# THE RISK FACTORS OF MATERNAL AND PERINATAL HEALTH PROBLEMS IN KISUMU DISTRICT

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BY

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## DECLARATION

This thesis is my original work and has not been submitted for examination for a degree in any University.

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## DEDICATION

This work is dedicated to my loving mother, Salome Nyaboke Ondimu and to the memory of my late father Stephen Mayyianda Ondimu whose words of wisdom have always been a secret tonic to my soul.

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# ABSTRACT

The risk of a woman dying in Kenya each time she becomes pregnant is estimated to be 1 in 20 times. This compares unfavorably with the industrialized countries where the rate is estimated to be as low as 1 in 1850. Perinatal health conditions have equally lagged behind in Kenya with a perinatal mortality rate estimated to be 45 per 1,000 live births compared to rates of 6 to 10 per 1,000 live births experienced in developed countries.

This study examines the major maternal and perinatal health problems and risk factors associated with these health problems in Kisumu district. To achieve this, the study applied two methods. First, a situation analysis was conducted on all registered health centers, nursing homes and hospitals in the study area to establish their ability to offer safe motherhood according to WHO standards. Second, four health facilities were further selected by purposive sampling to act as sentinel centers from which a prospective study was conducted and data collected on maternity cases handled there for an uninterrupted period of six months. Information pertaining to respondents' obstetric history, health status during current pregnancy, background characteristics, pregnancy outcome and early neonatal health status was obtained. Postpartum mothers were followed to their respective homes on the seventh day after delivery to establish their health status and that of their infants during early neonatal period. In total 1455, cases were recorded out of which 59 percent experienced an obstetric problem and 41 percent never experienced any problem. Frequency distributions and cross-tabulations have been used to establish the variation in the occurrence of these problems along maternal socioeconomic, demographic, biomedical and environmental characteristics. Multivariate case-control logistic regression analysis was applied to isolate the major risk factors of each of the reported problems.

The main findings of this research reveal that there exists a major flaw in the public health care facilities in Kisumu district which are very few and therefore overcrowded, under-staffed, unevenly distributed with an urban bias, and at the same time inadequately supplied with basic drugs and equipment. This compromises the capability of the health

facilities to adequately handle all maternal and perinatal cases in Kisumu District. There is a high prevalence of various reproductive health problems including low birth-weight (42%), anaemia (22%), antepartum haemorrhage (21%),caesarean deliveries (18%), obstructed labor (16%), eclampsia (14%), postpartum haemorrhage (12%), still-births (11%), sexually transmitted diseases (10%), pre-eclampsia (9%), abortion (9%), other operative deliveries, maternal deaths, and early neonatal mortality. The risk factors to these health problems lie in a complex web of socioeconomic, demographic, biomedical, and environmental variables that work together to determine pregnancy outcome.

The study suggests short-term, medium-term and long term integrated policies that address the above proximate determinants of maternal and perinatal health. These policies should target the populations at risk through effective screening, promotion of public health care programs, promotion of female education up to secondary school levels, improvement of health infrastructure and availability of emergency obstetric care services to those in need by upgrading and equipping health centres in the both rural and urban areas. In addition, there is urgent need to encourage communities to establish revolving funds to cater for drugs and transport costs. Moreover, the government should set up mobile units for prenatal care to reach the rural areas that are not well covered by existing facilities, and to explore the possibility of starting maternity waiting homes for mothers from inaccessible areas with transport problems. There is need to develop a culturally accepted and scientifically valid community based maternity care that can be relied on for early diagnostic and therapeutic care.

# CHAPTER ONE
# GENERAL INTRODUCTION

## 1.0. Background to the study problem

Over half a million women die from complications associated with pregnancy. Those who survive face repeated onslaughts of disease that at times cripple them for the rest of their lives (CHRD, 1990). The disparities that exist between the developing and developed countries are greater for maternal mortality than any other community used index of health. For example, whereas the levels of infant mortality rates are on the average 10 times higher in the developing countries than in the developed countries, maternal mortality in developing countries is more than 100 times higher than in the industrialised countries (WHO, 1994). These disparities reflect stark inequalities in global health and development. The world community has the resources to ensure that the fruits of health progress are shared equitably by all humankind. To meet this challenge, there is need for an understanding of the dynamic transition in health that is taking place around the world; the evolving epidemiological pattern of disease, the obstacles to health transition and impact of changing socio-economic and environmental issues on health.

Kenya's population was estimated to reach 31.2 millions by the year 2000 (Kenya, 1996a). More than 23 percent of this population is made up of women in their reproductive years. During a woman's life, one of the greatest risks to her health is childbearing. Pregnancy is associated with high risks of sickness, complications of delivery, disability, and sometimes death (Walsh *et al*, 1993; Royston and Armstrong, 1989). Some of the common reproductive health problems identified by most researchers include

obstructed labour, post-abortion or puerperal sepsis, haemorrhage, hypertensive disorders, stenosis, abortion, chronic renal failure and prolapsed uterus (Howard, 1987). Some of these problems may not necessarily lead to maternal mortality but can cripple a woman both physically and socially for the rest of her life. Pregnancy exposes the potential infants to increased risks such as; low birth weight, illness resulting from complications of delivery, disability and perinatal mortality (Walsh *et al*, 1989). Indeed, a large proportion of infant deaths and disabilities have their origin in the perinatal period and are determined by a woman's pregnancy condition and circumstances of birth rather than the condition of the child itself (WHO, 1994). Maternal and perinatal health are therefore inseparably linked in terms of risk factors for morbidity and mortality to the extent that any meaningful research in this area should combine the two issues. This is the approach adopted in this study.

Complications related to pregnancy and child birth are among the leading causes of mortality among women of childbearing age in Kenya. The maternal mortality ratio in Kenya ranges from 100 to 500 per 100,000 live births and there is a marked geographic variation with the rates being highest in the Coast, Western and Nyanza provinces and lowest in Central and Eastern provinces (Kenya, 1996). On the other hand, reductions in perinatal health have lagged behind strides made in reduction in infant and child mortality rates in Kenya. The national estimate of perinatal mortality rate in 1995 was approximately 45 per 1,000 live births (Kenya, 1996). Even though there are regional variations within the country, this rate is still high compared to developed countries where rates range from 6 to 10 per 1,000 live births.

## 1.1. Statement of the Problem

Maternal and perinatal mortality rates are basic indicators not only of the level of socio-economic development achieved, but also as a measure of gender equality in any country. Pregnancy and childbearing is a normal and important event. It is relatively safe in many parts of the world. Yet in Kenya, the risk of a woman dying each time she becomes pregnant has been estimated to be 1 in 20 times (Kenya, 1992). This puts the Kenyan woman in a more risky position than her counterparts especially in the industrialised countries where the risk is estimated to be 1 in 2000 (WHO, 1994). More women in Kenya also suffer from obstetric complications that render them disabled for the rest of their lives.

Maternal health has a major impact on the survival chances and health of their new-born babies. It is estimated that nearly two thirds of the 8 million infant deaths which occur each year in the world result from poor maternal health care (WHO, 1999). Indeed, perinatal mortality rates in Kenya still remain high at 45 per 1000 live births compared to 6 per 1000 live births in developed countries (Kenya, 1996). The tragedy is that these deaths and sufferings are preventable.

Very few studies have been conducted in Kenya to address the problem of maternal and perinatal health complications. The studies so far conducted have addressed the issue of maternal mortality rates and hence neglected other reproductive complications that are equally serious and life-threatening. Studies conducted in Kenya have been confined to small regions where researchers have either relied on hospital records or community surveys that have their own limitations. These shortcomings have resulted into a conflicting

picture of maternal health situation in Kenya. A 1980 study of maternal deaths at Kenyatta National Hospital for instance yielded a maternal mortality rate of 224 deaths per 100,000 live births between 1972 and 1977 (Makokha, 1980). However a similar study of maternal deaths at Pumwani Maternity Hospital found a much lower rate of 67 per 100,000 live births over a period 1975 - 1984 (Njoka and Bansal, 1987). The explanation for the differences may be that Kenyatta National Hospital being a referral hospital sees on average more difficult cases. Another study undertaken in Kwale district (Boerma, 1987) found maternal mortality rate to be 254 per 100,000 live births. The difference observed suggests that none of these figures should be taken as representative of the whole country. One thing that comes out clearly is that levels and prevalence of each reproductive problem varies from one region to another depending on the socioeconomic, environmental and cultural factors prevailing in each area. It is evident that studies which focus on small regions could help to establish the severity and variations in maternal and perinatal health problems at regional levels. Moreover, there is scarcity of information from past studies on the number of women who suffer from other reproductive health problems but do not die. This calls for more information on the rate and prevalence of obstetric related problems.

This study attempts to bridge this gap by collecting data on obstetric cases as they occur in selected health facilities that act as sentinel centres for surveillance. The data collected was detailed and reasonably reliable since the questionnaire was specifically designed for this purpose. The responses were recorded by trained medical personnel who were able to diagnose and record any obstetric related complications as they occurred.

In addition, past researches in Kenya have not addressed maternal and perinatal health problems as issues closely related. Yet it is becoming increasingly clear that the two are inseparable in terms of risk factors. This study attempts to bridge this gap by examining both issues in Kisumu district an area which suffers one of the highest infant mortality rates in Kenya.

Further more, no situation analysis known to this author has been conducted in Kisumu district to assess the availability of resources for safe motherhood. Yet without better resources and medical supplies good health will remain elusive. Policy makers often depend on official statistics that may be doctored by health managers to suit their needs.

One possible explanation for poor maternal and perinatal health is poor quality of medical services offered. This discourages pregnant mothers from visiting such centres for health care. For any positive change to be made in health service delivery, there is need to evaluate the quality of care in existing facilities. Studies done elsewhere indicate that mothers avoid using existing health facilities due to poor services, lack of drugs, and equipment (Annis, 1991; Feirman, 1981 and Bamisaye, 1984). This study also conducted a situation analysis of all the health centres hospitals and nursing homes in Kisumu district to determine their capacity and capability to provide safe motherhood. The methods used can be replicated elsewhere with minor variations.

In view of the high levels of maternal and perinatal morbidity and the dearth of information in this important area, the government of Kenya has set the following agenda in its reproductive health strategy for the period 1997-2010 (Kenya, 1996a): to reduce the current maternal mortality ratio of 365 per 100,000 to 170 per 100,000 by the year 2010, to increase professionally attended deliveries from 45% in 1995 to 90% by the year 2010,

to eliminate neonatal tetanus by the year 2010, to reduce perinatal mortality rates from the current estimates of 45 per 1000 live births to less than 30 per 1000 live-births by the year 2010, to establish magnitude of maternal and perinatal mortality and, to increase and sustain standard care in management of common childhood conditions in all health facilities. The present study was conducted partly to complement the efforts by the Kenya.

This study seeks to provide answers to the following key questions:

(i) What makes childbearing in Kisumu district more risky than in other areas in Kenya?

(ii) What are the major reproductive and perinatal health problems prevailing in Kisumu district?

(iii) To what extent can the maternal and perinatal health problems in Kisumu district be related to the individual, environmental or community level variables?

(iv) Are there variations in maternal and perinatal problems experienced in the study area or is it uniform? How can these variations, if any, help us in identifying the risk factors?

(v) Since the introduction of cost-sharing in health care in Kenya, what is the status of health facilities in Kisumu district in terms of availability of essential drugs and equipment for safe motherhood?

(vi) Are there any differences: between public sector and private sector facilities, and between rural and urban in terms of availability of basic equipment, drugs and supplies required for safe motherhood? If so, what are the policy implications?

(vii) What is the current status of spatial distribution of health infrastructure (private and

public sector) and trained personnel in Kisumu district and how does this affect maternal child health?

(viii) What role can other stake holders in the society play in promoting maternal and perinatal health?

## 1.2. Goal and Objectives of the Study

Given the high levels of maternal and perinatal mortality rates in developing countries and the wide gap in these rates that exists within developed countries, there is urgent need for research focusing on both social and biomedical fields.

The broad objective of this study was thus to identify the major risk factors that are associated with maternal and perinatal health problems in Kisumu district. This broad objective was assessed through the following specific objectives:

(i) to asses the incidence and major maternal health problems in Kisumu district.

(ii) to establish the incidence and main perinatal health problems experienced in Kisumu district.

(iii) to determine how maternal and perinatal health problems in Kisumu district vary along demographic and biomedical characteristics including: maternal age, parity, maternal height, obstetric history, illness during pregnancy, marital status, prenatal care, previous use of contraception, desire to be pregnant and, maternal nutritional status during pregnancy.

(iii) to find out how maternal and perinatal health problems in Kisumu district vary along socioeconomic and environmental characteristics especially maternal level of

education, mothers occupation, mothers place of residence, quality of house as measured by floor and wall material, availability of safe water, mode of transport commonly used by household, female autonomy as measured by major bread-winner for household and, sanitary condition of the household.

(iv) to evaluate the extent to which health facilities in the study area are equipped with essential drugs and medical equipment necessary for providing safe motherhood as per WHO standards.

(v) to evaluate the availability and distribution of hospital beds, trained nurses both in private and public sectors per division in Kisumu district.

(vi) to recommend appropriate reproductive health policies and programmes for the study area and others with similar characteristics.

## 1.3. Literature Review

As earlier stated, maternal and perinatal health problems are alarmingly high in the developing countries. Both maternal and perinatal health problems can lead to mortality. Moreover, the clinical causes of maternal deaths are essentially the same around the world. It is estimated that 25 per cent of women die due to haemorrhage, 15 percent due to sepsis, 12 per cent due to hypertensive disorders of pregnancy, 8 per cent due to obstructed labour and almost 13 per cent due to abortion (WHO, 1994). Perinatal health is normally measured by foetal mortality, neonatal deaths and low birth weight.

While it is not possible to provide a complete review of all studies that have been conducted on all issues of maternal and perinatal health, an attempt has been made to focus

on issues of concern to the current study. Preference is given to works that demonstrate concrete evidence of risks of maternal and perinatal health. A thematic approach where key determinants so far identified is used.

### 1.3.1 Age of The Mother

Several studies have indicated that, maternal and perinatal health problems are higher among women who are near the beginning or the end of their reproductive years. These studies indicate *ceteris paribus* that the risks of mortality and health impairment are much lower when women avoid childbearing at the extremes of their reproductive life span, that is below age 20 and above age 34 years (WHO, 1994). Young maternal age has been associated with high rates of maternal mortality in rural Bangladesh (Alauddin, 1986); in Indonesia and Egypt (Fortney *et al*, 1988) and in Tanzania (Arkutu, 1978). A study by Harrison (1985) on hospital births at a university teaching hospital in Zaria, Nigeria found that the highest rates of maternal mortality were among women aged below 15 years. The study concluded that exceedingly high mortality and morbidity rates in this age group is a result of a combination of physical immaturity, severe deprivation and frequent infection. Similar findings come from studies by Koenig (1988), in Matlab, Bangladesh; Kwarst *et al* (1996) in Addis Ababa, Ethiopia; and Ondimu (1997) in Kenya. A study in Cuba however, found maternal mortality rates to be lowest in the age group 15- 19 years (Cardoso, 1986). This study implied that child-bearing was safer for teenage mothers.

Some studies have also specifically indicated that a major problem of adolescent pregnancy is that young women are not fully grown. Their pelvises develop fully only when

they have attained their full stature. Teenage mothers who have not matured physically are, therefore, exposed to the risk of obstructed labour and fistulae. Studies by Murphy (1981) in Northern Nigeria; Sanghvi *et al* (1983) in Nairobi and Tahzib (1983) in Nigeria, have established that prolonged labour which sometimes led to operative deliveries is caused by young maternal age.

