

CHILD SURVIVAL DETERMINANTS IN THE ARID AND SEMI-
ARID LANDS : A STUDY OF MACHAKOS, KILIFI AND TAITA
TAVETA DISTRICTS

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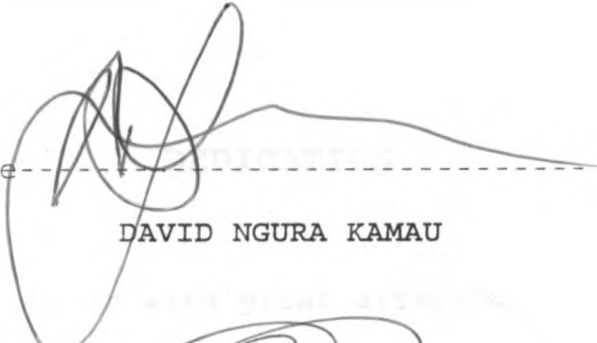


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DECLARATION

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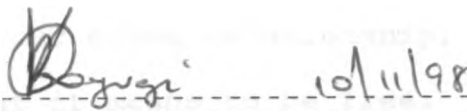
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DEDICATION

It is with great affection

I dedicate this Thesis to

TO MY DEAR DAD AND MUMMY

Because of our close relationship,

I know what it means to be free.

ACKNOWLEDGEMENT

I am a grateful man. I have every reason to be. It is my joy to have numerous people surrounding me with encouragement, affirmation, honest feedback, and an abundant supply of fresh hope to stay at tough tasks. I consider them more than friends; they are partners with me, true to the end. To say that they have been helpful in seeing this Thesis to completion is a gross understatement of the fact.

This Thesis is as a result of collaborative efforts of various people who I feel indebted to. Special honour goes to the Almighty God who has given me strength and hope that I can do all things through Jesus Christ who strengthens me.

My sincere appreciation is extended to the UNITED NATIONS POPULATION FUND (UNFPA) for granting me the scholarship to enable me take up full time study at the P.S.R.I.

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And finally, to all I say, may the Grace of our Lord Jesus Christ be with you all. Amen.

ABSTRACT

This study seek to examine factors affecting child survival dry land Kenya. Data available indicate that the areas not only experience high child mortality rates but the situation shows a worsening trend. These areas lack basic social amenities and access to health facilities.

The study area is faced with predisposing factors that aggravate transmission of diseases in children. This study examines issues encompassing environmental, Demographic socio-economic and health factors as they affect child survival.

The data used is from the Kenya Demographic and Health Survey 1993. The method of analysis used in this study is cross tabulation and multiple regression analysis techniques.

The findings show that in these arid and semi arid lands communities there is significant relationship between incidence of mortality and current marital status, highest level of education, and age at first birth, type of floor material, duration of breast feeding, religion, parity, current contraceptive use, type of toilet facility and place of delivery.

The multiple regression analysis showed that out of 10 variables significant in influencing child survival in the arid

and semi arid lands, two had showed reductive effects on child mortality. These are others namely; marital status, type of toilet, children ever born, number of unions, breast feeding duration, age at first birth, age at introduction of supplementary foods, type of floor, ante natal clinic attendance i.e tetanus injection and contraceptive use.

The policy makers should put in place mechanisms to improve the economic well being of the population in general and those in the arid and semi arid lands in particular. This can include small grants programme for the small scale farmers and business people in the village towns. This will boost their capacity to educate the children, the exposure will improve contraceptive prevalence, better housing, dietary habits and public health care to the overall well being of the child and the family at large.

The Government should make efforts to stem up girl child enrolment in primary schools and post primary school institutions and be strict in matters of early child pregnancies. Strategies should be mooted to boost maternal child health care, FP/HIV/STD control services utilization.

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CHAPTER ONE

INTRODUCTION

1:0 INTRODUCTION

Infant and Child mortality is one of the indicators of the physical wellbeing of a society. The socio-economic conditions in which the child is born influence their survival. Thus infant/child mortality has been used to measure the standard of living of a society.

Child mortality is still high in Developing Countries. The rapid pace of mortality decline achieved after Third World War 2 has not been sustained due to the slow pace of economic development. There are variations from country to country and within regions of a country. From an interpretative perspective, overall estimates of infant and child mortality mask major regional variations within a heterogeneous society such as Kenya (UNICEF, 1984).

This study is an attempt to describe and analyze various aspects of the situation of women and children in Kenya based on available statistical data and information. The wellbeing of children is a mirror which reflects the living conditions of families and communities. The traditional obligation of women as wives, mothers and food providers determine the pattern of life for most Kenyan women underlining the key role of women play in

child welfare.

The determinants causing an "at risk" situation for a child's survival and wellbeing are many and complex and a multi-sectoral approach to define the most important causes of the actual problem is needed. According to "Situational Analysis section 4" by UNICEF, the under five accounted for 21 per cent of the total population in 1980. Assuming constant levels of fertility and mortality this age group will increase from 3.5 million in 1980 to 5.2 million in 1990 an increase of nearly 50 per cent. The average child density for under five was 6 children per sq. km. in 1980 and this is estimated to 9 in 1990. As result of in-migration the highest increases in the child populations which will be in some of the semi arid districts which are also those in under utilized high and medium potential land and in government settlement schemes.

An obvious consequence of the rapid growth in the child population is the increasing magnitude of the task of maintaining and improving present levels of access, coverage and quality of basic needs services for this age group. In 10 years 50 per cent or 1.7 million more under fives will amongst other things need pre- and antenatal care Maternal Child Health (MCH) services, immunizations and food and this requires more health centres, trained medical staff and equipment and increased food production.

The nutritional status of children will become an even serious problem. In the majority of the 10 districts with the highest prevalence of stunted children under five in 1982 the

child population is expected to increase by more than 50 per cent in ten years.

Protection of life is the most basic need, infant and childhood mortality levels are usually closely associated with health care practices, nutritional status and level of wellbeing in a society. Presently about one out of every three Kenyans who die is below the age of five compared to about one in 12 in many developed countries (GOK/ UNICEF, Aug 1984). Proportion of infant deaths which occur during and after the first month of life may be one of the better indices of health development. In Kenya at present 40% of infant deaths are reported as occurring during the first month. (Mott, 1982,8).

High and fluctuating Childhood mortality generally indicate instability either in environmental conditions or in the availability of food (Meegama 1980). For instance, deaths from gastro-entreaties and other diarrhoeal diseases could increase in some years depending on the type of sanitary facilities available, source of drinking water and their interaction with the weather.

In conclusion, the present research is inspired by an attempt to apply spatial dimensions, socio-economic and demographic perspectives to research in infant and child mortality and morbidity so as to identify their contribution and thus endeavour to develop suitable interventions and strategies to solve this problem.

1:1 BACKGROUND OF THE STUDY AREA

Kenya covers an area of 582,000 sq.km. The country falls into two distinct regions i.e. lowland (dry land area) and highland Kenya. This distinction affects the climate, patterns of human settlements and agricultural activities. Approximately 80 per cent of Kenya's land is arid and semi arid and only 20 per cent is arable. Kenya Demographic and Health Survey findings indicate that one in 10 Kenyan children dies before reaching the age of five years. For 1988 to 1993 under five mortality was 96 per 1000 live births and infant mortality 62 per 1000 live births. There has apparently been no change in childhood mortality over the past decade according to the birth histories of women interviewed in the KDHS survey. Further evidence is that the previous decline in childhood mortality has stagnated, this is from a comparison of the childhood mortality data from the 1989 and 1993 KDHS.

At district level data on variables provides an opportunity for closer identification of 'at risk' groups, however it is reasonable to assume that even more desegregated data of the location and sub location levels are needed to finally identify those most at risk.

MACHAKOS DISTRICT

Machakos district is in the dry land Kenya. It borders Kitui district to the east, Kajiado district to the west, Makueni district to the south and Nairobi and Kiambu districts to the

north-west, Embu and Murang'a districts to the north-east. The district has an area coverage of 5,818 sq.km. The topography of the district is varied, it consists mainly of a large plateau which is elevated to about 1700m in the west and slopes to about 700m above sea level to the south.

The climate can be classified as hot and dry for most of the year and can be characterised as an arid and semi arid district with unreliable rainfall. The higher areas have higher rainfall than the low lying areas especially those in the rain-shadow of the hills they are dry most of the year.

Total annual rainfall ranges from slightly over 1000mm in some of the highlands to slightly less than 500mm in the low lying areas. Historical data indicates that in 4 out of 10 years there is a major drought in the district. The unreliable rainfall makes it difficult for farmers to plan their farming activity thus adversely affecting both agricultural and livestock production.

Machakos Infant mortality rate has declined from 66/ 1000 live births in 1986 to 60/1000 in 1990 compared to National rates of 81 and 75 in the same period. The major diseases in the district are malaria respiratory diseases, skin diseases, diarrhoea, urinary tract infections, eye and infections, pneumonia, rheumatism and joint pains. The significant increase in disease incidence between 1987 and 1991 can be attributed to lack of clean drinking water in most parts of the district and pollution especially in Athi River has a bearing on disease of the respiratory system.

Most of the district have inadequate water supplies as most of the rivers are intermittent and some even dry up completely during extended drought periods. Given the arid nature of the district, it is not possible to undertake irrigation activities. Existence of very few permanent rivers means that people walk long distances in search of drinking water and for watering their animals.

TAITA TAVETA DISTRICT

Taita Taveta district is the second district in this study of dry land districts. The district is situated in the south west part of the Coast province. It borders Tana River, Kitui and Makueni districts to North, Kwale and Kilifi districts to the south, Kajiado district to the north west and the republic of Tanzania to the south and south west.

Taita Taveta district can be divided into the upper zone, lower zone and the volcanic foothills. The Nyika is characterized by rather featureless non-dissected erosional and sedimentary plains. The featureless area is occupied by Serengeti plains, mainly Tsavo west national park and the Nyika or Taita steppe (a barren and desolate region), Dry river courses are covered by heavy dark and alluvial soils. Gulley erosion is active on the hill slopes and sheet erosion on the plains.

The variations in pattern of rainfall is that the highland areas of the district receive higher rainfall than the lowland areas. The lowland areas are only suitable for early maturing crops such as sorghum and millet and some maize varieties. However

crops such as sorghum and millet and some maize varieties. However the two areas are suitable for a variety of ASAL activities such as ranching and sisal growing. In the upper zone average rainfall is more than 1,250mm while the lower zone is between 540-750mm . The mean annual rainfall for the district is 55mm.

The major water resources in the district include Mzima springs. Streams from the Taita hills form an important water source for domestic, livestock use, other reliable sources are springs, boreholes and shallow wells in Taveta division. As for the disease incidence, malaria continued to be the major disease accounting for over 70% of all cases of mortality and morbidity, then upper respiratory tract infections , this is followed by diarrhoeal diseases, intestinal worms and eye infections.

Taita Taveta district has a major problem especially as far as squatters are concerned. Taita Taveta is a net importer of food. This means that people consume more than they produce hence reflecting a deficit in food production.

For the Infant mortality rates, data available from the Ministry Of Health (MOH) show that the District has an IMR of 78/1000 live births in 1993, this shows a decline compared to 85/1000 in 1988. The decline has been attributed to improved preventive and promotion health programmes in the District. The major causes of child deaths has been the prevalent of diarrhoeal diseases and malaria, the major causative factors to IMR include poor sanitation and poor water quality.

KILIFI DISTRICT

Kilifi district is in Coast Province. It borders the Indian Ocean to the East, Mombasa, Kwale districts to the south, Taita Taveta district to the west and Tana River district to the west.

Rainfall is the most important climatic element determining farming activities in Kilifi district. The average annual rainfall ranges from 400mm in the hinterland to over 1200 mm. To the north of the hinterland there is a marked decrease in rainfall intensity, Rainfall distribution is marked in the south but is barely noticeable in the hinterland or in the rangelands zone the rainfall varies from year to year and is very unreliable. Rainfall distribution in the has extensively dictated the economic activity carried out in the various regions in the divisions of Bahari, part of Malindi and Kaloleni, there exists high agricultural activity in the Magarini and Ganze divisions, there is relatively little economic activity. These divisions experience long droughts with erratic rainfall.

1:2 STATEMENT OF THE PROBLEM.

Infant and Child mortality considered a critical index of the health status of a community is still very high in most Developing Countries (Sai 1977). Although infant and child mortality in Kenya is generally believed to be low relative to most or many Sub-Saharan countries there are still regions of very high infant and child mortality, especially, the areas around Lake Victoria, Coast

Province and Parts of Eastern Province as shown in the 1969,1979, and 1989 censuses.

