	0.0010***	0.7111
Marital status Never married**					
Ever married	0.0956	0.1232	1	0.4378	1.1003
Region High mortality**					
Low mortality	0.5633	0.0659	1	0.000***	1.7564
Education No education			2	0.0017***	
Primary	0.0202	0.1083	1	0.8518	1.0204
Secondary	0.3039	0.1231	1	0.0136	1.3552
Constant	- .5642	.1899	1	1.0030	

** Reference category
*** Significant at P = 0.01

4.5.1 The Effect of Region of Residence

Children born to mothers in the low mortality region are 1.7 times more likely to be fully vaccinated compared to those children born to mothers in the high mortality region.The results show that children born in the low mortality region are more likely to undertake complete vaccination.

Region of residence is also positively associated with the full uptake of immunization. Region of residence is significantly associated with the uptake of complete vaccination.

4.5.2 The Effect of Birth Order

Children born in birth order 2 and 3 were 0.9 times likely to be fully immunized compared to children of birth order one. Children born in birth order 4 and above were 0.7 times likely to be fully immunized compared to children of birth order one. Birth order is negatively associated with uptake of immunization.

4.5.3 The Effect of Education

Children born to mothers with primary education were 1.02 times likely to be fully vaccinated compared to children born to mothers with no education.

Children born to mothers with secondary education and above were 1.35 times likely to be fully vaccinated compared to children born to women with no education.
Education is positively associated with the uptake of full immunization. The higher the level of education, the higher the uptake of immunization. Education is significantly related to the uptake of immunization at 0.01.

Conclusion of chapter 4

It is also noted that the other variables entered into the analysis, namely type of place of residence, socio-economic status, and age of mother are not significant as far as the uptake of complete immunization is concerned. The study did not find significant differences between urban; rural, between low; medium; and high socio-economic status, and between young mothers below 20 years; middle-aged mothers of 20-34 years; and older mothers above 35 years.

Comparing the results of the bivariate analysis of education and the results of the logistic regression analysis with controls for types of place of residence; socio-economic status, age, birth order, marital status, region of residence, the outcome is that the effect of education on the uptake of immunization from 1.19 times to 1.02 times for children born to mothers with primary education. For secondary education the effect of education on the uptake of immunization reduced from 1.79 times to 1.35 times for children born to mothers with secondary education and

above.

Therefore, it is evident that there are other factors that the uptake of immunization depends on. The study shows that the uptake of immunization is significantly related to birth order, region of residence and mothers education.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

5.1 SUMMARY

This study set out to establish the effect of mother's education on the uptake of complete vaccination. In addition the study was to identify the variability in the uptake of the vaccines with education together with its covariates.

The methodology employed was cross tabulation and logistic regression. Cross tabulation is to establish the variability (differentials) and logistic regression was to establish the effect of mother's education on the uptake of full vaccination.

The study reveals that education influences the uptake of individual vaccine uptake as well as the complete vaccination. The uptake of the antigens, Bcg, Oral polio, Polio 1,2,3, measles, DPT 1,2,3 increases with the level of education.

The uptake of complete vaccination also increases with the level of education; from 53.1% to 58.1% to 67.1%. Education is significantly associated with the uptake of complete vaccination.

The study established that the gross effect of education on the complete vaccination is higher but it reduces when effects of other variables are controlled for such as type of place of residence; socio-economic status, age of mother; birth order, marital status; and region of residence.

The bivariate analysis reveals that the children born to mothers with primary education were 1.19 likely to be fully immunized as compare to children born to mothers with no education.

Children born to mother's with secondary education were 1.7 times likely to be fully immunized compared to children born to mothers with no education. The results of the logistic regressions showed that the effects of other variables are controlled for. The effect of education reduces to 1.02 and 1.35 times likely to be fully immunized for children born to mothers with primary

education and secondary education respectively.

5.2 CONCLUSION

The study has shown that education of the mother is significantly related to the uptake of complete vaccination.

Since immunization against the childhood diseases reduces the risk of death and improves child health; the study confirms that mother education is still a significant determinant of child health.

The study has also shown that education of mother has a positively relationship with complete immunization. Thus higher education for mothers is directly related to better immunization coverage hence better child health.

It is also evident from the study that the effect of education reduces when other variables are controlled for namely; type of place of residence, socio-economic status; age of mother, birth order, marital status and regions of residence. The reduction is by 0.17 for children born to mothers with primary education and 0.44 for children born to children with secondary education. From the study the significant variables other than mother's education are birth order, region of residence.

5.3 RECOMMENDATIONS

5.3.1 Policy Formulation

It is evident from the findings of this study that education exerts a positive influence on complete immunization of children.
It is recommended that:

(i)   The government of Kenya should intensify the provision of education for the girl child. This will ensure that future mothers have enough knowledge to be able to make the right choices for their children.

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(ii)   Intensify the immunization campaign in the high mortality regions where the uptake of the vaccines is low.

(iii)   Intensify the booster measles campaign since the measles coverage is still low.

(iv)   The government should ensure the retention of the girl child in school so as to attain a higher level of education; for better child health.

(v)   Vaccination coverage rates should be monitored with consistent methodology to avoid the differences observed between vaccines given at the same time

5.3.2   Further research is recommended into

(i)   Comparative study between the low and high mortality regions to show the level of immunization uptake.

(ii)   The determinants of immunization uptake in rural and urban areas.

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Appendices.

Appendix 1. Number of the children immunised and not immunised.

	Polio 1	Polio 2	Polio 3	Dpt 1	Dpt 2	Dpt3	Bcg	Measles
Not received	378	642	1217	385	658	1043	245	1293
Vaccine date on card	1681	1539	1355	1674	1554	1386	1739	1004
Vaccine marked on card	45	44	40	49	35	37	71	38
Reported by Mother	1168	1045	658	1159	1015	796	1219	922

Appendix 2 Percentage of the children immunised and not immunised

	Polio 1	Polio 2	Polio 3	Dpt 1	Dpt 2	Dpt3	Bcg	Measles
Not received	11.6	19.6	37.2	11.8	20	32.0	7.5	39.7
Vaccine date on card	51.4	47.1	41.4	51.2	48	42.5	53.1	30.8
Vaccine marked on card	1.4	1.3	1.2	1.5	1	1.1	2.2	1.2
Reported by Mother	35.7	32.0	20.1	35.5	31	24.4	37.2	28.3

Appendix 3
Summary of the uptake of Complete, / Incomplete vaccination by various background variables.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
V106R Education * ALLV	3227	81.6%	727	18.4%	3954	100.0%
SESR socio economic status * ALLV	3227	81.6%	727	18.4%	3954	100.0%
V502R Marital status * ALLV	3227	81.6%	727	18.4%	3954	100.0%
V024R Regions2 * ALLV	3227	81.6%	727	18.4%	3954	100.0%
BORDR Birth order * ALLV	3227	81.6%	727	18.4%	3954	100.0%
V013R Age * ALLV	3227	81.6%	727	18.4%	3954	100.0%
V025 Type of place of residence * ALLV	3227	81.6%	727	18.4%	3954	100.0%