For reasons that are not clearly understood, hypertensive disorders of pregnancy seem to be much common in young women especially if they have given birth for the first time. This is evident from studies by; Dhutia (1981) in Coast province of Kenya, Diejmoah *et al* (1980) in Nigeria, Kapesa (1985) in Tanzania, Ojengbede *et al* (1987) in Nigeria and an early study by Rehan and Sani (1982 ) conducted at a maternity hospital in Nigeria.

Other studies conducted on induced abortion have identified adolescence as a major risk factor. These include Aggarwal and Mati (1982) who in their study of 610 women admitted with abortion to Kenyatta National Hospital, Kenya, found that, 44 per cent were aged below 19 years, 79 percent were not-married and 60 percent were school girls. Other studies conducted elsewhere by Lawn (1977) and Narone *et al.* (1983) support the findings of induced abortion being high among adolescents compared to old mothers.

Also, a number of studies have sought to link low birth weights, pre-maturity and perinatal mortality to adolescent childbearing. Arkutu (1978) in a study in Tanzania compared 259 primigravidae aged 15 years and below to primigravidae aged 21-25 years. The risk of premature birth and low birth weight was higher in the younger age group. A similar study was conducted by Haiek and Lederman (1988) in New York with conclusions that even if maternal weight at delivery is appropriate for height, teenage mothers have smaller babies compared to those of adult women. Kramer (1987) however, considered

factors that might have a direct causal impact on birth weight using published medical literature between 1970 and 1984. The study found that maternal age alone had no significant independent effect on low birth weight. These findings are supported by Geronimus (1987), who points out that reproductive health problems faced by adolescents could mainly be due to socio-economic status rather than age.

### 1.3.2. Parity

Some studies have found that maternal mortality is typically lowest at parities two and three and highest for nulliparous and multiparous women (Rinehart and Kols, 1984; Acsadi and Johnson-Acsadi, 1986; Maine *et.al,* 1987; Hart and Bain, 1989). Women who have not previously borne a child are more often faced with complications like pre-eclampsia, eclampsia and other problems related to delivery (Omran, 1985, Worthington-Roberts, 1989). The study by Omran (1985) found that older women with higher order births are more likely to experience greater health and mortality risks. Another study in Jamaica by Walker *et.al,* (1987) found maternal mortality rates of 63, 75 and 78 per 100,000 live births for women with two, three, and four children, respectively. First parity women had an average rate of 86 per 100,000 and those with five to nine children had an average of 102 deaths per 100,000 live births. Worthington-Roberts (1989) points out that regardless of maternal age, the risk of low birth weights increases with five pregnancies or more. This suggests that parity has an independent effect on reproductive health.

### 1.3.3. Birth Intervals

Some studies have indicated that the length of time that elapses between births influences the health and survival chances of both the new born and the mother (Rutestein, 1984; Maine and McNamara, 1985; Acsadi and Johnson-Acsadi, 1986). In general, short birth spacing of less than two years has a deleterious effect on survival of infants, foetal health and health of previous birth.

### 1.3.4 . Unwanted Pregnancy

Various studies have found that incidence of abortion is related to a pregnancy that is in most cases unwanted. A study by Kwarst and Liff (1988) in Ethiopia established that women who died from abortion were more likely to have had unwanted pregnancies. Most of these women were also single and had not previously used any method of contraception. Hart and Bain (1989) in their study on perinatal mortality in England found that perinatal mortality rates were high for children born of unwanted pregnancies to single teenage mothers.

### 1.3.5. Quality of Care

Quality of heath care services influences reproductive health because it determines the utilisation rates. One component of care is the availability of qualified medical personnel. Since treatment of complications that arise from childbearing requires skilled medical intervention, shortages of physicians, nurses and trained midwives contribute to maternal and perinatal deaths. Most trained personnel choose to live and work in the urban

areas to the extent that rural areas remain largely under-served. A study by Omu (1980) in Nigeria indicates that 90 percent of obstetricians in Nigeria were located in national and regional capitals and yet the proportion of the population living in these capitals was only 11 per cent of the total population. This leads to long queues in the health facilities situated in rural areas, a factor that discourages potential patients and reduces the facilities' utilisation rate. Confirming this, Feierman (1981), in a study in rural Tanzania revealed that mothers waited for so long before being attended to by medical personnel to the extent that they did not wish to come back to seek care.

Even when medical personnel are available, care is not necessarily adequate. Some studies have found that lack of equipment and essential drugs in the health facilities leads to high incidences of mortality which otherwise could be avoided. Lack of equipment could lead to poor diagnosis, poor management of patients, and sometimes late referral. A study by Kwast *et. al* (1986) revealed that insufficient blood supply was a vital factor in five of the seven maternal deaths due to haemorrhage in an Addis Ababa hospital. In a similar study, Price (1984) also cites shortage of blood as responsible for 35 per cent of maternal deaths in rural Tanzania. Another study by Mtimavalye *et .al.* (1984) indicated that 61 percent of maternal deaths in Tanzania were associated with lack of equipment and drugs in combination with shortage of drugs. Ojo *et. al* (1980) in a study carried out at Ilorin University teaching hospital found that most mothers with caesarean deliveries who developed sepsis, died due to lack of antibiotics in the hospital pharmacy. An earlier study at Kenyatta National Hospital established that women referred from lower cadre health facilities arrived in moribund condition (Aggarwal, 1980). This same study placed 59 per

cent of the blame on the referring facilities which could not diagnose the problem early enough thus causing unnecessary delays.

In an evaluation of maternal and child health facilities in Latin America and Caribbean countries, Ojeda (1992) revealed that only six per cent of the facilities could be classified as satisfactory in terms of essential drugs and equipment, eighty per cent as being unsatisfactory and fourteen per cent as being in a critical condition. The same study revealed that lower cadre centres were in less critical condition compared to referral hospitals. Another study by Farah and El-Ghouyal (1994) in Yemen found that shortages of qualified personnel in the health facilities in the rural areas contributed to high incidence of maternal and perinatal mortality. In similar studies conducted by Prevention of Maternal Mortality Network (PMMN) in West Africa, lack of essential supplies has been identified as a key determinant of reproductive health problems experienced (Maine, 1997).

### 1.3.6. Health Status of Mother

The health status of mothers before and during pregnancy determines the likelihood of developing complications and their survival chances. A key indicator of maternal health is her nutritional level. Ebrahim (1983), suggests that the health status of a mother who enters pregnancy in good health with sound reproductive psychology and has not suffered nutritional deprivation will have healthier and bigger infants than mothers who do not have such advantages. Birth weight is therefore determined by maternal nutritional status. Tahzib (1983) in addition suggest that low maternal height which is a sign of early nutritional status is a major risk factor to obstructed labour. Nutritionally deficient pregnant mothers have

been found to be prone to fatigue and are vulnerable to disease and complications during pregnancy (Rinehart and Kols, 1984). In Latin America and Caribbean, two thirds of pregnant women were attacked by nutritional anaemia (Buvinic and Leslie, 1981).

For expectant mothers, malarial attack can be serious since it may lead to maternal death, abortion, premature delivery or low birth weight. Malaria has been found to represent a serious risk in first and second pregnancies in areas where it is endemic. Pregnant women are easily infected with malaria because the placenta is a preferential cite for parasite growth (Najera, Liese and Hammer, 1993). Malaria attack during pregnancy also increases a woman's chances of developing severe anaemia (Arkutu, 1995).

Worthington-Roberts (1989) suggests that the past obstetric performance of a mother determines pregnancy outcome. Poor performance in the past increases the chances of problems in subsequent periods. Chances of having a low birth weight are greater when past pregnancy performance is poor (e.g. abortion or stillbirth). This implies that there are underlying circumstances that place some women at continued risk of developing complications every time they become pregnant.

Most studies have therefore emphasised that pre-natal care is essential to reduce complications related to poor health status because women are screened and their reproductive history considered with a view to taking preventive and remedial steps. For example, Fallis (1986) in a study in Kinshasa, Ojengbede *et al.* (1987) in their study in Ibadan, have shown that mothers who utilise pre-natal services have lower chances of experiencing morbidity and mortality. However, Acharya (1995) in a review paper challenges this notion and concludes that ante- natal care alone cannot prevent obstetric

complications like haemorrhage or obstructed labour. There is need to supplement ante-natal care with establishment of emergency obstetric care centres in all regions.

### 1.3.7. Socio-economic Status

Socio-economic status is a broad term that encompasses social and economic status of women as measured by income levels and quality of housing, maternal education level, marital status, occupation and source and quality of water for domestic use, among others.

Maternal education, has for long been seen as a key determinant of maternal and infant health. Education is normally measured by the number of years of formal schooling that individuals have received. Studies have shown that utilisation of medical services increases with increasing levels of education (Caldwell and Caldwell, 1985; Cleland and van Ginneken, 1988). In another study, Abbas and Walker (1986) found that non-use of prenatal services among women in Jordan declined from 76 percent among the illiterate women to 59 percent among those with elementary education and to 30 percent among these with secondary level of education. A similar trend was found in a study by Wong *et.al.* (1987) in Philippines where non-use of prenatal care decreased from 31 percent among uneducated women to 17 percent among those with primary education and to 9 percent among those with high school education. A study by Kwast *et. al.* (1986) in Ethiopia corroborates the association between use of prenatal care services and womens' education level. Only 7 percent of women with over 12 years of formal schooling had not received prenatal care compared to 50 percent of women with no formal education.

The mechanisms through which education operate to affect the decision to use medical services are not well understood. However, it has been hypothesised that education affects individuals by introducing them to a new 'modern' culture (Caldwell and Caldwell, 1985). Education also increases womens' self confidence, autonomy through enhanced knowledge, greater exposure to the outside world, greater decision making at home, greater economic autonomy and self reliance, and finally delays marriage (Jejeebhouy, 1995). Reduced access to education, information, and knowledge means that women are often poorly informed about health issues, about their bodies, functions, and about how to protect themselves from diseases and their ability to recognise and act on signs and symptoms of illness (Caldwell, 1993).

There are studies however which show that higher education may not necessarily guarantee higher levels of health service utilisation (Orubuloye and Caldwell, 1975; Lasker, 1981). This fact illustrates the explanation that determinants of maternal health cannot be reduced to one factor. In addition to their education level, other factors affect peoples health behaviour. One such factor or combination of factors is economic status.

Economic status of women is defined and measured in many different ways. These include income level, occupation, and major breadwinner in the household. Most studies done have established that utilisation of health facilities by mothers increases with their economic status (Kloos *et.al*, 1987, Kwast *et .al* 1984, 1986). In most cases, women lack power and social status in society and therefore access to economic resources. As a result of their differential positioning in society, women are usually poorer than men and are often economically dependent on men (Campell, 1990; Ankrah, 1991). Poverty has influence on health since it means less money is available to purchase adequate foods or drugs thus

increasing the risk of illness and disease. Sub-standard living conditions manifested in poor housing, deficient standards of hygiene, unhealthy sources of water, lack of garbage collection services all attributable to poverty, expose populations to risk of disease (Kitts and Roberts, 1996).

Alaudin (1986) conducted a prospective study on maternal mortality in rural Bangladesh in which the relationship between socio-economic status and mortality goes against conventional expectations. Women of higher economic status experienced higher mortality; those with more land and high education levels had the highest mortality rates. The level of nutritional anaemia was also found to be highest in the highest income groups. Studies conducted in Latin America and Caribbean have shown that maternal work status determines health status (Acsadi, Johnson-Acsadi and Vlassoff, 1994). Other domestic work like procurement and carrying of water and firewood, planting and land cultivation have the potential to damage womens' spine and pelvis, aggravate a prolapsed uterus and complicate childbirth (Stinson, 1986).

Finally, some studies have found that a woman's social status can be a risk factor to maternal and perinatal health problems. Muller and van Ginneken (1991) in their study in Machakos, Kenya found that, among other things, perinatal mortality was higher among babies born to unmarried women than married women. Another study by Dixon-Mueller and Wasseeheit (1991) found women in polygamous union to be at more risk of contacting STD's than their counterparts in monogamous unions. Poor self esteem and self respect has been found to reduce the likelihood that a woman will seek out health care services for her own needs (Kitts and Roberts, 1996).

## 1.3.8. Water and Sanitation

A review done by Esrey *et.al* (1991) revealed that improved water supply and sanitation often reduce child diarrheal mortality by 50 percent and sometimes by as much as 80 percent depending on the type of intervention and on the presence of risk factors such as poor feeding habits and maternal illiteracy. Poor sanitation and disposal of faecal waste complicate matters particularly in rural areas and periurban slums where seepage and run-off can contaminate ponds, streams, rivers and wells (World Bank, 1994). Improved excreta disposal can therefore have a major impact on health of mothers as does improved personal, domestic and food hygiene. A study in Lesotho recorded 36 percent reduction in diarrhoea related to improvement on excreta disposal (Daniels *et. al*, 1990). The study concluded that interventions to improve excreta disposal can have a greater impact in comparison to improvement in water quality particularly in areas where the environment is highly contaminated and the prevalence of diarrheal high. Diarrheal amongst pregnant mothers is likely to have the effect of weakening their bodies and exposing them to malnutrition.

## 1.3.9 Food and Nutrition

Malnutrition underlies more than one third of infant and child mortality in rural and urban areas of many African countries and 20 to 80 percent of maternal mortality (McGuire and Austin, 1986). Protein energy malnutrition, nutritional anaemia, vitamin A deficiency and iodine disorders have been identified as the most serious problems. Inadequate quality and quantity of food intake causes growth failure, decreased immunity, poor reproductive

outcome and reduced productivity (World Bank, 1994). Stunting which is a reflection of long-standing under-nutrition is very prevalent in Africa (USAID, 1993).

## 1.3.10. Drugs and Supplies

In the mid 1980's, the World Health Organisation (WHO) conducted a survey in 104 developing countries to determine the availability of essential drugs (WHO, 1988). The survey revealed that in seventeen countries with a combined population of about 200 million people, about 70 percent of the population had no regular access to essential drugs. In another 14 countries also accounting for about 200 million people, an estimated 40-70 percent of the population had no regular access. And nine countries with a combined population of 50 million people, an estimated 10-30 percent of the population had no regular access to essential drugs. These findings suggest that most people had no access to essential drugs and hence the risk if disease was high. Shortages of appropriate drugs have been found to afflict many public sector facilities in Africa (World Bank, 1994).

## 1.3.11. Human Resources

Research studies have been conducted to analyse the availability of trained medical personnel in the developing countries. These studies reveal high levels of under-supply of sufficiently trained medical personnel most this is due to high attrition rates. In Zimbabwe, for example, it was projected that roughly 7.1 registered nurses would leave public sector facilities annually between 1991 and 1995 (Vaughan, 1992). The same study reveals that

Uganda lost about 40 percent of trained nurses in public service in 1986. This implies that the supply of trained personnel in most African countries remains woefully low.

## 1.3.12. Equipment and Infrastructure

Medical equipment and supplies determine the quality of care offered in any facility. A study in Tanzania found that only 660 out of 1,800 rural government dispensaries were in good condition, while 810 were in fair condition and 330 were in bad condition (World Bank, 1994). On the other hand, a 1990/91 survey of fifteen hospitals operated by the Ministry of Health in Kenya found that 40 percent of the buildings were in poor unsatisfactory conditions (World Bank, 1994). A study in Nigeria by Esinosho (1991) found that health equipment had fallen into a state of disrepair. This study further established that close to one third of the equipment in a series of health care facilities were not being used due to poor state. In general, the more sophisticated the health care facility, the more equipment was out of use due to disrepair. Another survey on 13 Ministry of Health hospitals in Kenya found that 40 percent of the equipment were out of order (World Bank, 1994). A 1987 survey in Uganda found that only 20 percent of inventoried equipment were in working order, while one third of the remaining 80 percent was worth repairing (World Bank, 1994). There was need for another survey to specifically look at facilities related to reproductive health care.