If the reason of low infant and child mortality in Kenya are associated with improvement of nutritional status, introduction of modern medical services and increased educational status, especially of women, then the high infant and child mortality in the area of study are signs of poor multi-sectoral development which need to be urgently addressed.

In Kenya the under five mortality is high at 96 per 1000 births, (KDHS, 1993). This means that 10% of children born die before their fifth birthday. A low infant mortality is desirable as it has implications on increased child survival and a reduction in total fertility. Unfortunately the infant mortality rate for Machakos district has varied between level 66 per 1000 in 1986 and 60 per 1000 births in 1990. The District is among the high level mortality areas in Kenya compared to the national average of 62 per 1000 and Eastern Province figure of 47.7 (KDHS, 1993).

According to the "situational analysis of women and children in Kenya" (1984), children in Kenya live in an environment where various interacting factors determine child survival and health and consequently infant and early child mortality rates. These factors include health environment, sanitation, availability of clean water and the mother's understanding of nutrition health and hygiene.

According to data provided by health information system. The four major diseases of infants are pneumonia (26%) enteritis,

other diarrhoeal diseases (21%), measles (10%) and malaria (8%) (MoH, Health Information Bulletin 1982). These data confirm the prevalence of Parasitic, infectious and diseases of the respiratory system.

Infectious and parasitic diseases are prevalent in dry land Kenya and with a few significant exceptions such as tetanus and plague. Almost all infectious agents have their reservoir in human hosts, thus transmissions of these diseases depend largely on pattern of human behaviour.

The main routes for transmission of major diseases are; (a) contamination by air (b) contamination of food, water, fingers. These are gastro-intestinal diseases, cholera, typhoid, infectious hepatitis and the intestinal parasites. These statistics indicate that the arid and semi arid districts are not only experiencing high infant mortality rates as compared to other Districts in the country, but that situation shows a worsening trend.

In the A.S.A.L. there is lack of important social amenities like clean water for domestic use, standard dwelling places properly constructed and hygienic lavatories. Access to health facilities is another problem for people in Dry land Kenya, water is drawn from flowing rivers or open water holes which are open to impurities (Action Aid community sponsorship in Merti). This water is normally used without treatment or boiling, making the incidence of water borne diseases to be high. However, according to many communities in these dry lands, their attitude and belief is that they do not believe that the water is the cause of their

recurrent sicknesses since to these semi-arid communities, all water is good. The study area is faced by predisposing factors that aggravate transmission of diseases in these include hot and dry environment favouring tropical diseases. This makes A.S.A.L communities to be described as the worlds poorest children and families (Action Aid Kenya). There is need to study how the circumstances have affected the chid survival. The present study will investigate the strength of relationships between selected variables and their subsequent effect on Child Survival.

1:3 OBJECTIVES

1:3:1 GENERAL OBJECTIVE.

To examine the effect of environmental, socio-economic, and health factors on child mortality and morbidity in the A.S.A.L. Districts.

1:3:2 SPECIFIC OBJECTIVES

1. To examine the effect of environmental factors (access to drinking water, waste disposal, housing conditions) on infant and child mortality.
2. To examine the effect of socio- economic factors such as education level on infant and child mortality.
3. To examine the effect of socio-cultural factors such as

duration of breast feeding, age at introduction of supplement food, religion and contraceptives on infant and child mortality.

4. To examine the effect of demographic factors such as age at first birth, marital status, type of marriage and parity on infant and child mortality.
5. To examine the effect of health factors such as ante-natal clinic attendance, place of delivery on infant and child mortality.

1:4 JUSTIFICATION.

Child Mortality and Morbidity are a proxy for poverty at the Global level. In the areas of study there has been little research on child survival. Major surveys in Kenya such as the KDHS and the Kenya Fertility Survey have been excluding the ASAL Districts hence the need to study the background variables affecting the level of mortality and morbidity in this area.

An investigation of the effects of the environmental, socio-economic, socio-cultural and Demographic factors on infant and child mortality will be important for social and economic planning. If the high infant and child mortality in the area is to be reduced, the study will play an important role in determining what household level social and economic aspects in the A.S.A.L. should be given priority in planning.

Unfortunately available data that can be used for studies of child mortality in the A.S.A.L.s provide very little information on these intervening variables. While the intervening variables are not themselves identified to any important extent, their social clustering provides important clues to their nature and defines the distribution of their most salient elements.

Infant and child mortality data is useful for monitoring and evaluating population and health programmes and policies in the dry land Kenya. Mortality estimates can also prove useful in identifying populations that are at risk and designing intervention programmes that could reduce mortality. Infant and child mortality rates are also basic indicators of a country's socio-economic situation and quality of life.

The data from the study will help identify the underprivileged in the society. It will also be useful for health planners and thus appropriate policies and programmes can be initiated. New areas of Research will be opened up in the area of study .

1:5 SCOPE AND LIMITATIONS

The study will cover only the Arid and Semi Arid Land (A.S.A.L.) Districts of Machakos in Eastern Province, Kilifi in Coast Province and Taita Taveta District in Coast Province. The major limitations will be absence of many basic health care

variables such as food handling and various cultural practices during delivery.

Financial limitations will make the study to use secondary data and the sample size to be restricted to three Districts, hence much smaller than it could have been had more research funds been available, this limitation will also cause inconveniences hence delays during the study. Secondary data has it's inherent limitations, the variables that the investigator would like to have for testing hypothesis of that particular study are the ones included in the survey design.

CHAPTER TWO

LITERATURE REVIEW

2:1 INTRODUCTION

This chapter deals with the review of relevant literature on environmental, socio-economic, health, socio-cultural and demographic determinants on infant and child survival. This is mainly in the developing countries.

2:2 Developing World

Although mortality declined considerably in developing countries after the second world war, there remain significant regional differences in all countries. Studies of mortality determinants provide information for assessing inequalities among populations in terms of health and length of life. Secondly such studies help to identify those under privileged segments of the population who experience higher mortality levels, such groups are an appropriate target of policies and programmes for improving health conditions and survival chances. Finally studies of mortality improve our understanding of determinants of mortality and their interrelationships on the basis of which proper policy measures for reducing mortality are developed, selected and improved (UNITED NATIONS 1985).

Most developing countries whether in Asia or Africa are faced

Most developing countries whether in Asia or Africa are faced with extreme climatic conditions such as hot and dry climates. This is because of the dry environmental conditions therein. In most of these countries environmental factors like housing structure, sanitation, water source and treatment, disease incidence and action taken, scarcity of medical care and utilization of the few resources available, have been mentioned to be highly responsible for prevalence of diseases and the high infant and child mortality in the developing countries in Africa, Asia and the Latin America.

In this work, examination has been done on Gwendoline (1965) study on child mortality in Africa. While stressing the importance of public health attributed the high mortality levels among infants in Africa to poor environmental status. She suggested the campaign against diseases through the availability of piped water system and environmental sanitation such waste and sewerage disposal

In the drier areas this condition is made worse by virtue of there been acute water shortage hence the resident communities will have little option of clean drinking water, to them any water is good water. The situation is made worse by the high temperatures favouring breeding of tropical diseases.

According to United Nations report(1989) on studies in western Asia, child mortality is seen as the final outcome of a continual interaction between the child and its environment. At birth a child has a certain stock of viability, determined by

genetics, conditions of gestation and circumstances surrounding the birth.

As age increases the stock of viability is gradually increased through adequate nutrition and growth, and occasionally acutely decreased by malnutrition. If at some point the stock of viability falls to zero the child dies (U.N., 1989). Studies in Western Asia also revealed that the decrement due to infection will depend on exposure and resistance. A very large number of background factors will affect the process.

The exposure to diseases will depend, at the household level on hygienic and disease avoidance practices, likely to be affected by the educational levels of those providing child care and by housing conditions too, such as water supply and toilet facilities. Community and ecological conditions will also influence the prevalence of infectious agents and the likelihood of transmission. Resistance to infection will depend on current health status as well as on specific prevention practices such as immunization. Both resistance and severity are likely to be affected by the degree of motivation of those responsible for child care and are thus likely to be affected by parental education among other things.

The present study on factors affecting health of children in arid areas emphasizes more on environmentally related problems. This is because among other things a major environmental problem for a large proportion of mankind is inadequate and unsafe water supply which, is responsible for perhaps 3/4 of all infections and

most child deaths in the developing world.

The characteristics of the dwelling place have long been recognized as an important influence on infant and child mortality. Impact of housing, conditions on mortality have focused on the type of water supply, type of lavatory facilities and type of building materials used to construct the house.

2:3 Africa

Harrington's (1974) study of west African societies views a child's chance of survival as the outcome of a series of factors governing exposure to disease and those encompassing the course and outcome of disease. These factors are exposure and resource variables, some studies indicate that in Kenya especially in the first years of life, children die mainly from respiratory diseases which are environmentally related. The former group including environmental and socio-economic elements and the latter containing such components as nutritional status and access to medical care.

The role of infectious diseases in mediating the effect of the family dwelling on child mortality has been noted by others. Sanitation in these arid and semi arid areas thus have a unique case of sanitation. Safe sanitation has a strong emphasis on clean drinking water and also for domestic usage, be it piped or flowing in pollution free rivers. Pool water in arid and semi arid areas is hazardous due to it's inherent tendency to breed water borne

diseases and mosquitoes.

Therefore a major factor affecting the health of children as well as adults is the availability of clean water and safe sanitation. These are not only essential for human health and well-being but also contribute to the emancipation of women from the drudgery that has a pernicious impact on children, especially on girls. Progress in child health is unlikely to be sustained if one third (1/3) of the developing World's children remain without access to clean drinking water and half of them without adequate sanitary facilities (UNICEF 1991).

Katende (1983) in her study of housing conditions on mortality in Bushenyi District in Uganda found that the poorer the housing conditions the higher the mortality. The children born in the temporary houses had higher mortality than those in a semi-permanent houses. The temporary class is mainly dominated by the uneducated who are usually very careless about such details like drinking water, washing hands before eating e.t.c. In the dry land districts a glass of water for drinking is difficult to get let alone water for washing hands. The supply of good toilet facilities was again found to be most defective among the temporary class dwellers.

Rowland (1979) also argues that the transmission of infectious diseases in Africa through a polluted water supply or unsanitary lavatory facilities contributes to the contamination of traditional weaning foods. This argument is supported by the findings of Butz et. al., (1982), in Malaysia, that breast-feeding

has a larger protective effect on infant mortality in areas where sanitary facilities are poorer. This is because in areas with scarce water supply the water needed for washing utensils used by infants or even adults is very difficult to get.

Also according to K'Oyugi (1992) available evidence in Kenya shows that children receive supplements generally through use of bottles since the practice of day time breast feeding is declining especially for mothers working in formal employment and also during heavy work peak (weeding and harvesting season) in the rural areas. A case study relating diarrhoea incidence to weaning food samples taken showed severe contamination with diarrhoea - causing bacteria which was higher in contamination percentage when compared with water samples drawn from rivers and open wells.

The above discourse makes breast feeding to be more hygienic because it can be less prone to contamination with germs due to reduced exposure. In a related study in the dry land of Machakos district it underscored the importance of adequate faecal disposal and hygiene home conditions affecting safe food preparations, handling and storage of weaning foods which has also association with diarrhoeal mortality among infants and children in Kenya. K'Oyugi (1992)

Housing structures have come up to be increasingly more associated with child health this is because some structures such as a poorly constructed (poor finishing) done on a mud wall can be a breeding ground for harmful insects etc. Poorly ventilated and dark houses can be another factor favouring poor health among the

occupants. Farah and Preston (1981) in a study in Sudan were more interested in household structures. In this study of determinants of child mortality in the Sudan it included the type of household structure. The results show that living in a house made from mud raises child mortality by a statistically significant 6% in the Capital City and by 7% in all the Sudan.

In related studies, Farah and Preston (1982), underscored the point that many determinants of child mortality are properties of the household of the house in which the child is located. These include levels of household income, adult literacy, health practices among members, sanitary facilities, e.t.c. other factors such as ecological characteristics, land resources and the presence of disease vectors play a role, the evidence from Sudan supports the widely held view that infant and child mortality declines steadily as maternal education increases.