## 1.3.13. Summary of Literature Review

The studies reviewed indicate that the leading causes of mortality in most countries are haemorrhage, infection, obstructed labour, hypertensive disease of pregnancy and abortion. These clinical causes can be treated as long as they are detected early and the necessary supplies and equipment are in place. The levels, order and severity of the complications arising from these problems, however, vary from place to place. Beyond the known medical causes of maternal mortality other contributing factors, multi-faceted in nature exist. These involve a complex interaction of several negative socio-economic, demographic, environmental, health service related factors, attitudinal, medical and cultural barriers. Most of the studies reviewed have relied on existing medical records, and therefore have not synthesised all the risk factors before pregnancy, during pregnancy and after delivery to establish the most important risk factors. This study has addressed these weaknesses.

In addition, the studies reviewed suggest that there is no consensus about the risk factors to maternal and perinatal health problems. For example, some studies have indicated that the young age of the mother increases the risk of complications which may lead to both maternal and perinatal health problems (Lwanga, 1977, Arkutu, 1978). Other studies have contradicted this view by suggesting that some complications are not age-related but rather a function of inadequate care and malnutrition (Senderowitz and Paxman, 1985; Kramer, 1987). Indeed, some researchers observe that maternal age differentials in neonatal mortality or pre-term births and low birth weights disappear after adjustment for socio-economic variables is made (Geronimus, 1987; Makinson, 1985). Teenagers have

been found to have developmental superiority in child bearing to the extent that only other socio-economic characteristics determine their pregnancy outcome. Most teenagers are affected by important and often multiple health problems upon which the physiological demands of pregnancy are superimposed (Kreutner and Hollingswirth 1978). Some studies from Bangladesh (e.g. Alaudin, 1986) show that the conventional relationship between education, socio-economic status and maternal health does not hold true in some areas of that country. Other studies have also shown that education of the mother alone may not necessarily guarantee higher levels of health (Orubuloye and Caldwell, 1975, Lasker, 1981). In addition, Acharya (1995) points out that antenatal care alone cannot prevent obstetric complications. It is hardly surprising therefore that simplistic approaches so far adopted in many developing countries such as persuading women to go for prenatal care and training of Traditional Birth Attendants (TBAs) have not achieved the desired goals. There is thus need for broad-based studies that examine the role of social, behavioural, environmental community level factors that determine reproductive health. An integral component of such studies should be the analysis of availability, quality and delivery of health services to meet the desired goals. This study addresses these issues.

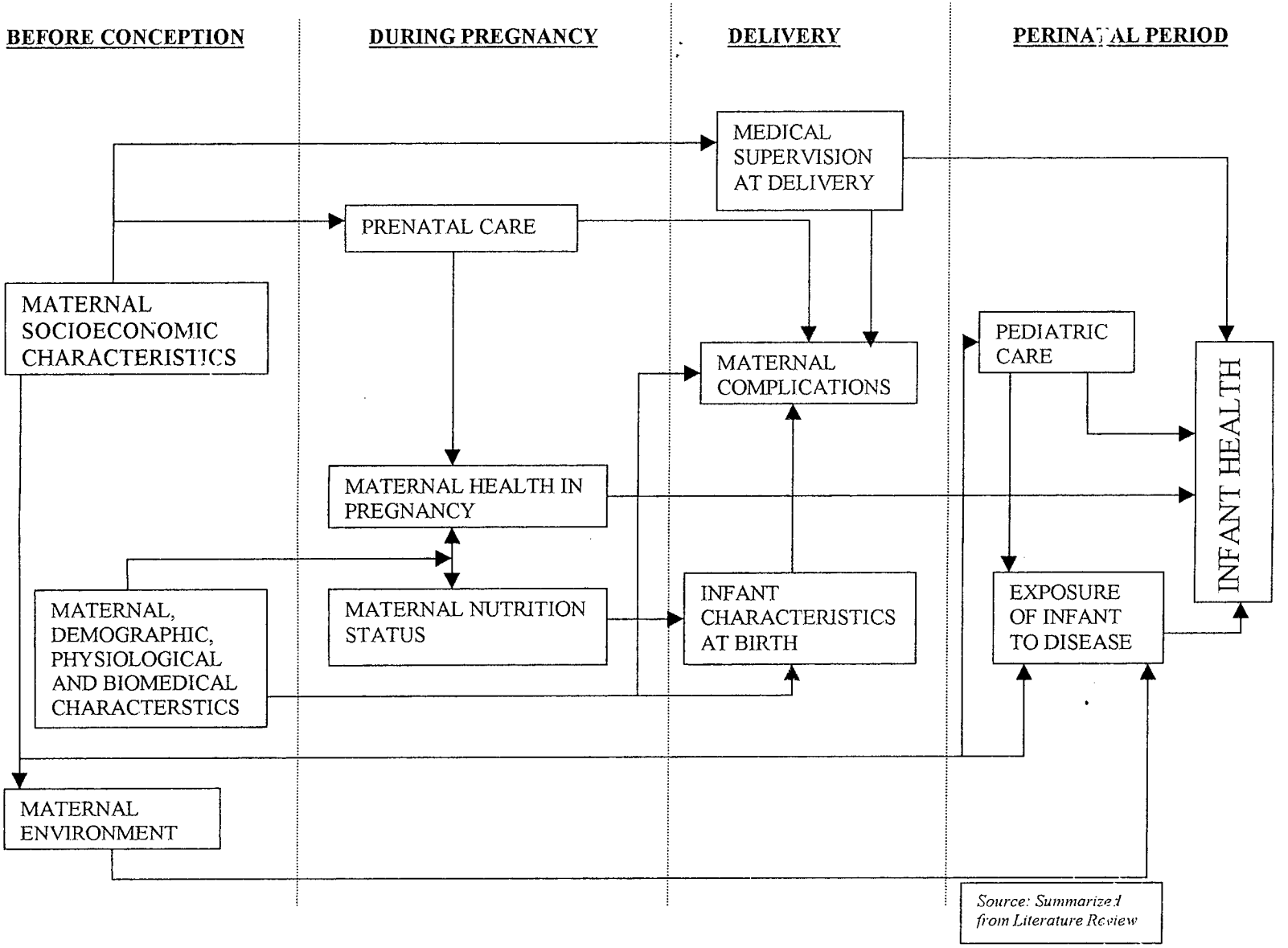
## 1.4. Theoretical Framework

The theoretical framework upon which this study is founded takes into account a number of risk factors which are assumed to profoundly affect maternal and perinatal health. These include: medical causes, socioeconomic, demographic and environmental risk factors. These factors are summarised for ease of reference in Figure 1.

As it may be observed from Figure 1, the risk factors of maternal and perinatal health exist before conception and hence affect maternal health during pregnancy, influence decisions on utilisation of medical facilities, nutrition status and consequently determine reproductive and perinatal health. These risk factors also determine the level of paediatric care and exposure of new born to disease and infection. There are however variations in these risk factors across regions and cultural groups.

Figure 1 also indicates that the nutritional status of the mother during pregnancy which is measured by her anthropometry, can influence pregnancy outcome most notably by affecting placental growth, which in turn determines birth weight (Ebrahim, 1983). Maternal age on the other hand, has been found to be important in determining pregnancy outcome and early health of children (Viegas, 1992).

## FIGURE 1: DETERMINANTS OF MATERNAL AND PERINATAL HEALTH PROBLEMS



It is considered best for women to start having children in their early twenties and stop at about 35 or soon thereafter. Very young mothers have problems not only with their health but with that of their children as well. At old age, the mother may well be growing towards her final mature stature and the metabolic and nutritional stresses of pregnancy will be exceptionally severe. Irrespective of the nutritional status, there is more likelihood of low birth weights, of still births and of neonatal deaths among children of mothers who are aged younger than 20 years. High maternal age is usually associated with higher rates of obstetric complications such as still births and prematurity (Viegas *et.al*, 1992).

Maternal socio-economic characteristics as measured by, education, marital status and occupation can determine maternal health through their influence on birth spacing by encouraging use of modern contraceptives. Family planning can reduce maternal morbidity in several ways. First, it can lead to the reduction of the number of births since every pregnancy is associated with risk. Second, it helps reduce maternal deaths. Third, it helps reduce mistimed or unwanted pregnancies especially among teenagers and those old women with high parities (WHO, 1994). Poorly educated women have been found to be often suspicious of health care and at the same time showing little response to its availability (Ware, 1994; Caldwell, 1979). Such women also resist modern family planning methods. Thus, they are likely to suffer the consequences of unregulated fertility.

Studies have indicated that quality of care in the available health facilities is important in influencing their utilisation (Thaddeus and Maine, 1990). If the available health facilities are not well equipped with personnel and adequate supplies of drugs and other basic equipment, mothers will not be motivated to use them, and this may lead to maternal morbidity and mortality.

The type and quality of the house in which a mother lives has an important influence upon her health (Meredith-Davies, 1972). Poor housing conditions increase chances of contracting more infectious diseases. Overcrowding in such areas may also lead to an increase in vermin and spread of airborne diseases. Dampness caused by defective roofs and gutters may lead to rheumatic problems which in turn may influence higher rates of maternal and perinatal morbidity. Tekce and Shorter (1984) in a study of determinants of child mortality in Jordan observe that housing which is the family's most single important capital asset also forms their immediate physical environment. The study further observes that the quality of the family's immediate physical environment strongly influences risk of exposure to infectious diseases and to injury. The higher the quality of housing, the smaller the daily co-operation of individual household members to minimise the risks of exposure to disease.

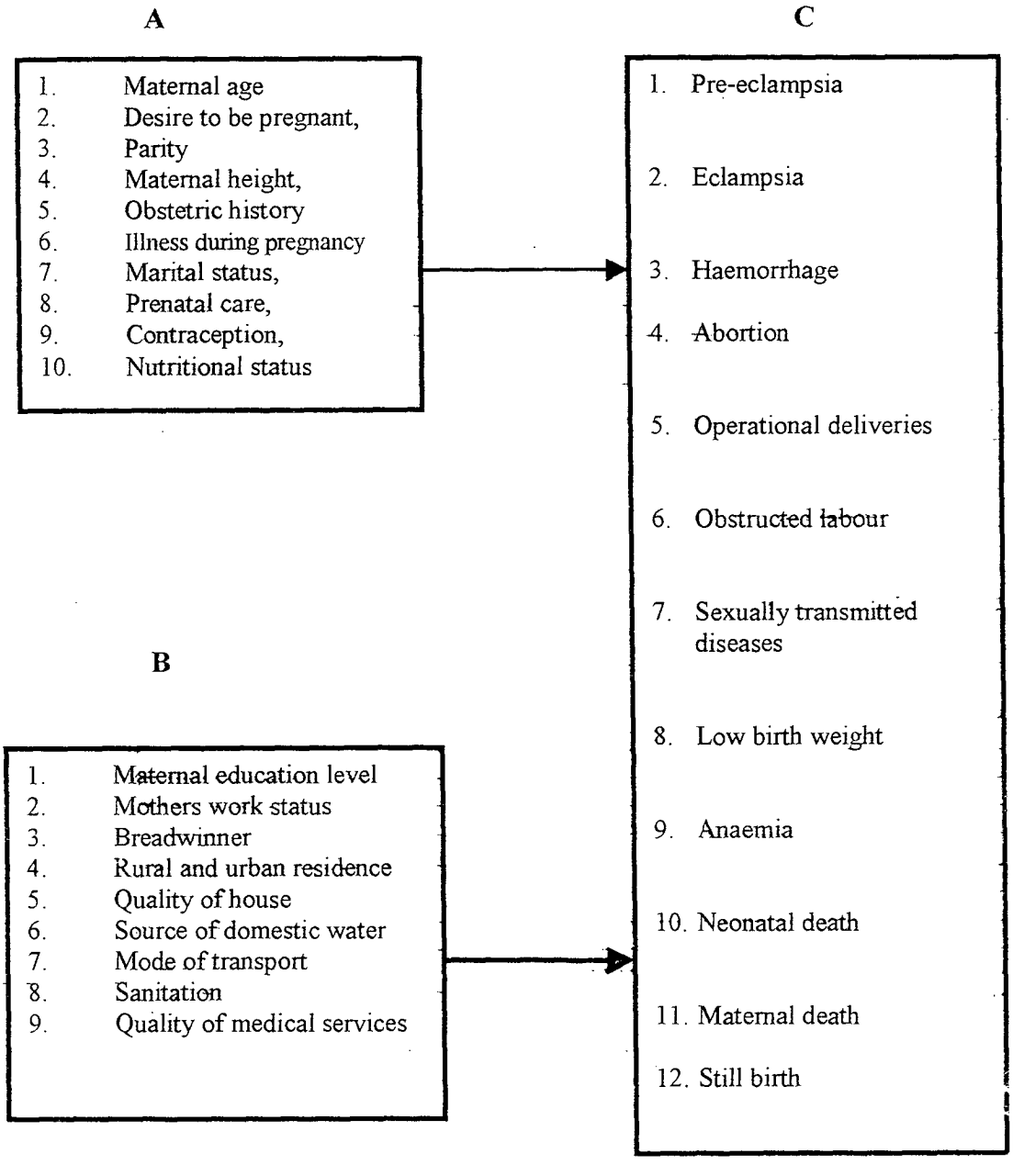
Majority of women in developing countries work at home or in the fields. They often work for long hours, carry heavy loads and take care of the needs of their husbands and children (Viegas et al, 1994). Long working hours for pregnant women exposes them to the risk of many reproductive health problems. Agricultural labour is often arduous and tiring. For example, cultivating weeding farms and harvesting of crops exposes women to injuries and backaches due to physically demanding work. In cases where pesticides are used in excessive amounts in the farms, it has been found that women exposed to them run the risk of spontaneous abortion, stillbirths and premature deliveries (Kitts and Roberts, 1996).

Finally, it has been postulated that properly conducted antenatal care is very effective in reducing maternal mortality (WHO, 1994b). Prenatal care helps to detect and

manage complications early before they become life-threatening. It also gives people information about dangerous signs so that they can seek specialised care from higher level medical facilities. The type of care offered, the personnel consulted and number of visits made determine the effectiveness of antenatal care. The foregoing discussion has been simplified and presented in the operational framework (Figure 2).

In reference to Figure 2, it is observed that the risk of having maternal and perinatal complications depends on; maternal demographic and biomedical characteristics, and the socio-economic and environmental characteristics of the household which exert their effect to determine pregnancy outcome. Factors in categories "A" and "B" are therefore the major determinants of maternal and perinatal health in Kisumu district. For instance, teenage mothers are considered to be physiologically immature and economically dependent upon their parents. They are also more likely to be single and hence likely to have unintended pregnancies. Moreover, very young women are less likely to receive prenatal care than older women. They are also more likely to receive care late in pregnancy. A young mother may be late in receiving care for a number of reasons. If unmarried, she may be ashamed of her pregnancy and thus hide the facts from her parents and other concerned people. She may refuse to acknowledge the pregnancy or simply not realise that she is pregnant. Whatever the reason, the delay can be costly to both the pregnant woman and the foetus. Chances of obstetric complications will therefore be higher for teenage mothers.

**Figure 2: Operational Framework on Risk Factors of Maternal and Perinatal Health**




A) - Demographic and biomedical characteristics
B) - Socio-economic and environmental characteristics
C) - Maternal and perinatal health

Mothers aged over 30 years are likely to belong to high parities and hence nutritionally weak due to many former pregnancies. Such mothers are likely to experience reproductive problems associated with high parity such as hypertensive diseases, prolonged labour, and operative deliveries among others.