In his study D' Souza (1980) considered a single aspect of housing conditions namely the floor area of dwelling and evaluated it's impact on child survival. For the purpose of his study the type of floor mentioned provided sufficient evidence that child mortality rates were inversely correlated with the levels of housing conditions (Odhiambo, 1991). This is because among other things it is more difficult to maintain safe sanitation in a mud floored house compared to cement.

Recent studies have suggested that child mortality in developing countries is associated more closely with maternal education than with any other socio-economic factor (Behm, 1980,

Caldwell, 1979, Cochrane, 1980). Many analysts have found that the association is strong when other socio-economic factors as well as more proximate variables are controlled.

The present study in selected dry land districts has taken interest in the maternal level of education. This is because education, to a large extent, has come up to be a major factor in determining the income and lifestyle of a woman. Arid and semi arid areas some of the places with the poorest of the populations in any given region except where there is oil drilling or other mineral deposits and mining.

A major theory of the linkage between increased maternal education and reduced child mortality is that education gives women the power and the confidence to take decision making into their own hands. Caldwell (1979) has argued that three factors are of importance in this regard. In ascending order, these are ;

- a. A reduction in fatalism in face of children's ill health.
- b. A greater capability in manipulating the world (e.g. in knowing where facilities are and in securing the attention of doctors and nurses).
- c. A change in the traditional balance of family relationships that shifts the focus of power away from the patriarch and the mother-in-law and ensures that a greater share of available resources is devoted to children.

Education is also cited as very significant in improvement of living standards. The educational attainment of a society is an indicator of it's rising aspirations and consciousness. The

resulting rise in aspirations had the effect of improving health awareness and thereby increasing investment at household and public level. Mothers formal education is also considered as an indicator of the knowledge and skills that mothers have to effectively take care of their children.

The greatest mechanism for social change is education. It's impact does not lie wholly in it's being a vehicle for a stronger belief in modern medicine. According to Caldwell (1979) he first became interested in the influence of maternal education over child survival when they found in an area of Nigeria where modern medicine was inaccessible that child survival rose steeply with the schooling of mothers. In some cases the education of fathers has an almost competitive impact but the usual picture is for the main influence to be the education of the mother and the occupation or income of the father.

Gwatkin (1988) using regression analysis of education and mortality data estimates that a rise in adult literacy from 50% to 90% would be expected to be accompanied by a fall in infant mortality rate of 15% greater over the next 20 years than no literacy improvements were seen.

Anker and Knowles (1977) and Kibet (1981) correlated infant and child mortality with urban population, female literacy, malaria cases, kilometres of road, population density and number of beds, per 1000 persons using 1969 census and 1979 census respectively. Anker and Knowles measured the infant and child mortality by considering the life expectancy at birth while Kibet

used the probability of dying at age 2; both of them used Brass estimation techniques to obtain their estimation techniques to obtain their levels. Using multiple regression, Kibet found that malaria and mother's education were the two major factors affecting child mortality.

Kibet (1981) has also used the brass indirect procedure and ordinary least squares method to study differential mortality in Kenya using 1979 census data. While Mott found that infant mortality was associated with parity, maternal education level and type of marriage. Kibet found that childhood mortality was mainly influenced by women's education, malaria prevalence, per capita, agricultural land and population density.

There is a general agreement among researchers in Africa that educational attainment of parents is inversely related to infant mortality (Caldwell 1979, 1981; Cochrane, 1980, Farah and Preston 1981). This inverse association has been attributed to many causes including ; breaks with traditional child raising practices, better utilization of available foods and increased availability of higher quality foods made possible by increased income and more personal and intensive attention by mothers with increased amounts of family resources spent on the child.

In perhaps the most common conceptualization, a mother's activity status is regarded a proxy for maternal time allotted to child-rearing (Da Vanzo and Lee, 1978). Reduction in maternal time devoted to child-rearing may be directly related to infant or child mortality through the loss of specific elements in a

desirable child care regime or indirectly related through a deterioration in maternal health (because of long hours or deficient conditions of the work).

However, despite the clear relationship between education and child mortality. It is not clear why education is related to child survival. In particular it is not clear how much of the relationship is a direct effect of education and how much is due to factors correlated with education but not held constant in the comparisons.

Kichamu (1986) used Trussell's procedure to estimate child mortality using the 1969 and 1970 population censuses. The study showed that there were socio-economic and environmental differentials in mortality in Kenya. Further the study showed that measles, diarrhoea and respiratory diseases were the major causes of death. Mott (1979) estimated infant and child mortality using Brass indirect procedure. Ordinary Least Squares technique was used to find out the variables that significantly determine infant mortality.

In other works Muganzi, (1984) adds that the relationship between maternal education and child mortality is still a controversial issue among social scientists. Caldwell (1979, 1983) believes that in addition to being proxy, education also provides the woman not only with the skill and knowledge to do the job but most important it changes the traditional balance of familial relationships such that an educated mother has more weight in the decision making process related to the care of children.

The age of the mother could have an influence on neo-natal mortality, The older the mother the higher the probability of her being anaemic or suffering from such diseases such as diabetes, hear ailments etc. such conditions could have an influence on the health of the unborn child. Samoza, (1980) often analyzing the causes and levels of infant and child mortality in Colombia found that infant mortality is higher among the children of women with lower education compared with those having higher education within the same age groups. He also found that there was relatively higher infant mortality for mothers between 25 and 30 years old and increasing infant mortality for older mothers. For young mothers infant mortality was high but it reached it's lowest level for mothers around the age of 25 and 30.

For Sub- Saharan Africa there is a considerable literature on whether educated women wild more power within the family then family than their illiterate counterparts (Peil, 1975. Pellow, 1977). The majority view appears to be that educated women who marry men whose status and income are superior to theirs lose relative power.

However, for Latin America Palloni (1981: 643) has shown that literacy has a much greater influence on child mortality than on infant mortality. Instances of excess child mortality are associated with a disproportionate contribution of the complex of water-food-airborne diseases as Palloni has argued, the extent of illiteracy in a society reflects not only the limitations of families but more importantly limitations in the capacity to

organize and mobilize to fulfil societal necessities.

In the Arid and semi arid lands Women's effort need be strengthened as a major step towards assisting the betterment of Child Survival, this would improve women's status and their role in development, however this must begin with the girl child. Equal opportunities should be provided for the girl child to benefit from the health, nutrition, education and other basic services to enable her to grow to her full potential (UNICEF 1991).

As for the 'State of the World's children,1991', Women in their various roles play a critical part in the well-being of children. The enhancement of the status of women and their equal access to education, credit and other extension services constitute a valuable contribution to a nation's socio - economic development. Maternal health,nutrition and education are important for the well-being of women in their own right and are key determinants of the health of the child in early infancy. The causes of the high rates of infant mortality especially neo-natal mortality, are linked to untimely pregnancies,and low birth weight.

According to related studies conducted in Western Asia based on the above conceptual framework the decrements due to infection will depend on exposure and resistance, itself partly a function of viability, while decrements due to malnutrition will be associated with growth faltering. A very large number of background factors will affect the process. Nutrition is likely to be determined by the economic conditions of the households, by

cultural behavioral factors and by ecological conditions of the area. In the early childhood factors affecting breast-feeding, cultural factors including the nutritional status of the mother will predominate.

On the same line, the exposure to diseases will depend at the household level on hygienic and disease avoidance practices, likely to be affected by the educational levels of providing child care and by housing conditions too, such as water supply and toilet facilities. Community and ecological conditions will also influence the prevalence of infectious agents and the likelihood of transmission. Resistance to infection will depend on current health status as well as on specific prevention practices such as immunization.

Evidence from both West Africa and South India suggests that the teaching of health measures in school is only a minor factor. The key factor seems to be that a woman who goes to school is increasingly seen by both herself and others as being part of a global society with an accepted attitude towards bacterial contamination and corresponding hygienic methods, the use of modern medical facilities and persistence in recommended treatments. However, a recent review by Were (1984) indicates that this interpretation may be too simplistic. Were mentions one study in Africa which reveals that even final year teacher trainees knew only a little more about child nutrition than the illiterate mothers of malnourished children.

The Cebu Study (1988) found that the overall process whereby

childhood mortality is determined is an extremely complex one involving social, cultural, economic and medical factors at the household and community level. Some anthropological studies advanced in Kenya indicated that infants and children in some parts of the country die of malnutrition due to food taboos and habits practised (Ocholla Oyayo, Z.Muganzi - Fieldwork report 1986). Other studies (KCPS-1984) indicated that shortened period of breast-feeding of babies result in severe illness of such children and some end up dying.

Under the Social-cultural arena, Religion, according to E. Akoto (1985:185), carries with it a certain number of values and norms which govern the lives of believers on behavioral, physiological and psychic levels. It may reflect an openness to western civilization (for Catholic and Protestant Religions), adherence to customs (traditional religions). Certainly then religion is not a variable to be neglected in a study of mortality differentials.

Formal education may facilitate knowledge and use of the available health care facilities; in this case education and health facilities. The difference as Ware argues, is between seeing poverty and depravation as the cause of the under-utilization of medical services by the illiterate or attributing their (medical services) absence to ignorance. Mosley (1983) felt if existing health services are basically immaterial for mortality levels then one might expect that health care availability would not affect the education - mortality relationship; and

correspondingly, that the education effect would not vary across countries or regions with different degrees of health services.

The relationship between maternal education and child mortality is still as controversial issue among social scientists.

Caldwell (1979,1983) believes that in addition to being proxy, education also provides the women not only with the skills and knowledge to do the job but most important, it changes the traditional balance of familial relationships such that an educated mother has more weight in the decision making process (Muganzi 1984).

Demographic factors affecting infant and child mortality are basically divided into two classes. The first lot concerns the health of the mother to the extent of exposing her infant to mortality risks. They include, age of mother, birth interval and birth order of the child. The second class of variables refers to sex and age of child. In Kenya it has been found that mothers who marry at young ages have risks of high infant mortality due to prenatal and perinatal clinic care considerations (KFS1977/78).

The pattern of groups most at risk experiencing the most improvement overtime is repeated for mother's age and child's parity. Similarly the mortality rates of first born and children at the highest parities have the first birth and declines progressively until the 6th child. After that it rises almost continuous with increasing parity. First births include a disproportionately number of 1st births occur to women at ages below the physiological optimum for reproduction.

The rising mortality rates at the higher birth orders are partly attributable to the shorter average spacing between births for women with many children.

Reduced intervals between births are associated with poorer nutrition and health for both infants and mothers. In addition women with many children have an average inferior living conditions and are less able to provide their children with appropriate medical care (Mott,1982,14).

Closely spaced births primarily occur at, but are not confined to the higher parities. Mortality levels for the second, third and fourth births of younger women (20-24) are higher than for women who are older (25-24) are higher than for women who are older (25-34).

Spacing may be one of the factors which contributes to higher risk for the youngest groups of women. "...within every birth order the mortality rate for infants born to the youngest groups of mothers increased, sometimes quite dramatically ... Those younger women in order to have (achieved these parities) must have had intervals that were too short to allow for adequate nutrition and health care for themselves and the offspring. Thus women are said to have given birth to a child at an age which was premature for the parity of the child" (social perspectives, 5:2, 5-6).

A reduction in teen-age pregnancies and in high parity births (with associated increases in birth intervals) as well as greater spacing of births at all parities would have substantial impact

on infant and child mortality (Mott,1982).

According to Mosley (1983), his argument that it is not unreasonable to expect child survival to be linked to the availability of health care services. Governments in developing countries often assume that the optimal route to lower child mortality is through expansion of the formal health sector. However, this assumption has been challenged by those who argue that too much emphasis is still being placed on short term vertically organized public health interventions and modern medical institutions at the expense of social and economic development.

The importation of medical technology reduced or in some cases eradicated diseases such as smallpox and malaria. Now it is argued, that a much greater proportion of deaths is due to diseases borne by water, food and faeces, the prevention of which appears to be responsive to improved personal hygiene.

Palloni (1981) has also argued that the incidence of water borne and faeces borne diseases is disproportionately concentrated among infants and children. He argued that development of health care systems should be abandoned in favour of improvements in levels of living. Yet advocates of the primacy of education contend that "it is wasteful to put large inputs into health services without putting equivalent inputs into education, especially of girls". Those who come down on the side of education are not against hospitals but rather in favour of development Programmes be they health or education, which reach the majority of

the population (Caldwell and McDonald, 1981). In developing strategies to combat child mortality a number of research issues arise. Whether access to and utilization of current health facilities guarantee significant reductions in child mortality is perhaps the most important question (Mosley, 1983).