Mothers who never intended to be pregnant are likely to have induced abortion compared to their counterparts. Such mothers are less likely to utilize prenatal services due to fear and social stigma associated to unintended pregnancies. Risks of complications that may arise from poor obstetric care are high for such mothers. Mothers with height below 155 cm are considered stunted and hence their pelvises are not fully developed. The risk of obstetric complications like prolonged labour and operative deliveries is higher for such mothers and in the absence of appropriate interventions, can lead to maternal and perinatal mortality.

Poor past obstetric performance of mothers as measured by occurrence of abortion and still births is likely to indicate some element of risk among such mothers. In the absence of proper medical care such mothers are more likely to have repeat complications compared to their counterparts. This is because the inherent factors that may have led to earlier complications are likely to be persistent. Similarly, maternal health status during pregnancy determines pregnancy outcome. Those mothers who were ill while pregnant are more likely to suffer complications like haemorrhage, abortions, still births and low birth weights compared to their counterparts. This is largely due to the negative effect that sicknesses such as anaemia and malaria have to the pregnant mother. Mothers who utilised prenatal health care services are likely to be at reduced risk of complications compared to those that did not. This is because prenatal care is likely to have a positive effect of;

educating mothers on good dietary habits, screening for diseases, and taking early remedial measures before it is late. Mothers who have utilised contraception are less likely to experience obstetric complications. This is because such mothers are likely to space their births and reduce incidences of unwanted pregnancies.

Mothers with high education levels for instance, secondary and above, are more likely to suffer less incidences of obstetric complications. This is because such mothers are likely to start childbearing at a relatively higher age. Moreover, they are more likely to know the importance of utilising modern health facilities for prenatal care, and also to be in formal employment compared to those without any education. Similarly mothers who are not in formal employment are likely to be poor and less autonomous. Such women are likely to depend on other people for their upkeep. This has the potential to compromise their decision to seek proper medical care. Women who are not in formal employment are more likely to engage in physically demanding jobs such as farm labour that can be detrimental during pregnancy.

Poor standards of living as measured by type of house, availability of clean piped water and garbage dumping facilities within a woman's household has an effect on the sanitary conditions of the house and disease outbreak. Those women living in poor environments are at higher risk of suffering various diseases while pregnant. This increases the chances of having obstetric complications. On the other hand, women resident in urban areas are likely to have an advantage over their rural counterparts. Urban residents enjoy proximity to many health facilities located there in addition to availability of motorised means of transport that can be used during emergencies. This has the potential of reducing risk among pregnant urban residents. Finally, the birth weight of an infant determines its

chances of survival. Infants weighing less than 2,500 gms are likely to be premature births and hence likely to die before, during or after delivery. Such infants are at high risk of suffering from many illnesses during the early neonatal period.

## 1.5. Working Hypotheses

Basing on the literature reviewed and the resultant conceptual framework, this study was guided by the following working hypotheses:

(a) The risk of experiencing maternal health problems in Kisumu district is higher for women who are aged below 20 years, women aged over 30 years, women who have low level of education, women of high parity, those who reside in the rural areas, single mothers, women with past obstetric complications, women who suffered from some illness while pregnant, stunted women whose height is less than 155 cm, women who have unwanted pregnancy, women who never attended prenatal clinics, women who have never used any contraceptive method, women who are not in formal employment, women whose households have no access to safe water, women whose household have poor sanitary conditions, women who lack autonomy, and , women who are poor as measured by type of house and lack of access to motorised mode of transport.

(b) The risk of experiencing stillbirths in Kisumu district is higher for women who are aged below 20 years, aged over 30 years, who have low level of education, women of high parity, those who reside in the rural areas, single mothers, women with past obstetric complications, women who suffered from some illness while pregnant,

stunted women whose height is less than 155 cm, women who have unwanted pregnancy, women who never attended prenatal clinics, women who have never used any contraceptive method, women who are not in formal employment, women whose households have no access to safe water, women whose household have poor sanitary conditions, women who lack autonomy, and , women who are poor as measured by type of house the live in and lack of access to motorised mode of transport.

(c) The risk of early neonatal morbidity and mortality in Kisumu district is higher for infants who have low birth weight. The risk is also higher for those born to mothers with the following characteristics: age below 20 years or over 30 years, low level of education, high parity, rural residents, single mothers, those with past obstetric complications, those who suffered from some illness while pregnant, those whose height is less than 155 cm, those who had unwanted pregnancy, those who never attended prenatal clinics, those who have never used any contraceptive method, those who are not in formal employment, those whose households have no access to safe water, those whose household have poor sanitary conditions, those who depend on other people for upkeep, and, those who are poor as measured by type of house the live in and lack of access to motorised mode of transport.

(d) Health personnel and infrastructure in Kisumu district are not equitably distributed.

(e) Most public sector health facilities in Kisumu district lack essential drugs and medical equipment for the provision of safe motherhood.

## 1.6. Justification of the Study

Like many developing countries, Kenya is at an epidemiological cross roads. The country is going through pre-transitional health problems, nutritional deficiencies, and reproductive health problems, among others. At the same time, the country is now facing a growing burden of chronic and degenerative diseases usually associated with industrialised countries. In the words of Frenk *et.al,* (1989) the country is in what is called "protracted-polarised model" of epidemiological transition. Despite significant efforts to reduce mortality by infectious diseases, these diseases have not been fully brought under control. This situation, together with the increase of non-communicable diseases has produced an overlap of eras of transition. The unequal distribution of wealth coupled with incomplete coverage of health interventions has given rise to a widening gap in the health status among social classes and geographical regions hence leading to epidemiological polarisation. If this trend is allowed to continue unabated, there is a danger of re-emergence of the diseases that were once considered eradicated.

Reproductive health has been defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity in all matters related to the reproductive system and to its functions and processes. People should be able to have a satisfying and safe sex life and the capability to reproduce and the freedom to decide if, when, and how to do so. Both men and women should have the right to be informed and have access to safe, effective, affordable and acceptable methods of their choice of regulation of fertility which are not against the law; as well as the right of access to health

care for safe pregnancy and child birth (FCI, 1995). Reproductive health care is therefore the constellation of methods, techniques and services that contribute to reproductive health and well being by preventing and solving reproductive health problems. Defined this way reproductive health is therefore part and parcel of basic human rights.

Despite the advances made in terms of promotion of family planning in Kenya, gaps remain in terms of policy oriented research that looks broadly at socio-economic, demographic and biomedical factors that contribute to high rates of reproductive morbidity and mortality in Kenya. This is partly because reproductive health has for long been considered the domain of specialists of obstetric and gynaecology and not an epidemiological or social issue. This orientation has narrowed the perception of health managers to the extent that they have focused most attention to medical at the expense of socioeconomic and environmental dimensions. This study is therefore important because it examines the determinants of maternal health from a broader socio-economic, demographic and biomedical perspectives. Such information is needed in designing broad-based health strategies. With proper policies, most reproductive health problems experienced in Kenya today can be eradicated. Yet maternal morbidity and mortality continue to take a great toll on Kenya's population. There are some indirect economic costs mainly associated with sickness and treatment which affect the household and community welfare.

This study is also important because it underscores the health of women who have a primary function of supporting their families through their productive labour, cash crop labour, subsistence farming and other remunerative work. Good health ensures their survival and productivity in many sectors. The loss of a mother through death or disability is a major loss of the nurturer, provider and sometimes *de facto* head of the household.

This study makes a contribution to better health for women by examining the factors that threaten their lives during the critical stage of their productive and reproductive life-span.

In addition, child survival has an influence on desired family size and this is an important rationale for integration of programmes addressing both maternal and perinatal health. Where perinatal mortality remains high, couples opt to have many children to ensure that the desired number survive. This research suggests strategies that have the potential to reduce perinatal mortality to desired goals and hence lead to a reduction of fertility levels.

The evaluation of health facilities in Kisumu district is also important in many respects. Health care facilities in most developing countries are being under-used and misused. The facilities should not only exist but they must be easily reached by people who need them. The ultimate health goal should focus upon reasonable cost of health care, adequate supplies and equipment and availability of qualified personnel. Indeed, public confidence of health workers and their satisfaction with health services provided depend upon maintenance of reliable and well equipped facilities. The evaluation of health facilities therefore is essential for the formulation of strategies that will make services more accessible and acceptable to those in need.

Several demographic and socioeconomic conditions justify the selection of Kisumu district for this study. These include: low literacy levels, low levels of contraceptive use, low age at first marriage and, low age at first intercourse amongst women as reported by the Kenya Demographic and Health Survey of 1993 (Kenya, 1994a). The region had also the highest neonatal mortality rate in Kenya at 38.5 per 1000 live births compared to the national average of 27.0 per 1000 live births. The mortality for children aged 5 years and

below is 186 per 1000 live births which is the highest in Kenya (Kenya, 1994b). The above figures are indicators of poor maternal and perinatal health prevailing in the study area.

## 1.7. Definition of Key Terms

In this section some key terms used are defined in the specific context of this study. The terms are presented alphabetically.

**Abortion:** This is the termination of pregnancy (expulsion or extraction of embryo or foetus) before the foetus is able to live outside the mother's body. It can happen anytime up to 26th week of pregnancy, but usually before the 12th week. It can happen on its own (spontaneous abortion or miscarriage), or it can be caused by an operation or procedure(induced abortion).

**Anaemia:** The term anaemia refers to lack of sufficient red blood cells. It is characterised by significant reduction in haemoglobin and red blood cells as measured by concentration of haemoglobin per 100 ml, volume of packed red blood cells per 100 ml of blood or number of red blood cells per cubic millilitre. The average normal haemoglobin value for healthy adult women is 14g/100 ml with a range of 12 to 16g/100 ml. Signs of anaemia include tiredness; pale gums, tongue, eyelids, palms and soles of feet and lack of energy.

**Anaesthetics:** Drugs used to put patients to sleep or to make part of the body numb so that they will not feel any pain or discomfort during an operation.

**Analgesics:** Drugs that relieve pain.

**Antepartum haemorrhage:** This refers to bleeding from the genital tract occurring after the 20th week of pregnancy but before delivery of a baby.

**Anthelmintics:** This refers to drugs that are destructive to worms in human bodies.

**Biomedical factors:** These include poor obstetric history, infection during pregnancy, multiple birth, birth weight and sex of child.

**Birth asphyxia:** This is a birth that is characterised by absence or depressed breathing at birth.

**Caesarean delivery:** An operation in which a baby is delivered by cutting open the abdomen and womb and removing the baby and the placenta. The womb and the abdomen are then sewn closed.

**Demographic factors:** These refer to age, marital status, parity birth interval and use of contraceptives.

**Diuretics:** Drugs that encourage the elimination of water and salt from the body. They are prescribed specifically for low blood pressure and those with oedema.

**Eclampsia:** This describes sudden convulsions and coma occurring especially during late pregnancy or after childbirth. One out of 200 patients with pre-eclampsia normally will develop eclampsia.

**Essential obstetric care:** This refer to the minimal health care interventions needed to manage complications of pregnancy and delivery. It comprises obstetrics (caesarean delivery, treatment of sepsis, repair of high vaginal tears, (laparatomy, removal of ectopic pregnancy, evacuation of the uterus, intravenous oxytocin, amniotomy, craniotomy, symphysiotomy), anaesthesia, medical treatment (of shock, sepsis, eclampsia, anaemia), blood replacement, manual procedure (removal of placenta, labour monitoring, repairing of episiotomies, and perineal tears, vacuum extraction, partography), management of high risk (intensified prenatal care), and a range of contraceptive methods.

**Fistula:** This is an abnormal opening from bladder to the vagina, which may be due to severe tear following childbirth or error in operation.

**Foetus:** The term for a baby in the womb from the third month of pregnancy until birth.

**Forceps:** Instruments sometimes used during delivery to grasp the baby's head and help pull it out of the birth canal.

**Health Centre:** For the purpose of this study, a health centre is a facility concerned primarily with ambulatory patients with capability of providing preventive and curative services more advanced than those which can be provided as part of community health action but less sophisticated than those which require the technical capacity and facilities available only in hospitals.

**Hospital:** It is the first referral level to which a woman at high risk is referred prenatally or to which she is sent for emergency obstetric care. Certain essential obstetric care mostly of life-saving nature in emergencies can only be performed here.

**Hypertensive disorder of pregnancy:** This arises when blood pressure of a pregnant woman reaches 140/90 mm Hg or greater, or when there has been an increase of 30 mm Hg systolic or a 15 mm Hg diastolic rise over baseline values on at least two occasions, six or more hours apart.

**Live birth:** This refers to complete expulsion or extraction from its mother's body of a product of conception irrespective of the duration of pregnancy which after such separation breathes or shows any other evidence of life.

**Low birth weight:** This is a birth weighing less than 2500 grams.

**Maternal mortality:** A maternal death is the death of a woman while pregnant or within 42 days of termination of the pregnancy, irrespective of the duration and the site of the

pregnancy from any causes related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

**Maternal mortality ratio:** The number of maternal deaths per 100,000 live births.

**Neonatal death:** Number of deaths among live births during the first completed 28 days of life. It may be subdivided into early neonatal deaths, occurring during first seven days of life, and late neonatal deaths, occurring after the seventh day but before 28 completed days of life.

**Obstructed labour:** This is when the baby cannot be delivered through the birth canal without serious damage to the mother or the baby. It can happen if the mother's birth canal is too small to permit the passage of a normal-sized baby, or the baby is too big. In most cases this requires operative delivery.

**Oxytocin:** A drug that causes the womb to contact. This drug is used if labour needs to be started artificially. It is also used after a baby has been born to reduce bleeding.

**Parity:** This refers to the number of live-births previously born to a woman.

**Perinatal morbidity:** This refers to any sickness that occurs to a new-born in the first seven days after delivery.

**Partograph:** A form that is used to measure the progress of labour by recording the timing of contractions, cervical dilation, blood pressure, and pulse. Use of partograph provides an early warning when labour is not progressing as expected, and indicates that an operation or other intervention might be required.

**Perinatal mortality:** This refers to the risk of any stillbirth in which a child is born dead or an early neonatal death in which the infant dies within seven days of birth. The levels of

such risks are calculated using the numbers of still births, and early neonatal deaths occurring in the first seven days of life.

**Perinatal period:** This is the period of prenatal existence after viability is reached, the period of labour, and the early part of extra-uterine life. The lower limit of viability is taken to be 28 weeks of gestation and the early part of extra uterine life is taken to be the first seven days of life.

**Post partum haemorrhage:** The loss of 500 ml or more blood from genital tract after delivery of a baby.

**Primigravida:** This refers to a woman who is pregnant for the first time.

**Primipara:** This refers to a woman who has given birth to her first child.

**Pre-eclampsia:** Refers to a condition in pregnancy manifested by hypertension (high blood pressure), headaches, protein in the urine, and swelling of the ankles, feet, hands, and face. If this case is not treated, it leads to eclampsia.

**Pre-term birth:** Refers to any birth which occurs less than 37 weeks of gestation.

**Prolonged labour:** This is active labour with regular uterine contractions for more than twelve hours.

**Puerperium:** This refers to the 42 days (six weeks) following the birth of a child. The womb is expected to return to normalcy during this period.

**Puerperal sepsis:** This refers to infection of the genital tract occurring at any time between the onset of rupture of membranes or labour and the 42nd day postpartum in which either there is pelvic pain, vaginal discharge, abnormal smell or delay in the rate of reduction of uterus.

**Purposive sample:** This is a non-probability sample that is biased towards a particular "type" of subject (e.g., women with birth complications).

**Qualitative variable:** This is a variable or response that describes a quality rather than a quantity; qualitative variables are usually described in words rather than numbers.