Mosley further points out that recently there has been emphasis on the development of primary health care systems that are village based, use of paramedics and traditional health care workers and employ relatively simple and inexpensive technologies (Mosley 1983). There is evidence, albeit limited to suggest that health care of this type can have a significant effect on child mortality (Gwatkin and Brandel, 1981).

Even one of the leading advocates of increased maternal education for the reduction of child mortality, has documented the important role that rural health services played in one Nigerian village (Orubuloye and Caldwell, 1975). But this finding has not been repeated. In some places like Colombia public health care programmes are found to be weakly related to survival in rural areas (Rosenzweig and Schultz, 1982).

According to Caldwell's study using Nigerian data, the role of dwelling type in rural/urban differentials in child mortality merits closer attention. His analysis includes a bivariate cross tabulation of type of dwelling variables with rural or urban residence.

The general presumption is that rural or urban residence distinguishes sufficiently and clearly between poor and good

conditions of sanitation, drinking water and housing structure (Boulier and Paqueo 1981, Mott 1979, Caldwell 1979). According to UNICEF (1991), each day 40,000 children die from malnutrition and disease, including acquired immune-deficiency syndrome (AIDS), from lack of clean water and inadequate sanitation. Preventable diseases such as measles, polio, tetanus, tuberculosis, whooping cough and diphtheria, against which there are effective vaccines, and diarrhoeal diseases, pneumonia and other acute respiratory infections than can be prevented or effectively treated through relatively low cost remedies - are currently responsible for the majority of the worlds 14 million deaths of children under five years and disability of millions more every year.

Effective action must be taken to combat these diseases by strengthening primary health care (PHC) and basic health services in all countries (UNICEF, 1991). According to KDHS (1983) it is not a single episode of diarrhoea that kills but the fact that children weakened by malnutrition continually battle diseases, thus in his model of child mortality and morbidity, he does not label diseases or disease status such as malnutrition as causal factors but instead calls them indicator variables.

In the arid and semi arid areas of the third world countries of Africa, hunger and malnutrition in their different forms contribute to about half of the deaths of young children. More than 20 million children suffer from severe malnutrition, 150 million are under weight and 350 million women suffer from

nutritional anaemia. Improved nutrition requires, (a) adequate household food security, (b) healthy environmental and control of infections and, (c) adequate maternal and child care.

Inadequacies in nutrition intake eventually result in many adverse effects or outcomes. The basic causes of malnutrition in developing countries are socio-economic. Poverty, lack of and misappropriation of resources for economic development and harsh environment is pervasive in much of the third world, and the capacity of families to produce food is limited.

Ignorance of special needs of children and inappropriate cultural beliefs and practices often cause families to give their children diets that are inadequate. Conditions of environmental sanitation are typically deficient and combined with limited access to preventive and curative health care result in high, incidence and increased severity of infectious diseases.

Most studies in Developing Countries have focused on diarrhoeal diseases and respiratory infections, the two most important causes of morbidity. A number of well defined mechanisms could account for these findings. Chen and Scrimshaw (1968) contend that while most studies from Developed Nations find no associations between illness and physical growth, those from Developing Nations report that common childhood ailments - in particular diarrhoeal diseases - are clearly associated with physical growth.

According to Mata (1977), poor dietary and high incidence of infection are clearly the immediate causes of poor nutritional

status as measured by physical growth. Some researchers have advanced the notion that infectious diseases and in particular diarrhoeal diseases are more important than the lack of malnutrition in children (Mata et. al.,1977). There is sufficient evidence to demonstrate that malnutrition impairs the body's defence mechanisms (Chandra 1981;Chandra and New Berne,1977;Suskind 1977). However, not all components of the immune system are affected to the same degree. Chen,Huq and Huffman(1981) have reported on studies carried out in Bangladesh.

They found no association between hospitalization for treatment of diarrhoeal diseases over a two year period and anthropometric measures (weight-for-age; weight-for-height and height-for-age) at the beginning of the period. However only the studies by Delgado et.al.(1983) and Tomkins (1981) support the notion that nutritional status is associated with a greater incidence of infection.

Mata (1978;1982) found that improvement of nutritional status contributed to a decline in diarrhoeal diseases in Costa Rica. The strong correlation between diarrhoeal diseases deaths and infant mortality in Costa Rica suggests that it was a strong cause of death in that age group. If the environment is unsanitary and personal hygiene is poor and if this is compounded by minor seasonal fluctuations as in the Tropics, then dissemination of diarrhoea agents and opportunities for their acquisition by infants and small children are optimized. It can therefore be seen that immune-competence is seriously impaired in severely

malnourished children. The evidence from field studies showing that the frequency of infection is greater in children with mild and moderate malnutrition is weak. On the other hand there is more support for the notion that poor nutritional status, whether severe or moderate predisposes children to more severe infections. Other mechanisms link high child death rates to high birth rates.

Firstly, infant deaths ends the suppression of ovulation which is caused by breast feeding. In absence of any other method of birth control, a new pregnancy becomes more likely. Secondly, the death of a child can also prompt couples to replace the loss by a new pregnancy sooner than would otherwise have been the case.

Thirdly, when child death rates are high, many parents compensate for the anticipated loss of one or more of their children by giving birth to more children than they actually want. Compounded by such factors as gender preference and the time - lag between changes in death rates and changes in perceived risks, this insurance effect is a major reason for the persistence of high birth rates. Reducing child deaths can therefore help societies to move towards family building by design rather than by chance.

The nutritional status of children who are between 1 and 2 years of age is a good indicator of the adequacy of weaning practices. The fact that overall nutritional status (as measured by stunting and/or wasting) declines between the age 6 months to 3 years gives evidence that in Kenya as elsewhere that weaning is a critical period for growth, health and survival. Failure to

supplement at the right time is common in rural Kenya and of great potential danger. There is a concentration of late supplementation in Nyanza, Western and Coast provinces.

Women in polygamous marriages have had higher levels of infant mortality than those in monogamous unions in both time periods examined and the magnitude of the differential has remained virtually consistent, this is according to the "Situational analysis of women and children in Kenya" UNICEF (1984)

Regardless of the level of education polygamous women currently have higher rates of infant mortality than their monogamous counterparts. This however narrows much for the most educated women. Within monogamous unions a little education appears to make a large difference whereas in polygamous marriages the biggest decline occurs only after the women had at least primary education. This association between infant mortality and polygamy is confounded by the fact that the tropical regions of Kenya, with their attendant health risks to infants are also the areas where polygamy is most prevalent.

Family planning can be seen to be still one of the highest priorities, even if population growth were not a concern. The well-informed timing and spacing of births is one of the greatest of all opportunities for improving the health and saving the lives of both women and children in the decade ahead. For women of the developing world, child spacing can mean a drastic reduction in maternal deaths, estimated at 50,000 per year, and the number of

abortions estimated at more than 10,000 everyday. For the children of the developing world the responsible planning of the family size can mean better levels of health, nutrition, education and is one of the most powerful means of achieving most basic human development goals adopted for the year 2000.

The interplay of the above mentioned factors in the literature review seek to throw some light on factors that can be associated and thus responsible for high level of infant and child mortality in various areas mainly in the developing World, as per the studies and even the arid and semi arid lands in particular.

The high infant and childhood mortality or low child survival previously seen can be given an interpretation by developing a theoretical framework borrowed from the Mosley and Chen Model. Ideas are borrowed from the literature review to adopt and develop a theoretical model to give interpretation to infant and child mortality in the arid and semi arid lands areas under the present study.

CHAPTER THREE: THEORETICAL FRAMEWORK OF THE STUDY.

There is no general theory concerning the determinants of mortality and the mechanisms by which these determinants operate. Various conceptual frameworks have been developed for analysis of the conditions determining health and sickness in childhood. These frameworks reflect different disciplinary approaches (Hugo, 1991).

The present study borrows ideas from the above cited literature review and adopts Mosley and Chen (1984). Theoretical framework which combines both socio-economic and environmental risk factors among other variables in explaining infant and child mortality.

The framework for the analysis of infant and child mortality must take into account several factors which influence and determine the level of mortality (Meegama, 1980). The proximate determinants framework defines a set of intermediate variables through which all social and economic determinants operate to influence infant and child survival. Mosley and Chen (1984) using a multi-disciplinary approach produced a useful classification for the analysis at this level.

On the one hand they consider the socio-economic determinants acting at the levels both of the family and of its individual members. They also distinguish the proximate determinants, through which the socio-economic determinants affect

child's health and disease process. These variables in the present study adopted from the Mosley and Chen can be grouped into five categories:

1. Demographic factors such as marital status, age, parity and type of marriage.
2. Environmental contamination, which encourages the spread of infectious diseases such as source of water, type of toilet facility and floor materials.
3. Socio-economic factors such as education level.
4. Health care factors such as ante-natal clinic attendance and place of delivery
5. Socio-cultural factors (selected).

Although interrelationships among mortality determinants are very complicated these determinants can be roughly be divided into environmental, socio-economic and health factors . Because death is a biological process , factors affecting child mortality in the most direct manner are health related.

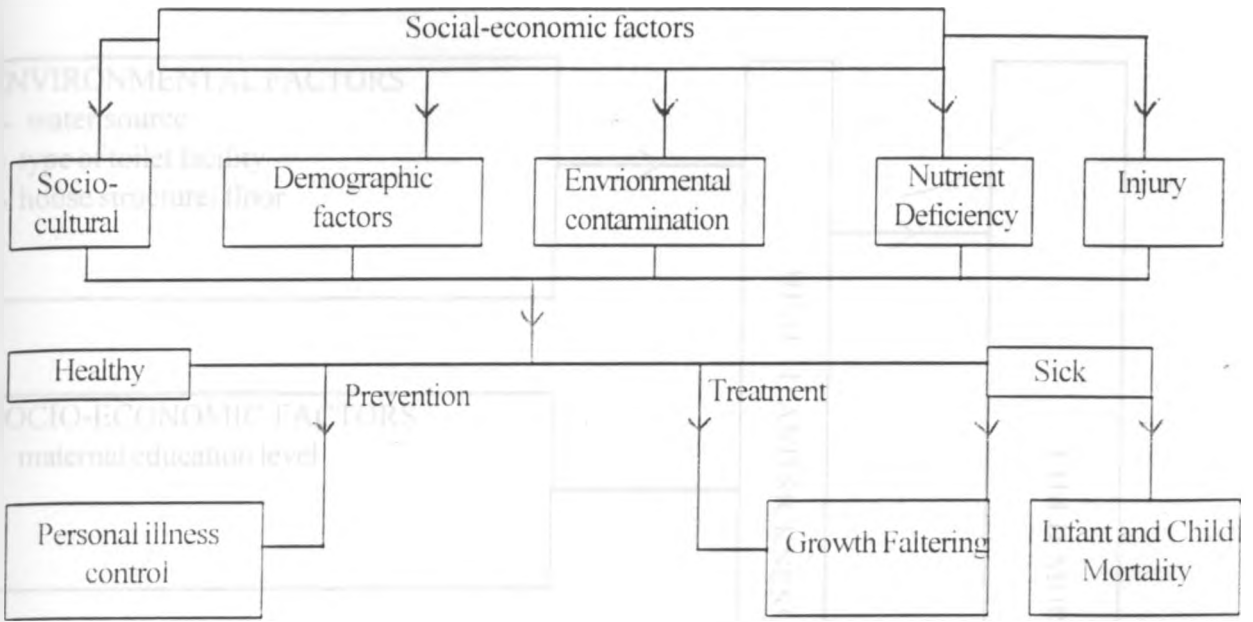
On the other hand effects of social, economic, cultural and geographical variables are indirect they operate through the above mentioned factors. Thus biomedical variables that exert direct influences on child mortality can be called intervening variables since they intervene between social, economic and geographical conditions and the event of death.

3:1 CONCEPTUAL HYPOTHESES

The following conceptual hypotheses can be derived from the theoretical framework.