**Reproductive health:** Reproductive health is a state of complete physical, mental and social well-being and not merely absence of disease or infirmity, in all matters relating to the reproductive health system and to its functions and processes. Reproductive health therefore implies that people are able to have a satisfying safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how to do so. Implicit in this last condition are the right to men and women to be informed of and to have access to safe, effective, affordable and acceptable methods of family planning of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant.

**Risk factor:** This is a characteristic that is more common among respondents with a given health problem than those who do not have the same health problem. It is therefore an attribute or characteristic of an individual that affects the onset and/or advancement of a process.

**Sentinel centres:** These were health facilities selected to act as points where surveillance survey and data collection on all maternity cases was done for uninterrupted period.

**Stillbirth:** The death of a product of conception with a minimum weight of 500 gm, gestation age of 22 completed weeks before the complete expulsion from its mother.

**Socio-economic factors:** This term broadly denotes all other factors other than biological ones that influence health outcomes. These include education level, work status, age at marriage, availability of clean water, housing and sanitation.

**Symphysiotomy:** This refers to an operation that is sometimes done during delivery when labour is obstructed. A cut is made at the top of the pubic bone to enlarge the birth canal and allow the baby to pass through.

**Unwanted pregnancy:** This is a pregnancy that for a variety of often overlapping reasons is unexpected and undesired. Reasons a pregnancy may be unwanted include, but are not often limited to, social/cultural, environmental, economic, and/or health factors.

**Vacuum extraction:** The use of a small suction cup placed on top of a baby's head during delivery to help pull the baby out of the birth canal.

# CHAPTER TWO

# STUDY AREA AND RESEARCH METHODOLOGY

## 2.0.0 The Study Area

This chapter provides background information on Kisumu district including the location, physical features, demographic and other socio-economic characteristics.

## 2.0.1. Location, Physical Features and Health Implications

Kisumu is one the nine districts forming Nyanza province and is the largest in size. It is defined by longitudes 30° 20'E and 35° 20'E and latitudes 0° 20'S and 0° 50'S. The district is bordered by Rachuonyo district to the south west, Kisii district to the south, Nandi district to the north east, Bomet district to the east, Vihiga district to the north west and Siaya district to the west. It covers a total area of 2,660 square kilometres of which 567 square kilometres are under water (see Figures 3 and 4).

The district lies in the depression that is part of a large lowland which surrounds Nyanza Gulf, a protruding part of Lake Victoria at the head of which Kisumu town is located. This area can be broadly divided into three topographic zones namely: the Kano plains, the upland area of Nyabondo plateau, and the midland areas of Maseno. The processes associated with the formation of the Rift Valley are believed to have influenced the development of some notable features in the area for instance, scarps in the north, east, south and the associated hill slopes and piedmont plains that spread across Kano Plains (Kenya, 1997).

The district has three major rivers, all flowing into the Nyanza Gulf namely: the Nyando, Kibos and Sondu. These rivers are heavily silted, resulting in the extensive formation of lakeside swamps and frequent flooding. The frequent floods interrupt farming activities, destroys crops and livestock leading to famine and malnutrition. The effect of malnutrition on the vulnerable groups is the prevalence of diseases like kwarshiokor, marasmus, stunting and child wastage. For women stunted growth and malnutrition are likely to expose them to complications when pregnant. Famine and malnutrition also negatively affects labour productivity leading to poverty. Frequent floods increase the areas' vulnerability to waterborne diseases such as diarrhoea, bilharzia, intestinal worms and cholera among others. Diarrhoea and intestinal worms are ranked fourth and sixth leading causes of morbidity in the district respectively.

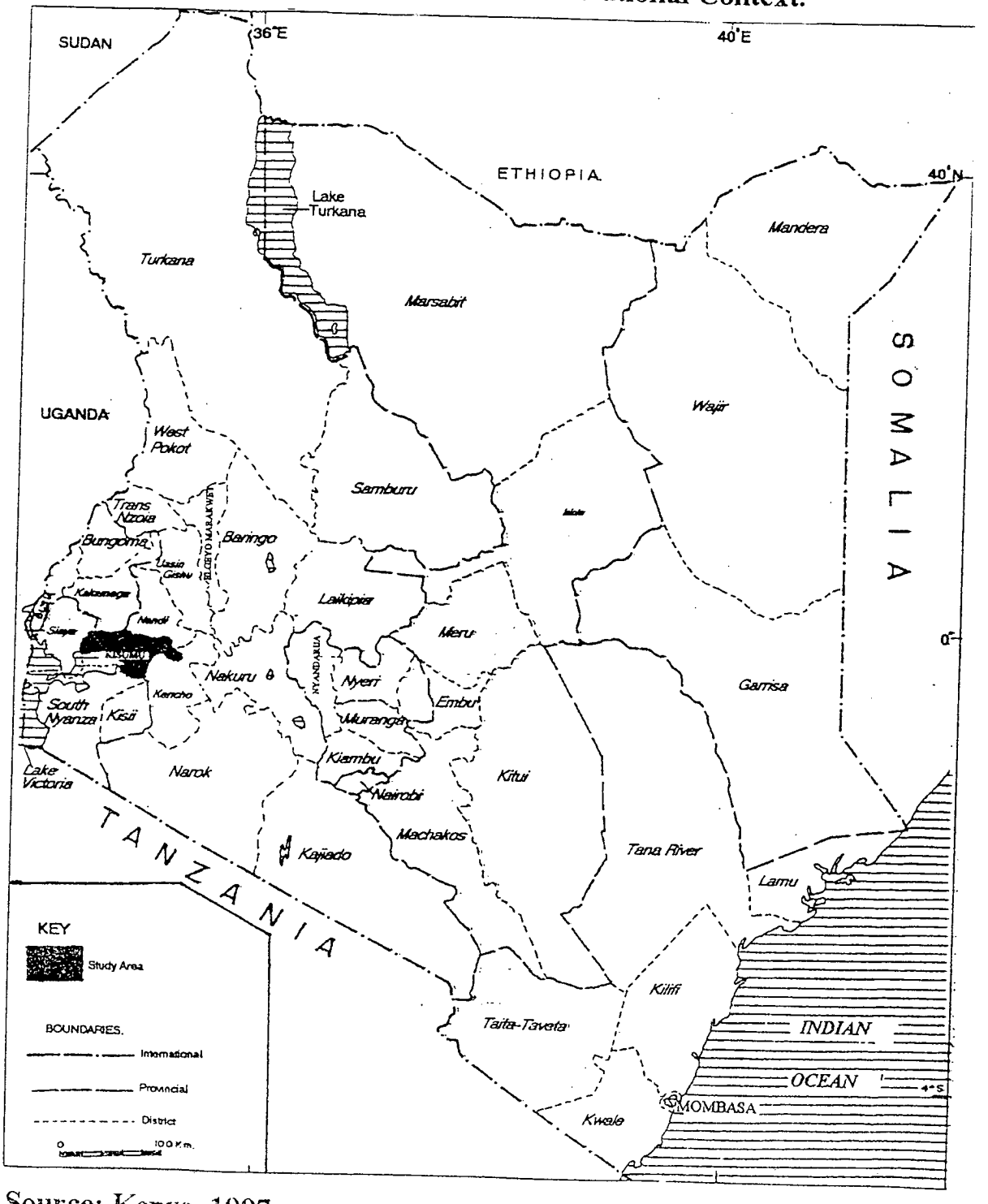
The mean annual rainfall in the district varies from 560 mm to 1630 mm per annum. The variation is influenced by altitude, the proximity to the highlands of Nandi escarpment and nearness to the lake shore. Maseno has mean annual rainfall of 1,630 mm, Kisumu town 1,280 mm, Ahero 1,260mm, Kibos 1,290, Muhoroni 1,525, and Koru 1,103 mm per annum. Although there is no entirely dry month, the long rains are experienced between the months of March and May and short rains between September and November. The rainfall reliability is also low and rains are distributed over a long period. This makes the cultivation of second crops difficult. This has some implications on health because it creates deficits in food supply especially maize, finger millet, and sorghum leading to famine and malnutrition.

The mean annual maximum temperatures range from 25 degrees celsius to 30 degrees celcius and the mean annual minimum temperatures range from 9 degrees celcius

to 18 degrees celcius following the altitude variation from 1,144 metres above sea level on the plains to 1,525 metres above sea level in Maseno and lower Nyakach areas. The climatic conditions and the flat terrain in Kisumu district provide a good habitat for mosquitoes the carrier of malaria the leading cause of morbidity in Kisumu district with an incidence level of 39 percent (Kenya, 1997).

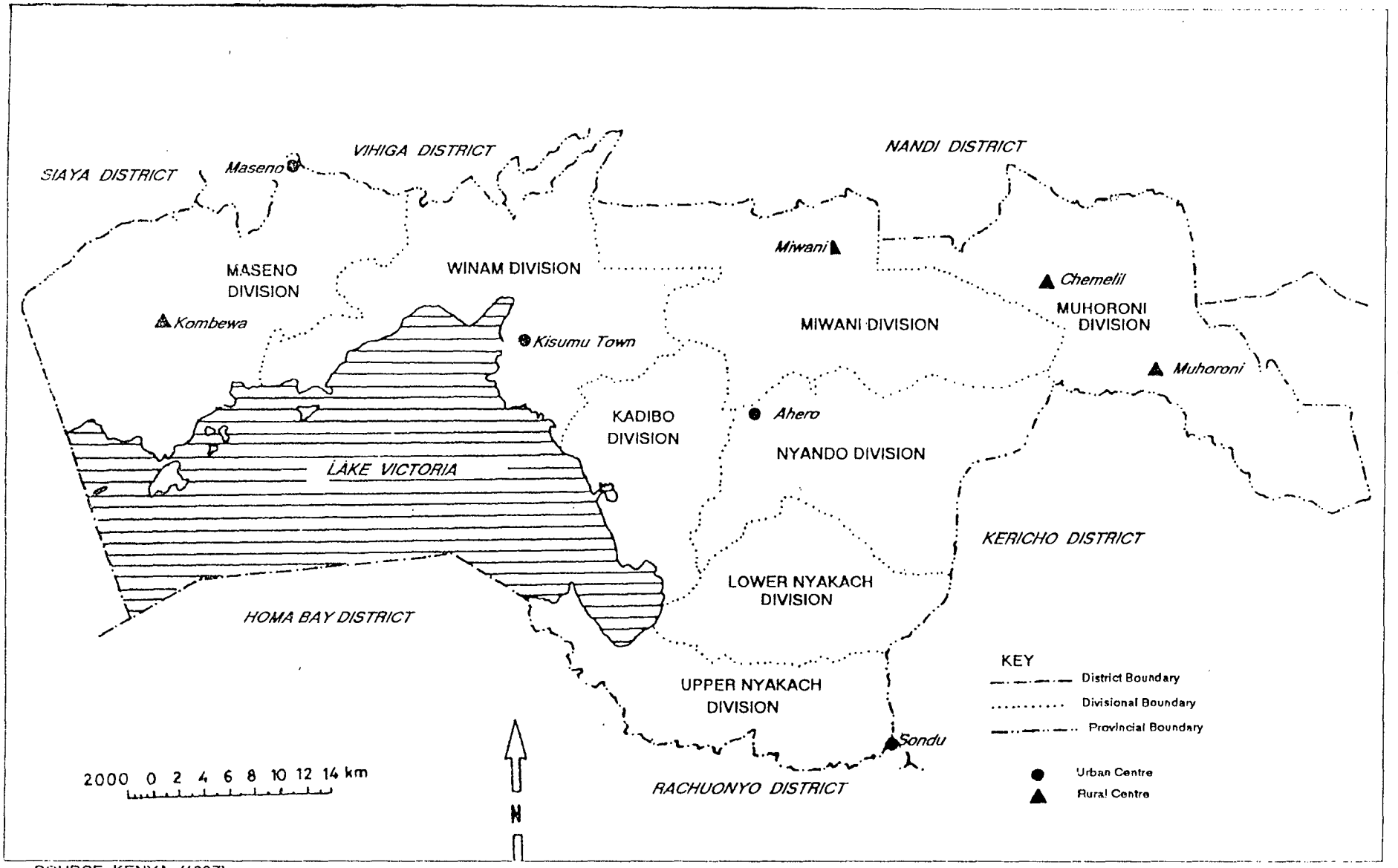
Administratively, Kisumu district is subdivided into eight divisions, fifty-one locations and one hundred and fifty-eight sub-locations. The divisions and their respective areas are; Winam (182 sq. km), Maseno (339 sq. km), Nyando (297 sq. km), Muhoroni (329 km sq.), Lower Nyakach (263 sq. km), Upper Nyakach (232 sq. km), Kadibo (139 sq. km), and Miwani (312 sq. km)-(Figure 4).

Figure 3: Location of Kisumu District in a National Context.




Source: Kenya, 1997.

**Figure 4: Kisumu Districts' Administrative Boundaries.**



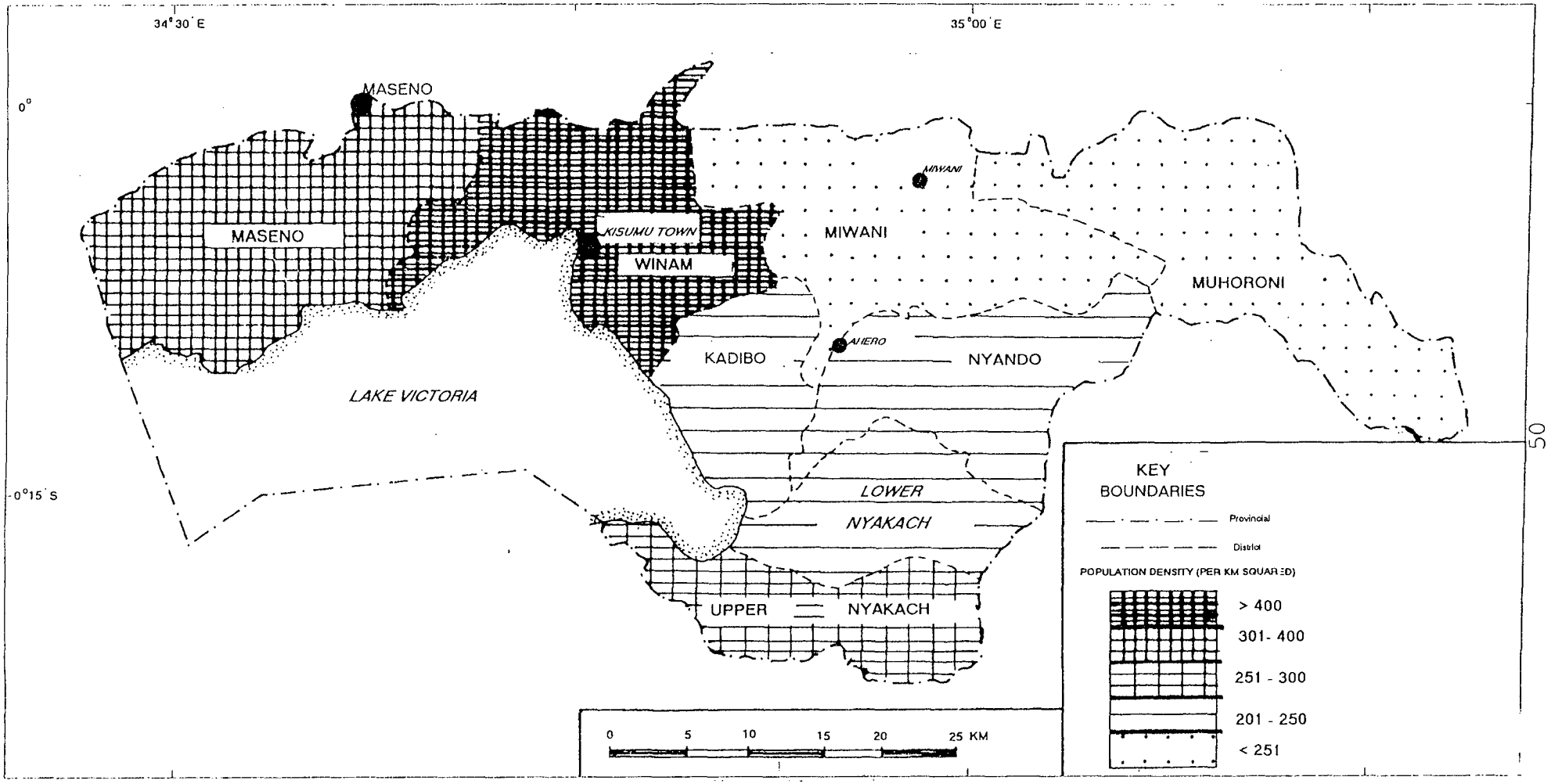

SOURCE: KENYA, (1997)

## 2.0.2. Demography

The population of Kisumu district has shown a steady upward trend from 400,643 in 1969 to 664,086 in 1989 and is estimated to be 939,000 in 1998 (Kenya, 1996b). Of this, 22.5 percent is composed of females of childbearing age 15 - 49 years. According to 1989 population census, 69 percent of all the females aged 12 years and above, were married. Of these 47.5 in polygamous unions, 6.5 percent widowed and 1 percent were either divorced or separated. There is therefore high prevalence of marriage with singulate mean age at first marriage (SMAM) of 20 years for females and 25.5 for males. The mean age at first birth (MAB) is 18.8 years which is further indication of teenage involvement in childbearing. The fact that SMAM is higher than MAB indicates high incidence of childbearing before marriage. The fertility levels in 1989 as measured by crude birth rates and total fertility rates were estimated to be 53.6 per 1,000 and 6.9 children per a woman, respectively.