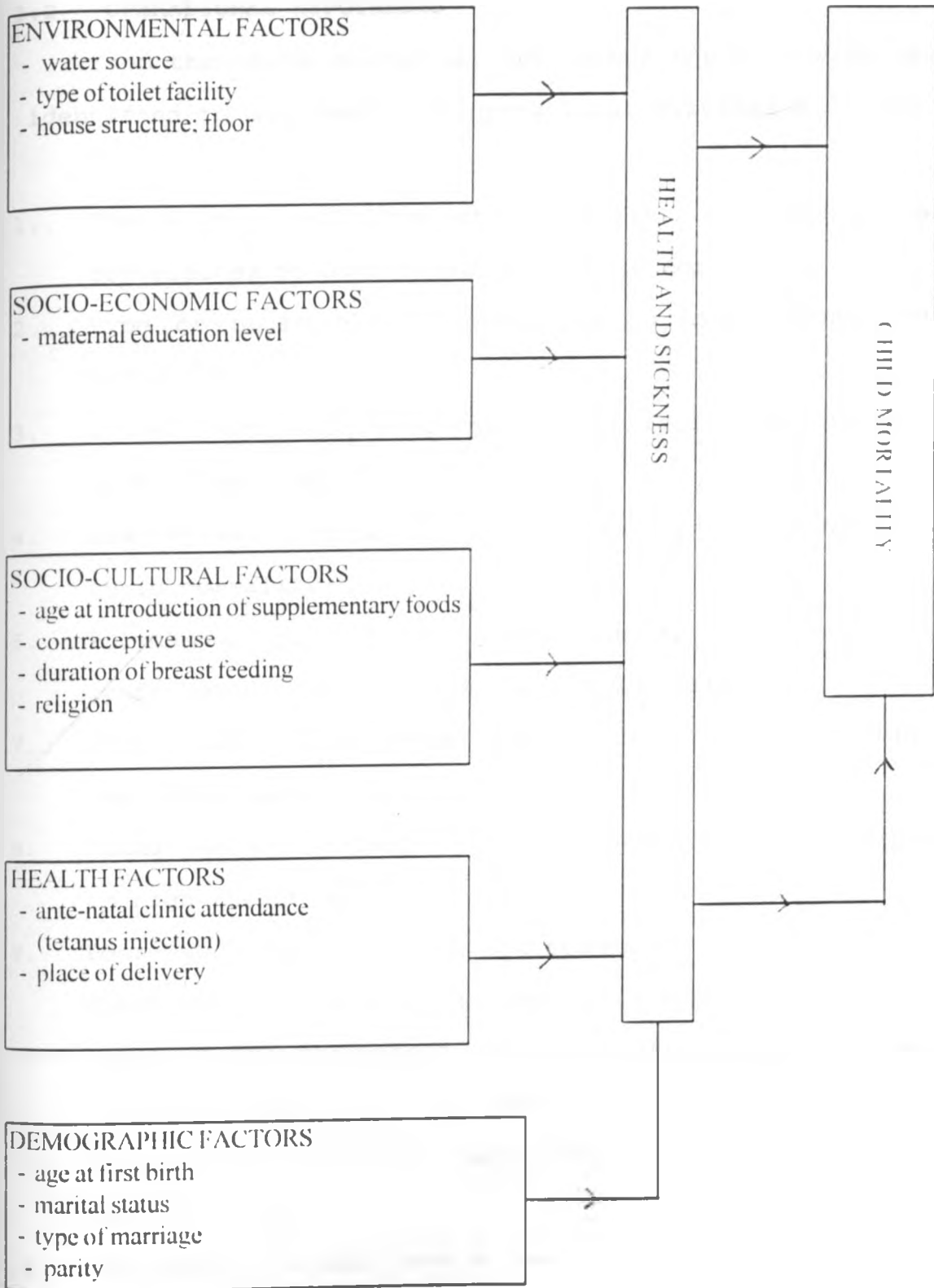
1. Environmental factors are likely to have an effect on the level of child mortality.
2. Socio-economic factors are likely to influence child mortality.
3. Socio-cultural factors are likely to influence infant and child mortality.
4. Demographic factors are likely to influence infant and child mortality.
5. Medical and health factors are likely to influence infant and child mortality.

FIGURE 1
CONCEPTUAL MODEL



Adopted From: Mosley and Chen (1984).

FIGURE 2
OPERATIONAL MODEL



Adopted from: Mosley and Chen

3:2 OPERATIONAL HYPOTHESES

From the above conceptual hypotheses the following have been identified to represent the operational hypothesis of the study.

1. The source of water in the A.S.A.L. if poorly managed contributes to high infant and child mortality;
2. Type of house floor contributes to high infant and child mortality;
3. Toilet facility/poorly maintained facilities contribute to high infant and child mortality;
4. Low maternal education level contributes to high infant and child mortality;
5. Polygamous union status and low age of mother at first birth contributes to high infant and child mortality;
7. Short duration of breast-feeding contributes to high infant and child mortality;
8. Young age at introduction of supplementary foods contributes to high infant and child mortality;
9. Poor Ante-Natal clinic attendance in the A.S.A.L. contributes to high infant and child mortality;
10. Catholic and protestant religious affiliation is associated with low infant and child mortality;
11. Contraceptive non-use contributes to high infant and child mortality and;
12. High parity mothers have a low infant and child survival.

CHAPTER FOUR

DATA AND METHODOLOGY

4:1 SOURCE OF DATA

In this study KDHS data will be used. The survey covered 15 selected districts in Kenya. This data contains the principle variables needed for the present study. For the present study 3 Districts which are classified as Arid and Semi Arid Lands by the District development plans are selected for study these are Machakos in the Eastern Province has 462 respondents and Taita Taveta and Kilifi in the Coast Province, had 287 and 259 respondents respectively total of 1108 respondents. Secondary data analysis has certain inherent limitations. Perhaps the most serious problem, is that often they approximate the kind of data that the investigator would like to have for testing hypothesis, relevant to that particular study. A second problem is access to data. There is also the bureaucratic measures brought by the government Acts. A third problem is insufficient information about the collection of data to determine potential sources of bias e.t.c.

Sample design and quality of KDHS data

KDHS is a nationally representative survey of 7540 women age 15-49 and 2336 men of age 20-54. It provide information on levels and trends of fertility, infant and child mortality, family

planning and AIDS. The male survey obtained data on men's knowledge and attitudes towards family planning and awareness of AIDS.

The estimates from a sample survey are affected by two types of errors, non sampling error and sampling error. Non sampling error is result of mistakes made in implementing data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions by either the interviewer or the respondent, and data entry errors. Efforts were made during the implementation of the KDHS to minimize this type of error, however non sampling errors are difficult to avoid and evaluate statistically.

The Chi-square, will be used to tell whether or not a relationship exists between or among variables. Multiple regression analysis will be applied to test strength and direction of association, this will help see factors that strongly and significantly affect child survival.

4:2 CROSS TABULATION

Cross - tabulation is a useful step in studying the association and distribution between two variables. This study utilizes cross - tabulation for the purpose of showing how the women in the sample are distributed in the various categories of the variables under study.

Cross-tabulating two variables, a table produces 4 cells. Each cell represents a combination of scores on the two variables

i.e a possible type of interrelationship. Table analysis will be the determination of the proportion of units in the study which combine a given pair of values for the variables being cross-tabulated.

Most cross-tabulations are constructed so that a positive relationship is demonstrated if most cases fall into the diagonal cells. The definition of a positive relationship in data analysis is a data pattern in which the values of the Dependent variable increase as the values of the Independent variable increase.

In cross-tabulation the table is percentaged so that the reader can see the effect on the dependent variable. The table is read by comparing what happens to the dependent variable as the Independent variable change. The technique describes the magnitude of discrepancy between theory and observation. If chi-square is zero then it means that the observed and expected frequencies completely coincide.

Actual computation involves calculating the difference between no relationship, called the expected result and the relationship one finds, the observed result.

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

f_e

f_o = Observed frequency

f_e = Expected frequency

Calculated value of chi-square is compared with the table

value of chi-square for given degrees of freedom at specified levels of significance in this case 0.05 or 95% . If calculated value of chi-square is greater than the table value the difference between theory and observation is significant, thus there is association, therefore null hypothesis will be rejected. Also, if the calc. value of chi-square is less than the table value the difference between theory and observation is significant, ie it could have arisen due to fluctuation of sampling, thus there is no association, therefore the null hypothesis is accepted.

The degrees of freedom for all the cells is $(c - 1) (r - 1)$

Conditions for chi-square application:

1. Experimental data must be independent of each other.
2. Sample data must be drawn from target population.
3. Data must be expressed in original unit.
4. Sample should contain at least 50 observations.
5. There should be no less than 5 observations in any cell.

4:3 REGRESSION ANALYSIS

Regression analysis is used to predict the exact value of one variable from knowledge of another variable, unlike in the correlation, it tells us something more precisely about the nature of the relationship. It asks how much an increment in one (Independent) variable produces an increment in another (Dependent) variable.

Multiple regression technique will ascertain the degree and

direction of association between selected variables this help see factors that strongly and significantly affect child survival. Regression analysis is a statistical tool for evaluating the relationship of independent (explanatory) variables to a single dependent (outcome) variable. The multiple regression analysis is carried out for both the lifetime and recent infant and child mortality indices.

In the present study regression analysis will help determine the extent, direction and strength of the association. It will help to determine which of the independent variables are important or not in predicting or describing a dependent variable.

The infant and child mortality index is taken as the dependent variable, all other variables in the conceptual framework are been considered and an enter regression analysis carried out. The program determines the independent variable that correlates best with the dependent variable, Mortality Index (MI) and then adds in the other variables e.g. education, one at a time accounting for more and more variance until all specified variables are analyzed.

The model used is of the form;

$$Y_i = b_0 + b_1X_i + \dots + e$$

Where X_i 's are the variables in the equation and b_i 's are the regression coefficients.

They indicate association between the dependent variable (infant and child mortality index) and the independent variable.

The basic problem with multiple regression is that of multicollinearity, defined as the inter-correlations of the independent variables. This problem arises when independent variables overlap. The greater the overlap of the independent variables, the lower the reliability of the regression coefficients. When using the regression there arises a problem in that it decides for the researcher variables to be included. Thus one doesn't have absolute control over what he is doing.

4:4 TRUSSELL AND PRESTON

Trussell and Preston (1982) developed and tested a method for analyzing mortality differentials from child survivorship data. The focus of this study is on infant and child mortality which is high in the developing countries. The essential feature is to construct an index of child mortality for women and compare the values of the index among different groups of women.

The principle of the index construction rests on the idea that the proportion of children who have died can be used as a measure of the mortality of children of women. The index of child mortality for a women of a certain age is constructed as the ratio of actual proportion of her children who have died to the proportion expected for an "average" women in the population of the same marital duration (or age).

The index is equal to the number of her dead children (children ever born minus children surviving) divided by the expected number of dead children. This latter quantity is derived

by multiplying her number of births by the expected proportion of children dead. This expected proportion dead in turn is based upon general mortality conditions in the population.

The index of child mortality for women i , of marital duration j , M_{ij} , is thus ;

$$M_{ij} = D_i/N_i \cdot EPD_j,$$

where,

D_i = Number of dead children for women i ,

N_i = Number of Births to women i ,

EPD_j = Expected proportion dead for a woman of marital duration category j .

For purposes of the present study, the expected proportion dead for a woman of marital duration category j is 0.101. This was derived from the 1979 census. To derive EPD_j , the mortality estimation procedure (originally developed by Brass, 1968) is turned upside down. Brass developed a system of equations for converting an observed proportion dead among women in category j , into a life table measure of mortality. The equations are of the form;

$$q(x) = K(j) \cdot d(j),$$

Where,

$q(x)$ = probability that a child will die before exact age x ,

$d(j)$ = proportion dead among children ever born to women in marital duration category j ,

$K(j)$ = Multiplier suitable for women in age category j .

The multiplier $K(j)$, is a function of the pattern of marital

fertility in the population as indexed by ratios of cumulative parities for women in different marital duration groups.

The (x,j) correspondences when j refers to age group of mother are (1, 15-19), (2, 20-24), (3, 25-29), (5, 30-34), (10, 35-39), (15, 40-44), (20, 45-49).

Equations for the multipliers used in this work are those derived by Trussell (United Nations, 1983). To put the above equation to work the problem at hand, we impose a 'standard' mortality function $q_s(x)$ and convert that standard into an expected proportion dead by re-writing the previous equations for $q(x)$ as; $EPD_j = q_s(x) / K(j)$

To obtain the value of $q(x)$ we either use " North " or " West " model Life table systems of Coale and Demeny.

The final form of the infant and child mortality index for Woman i , of age group j , is thus ;

$$M_{ij} = \frac{d_i}{N_i * q_s(x) / K(j)}$$

The index of mortality, M_{ij} , as any other mortality index is always positive and can be interpreted as follows :

If,

$M_{ij} < 1$ Then the number of children dead for woman i , in age group j , is likely to be lower than expected.

$M_{ij} = 1$ Then the number of children dead for woman i , in age group j is likely to be equal to the expected.

$M_{ij} > 1$ Then the number of children dead for woman i , in age group j , is likely to be higher than expected.

CHAPTER 5

DETERMINANTS OF CHILD SURVIVAL

5:1 INTRODUCTION

The following factors were considered in the present study.

SOCIAL ECONOMIC FACTORS, covers highest education level.

ENVIRONMENTAL FACTORS include, floor material, source of drinking water, toilet facility,

HEALTH FACTORS include, ante-natal clinic attendance (Tetanus injection before birth) during pregnancy, place of delivery.

SOCIO-CULTURAL FACTORS, duration of breastfeeding, age at introduction of supplementary foods, contraceptive use, religion.

DEMOGRAPHIC FACTORS, current marital status, age at first birth, type of marriage.

MORTALITY INDEX

0.101 is used as the expected mortality i.e the weighting factor for prevailing mortality in the area, in the present study, this is derived from the 1989 population census analytical reports on mortality volume iv, (1996). This is an average of Taita Taveta 0.116, Kilifi 0.185 , Machakos with 0.092.

The formula used as explained earlier is number of children dead divided by number of births multiplied by the weighting factor 0.101. i.e. Number of children dead * 0.101 = MI

Number of births

CODES

MI = 0 if no children died for the mother.

MI = low if observed mortality equals expected mortality.

Then it means that the observed mortality was less than expected mortality therefore mortality is low.

MI = high if observed mortality is greater than expected mortality. Therefore mortality is high.

'low' represents $MI < 1$ but > 0

'high' represents $MI > 1$

These notations are used in the tables that follow.

no - means no mortality experienced by the mother

low - means low mortality category

no + low - means a combination of no and low mortality category

high - means high mortality experienced by mother

T - means total number of respondents for that variable

X^2 - means chi-square

DF - means Degrees of Freedom

Sig. - means Significant figures

5:2 ENVIRONMENTAL FACTORS

Environmental Factors were grouped into type of toilet, were shared flush toilet, traditional pit and ventilation improved pit latrine and others. Water sources included public tap, well

without pump and other sources. Type of floor included earth and dung and cement floors.

TABLE 1 CHILD MORTALITY INDEX BY ENVIRONMENTAL FACTORS

The table below shows results of child mortality index by environmental, in the selected arid and semi arid lands.

variable	child mortality index					testing stat.		
	proportion in the category					X2	DF	Sig.
	no	low	(no+low)	high	T			
type of toilet						15.2	6	0.019
-shared flush	71.4	0	(71.4)	28.6	14			
-traditional	70.4	9.9	(80.3)	19.7	547			
-V.I.P	82.6	10.9	(98.5)	6.5	46			
-other	59.6	11.8	(71.4)	28.6	161			
water source						3.0	4	0.556
-public tap	69.0	9.3	(78.3)	21.7	290			
-well with.pump	66.2	14.1	(80.3)	19.7	142			
-other	69.6	9.3	(78.9)	20.9	335			
type of floor						0.21	2	0.0061
-earth, dung	65.5	11.1	(76.6)	23.3	557			

-cement	77.5	7.7	(85.2)	14.8	209	
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source: computer print out

5:2:1 MAIN FLOOR MATERIAL

There are two types of floors examined, cement floor and earth,dung. Most reported a floor of earth or dung floor material as compared to those who reported a cement floor.

Majority of women with earth,dung floor (23.3%) recorded a high infant and child mortality category. While few of those with cement floor recorded high mortality. 85.2% of the women with cement recorded a no+low mortality category which was confirmed by the observed significance of 0.0061. This confirms the hypothesis that floor type is contributory to high infant mortality.

Further cross tabulation of floor material and number of children dead showed that the observed relationship was statistically significant, therefore floor material comes out as having a significant contribution in mortality incidence in these arid and semi arid lands communities.

Type of floor has an important bearing on sanitation levels in the house. Whereas it is easy to maintain high sanitation standards with cemented floors it is not the case with a earth or dung floor. Given that children and utensils are normally in constant touch with the floor, it is easy to come into contact with germs, this may bring infection to the children.

5:2:2 SOURCE OF DRINKING WATER

Most of women interviewed indicated that they had rivers, streams as their source of drinking water. Results show that majority of the women with public tap (21.7%) have the high mortality while fewer women using other sources (20.9%) have high mortality.

This result gives an observed significance (0.5567) which surprisingly, shows that source of water and number of children dead are not dependent. Hence little significant contribution in mortality incidence in these arid and semi arid land communities. This does not confirm the hypothesis that source of water is contributory to the mortality incidence in this area.

5:2:3 TYPE OF TOILET FACILITY

Majority of the women interviewed indicated that they had a traditional pit latrine. Most of the women (98.5%) with V.I.P. latrines recorded no and low mortality category. These were followed by those with traditional pit latrines (80.3%). The results also show that women who used the others types of toilets e.g. bush, garden had a high risk factor, and a high mortality index.

This surprisingly holds for those with shared flush as well. Further cross tabulation of type of toilet facility and number of

children dead showed that the observed relationship was statistically significant. Therefore toilet facility comes out as having a significant contribution in mortality incidence in these arid and semi arid lands communities.

This is in line with the hypothesis that type of toilet if not hygienic is contributory to high infant and child mortality. Thus appropriate faecal disposal practices are important latrines, hygienically constructed and maintained. Use of bush and other ways of faecal disposal poses serious health hazards to children.

A toilet facility is a basic measure of hygiene and sanitation levels in the home. A home with poor or no toilet facility will have flies buzzing all over, bringing disease contamination, such as diarrhoea, others will be eye infections. Traditional pit latrine reported the highest mortality, this means that though they had a toilet structure it was poorly maintained thus acting as a source of contamination more than an instrument to prevent contaminants.

5:3 DEMOGRAPHIC FACTORS

Demographic factors were grouped into age at first birth, marital status, marriage type, parity as they affect survival of children in the arid and semi-arid lands.

TABLE 2 CHILD MORTALITY INDEX BY DEMOGRAPHIC FACTORS

The table below shows the results of the child mortality

index by demographic factors, in the selected arid and semi arid lands.

variable	child mortality index					testing stat.		
	no	low	(no+low)	high	T	X2	DF	Sig.
age first birth						38.10	6	0.00
10 - 14	37.7	41.0	(78.7)	21.3	61			
15 - 19	69.2	23.9	(93.1)	6.9	419			
20 - 24	74.4	18.8	(93.2)	5.8	250			
25 +	76.9	12.8	(89.7)	10.3	39			
marital status						33.4	10	0.0002
-nev. married	90.7	0	(90.7)	9.3	54			
-married	67.4	10.8	(78.2)	21.9	613			
-liv. together	40.0	30.0	(70.0)	30.0	10			
-widowed	52.3	11.4	(63.7)	36.4	44			
-divorced	81.5	3.7	(85.2)	14.8	21			
-not together	85.7	14.3	(100)	0	21			
marriage type						1.85	2	0.39
-once	68.1	10.6	(78.7)	21.3	640			

-more than once	60.3	13.7	(74)	26.0	73	
parity						190.0 4 0.00
1 - 3	88.9	0	(88.9)	11.1	332	
4 - 6	67.5	8.8	(76.3)	23.7	249	
7 +	35.1	29.8	(64.9)	35.1	188	

source: computer print out

5:3:1 AGE AT FIRST BIRTH

Majority of women with age at first birth of 10 - 14 years (21.3%) recorded a high mortality category. Thus women in this age cohort reflected a high risk factor in infant and child mortality, compared to (6.8%) of age 20 - 24 who recorded a high mortality. Likewise majority of women of age 20 - 24 years recorded a no + low mortality category. This confirms the hypothesis that low age at first birth is contributory to high infant and child mortality

Further cross tabulation of Age in years and number of children dead showed that the observed relationship was statistically significant. Therefore age has significant contribution in mortality incidence in these Arid and Semi- Arid Lands. This confirms the hypothesis that low age at first birth is contributory to high infant and child mortality.

Table 4 shows the distribution of average Mortality index and Age in years. This finding is not surprising because the woman of

lower ages 10 to 14 years will normally exhibit a higher mortality index than the older women. This is because of several factors such as the undeveloped physiological bodies are not able to withstand the stress of foetal development, growth and birth.

However, the older women also have a high mortality because of a longer length of exposure to the risk of death of their children. Women of ages 20 to 24 years are more enlightened to proper hygiene and child care due to higher levels of education and exposure to better living conditions compared to the older cohort. Births in younger ages are of single teenage mothers, uncared for by their families, they live under stressful circumstances mainly because of rejection by their families the society, they also lack financial support which is very much needed at this time when both the mother and baby need a lot of high nutritious food. These conditions are not the best for a child's proper development.

5:3:2 CURRENT MARITAL STATUS

Most of the respondents indicated that they were married. The majority of women with high mortality were the widowed while the majority never married had the lowest mortality. Therefore the widowed women group showed a risk factor compared to the rest of the marital status groups.

The results show that children of the widowed mothers have a low survival rate. This may be due to the stress the child and

mother undergo due to the bereavement. This is more so when the bereavement occurs while the woman is in pregnancy or immediately after birth. The never married women having a majority in the low mortality category is explained by the few number of women in this never married category. These categories will also tend to have fewer children, hence low death occurrence to this category.

Further cross tabulation of marital status and number of children dead showed that the observed relationship was statistically significant. Therefore marital status comes out as having a significant contribution in mortality incidence in these A.S.A.L. communities.

This finding is not amazing because the women in the not living together, divorced and widowed category will normally experience a higher mortality compared to those in marital unions. However, it is surprising that the women who have either never married, divorced, not living together or widowed do not exhibit higher mortality. This may be due to data error. The other groups apart from the married were very few as can be seen from the table, also their parities are usually less than those of married because when women are out of marriage births are considerably reduced hence low mortality may be reported.

5:3:3 TYPE OF MARRIAGE

Two types of marriage were identified in this study; these were the monogamous union and the polygamous union. Majority of

respondents indicated that they were in one union. Results shows that children of polygamous unions have low survival rate with majority of women (26.0%) showing high mortality category. Children of women of monogamous marriages had a high survival rate with most women (78.7%) reporting a low category mortality .

Further cross tabulation between type of marriage showed that the observed relationship was statistically significant. Therefore type of marriage comes out as not having a significant contribution in mortality incidence in these arid and semi arid lands communities. This confirms the hypothesis that polygamous unions contribute to high infant and child mortality.

5:3:4 PARITY

In the present study majority of respondents indicated that they belonged to parity level 1-3. Majority of the women with a parity of 7 children and over (35.1%) recorded the highest mortality category, this group of mothers exhibited a high risk factor. These were followed by those with a parity of level 4 - 6 children (23.7%) then followed by those with a parity level of 1 - 3 children. Likewise women with 1 - 3 children had the highest child survival; these recorded a low mortality category. These results confirm well the hypothesis that high parity mothers have a low infant and child survival.

Further cross tabulation between parity and children dead showed that the observed relationship was statistically

significant, therefore this confirms the hypothesis that high parity mothers have low infant and child survival hence parity comes out as having a significant contribution in mortality incidence in these arid and semi arid lands communities.

This result could be attributed to the fact that at the high birth orders there is shorter average spacing between births for women with many children. Reduced intervals between births are associated with poorer nutrition and health for both infants and mothers. Women with many children mostly have low living conditions and less able to provide their children with appropriate medical care. This is likely to compromise the health of the child in question. Children of higher parities as studies elsewhere have shown are likely to suffer from congenital malformations.

5:4 SOCIO-ECONOMIC FACTORS - EDUCATION

The Socio- economic factor included in the study is only the maternal education level. This was grouped into, No education, primary education and secondary education level.

TABLE 3 CHILD MORTALITY BY EDUCATION (SOCIO-ECONOMIC FACTORS)

The table below shows the results of the child mortality by education (as a socio- economic factor) in the selected arid and semi arid lands.

variable	child mortality index					testing stat.		
	proportion in the category					X2	DF	Sign.
	no	low	no+low	high	T			
education level						45.14	4	0.00
-No education	53.1	36.2	(89.3)	10.7	224			
-primary	72.0	20.3	(92.3)	7.7	418			
-secondary	85.8	3.7	(94.5)	5.5	127			

source: computer print out

5:4:1 HIGHEST EDUCATION LEVEL

Women with no education showed the lowest child survival rate majority of these showed a high mortality category followed by those with primary level of education. Women with secondary education and over exhibited the highest child survival rate, majority of these showed a low mortality category. This is in line with the hypothesis that high maternal education level is contributory to the low infant and child mortality.