By 1989 Kisumu district had one of the highest under 5 mortality rate of 205 per 1000 live births compared to the national average of 113 per 1000. Siaya and South Nyanza districts come close with infant mortality rate of 213 per 1000 each. Life expectancy at birth for females was 50.7 years which was also among the lowest in Kenya compared to national average of 61.4 years. This is an indication of high maternal mortality. The area was reported to be having high in-migration rates probably because of the location of Kisumu town. Of the total population in the district by 1989 census, 23 percent were in-migrants. Of this total, 67.85 percent were aged between 15-64 years, 30.1 were aged between 0 and 14 years (Kenya, 1996). Figure 5 shows the population density in the study area.

Figure 5 : Kisumu District Population Density by Division.




Source: Data obtained from Population Projections for 1997.

## 2.0.3. Other Socioeconomic Indicators

Other socioeconomic indicators of Kisumu district considered in this study include: average household occupancy, type of housing material for floor and roof, main source of water and general sanitation for each household (Kenya, 1996b). The average household occupancy is 5 people for rural households and 4 for urban households. The quality of roofing materials varied greatly with the rural areas having 58 percent grass thatched and 39 percent iron roofs compared to urban household who had 79 percent iron roofs and 20 percent grass and others. These statistics show that for the whole district only 58 percent of houses are considered durable (Kenya, 1996b). The material used on floors for most houses also varied greatly with 82 percent rural household having earth floor, compared to 31 percent of urban households who had earth floor. This poor quality of housing has serious implications on the sanitation and health conditions of the household.

The sanitation of each household is normally measured by the households main source of water and type of sewerage disposal facility available. From the evidence provided by 1989 population census, only 14 percent of rural households and 80 percent of urban households had access to piped water respectively. The major sewerage disposal facility was pit latrine with 84 percent of rural households and 75 percent of urban households respectively, using this facility. However, about 11 percent of rural households did not have any sewerage disposal facility as compared to 6 percent of urban households. The former therefore resort to using bushes for sewage disposal (Kenya, 1996).

By 1996, there were 21 piped water supplies in the district, 387 bore-holes or wells and 26 protected springs serving a total of 356,785 people in the district. Muhoroni division

had the highest number of piped water schemes followed by Nyando, while Miwani, Kadibo, Upper Nyakach and Lower Nyakach divisions had the least. Nyando division has the highest number of bore-holes followed by Kadibo, Lower Nyakach, Miwani and Maseno divisions, respectively. In terms of coverage, Nyando division is the best served with 60 percent of its population served with piped water while Muhoroni division has the least access with only 30 percent of its population having access to water supply (Kenya, 1997). It is ironic that despite being located close to the world's second largest fresh water body, the district particularly Kisumu town continues to face chronic water shortages. Most of the water in the district is polluted and needs to be treated before use for domestic and livestock purposes.

The education levels of women aged between 15 - 49 were reportedly low according to 1989 census. Of the total women in the district 26 percent had no education, 55 percent had obtained only primary education and the remaining 19 percent had attained secondary school education and above. These low levels of education attainment have a bearing on women's autonomy and access to employment opportunities since those with primary education and below can hardly obtain gainful employment especially in the formal sector.

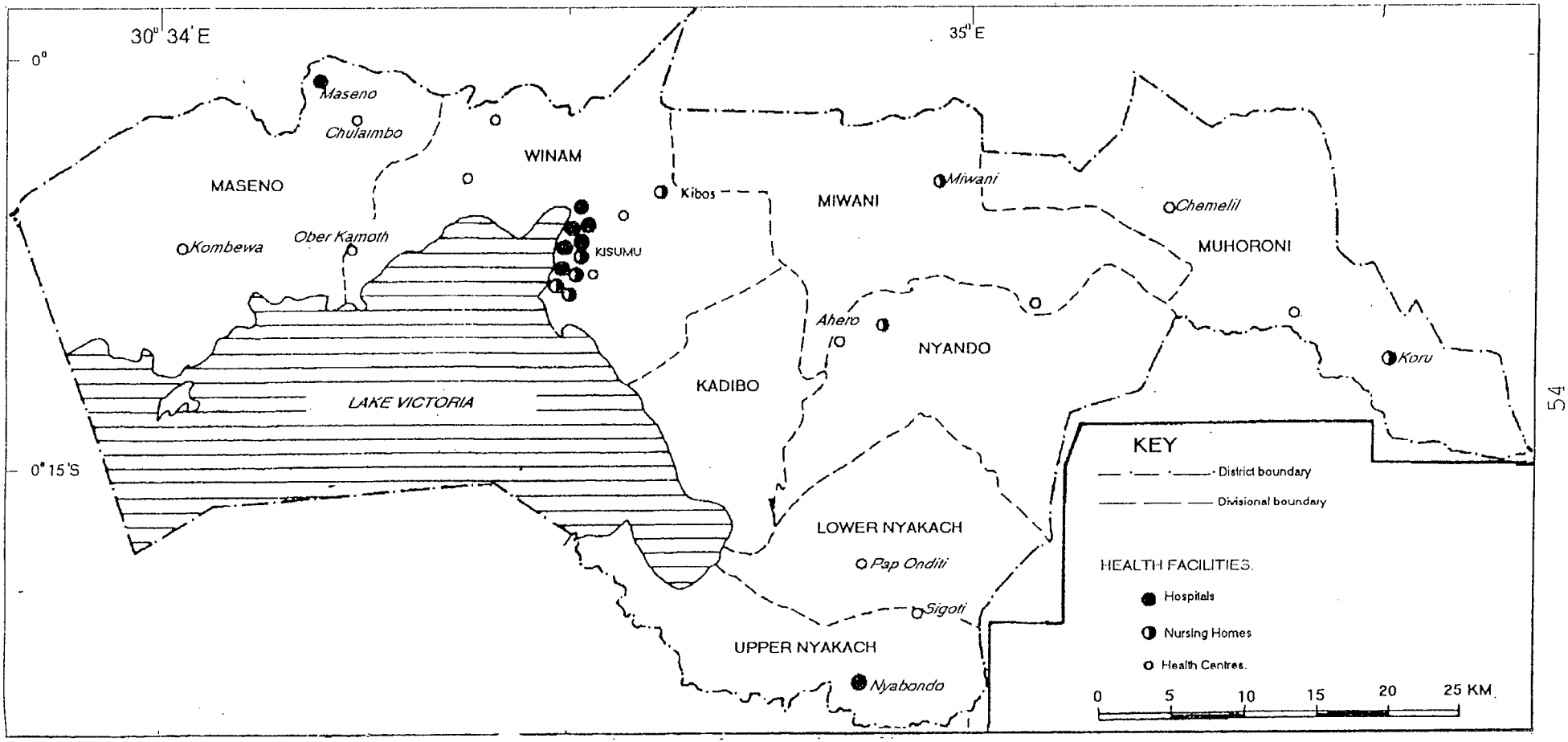
The district has a road network of 2,182.9 km of which 289.9 km are of bitumen standard, 923.3 km are of gravel and 960.7 are of earth surface (Kenya, 1997). The rural access roads in the district account for a total of 187.1 km. However, 90 percent of the roads in the district are in Miwani and Muhoroni divisions which are the main sugarcane growing areas in the district. In general, the road network in the district is in poor state and

there is need for expansion and improvement of those existing in order to speed up development (Kenya, 1997).

The present health delivery system in Kisumu district is supported by the government, religious and non governmental organisations, and by private individuals. Altogether there are 77 health facilities; 6 hospitals, 14 health centres, 46 dispensaries and 11 maternity and nursing homes. The government runs 3 hospitals, 13 health centres and 33 dispensaries. Religious organisations and NGO's run 2 hospitals and 10 dispensaries, whereas private individuals run one hospital, 11 nursing homes, 1 health centre and 3 dispensaries. Of these, Winam division has 26 heath facilities which is the highest in the district. Kadibo division is poorly served with only two dispensaries. In the areas with poor road network, accessibility to these health facilities during rainy seasons by any motorised means of transport is impossible. Figure 6 shows the distribution of health centres, nursing homes and hospitals in the study area.

Malaria is the leading cause of morbidity in Kisumu district despite a steady decrease since 1993. This is followed by respiratory tract infections, skin diseases and ulcers, urinary tract infections intestinal warms, eye and ear infections and anaemia in that order (Kenya, 1997). Manifestations of HIV/AIDS have been on the increase. The frequency of occurrence of these diseases amongst pregnant mothers can have an important effect on maternal and perinatal health. This setting therefore, represents a challenging context for the study of maternal and perinatal health.

**Figure 6: Location and Distribution of Health Facilities in Kisumu District.**




Source: Kenya, 1997.

## 2.1.0. Research Methodology

This section discusses the methods used to obtain different types of data for this research. Also discussed are the different techniques used in data analysis and the advantages of these methods. The last part of this chapter provides a description of the dependent and independent variables used in the study.

## 2.1.1. Data Sources

Two different sets of data were considered necessary for this study. First, there was need to collect data for the situation analysis of all the registered health centres, hospitals and nursing homes in the study area and establish whether they are equipped with the essential drugs, medical equipment and manpower to provide services critical to safe motherhood. The WHO (1994) has come up with a list of essential drugs and equipment for safe motherhood at each level of health care. For the health centres, a range of drugs are required including; anaesthetics, analgesics, anthelminthics, antiallergics, antianemia drugs, anticonvulsives, antibiotics, antimalarials, blood products, contraceptives, disinfectants, intravenous solutions, iodine preparation, oxytocics, and vaccines. The essential equipment for health centres level include; normal delivery equipment, suturing kit for episiotomies, equipment for neonatal resuscitation and new-born care, instruments for vacuum extraction, manual vacuum extractor pack, kit for insertion of intrauterine contraceptive device, equipment to measure blood pressure and a side laboratory. On the other hand, hospitals and nursing homes are expected to have all the drugs found at the health centres and in addition, have drugs for general anaesthesia, anticoagulant and

antidotes, antihypertensive drugs, diuretics, and endoctrine drugs. The equipment for hospitals and nursing homes include all those found in health centres plus additional ones like equipment for forceps delivery, obstetric laparatomy and caesarean section, equipment for craniotomy, equipment for mini-laparatomy, vasectomy pack, equipment for anaesthesia, essential materials for provision of blood transfusion and a side laboratory.

To obtain all these data, different methods were employed. The baseline information on the type, number and distribution of heath facilities in the study area was obtained from the district health information systems. The number and distribution of trained nurses/midwives was obtained from Kisumu District Medical Officer of Health Annual Reports whereas the population distribution by division was obtained by computing projections based on 1989 census report. For the purpose of evaluating all the facilities, all the health centres, hospitals and nursing homes in the study area were visited and enumerated. Pre-tested health evaluation inventories were administered for each facility to ascertain the availability of essential drugs, equipment, and manpower necessary for the provision of safe motherhood. Separate inventories for drugs, equipment and manpower for health centres and hospitals were prepared for this purpose ( Appendices 1, 2, 3, and 4).

Secondly, data was required on various background characteristics of pregnant mothers who delivered at selected health facilities in the study area for a given period of time. Due to financial constraints purposive sampling was applied and only four health facilities were selected as sentinel centres. This is because the research was biased towards a particular type of subjects (i.e. women with birth complications). In addition, it was easy to select controls from the same facilities from persons admitted for delivery but never had

any complications. The facilities were, however, desegregated into two broad categories namely; rural based and urban based. From each, there was a health centre and a hospital. Since hospitals act as referral centres for complicated cases, it was assumed that data obtained from these facilities was representative. Data collection exercise ran uninterrupted for a period of six calendar months. The data required from pregnant mothers, who were the main respondents in this study included a range of variables that were considered to be potential risk factors from the literature earlier reviewed. Consequently, maternal characteristics investigated in this study include: age, parity, ethnicity, marital status, type of marital union, and use of contraceptives. The socioeconomic characteristics include; maternal education, occupation, major breadwinner in the household, religion, place of residence, mode of transport available to the household. The biomedical factors include; anthropometry, obstetric history, illness during pregnancy, type of prenatal care, nutritional status and ever use of contraception. Finally, data was required on a number of environmental variables including; type of house/dwelling, source of water for domestic use, household density and sanitation. Important information pertaining to the nature of delivery, complications experienced, the health status of the new-born, the birth weight was collected

Since data of this magnitude and detail could not be readily available in existing records, a structured questionnaire (Appendix 5) was developed and administered to all mothers who delivered or had obstetric related complications in the four selected sentinel centres within the six months of data collection. In cases where mothers died due to obstetric complications, the questionnaire was administered to the closest relative who accompanied the respondent to the health facility. For the purpose of covering the entire

perinatal period, respondents were followed up to the first seven days after delivery to monitor the health condition of the mothers and new-borns. For those cases where the mothers died during delivery, their close relatives were asked questions pertaining to the background characteristics of the deceased. Data on medical variables such as blood pressure, birth-weights, anaemia status, nature of delivery and any complication experienced was collected by nurses working in the same health facilities who served as research assistants. The four health facilities selected to act as sentinel centres for this study are presented in Table 2.1.

**Table 2.1. Selected Sentinel Facilities For Data Collection**

| Name | Sponsor | Location | No. of Respondents. |
|---|---|---|---|
| St. Joseph's Nyabondo | NGO | Rural | 542 |
| Provincial General Hospital. | Ministry of Health | Urban | 502 |
| Chulaimbo RHTC | Ministry of Health | Rural | 194 |
| Lumumba Health Centre | Local Authority | Urban | 217 |

**Source: Field Survey, 1997.**

The methodology described above has several advantages. First, it permitted a flexible way of choosing variables that were systematically recorded for analysis. This has served to enrich the study in terms of background information on the respondents. Second, it provided a complete description of experience subsequent to the outcome of any obstetric complication. Third, questions pertaining to the mother were put to the subject

herself hence increasing the reliability of information collected. Fourth, the follow-up exercise increased the chances of recording most cases of morbidity and mortality in early neonatal period. The six months uninterrupted recording also enabled calculation of facility based maternal and perinatal mortality rates. Lastly, all the interviewers were trained nurses working in the obstetric and gynaecological units of the selected sentinel facilities. Since they collected data while on normal duties, the accuracy of data was guaranteed to a great extent.