Further cross tabulation of education and number of children

dead showed that the observed relationship was statistically significant. Therefore education comes out as having a significant contribution in mortality incidence in these arid and semi arid communities. However, education in itself is not always directly related to mortality but it acts through other proximate variables. On average woman with higher educational standards will tend to have a higher income and hence be able to fend better for the family.

5:5 SOCIO-CULTURAL FACTORS

The socio-cultural factors were grouped into duration of breastfeeding, age at introduction of supplementary foods, type of religion, and contraceptive use.

TABLE 4 CHILD MORTALITY INDEX BY SOCIO-CULTURAL FACTORS

The table below shows results of child mortality index by socio-cultural factors in the selected arid and semi arid lands.

Variable	child mortality index					testing stat.		
	no	low	(no+low)	high	T	X2	DF	Sign.
dur. breastfeed						78.5	10	0.00
0 - 12	73.1	5.8	(78.9)	21.2	52			
13 - 24	74.4	10.9	(85.3)	14.7	129			
25+	65.4	13.5	(78.9)	21.2	52			
-neve breastfed	7.1	0	(7.1)	92.9	14			
-still breastfe	76.8	7.7	(84.5)	15.5	310			
-breastfe until	0	0	(0)	100.0	5			
Age introd.supp						10.14	6	0.11
-< four months	73.3	6.7	(80.0)	20.0	45			
->four months	74.1	9.3	(83.4)	16.6	386			
-not given	64.8	7.0	(71.8)	28.1	128			
-inconsistent	100.0	0	(100)	0	4			
religion						19.8	6	0.003
-catholic	67.8	13.2	(81.0)	19.0	205			

-protestant	73.9	8.5	(82.4)	17.6	387	
-muslim	61.3	6.5	(67.8)	32.3	62	
-other	57.0	12.3	(69.3)	30.7	114	
contracept use						9.42 2 0.009
-not using	66.6	9.5	(76.1)	23.9	548	
-using	74.2	11.8	(86)	14.0	221	

source: computer print out

5:5:1 DURATION OF BREASTFEEDING

Duration of breastfeeding was divided into 0 to 12 months, 13 to 24 months, 25 months and over. Majority of respondents indicated that they were still breastfeeding. Results show that women who never breastfed (92.9%) had a high risk factor, these recorded a high mortality category, while those who breastfed for a relatively longer time i.e 13 - 24 months, fall in a no + low mortality category. This concurs well with the hypothesis that short duration of breast-feeding is contributory to high infant/child mortality.

Further cross tabulation of duration of breastfeeding and number of children dead showed that the observed relationship was statistically significant. Duration of breastfeeding comes out as

having a significant contribution in mortality incidence in these arid and semi arid land communities. This confirms the hypothesis that short duration of breastfeeding contributes to high infant and child mortality.

Exclusive breastfeeding is recommended as the best way to feed a child for the first 4-6 months of life. After the age of six breast milk alone is not sufficient to maintain an adequate rate of growth thus introduction of semi-solid is recommended during this period of a child's life.

5:5:2 AGE AT INTRODUCTION OF SUPPLEMENTARY FOOD

Majority of the respondents indicated that they introduced supplementary foods after four months. Majority of women (28.1%) who did not introduce supplementary food to their infants had the highest mortality category, these had a high risk factor compared to their counterparts. Few women who introduced supplementary foods before four months (20.0%) had a high mortality category while those who introduced supplementary foods after four months had a lower child survival. This concurs well with the hypothesis that young age of supplementation is contributory to high infant and child mortality.

Further cross tabulation of age of introduction of supplementary foods and number of children dead showed that the

observed relationship was not statistically significant age of introduction of supplementary foods comes out as not being significant.

5:5:3 RELIGION

In the present study, majority of respondents indicated that they were protestants. The catholics (81.0%) and protestants (82.4%) had high child survival compared to their counterparts in the other religions while low percentage of muslims (67.8%) and others (69.3%) had a low mortality category. This confirms the hypothesis that Catholic and protestant religious affiliation is associated with low infant and child mortality.

Further cross tabulation between religion and number of children dead showed that the observed relationship was statistically significant, therefore religion comes out as having a significant contribution in mortality incidence in these arid and semi arid lands communities. This is in line with the hypothesis that catholic and protestant religious affiliation is associated with low infant and child mortality.

However, a child does not die because the mother is of a particular religion, however it is basically what the particular religion has to do with the way of life of it's faithfulls, in this case child care. Religions which encourage better and or hygienic living standards will promote child survival directly and

indirectly while those barring members from use of services such as hospitals will tend to be contributory to low child survival.

5:5:4 CURRENT CONTRACEPTIVE USE

Two cases of contraceptive use were examined, those mothers using contraceptives and those not using contraceptives. Majority of the respondents indicated that they were not contracepting. Majority of the women using contraceptives (86.0%) recorded low mortality category, those not using (23.9%) had a high mortality category. This goes well with the hypothesis that Contraceptive non use is contributory to high infant and child mortality.

Further cross tabulation of contraceptive use and number of children dead showed that the observed relationship was statistically significant, contraception comes out as having significant contribution to incidence of mortality in these lands. This agrees with the hypothesis that contraceptive non-use is contributory to high infant mortality.

5:6 HEALTH FACTORS

Health factors included in the study are, the place of delivery and the ante natal clinic attendance this was to show whether the mother received injection (tetanus) or not. Table 5 shows mortality index by health factors in the arid and semi arid lands.

TABLE 5 CHILD MORTALITY INDEX BY HEALTH FACTORS .

Table below shows results of child mortality index by health factors in selected arid and semi arid lands.

variable	child mortality index					testing stat.		
	proportion in the category					X2	DF	Sign.
	no	low	(no+low)	high	T			
place delivery						10.2	4	0.036
-gov hos/mater	77.9	3.4	(81.3)	18.6	145			
-mission hosp	92.3	0	(92.3)	7.7	13			
-other	69.8	10.6	(80.4)	19.6	404			
ante natal att						1.44	2	0.48
-received no injection	65.3	10.2	(75.5)	24.5	49			
-received injection	73.2	8.4	(81.6)	18.4	512			

source: computer print out

5:6:1 PLACE OF DELIVERY

Most respondents indicated that their place of delivery was at other places that is apart from the government hospitals/health centres/ maternity or mission/clinic. Majority of the women who

delivered in mission hospitals (92.3%) recorded a low + no mortality category. These were followed by Government (81.3%) and others (80.4%). Differences was not very big between the different places of delivery may be because the person who assisted the mother in delivery is more important.

Further cross tabulation of place of delivery and number of children dead showed that the observed relationship was statistically significant, place of delivery comes out as having significant contribution in mortality incidence in these communities. This may be because, even though the place of delivery may not have been in the hospital or clinic there was a high probability that the mother was assisted by experienced birth attendant be it a nurse, a TBA or a midwife in the village.

The purpose was to see whether the birth process was aided by a qualified and responsible personnel and under sanitary conditions which in many cases is available in the hospitals. In the above situation it shows that though the dependency is low, the women who did not deliver in hospitals were not assisted by well qualified birth attendants hence resulting in the mortality incidence as can be seen above.

5:6:2 ANTENATAL CLINIC ATTENDANCE

In the present study antenatal clinic attendance (tetanus injections before birth) was divided into those who received injections and those who received no injections. Majority of the

women indicated that they had tetanus injections before birth.

Majority of the mothers who received no injection (24.5%) recorded a high mortality category while those who received tetanus injection (81.6%) recorded a low mortality category. This concurs well with the hypothesis that Poor Ante-Natal clinic attendance in the A.S.A.L. is contributory to high infant and child mortality.

Further cross tabulation of education and number of children dead showed that the observed relationship was not statistically significant therefore antenatal clinic attendance (Tetanus injections before birth) comes out as having little or no significant contribution in mortality incidence in these arid and semi arid land communities. This does not confirm the hypothesis that poor ante natal attendance is contributory to high infant and child mortality.

5:7 SUMMARY OF THE CROSS TABULATION

The findings show that in these arid and semi arid lands communities there is significant relationship between incidence of mortality and current marital status, maternal education, house floor material, duration of breastfeeding, age at first birth, religion, parity, current contraceptive use, type of toilet facility and place of delivery.

It can be seen that socio-cultural factors came out as strongly related to the incidence of mortality in these arid and

semi arid lands communities. This therefore shows that emphasis should be put in the area of cultural lifestyle of these communities for effective interventions to be put in place.

5:8 RESULTS OF THE REGRESSION ANALYSIS

5:8:1 Introduction

In the multiple regression the enter method is used. The computer determined the order of variables included in the equation. At each step of the analysis each variable was included on merit of the unexplained variation of the mortality index it accounted for.

The SPSS package utilises the regression method to show which variables are significant within limits specified (e.g. 95%) and which ones are not. The enter method gives all the variables together. This helps in knowing which variables were entered, which came out as significant and which were not significant. It is thus useful when you want see the coefficients of all the variables put together in one model (equation). The R^2 i.e 20% indicates the proportion of total variation that is explained by the variables considered. Sign. F indicates the significance distribution of all the variables that have been considered in this case it is at 0.0000

5:9 DETERMINANTS OF CHILD SURVIVAL

The determinants of child survival in the arid and semi arid lands included in the present study and of significance are as shown below.

VARIABLE LABELS

The reference category denoted with *

* REL1-No religion, Muslim & Others

REL2(religion) - Catholic

REL3 - Protestant

* AGE1 - 7 or 10 - 14

AGE2(age at first birth) 15 - 19

AGE3 - 20- 24 years

AGE4(age at first birth) - 25 years and over

* MAR1 - Never Married

MAR2 - married

MAR3 - widowed

MAR4 - divorced

* TOIL0 - No Facility, Bush

TOIL1(toilet facility) - shared flush

TOIL2 (toilet facility) - traditional pit latrine

TOIL3 - ventilated improved pit latrine (VIP)

* RIVER

WELL - (as source of water)

PIPED

* BR1 - Never Breast fed

- BR2 (duration of breast feeding) 0 - 12 months
- BR3 - 13 - 56 months
- * CEB1 - 7 children and over
- CEB2-(children ever born) 0-3 children
- CEB3 - 4 - 6 children
- * HOME (place of delivery)
- PRIV (place of delivery) - private hospital
- GOVT - government hospital
- * ED1 - No Education
- ED2 - (education level) - secondary school+ higher
- * CP1 - Not Using
- CP2 - (contraceptive use) - using
- * UNION2- More than once i.e. Polygamous
- UNION1 (number of marital unions) - once i.e. monogamous
- union *AGES 0 - < 4 months
- AGES2 (age at introduction of suppl. food) - > 4 months
- * FLOOR2 - Mud
- FLOOR1 (type of floor material) - cement
- * ANTE1 - Not Received injection
- ANTE2 - received no injection

TABLE 6 SHOWING RESULTS OF THE MULTIPLE REGRESSION RESULTS .

Dependent Variable MI - mortality index

Variable(s) Entered on Step Number

R Square .20094

Standard Error .01265

Signif F .0000

Variable	B	SE B	Beta	Sig T
REL3	-3.88030E-04	5.52212E-04	-.01344	.4823
AGE3	6.547889E-05	5.33906E-04	1.8421E-03	.9024
MAR4	9.334206E-03	9.36096E-04	.14867	.0000
TOIL3	-3.07215E-03	7.40875E-04	-.05311	.0000
WELL	-4.23064E-04	3.87009E-04	-.01213	.2744
MAR3	9.968963E-03	1.10962E-03	.12241	.0000
BR3	-2.15146E-03	4.58805E-04	-.05667	.0000
AGE4	9.740461E-04	8.84988E-04	.01275	.2711
BR2	5.735972E-04	7.16587E-04	8.7740E-03	.4235
CEB3	-9.90883E-03	4.77177E-04	-.29229	.0000
TOIL1	-1.99163E-03	7.32926E-04	-.04072	.0066
PRIV	-1.28562E-03	6.93739E-04	-.02081	.0639
ED2	-5.13596E-04	3.10091E-04	-.01789	.0977
CP2	-2.58198E-03	3.63293E-04	-.07957	.0000
GOVT	-4.33169E-04	4.59567E-04	-.01166	.3459
UNION1	-3.35212E-03	6.51950E-04	-.11414	.0000
PIPED	2.006946E-05	3.83257E-04	6.6295E-04	.9582
AGES2	-1.30192E-03	4.09630E-04	-.04237	.0015
FLOOR1	-1.04714E-03	3.93705E-04	-.03392	.0078
TOIL2	-2.56776E-03	4.35282E-04	-.08378	.0000
AGE2	1.322463E-03	4.66590E-04	.04641	.00461
CEB2	-.01325	4.60485E-04	-.45779	.0000

ANTE2	-1.39800E-03	4.44934E-04	-.04935	.0017
REL2	-6.02434E-04	5.82189E-04	-.01973	.3008
MAR2	6.312508E-03	7.58737E-04	.21824	.0000
(Constant)	.01897	9.24743E-04		.0000

Source: computer print out

10 variables were found to be significance in influencing child survival in the arid and semi arid lands. These are marital status, type of toilet, children ever born, number of unions, breast feeding duration, age at first birth, age at introduction of supplementary foods, type of floor, ante natal clinic attendance i.e tetanus injection and contraceptive use.