## 2.1.2. Data Analysis

The bed/population and nurse population ratios have been calculated for each division to indicate the availability and distribution of trained personnel and the bed capacity for all the divisions in the district. Data obtained from health facility evaluation schedules has been summarised using score sheets, developed for both essential drugs and essential equipment for each level of care. This study has used the grading scale similar to that used by Ojeda (1992), in a study of health facilities in Latin American countries. An optimum score for each is 100 percent of all the assignable points, implying that the facility has all the essential drugs or equipment. The lowest is 0 percent implying non-availability of drugs or equipment in question. The following scale has been used to describe the scores for each facility: 40 percent and below is considered critical condition, hence unable to offer quality care, 40 to 79 percent is considered unsatisfactory and 80 percent and above is considered satisfactory for offering safe motherhood.

In addition, descriptive and inferential statistics have been used to analyse data obtained from the individual questionnaire. Cross tabulations have been used to demonstrate the presence or absence of a relationship between the risk factors and the maternal and perinatal health problems by indicating the percent distribution of dependent variable along independent variables. The contingency tables from the cross tabulations are summarised to frequency distributions for all the maternal and perinatal health problems that were reported in the study area and results presented.

Multivariate case-control analysis is used whereby respondents with a particular condition or disease (cases) are selected for comparison with a series of individuals without such diseases (the controls). Cases and controls are compared with respect to existing and past attributes thought to be relevant to the development of disease under study. The advantages of case-control studies have been discussed by Schlesselman, (1982) and Kahn and Sempos (1989). These include their suitability for the study of rare diseases, the relative ease with which they are mounted and conducted. The case-control strategies are relatively cheap in terms of cost, they require comparatively few subjects and existing records can occasionally be used. In some instances, they have no risk to subjects since you can rely on what has already taken place, and finally they can allow one to study multiple potential causes of a disease. The disadvantages of the method are that it relies on recall for information on past exposures, validation of information is difficult or sometimes impossible, the control of extraneous variables may be incomplete and the detailed study of mechanism may sometimes be rarely possible. In this study, it is assumed that since the questions were put to respondent concerning the current pregnancy, it was relatively easier for them to recall all events about the pregnancy and characteristics of the household.

Some of the variables such as height, weight, and reproductive health problems experienced are also easy to identify and record since births took place in a health facility where their records were taken by trained medical personnel. It was therefore easy to distinguish and isolate cases from controls.

Logistic regression model was used to identify the major risk factors of each reproductive and perinatal health problems reported in the study area. The logistic regression model is now considered a standard tool for epidemiological studies (Bross and Shapiro, 1982). The model is frequently used in studies in which dichotomous outcome variable (e.g. presence or absence of disease) is related to a number of variables ( Lemeshow and Hosmer, 1982). Its widespread use is probably due to its ease of interpretation as well as its relationship to log-linear analysis and linear discriminant analysis (Schlesselman, 1982; Gray, 1990). Some of the recent studies that have used logistic regression analysis include: Bhatia (1993) in a study of causes of maternal mortality in southern India; Joshi (1994) in a study of effect of maternal schooling on child health in rural Nepal; Toroitich-Ruto (1997) in a study on determinants of teenage sexuality in Kenya; and Chimere-Dan in a study determinants of non-marital childbearing in Namibia.

The logistic model specifies that the probability of a disease depends on a set of variables $X_1, X_2, ----, X_p$ in the following way:

$$P_x = P(d = 1/x)$$

$$= 1/ \{1+ \exp.[-(\beta_0 + \beta_{1X1} + ..... + \beta_p X_p)]\}$$

The variable "d" denotes either the presence (d = 1) or absence (d = 0) of disease, and "x" denotes a set of variables; $X = X_1, X_2, ----------, Xp$. These variables represent potential risk factors.

The β's are parameters that represent the effects of X's on the risk of disease.

All the dependent variables are dichotomously measured i.e. whether or not respondents experienced a given maternal or perinatal health complication. The independent variables were also categorical and most of them dichotomous and as such assumed the value of zero or one. In cases where a variable had more than two categories, dummy variables were used. In each variable, one category was omitted in the estimation of parameters so as to act as a reference category.

The effect of any independent variables on the dependent variable is expressed as an odds ratio which is a percentage increase or decrease in the odds of occurrence of any problem under study. Logistic regression coefficients can be used to estimate the odds ratio for each independent variable in the model. The estimated coefficients are measures of the change in the odds ratio. A positive coefficient increases the probability of an event occurring while a negative coefficient decreases the predicted probability. Hence if $\beta_I$ is positive, its transformation will be greater than 1 and the odds ratio will increase. This increase occurs when the predicted probability of the event occurring increases and the predicted probability of it not occurring is reduced. Likewise, if $\beta_I$ is negative, the antilog is less than 1 and the odds ratio is decreased. A coefficient of zero equals a value 1.0 resulting to no change in the odds. Each odds ratio is calculated relative to the omitted category for each variable and hence shows an indication of relative risk. Possible categories of odds ratio are greater than 1, zero,, and less than 1 but never less than zero. A value greater than 1 indicates that risk or odds of disease is greater when exposed to the specified risk factor (positive association). A value of zero indicates no association

between exposure and the disease. A value of less than 1 indicates reduced risk or odds of exposure to the risk factor (negative association). There may be differences in numerical values of odds ratios but they always point in the same direction.

## 2.1.3. Description of Variables

A detailed description of both dependent variables that form maternal and perinatal health problems and the independent variables that are considered risk factors to these problems experienced is given below. As is shown, all the variables are categorical and discrete hence do not have an ordinal scale of measurement. In this case, indicator variables taking the values of 1 or 0 to designate the presence or absence of an attribute are used to correctly represent the effects of such variables for both cross-tabulations and logistic regression models. For example, with a dichotomous variable like place of residence, the indicator variable (RESIDE) coded 1 for urban and 0 for rural residence is used. The coefficient $\beta_1$ in term of $\beta_1$ (RESIDE) may be interpreted as change in logit of risk that is associated with change in the variable RESIDE from rural to urban. Thus for rural, $\beta_1$ RESIDE = 0 whereas for urban $\beta_1$ = 1 so that exp($\beta_1$), which is the odds ratio, represents relative odds of disease for rural as compared with urban. It is also evident that with discrete variables which have more than two categories, one needs to use more than one indicator variable. For example, in the case of age, which has three categories, two dummy variables are used. First, one category (21-30) is designated as reference category. For the each of the remaining age categories, a variable $R_j$ which is coded 1 (present) and 0 (absent), is introduced. The coefficient $\beta_j$ associated with dummy variable $R_j$ then

represents change in logits of risk for this category relative to the reference category mentioned above. Equivalently, $\exp(\beta_j)$ represents the relative odds of disease for individuals of age category $R_j$ as compared to individuals of a reference category.

## (a) Dependent Variables

**ANAEM:** Binary variable indicating anaemia status during pregnancy 1 = anaemic 0 = not anaemic.

**ANHAEM:** Binary variable indicating suffering of ante-partum haemorrhage during current pregnancy 1= suffered 0= not suffered.

**PPHAEM:** Binary variable indicating experience of post-partum haemorrhage 1= suffered 0= not suffered.

**PLABOR:** Binary variable indicating presence or absence of obstructed labour during current delivery 1= suffered 0= not suffered.

**CAESER:** Binary variable indicating type of delivery 1= caesarean 0= other.

**EPISIO:** Binary variable indicating nature of delivery 1= episiotomy 0= other.

**ECLAMP:** Binary variable indicating whether mother suffered or never suffered eclampsia 1= suffered 0 = never suffered.

**STD:** Binary variable indicating whether mother suffered any sexually transmitted disease during current pregnancy 1= suffered 0= never suffered.

**PECLAMP:** Binary variable indicating whether mother suffered from pre-eclampsia during current pregnancy 1= suffered 0= never suffered.

**VACUM:** Binary variable indicating nature of delivery 1= vacuum 0= other.

**ABORT:** Binary variable indicating whether mother suffered an abortion in the current pregnancy 1= suffered 0= not suffered.

**MDEATH:** Binary variable indicating survival of mother 1= dead 0= alive.

## (b) Independent Variables

**SAGE1:** Binary dummy variable indicating age of mother; 1 = 31-50 years, 0 = others.

**SAGE2:** Binary dummy variable indicating mothers age, 1 = less 20 years, 0 = others.

**MASTAT:** Binary variable indicating respondents marital status; 1 = single; 0 = other.

**RESIDE:** Binary variable indicating respondents place of usual residence; 1 = urban 0 = rural.

**EVMISC:** Binary variable indicating whether respondent has ever miscarried before; 1 = yes, 0 = never miscarried.

**EVSTBTH:** Binary variable indicating whether respondent has ever had a still-birth; 1 = yes, 0 = never had.

**SPARI1:** Binary dummy variable indicating parity of current birth; 1= primiparous, 0 = others.

**SPARI2:** Binary dummy variable indicating parity of current birth, 1 = 5+, 0 = other.

**EDUCL:** Binary variable indicating maternal education level; 0= primary and below 1 = secondary and above.

**OCCUP:** Binary variable indicating maternal occupation; 1 = not working, 0 = working/business.

**BREADW:** Binary variable indicating the main breadwinner for the respondent; 1 = self, 0 = other.

**MODETRA:** Binary variable indicating the major mode of transport used in the household; 1 = Motor vehicle, 0 = Non-Motorised.

**WALLS:** Binary variable indicating materials used for walls; 1 = Stone/bricks, 0 = other.

**SWATER:** Binary variable indicating source of water for domestic use; 1 = piped, 0 = other.

**ANAEM:** Binary variable indicating whether respondent suffered anaemia during current pregnancy, 1 = suffered, 0 = never suffered.

**SBOOKED:** Binary variable indicating whether respondent booked to deliver in a health facility, 1 = booked, 0 = not booked.

**SHEIGHT:** Binary variable indicating mothers height, 1 = less than 155 cm, 0 = 155 cm.

**GARBDM:** Binary variable indicating availability of garbage dump in the respondents compound; 1 = available, 0 = not available.

**PRECNC:** Binary variable indicating whether respondent utilised pre-natal health care services; 1= utilised 0 = not utilised.

**ILLNESS:** Binary variable indicating whether respondent suffered any illness during current pregnancy; 1 = Suffered, 0 = Never suffered.

**CONTRA:** Binary variable indicating whether the respondents has ever used modern contraceptive method; 1 = has used, 0= never used.

**WANPREG:** Binary variable indicating whether the respondent wanted the current pregnancy; 1 = wanted, 0 = never wanted.

**ANAEM:** Binary variable indicating whether respondent suffered anaemia during current pregnancy; 1 = suffered, 0 = never suffered.

**SBOOKED:** Binary variable indicating whether respondent booked for delivery care at the health facility 1 if booked, 0 if not booked.

**HEIGHT:** Binary variable indicating mothers height, 1 if less than 155 cm, 0 if more than 155 cm.

# CHAPTER THREE

# RESULTS AND DISCUSSION

## AVAILABILITY AND QUALITY OF OBSTETRIC CARE SERVICES IN KISUMU: A SITUATION ANALYSISG

### 3.0 Introduction

One of the objectives of this study was to evaluate the existing health facilities in Kisumu district and to establish the extent to which they are equipped to offer safe motherhood. This is important because quality care exerts some influence in the utilization of health services. Quality of service is determined by the availability of drugs/supplies, trained manpower and equipment amongst other factors. At the health centre level, services required for safe motherhood include among others; prenatal screening, management and referral for anaemia and infections, providing tetanus toxoid, conducting routine deliveries, managing complications and make prompt referral if not responding to treatment, providing contraceptive counselling and services, treatment of incomplete abortion and early detection and treatment of reproductive tract infections (Tinker et. al., 1994).

The medical staff at health centres in Kenya typically include one or more clinicians, professional nurses or midwives, some auxiliaries responsible for maternal child health (e.g. laboratory technicians, nutritionists, and health inspectors). These centres have a few beds and baby cots for short-stay patients and for midwifery. Operating theatre facilities are meant for minor outpatient cases. In addition, such centres also have a basic laboratory. On the other hand, hospitals and nursing homes should provide all the services offered by the health centre in addition provide surgical obstetrics and anaesthesia, treatment of

pregnancy complications such as sepsis, shock and eclampsia, and manage post partum complications (WHO, 1994).

## 3.01. Health Care Provision in Kenya

The Kenyan modern health care system is pluralistic and can be broadly categorised into four complementary sub-sections. These are Ministry of Health, the local authorities, private-for-profit sector, and religious groups (Kenya, 1994 b). The Ministry of Health is the largest provider of health care in the country and administers over 55 percent of all health institutions country-wide. These include: 1,158 dispensaries, 406 health centres, 101 hospitals and 6 maternity and nursing homes (Kenya, 1994 b). Except for voluntary providers and missionary groups, the provision of preventive and promotive health care is mainly done by the Ministry of Health. Over and above these, the ministry has the legal obligation to supervise all other providers of health care in the country (Wangombe, 1989).

The Ministry of Local Government caters for just over 3 percent of all the health institutions in Kenya. Their network of institutions are mainly urban-based and include 28 dispensaries, 37 health centres, 39 clinics, 6 maternity homes and 1 hospital (Kenya, 1994 b). Since the local authorities are maintained by public finance, they are the only other group who are by law required to undertake public heath care programmes as well as curative in-patient and out-patient services (Wangombe, 1989).

The private sector comprises of two categories. First, there is private-for-profit sector which is made up of private hospitals, nursing homes and clinics that concentrate. on curative services. This sector derives its existence from willingness of people to pay for

curative services. Second, there are private parastatals and companies that provide health care for their staff within their own facilities. These groups of providers also concentrate on curative services. In total, the private sector accounts for 26.6 percent of all the health institutions in Kenya. These include; 409 dispensaries, 88 health centres, 43 hospitals, and 53 maternity and nursing homes (Kenya, 1994b).

The mission and religious groups provide about 14.2 percent of health care institutions in Kenya. The distinction between mission/religious groups and other private sector is that the former do not operate for profit. They charge fees for service rendered but this fee is much lower compared to that charged by private-for-profit sector. Consequently, the Government of Kenya has for many years subsidised their operating costs (Wangombe, 1989).

## 3.02. Kenya Drug and Pharmaceutical Supplies Policy

Different providers of health care have different sources of finance to manage the facilities and purchase essential drugs and supplies. The Ministry of Health which is responsible for running all the public health sector facilities derives its funding from the government budgetary allocations. This includes contributions from international donations, foreign governments and non-governmental organisations. To promote a more rational use of drugs, the Ministry of Health with assistance from WHO developed a national drug policy to meet the requirement of all Kenyans in prevention, diagnosis and treatment of diseases. A list of essential drugs was made available to all health institutions in the country by 1992 (Kenya, 1994b).

Due to the high cost of drugs and inflation, the Ministry of Health implemented a cost-sharing scheme in 1989 in all public health facilities. According to this programme, cost-sharing was supposed to generate more revenue for financing their services (Wangombe, 1989). Three quarters of the funds generated through cost-sharing were supposed to be used at the collecting facility and the other one quarter set aside for the district level expenditure on primary health care. Later on, it became apparent that a more local control of funds generated by this scheme was required. As a result, District Health Management Boards (DHMB) were created in 1992 (Kenya, 1994b). These boards were empowered to superintend the management of health facility services and support public health care programmes and specifically oversee the cost-sharing programme. This implies that at the moment, members of DHMB are not directly involved in decisions regarding funds available from the district health vote.