The equation results are:

$$\begin{aligned}
 MI = & .01897 + .00933(MAR4) - .003072(TOIL3) + .00996(MAR3) - .00215(BR3) - \\
 & .00990(CEB3) - .00199(TOIL1) - .00258(CP2) - .00335(UNION1) - \\
 & .00130(AGES2) - .00104(FLOOR1) - .00256(TOIL2) + .00132(AGE2) - \\
 & .00132(CEB2) - .00139(ANTE2) + .00631(MAR2)
 \end{aligned}$$

Two variables showed a positive relationship against the particular reference category hence an increasing effect on child mortality (i.e. poor Child Survival). These are marital status (MAR 2,3&4) and age of at first birth (AGE 2). Women giving birth at young ages 15-19 indicated a positive effect on the child mortality situation, than those giving birth in higher age

cohorts. Mothers who give birth at young ages have risks of high infant and child mortality due to inherent endogenous biological and perinatal clinic care factors (KFS 1977/78).

Married, widowed and divorced category experienced lower mortality among their children compared to the never married women have the lowest parities i.e. one or two children. This can be attributed to the fact that their exposure to child mortality incidence is much reduced. The converse holds for their counterparts, mainly the widowed and divorced, who tend to be mostly relegated to poorer living conditions due to lack proper livelihood in these arid and semi arid lands.

The variables that had decreasing effects on child mortality hence better child survival situation were breast feeding (BR3), toilet facility (TOIL1,2,3), children ever born(CEB3), Number of unions (UNION1), contraceptive use(CP2), age for solid and marshy food(AGES2), type of floor (FLOOR1) and ante natal clinic attendance (ANTE2).

Women living in cement floored houses indicated a relatively lower infant and child mortality than those living in earth, dung floored houses. It is normally more difficult to maintain sanitation in an earth floor compared to a cement one. This variable came out as being significant in contribution to better infant and child survival in this study area. Katende (1993) in her study of housing conditions on mortality found that the poorer the housing the higher the mortality. Poor housing and floors have a high association with poor hygiene because of dirt

and can be a breeding ground for germs and harmful insects.

Relatively mothers who breast fed their babies for a period of 13 through to 56 months had a lower ratio of observed to expected deaths than those who did not breast fed at all. This should be due to health weaknesses in poorly breast fed children. Exclusive breast feeding is recommended as the best way to feed a child for the first 4-6 months of life. After six months, breast milk alone is not sufficient and the introduction of semi-solid food is recommended during this period of a child's life. Supplementary foods when introduced early the child is unlikely to cope with the demanding digestion of solid foods at such ages and also any contamination that may accompany such foods.

This variable came out as being significant in contribution to better child survival. Failure to supplement at the right time is common in rural Kenya and of great potential danger. The nutritional status of children who are less than 1 year of age is a good indicator of the adequacy of weaning practices. The fact that overall nutritional status declines between the age 6 months to 3 years gives evidence that in Kenya as elsewhere weaning is a critical period for growth, health and survival. There is need for concentration of late weaning practices in these critical stages of a child's life. This information should be communicated effectively in the MCH/FP centres by the health providers.

Attending ante natal clinic attendance or receiving tetanus injection indicated a lower ratio of observed to expected deaths compared to those who did not receive the injection. This could be

explained by the fact that if a woman does not attend clinic ,the risk is more than vice versa. This came out as being significant in contribution to infant child survival in these arid and semi arid land study area. Vaccination campaigns and the importation of medical technology help reduce or in some cases eradicate diseases such as tetanus, smallpox and malaria.

Strategies to boost Ante - natal clinic attendance should be mooted, this will enhance maternal child health care and family planning, (MCH/FP) services utilization.

Developing countries often assume that the route to lower child mortality is through expansion of the formal health care. Advocates of the primacy of education contend that "it is wasteful to put large inputs into health services without putting equivalent inputs into education, especially of girls". These are not against hospitals but in favour of developmental Programmes be they health or education. (Caldwell and McDonald 1981).

Using contraception indicated a lower ratio of observed to expected deaths compared to those who did not use contraception. This could be explained by the advantages that contraception put both to the mother and the child i.e, is the benefit of child spacing. The well-informed timing and spacing of births is one of the greatest of all opportunities for improving the health and saving the lives of both women and children.

Family planning can be seen to be still one of the highest health priorities, even if population growth were not a concern. For women of the developing world, longer child spacing can mean a

drastic reduction in maternal mortality, (i.e. deaths occurring to a woman during the birth process) estimated at 50,000 per year, and the number of abortions estimated at more than 10,000 everyday. (UNICEF,1984). Responsible planning of the family size can mean better levels of health, education and is one of the most powerful means of achieving most basic human development goals adopted for the year 2000.

Relatively mothers who reported modern toilet facilities showed a lower ratio of observed to expected deaths than those who reported bush or no facility at all. This could be due to weaknesses in poor faecal disposal habits common in these remote parts of arid and semi arid lands. This came out as being significant in contribution to infant and child survival. Exposure to diseases will depend at the household level on hygienic and disease avoidance practices. Faecal disposal is central to hygiene. Poor disposal coupled with water scarcity to wash hands will among other things bring abdominal ailments and cholera.

Mothers of low parity i.e. less than five children showed lower ratio of observed to expected deaths relative to those of higher parities (more than seven). This variable came out as being significant to the contribution of infant and child survival in this area. The result showed that number of children ever born to a mother have a significant effect on the number of children dead. Mothers of high parities will hence have a higher ratio of observed to expected deaths and hence lower infant and child survival.

This result could be attributed to the fact that at the high birth orders there is shorter average spacing between births. Reduced birth intervals are associated with better nutrition and health for infants and mothers. The older women have a high mortality because of longer exposure to the risk of child bearing and mortality. Younger women have a relatively shorter child bearing period, are enlightened in child care due to exposure to better and modern living conditions.

Women of monogamous unions indicated a lower ratio of observed to expected deaths compared to those of polygamous unions. Women in polygamous marriages have had higher levels of infant mortality than those in monogamous unions in time periods examined and the magnitude of the differential has remained virtually consistent, this is according to the "Situational analysis of women and children in Kenya" UNICEF (1984)

In conclusion, it is evident that socio-cultural factors hence behavioral characteristics have a significant effect on the ratio of observed to expected deaths. (Siegfried et. al. 1990) Observed that the actions of individuals are prescribed by culture. These include abiding by the restrictions on some types of work, food taboos, rituals e.t.c. Questions of culture, modern structures and reproductive health have to be considered to an overall impression of woman's lives and not to examine any single issue exhaustively. No aspect can be understood in

isolation from the others. Women's lives are characterised by an interplay between possibilities and constraints that are rooted in economic cultural and biological factors.

Many of the everyday life experiences specific to women are not discussed openly, nor provisions made to improve their lives, despite the costs and discomforts they bear; poor sanitation, nutrition, extremely low income levels, lack of Reproductive health information, quality /effective medical attention results in high infant and maternal mortality. One can thus conclude that these factors have a significant effect on child survival in these arid and semi arid lands under study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6:1 SUMMARY AND CONCLUSIONS

The following chapter seeks to achieve three major purposes. Firstly it presents conclusions, based on the findings of the study. Secondly, it makes recommendations important to policy planners and persons having interests in maternal and child health. It also highlights opportunities for further research.

A summary of the major findings is given in relation to both the objectives and hypotheses of the study. The main objective of the present study is to examine the effect of socio-economic, health and environmental risk factors on child mortality and morbidity in the A.S.A.L. districts.

Data analysis by cross tabulation, results showed that type of floor material is more significant and closely related to number of children dead per individual mother. What this implies is that floor material has a bearing on the hygiene of the house which taken into consideration of other factors affect the health of the child. The association between type of toilet facility and number of children dead was also found significant. In the Socio-economic factors, education showed significant relationship. Health factors included in this study, showed that place of delivery, Ante-natal clinic attendance (tetanus injection) were

significant and hence a very close association with number of children dead per individual mother.

In demographic factors, age at first birth and parity showed close association. Other variables include marital status and marriage type. For, socio-cultural variables examined, religious affiliation months of breast feeding, age at introduction of solid foods and contraceptive were significant, all showed close association with number of children dead.

In the regression, the purpose was to determine which variables had an impact on mortality index. Marital status, age at first birth came out as having an increasing effect on infant and child mortality. While, toilet and floor type, number of unions, ante natal clinic attendance, breast feeding, age at first birth and at introduction of supplementary foods, contraceptive use and children ever born were found to have a significant decreasing effect on the mortality situation (hence better child survival) in these arid and semi - arid lands under study.

From the above results it is evident that socio-cultural and demographic variables have a significant effect on the ratio of observed to expected deaths . One can thus conclude that the interplay of the above socio-cultural factors have a significant effect on child survival in the study area.

6:2 RECOMMENDATIONS FOR POLICY PLANNERS

The field of Maternal Child Health has been an issue of national and international importance especially in the developing countries. Almost every country has been keen to develop policy guidelines to outline clear and specific intervention action programmes, which can be implemented to better the health of women and children, to lower infant and child mortality.

This is an important area and involves a complex interaction of factors affecting the life of the mother and the child. Thus it requires a very clear understanding of the complex cause and effect interactions of mortality and interventions required in areas such as health, nutrition, sanitation and education (United Nations, 1984).

The present study has provided information on the effect of mortality determinants on child survival. However, it is important to note that the effect of these factors is multi-dimensional. It is in light of the multi-sectoral approach to child health problem solving that the following recommendations are made. The present study recommends that strategies be formulated to change peoples attitude towards female opportunities in both health care and education with respect to the girl child. This should be in line with the public and child health care campaign by the various stake holders in health service and other related Government agencies. This will expose the rural communities to better health

care provision.

The Government should make efforts to stem up girl child enrolment in primary schools and post primary educational institutions. Strategies to boost Ante-natal clinic attendance should be mooted through the unexploited field of effective and appropriate information communications, this will enhance maternal child health care and family planning services utilization.

Notable in most policy and programmes of action for most of these Developing countries is the subtle and elusive field of culture. The issue of socio-cultural characteristics is of enormous importance due to it's intricate position in the lifestyle of the society, this needs to be addressed by the authorities concerned. It's roots touch the core of the behaviour and response to life situation and immediate environment be it natural, economic, social or political.

This study has shown that socio-cultural and demographic factors significantly affect child survival more so in the arid and semi arid lands. Policies for intervention programmes of action to better maternal and child health must strongly incorporate the social-cultural behavioral characteristics of the people in question. The recommendation for policy making given in this present study on determinants of child survival in Arid and semi arid lands therefore embraces all possible areas that need action.

6:3 RECOMMENDATIONS FOR FURTHER RESEARCH

A long term health strategy as-it-were, must integrate modern health care within a strategy of social change in the fields of Information communications, nutrition, clean water supply and environmental sanitation. It must focus on a multi-sectoral approach to the problems of child morbidity and mortality, paying attention both to the social determinants and the biological variables that actually operate to influence disease and death.

I recommend further in depth research encompassing quantitative and Participatory qualitative methodologies in the following areas which could form interesting and justifiable research undertaking.

(1) Research to ascertain mechanisms through which role of MCH/FP/HIV Aids facilities play to influence health information communication dissemination affecting child survival in the arid and semi arid communities.

(2) Research undertaken to ascertain the impact of government services for instance agriculture extension, social and medical service providers in effective information communications.

(3) Lastly, I recommend investigations into education curricula in the primary and post primary educational institutions to ascertain mechanisms through which women advancement in education and literacy affects child survival.

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