The procurement of drugs, dressings, and other medical supplies for public sector facilities is accomplished by the Ministry of Health through a Department Tender Board. These are later distributed to all centres nationally. The high cost of drugs in the public health sector was to be addressed through promotion of generics and quality control where registration of drugs was limited to products with proven quality, safety and efficacy (Kenya, 1994b). The discussion that follows provides a situation analysis on the extent to which government policies on drugs, supplies and manpower development have succeeded in the study area.

## 3.03 Health Care Facilities in Kisumu District

As earlier mentioned, the facilities that should offer essential obstetric care are either health centres, hospitals or nursing homes. For the purpose of this study, the facilities were broadly categorised into two. This include: public sector facilities that are sponsored by either central or local government and secondly private institutions that are either run by religious organisations, non governmental organisations or private individuals. Public institutions are open to all patients, they admit cases on basis of need. The private institutions, on the other hand, may restrict their admission on the basis of patients' ability to pay for care or other considerations. This chapter discusses the findings on the quality of care in all the health centres hospitals and nursing homes in Kisumu district.

## 3.1.0 Distribution of Facilities

Spatial distribution of facilities has implications on travel distances between a woman's residence and the closest facility, let alone specialised referral hospital. In cases where the facilities are sparsely distributed distance between them and potential users is widened. A longer distance to a health facility has been proved to be an important barrier to utilization of health care services (Thaddeus and Maine, 1990). The effect of distance is felt most in the rural areas where lack of transportation and poor roads is likely to lead to unnecessary delays in seeking and reaching medical care facilities. This study relies on the bed-population and the nurse population ratios for each divisions in Kisumu district as indicators of the availability of essential medical care.

### 3.1.1 Distribution of Beds

The distribution of beds provides an indication of the number of patients that can be admitted to a facility. More bed space increase the potential for admission of large numbers of the population who may even live far away from the location of a facility. Tables 3.1 and 3.2 show the supply of beds per 100,000 people and percentage of these under government and private sponsorship, respectively, for each division in Kisumu district.

**Table 3.1: Kisumu District supply of Hospital Beds per 100,000 in 1997 by division In Kisumu District**

| Division | Ratio | Area $KM^2$ |
|---|---|---|
| Winam | 457 | 279 |
| Maseno | 153 | 351 |
| Nyando | 26 | 249 |
| Kadibo | NIL | 167 |
| Upper Nyakach | 297 | 177 |
| Lower Nyakach | 27 | 183 |
| Muhoroni | 439 | 340 |
| Miwani | 432 | 331 |

Source: Survey Data, 1997

**Table 3. 2: Percent Distribution of Hospital Beds Under Government and Private Health Facilities In Kisumu District, 1997**

| Division | Government | Private |
|---|---|---|
| Winam | 48 | 52 |
| Miwani | 0 | 100 |
| Kadibo | NIL | NIL |
| Maseno | 21 | 79 |
| Nyando | 100 | 0 |
| Lower Nyakach | 100 | 0 |
| Upper Nyakach | 11.5 | 88.5 |
| Muhoroni | 7.9 | 92.1 |

Source: Survey Data, 1997.

The ideal bed population ratio situation depends on disease prevalence, injury and characteristics of the health system. From Tables 3.1 and 3.2, it may be observed that the supply of beds in Maseno, Nyando, Kadibo, and Lower Nyakach is below capacity. Each of these divisions has a bed population ratio less than the national average ( 175 per 100,000). These areas have very poor roads and accessibility to the health facilities during the rainy season by motorised means is impossible (Kenya, 1997).

There are four divisions in Kisumu district which have a bed population ratio that is above the national average. These are Upper Nyakach, Winam, Muhoroni, and Miwani. Winam has the highest concentration because of its urban status and also being the provincial and district headquarters. It is therefore the site of major government and private referral hospitals. Upper Nyakach benefits from the location of Nyabondo Mission Hospital which is operated by the Catholic Church. This notwithstanding, the division is under-served especially in terms of public health facilities. For the cases of Muhoroni and Miwani divisions, this can be explained by two factors. First, these areas are the most sparsely populated in the district which can exaggerate the bed population ratio despite the fact that the facilities could also be sparsely distributed in the area. Secondly, these two divisions are located in the main sugarcane growing area. The private sugar companies operating in the area have established private health facilities which are well stocked with beds and drugs to cater for their employees. In addition, the sugar belt has attracted other private entrepreneurs who have established private nursing homes to tap clientele from the wage earners in the area who have relatively high levels of income and hence can afford to pay for private medical care. Miwani and Muhoroni are also well served by physical

infrastructural facilities like electricity and this has the potential to attract private investment including health provision.

Overall, there is evidence of general maldistribution of public sector beds in Kisumu district which points to the need for an improvement in availability and wider distribution in the rural divisions. With the large areas shown and prevailing poor transport network, women in the poorly served rural areas have to walk for long distances to reach a health facility. One consequence of long travel distances is that the patients' conditions can deteriorate with the delays in reaching the facility.

When we consider sponsorship, it is observed that privately owned health facilities have more capacity than the government owned in Winam, Miwani, Muhoroni and Upper Nyakach. The beds in the government health facilities are concentrated in Winam division which happens to have both the provincial and district general hospitals. This implies that the poor rural mothers who need admission but cannot afford paying fees in the rural privately run facilities have to travel to Winam division where the government referral hospitals are located.

### 3.1.2 Distribution of Nurses/Midwives

In most cases, insufficient supply of medical and nursing personnel leads to the delays in patients receiving the care they need. This study uses nurse supply ratio per 100,000 population to gauge the adequacy of trained manpower in the study area. Table 3.3 shows nurse population ratio for divisions in the Kisumu district.

**Table 3.3: Nurses per 100,000 in Kisumu District, 1997**

| Division | Ratio | Area $KM^2$ |
|---|---|---|
| Winam | 175 | 279 |
| Maseno | 74 | 351 |
| Nyando | 38 | 249 |
| Kadibo | 11 | 167 |
| Upper Nyakach | 98 | 177 |
| Lower Nyakach | 41 | 183 |
| Muhoroni | 62 | 340 |
| Miwani | 24 | 331 |

Source: Field Survey, 1997.

The ideal nurse-population ratio depends on the epidemiological profile of a region. The World Bank (1989), however, has indicated that for developed countries nurse to patient ratio varies from 556 per 100,000 for USA to 1,000 per 100,000 for Sweden. For the developing countries, the variation is wide. For example, 43.5 per 100,000 for Kenya to 270 per 100,000 for Cuba. Developing countries are, however, expected to have more nurses given the higher incidence of health problems. From Table 3.3, it is observed that the largest share of nurses are found in Winam, Maseno and Upper Nyakach divisions. The geographic distribution of nurses corresponds generally to the size and location of health facilities earlier discussed. In so far as these facilities are not located in rural areas, nurses will ordinarily not be found there. Nurses/Midwives are concentrated in Winam Division which is basically urban with supposedly better infrastructural facilities and hence making medical practice there more lucrative. Kadibo, Miwani and Nyando divisions are therefore under-served with trained medical personnel. It is worth noting however that for Muhoroni and Miwani divisions, the nurse population ratio which is considerably low does not correspond to the bed population ratio earlier shown in Table 3.1. This could be

explained by the fact that most health facilities in these two divisions are privately run and there is a possibility of having more beds to boost their capacity for more business.

## 3.2.0 Availability of Essential Drugs

Availability of drugs is perhaps the most critical indicator of a health facility's effectiveness. Even if the facilities are staffed with competent staff, their capacity to effectively treat patients will depend on availability of drugs and vaccines. It is or this reason that adequate supply of essential drugs is seen as a critical issue in the implementation of safe motherhood package (WHO, 1994a). Table 3.4 indicates essential drugs and vaccines required for safe motherhood both at the health centre and hospital level.

**Table 3.4: Essential Drugs for Maternal and Child Care at Hospital and Health Centre Levels**

| |
|---|
| Anaesthetics + oxygen |
| Anticoagulant and antidote |
| Diuretics* |
| Anti-hypertensives and related drugs* |
| Endocrine drugs* |
| Analgesics |
| Anthelminthics |
| Anti-allergies |
| Anti-anaemia drugs |
| Anti-convulsives |
| Anti-infectives/antibiotics |
| Anti-malaria's |
| Dried human plasma |
| Contraceptives |
| Disinfectants and antiseptics |
| Intravenous solutions |
| Iodised oil for injection |
| Oxytocics for haemorrhage |
| Vaccines |

* asterisk applies for drugs to be found in hospitals only.

**Source: WHO 1994a**

The health facility evaluation schedules (Appendices 1 and 3) sought to establish whether the above drugs were available in all the facilities visited at the time of the survey. Scores were assigned against each drug for the health centre and hospital, separately. An optimum score of 100 percent of the assignable points was set for those facilities with all the essential drugs. The results are interpreted using a scale similar to the one earlier used by Ojeda (1992) which 40 percent and below was considered critical condition, 40 - 79 percent was considered unsatisfactory and 80 percent and above considered satisfactory. The results of the essential drugs evaluation for health centres and nursing homes/hospitals are presented in Tables 3.5 and 3.6, respectively.

**Table 3.5: Average Percent Score for Drugs for each Health Centre in Kisumu District**

| Name of Health Hacility | Percent Score |
|---|---|
| Migosi | 53 |
| Lumumba | 58 |
| Pap Onditi | 53 |
| Kombewa | 54 |
| Kodiaga | 60 |
| Nyahera | 56 |
| Ober Kamoth | 58 |
| Ahero | 54 |
| Sigoti | 50 |
| Chulaimbo | 64 |
| Chemilil Sugar Company | 83 |
| Muhoroni | 66 |

Source: Calculated From Survey Data, 1997.

**Table 3. 6: Average Percent Score for Drugs for each Hospital and Nursing Home in Kisumu District 1997**

| Name of Health Facility | Percent Score |
|---|---|
| Maseno Mission Hospital | 88 |
| Koru Nursing Home | 84 |
| Kisumu District Hospital | 66 |
| Provincial General Hospital | 64 |
| Aga Khan Hospital | 88 |
| Miwani Nursing Home | 78 |
| Maternicare Nursing Home | 82 |
| Jalaram Nursing Home | 85 |
| Kibos Road Nursing Home | 80 |
| Lake Nursing Home | 82 |
| St. Joseph's Nyabondo Hospital | 80 |
| Nyawita Maternity Home | 75 |

Source: Calculated From Survey Data, 1997.

Information in Tables 3.5 and 3.6 indicates that no health facility in the study area is classified as being in critical condition as regards availability of drugs. However, more than half (i.e. 67%) are considered to be in unsatisfactory condition. A closer scrutiny reveals that, 92 per cent of the health centres (most of which are located in rural areas and owned by the government) have acute shortages of drugs. It is only Chemelil Sugar Company Health Centre (privately owned) that had an average score of 83% and hence considered satisfactory. All the hospitals and nursing homes were at the time of the study fairly well stocked with essential drugs except three, that is; Kisumu District Hospital, New

Nyanza General Hospital and Nyawita Maternal and Nursing Home that were classified as unsatisfactory with regard to supply of essential drugs.

It is, however, important to note that despite the rising prices, there are no shortages of drugs and supplies in private sector health facilities. As earlier pointed out, the prices of service and medicine in these facilities is beyond the reach of many residents and this places a heavy burden to the vulnerable group, pregnant women included. Most of these private facilities are located centrally in Kisumu town. Government run hospitals suffer from shortages of drugs, yet they are the major referral centres for most rural health centres.

A possible explanation of the shortages in supply of drugs in public health care facilities is poor management and lack of funding. For instance, the per capita expenditure on health has been declining in the recent years. In spite of growing population and disease burden, the share of government recurrent expenditure allocated to the Ministry of Health declined from 9.26 percent of the government total in 1979/1980 to 8.51 percent in 1991/92, and was expected to further drop to 7.61 percent in 1996/97 (Kenya, 1994b) the year of study. This implies that the Ministry of Health cannot cope with the demand since it spends 70 percent of its recurrent budget to payment of staff salaries to the detriment of other essential items such as purchase of drugs, equipment and supplies. The poor supply of essential drugs in public sector facilities could also be an indicator of failure of the government to collect revenue through the cost-sharing exercise.

## 3.3.0 Availability of Essential Equipment

Instruments and medical equipment used for both diagnostic and therapeutic purposes are essential for timely provision of care and are of paramount importance in the management of obstetric complications. Health centres should have the capacity to screen and identify high risk pregnancies, and refer them to more skilled and better equipped level of care (WHO, 1994b). On the other hand, the referral centres should have all the equipment to manage the difficult cases so as to act as an appropriate back-up for the health centres (WHO, 1994a). Table 3.7 indicates the essential equipment for obstetric care that should be available in health centres and hospitals as per WHO recommendations. Inventories to evaluate the availability of these essential equipment at each level of care were administered and the results of the evaluation are presented in Tables 3.8 and 3.9.

The information in these tables shows that, all the health centres are within the "unsatisfactory" category in terms of availability of essential equipment except for Chemelil Sugar Company health centre which is privately owned. Indeed, most health centres lacked even the basic equipment for measuring haemoglobin, and detection of malaria. The lack of essential equipment at the health centre level suggests that most pregnant mothers who go for prenatal, delivery and post natal care are not properly screened. This has the potential of causing delays in referring risky cases and finally leading to adverse effects on the mother and infant. Hospitals and nursing homes were, however, well equipped and all of them fall in the category classified as "satisfactory" as shown in Table 3. 9.

**Table 3. 7: Essential Equipment for Emergency Obstetric Care**

| |
|---|
| (i) Weight scales |
| (ii) Blood testing apparatus |
| (iii) Laboratory equipment for ante-natal examination (Hb examination, blood count, blood grouping, serological examination for syphilis, dipsticks for urine and stool examination) |
| (iv) Partogram |
| (v) Essential obstetric kit for normal delivery |
| (vi) Vacuum extractor and forceps for prolonged labour |
| (vii) Equipment for surgical contraception |
| (viii) Manual vacuum aspirator pack |
| (ix) Obstetric laparatomy/caesarean section pack* |
| (x) Equipment for craniotomy* |
| (xi) Equipment for mini laparotomy* |
| (xii) Vasectomy pack* |
| (xiii) Equipment for anaesthesia (general)* |
| (xiv) Essential material for provision of blood donor* |
| (xv) Side laboratory for referral examination* |

* asterisk implies equipment to be found in hospitals only.

Source: WHO, 1994a

**Table 3.8: Average Percent Score For Essential Equipment For Each Health Centre in Kisumu District, 1997**

| Name Of Health Facility | Percent Score |
|---|---|
| Migosi | 58 |
| Lumumba | 74 |
| Pap Onditi | 76 |
| Kombewa | 69 |
| Kodiaga | 45 |
| Nyahera | 71 |
| Ober Kamoth | 69 |
| Ahero | 54 |
| Sigoti | 53 |
| Chulaimbo | 79 |
| Chemelil Sugar Company | 86 |
| Muhoroni | 75 |

Source: Field Survey, 1997.

**Table 3. 9: Average Percent Score for Essential Equipment for each Hospital and Nursing Home in Kisumu District 1997**

| Name Of Health Facility | Percent Score |
|---|---|
| Maseno Mission Hospital | 97 |
| Koru Nursing Home | 93 |
| Kisumu District Hospital | 90 |
| New Nyanza General Hospital | 98 |
| Aga Khan | 98 |
| Miwani Nursing Home | 93 |
| Maternicare Nursing Home | 92 |
| Jalaram Nursing Home | 97 |
| Kibos Road Nursing Home | 93 |
| St. Joseph's Nyabondo | 87 |
| Nyawita Maternity N. Home | 98 |

Source: Calculated From Field Data, 1997.

## 3.5. Chapter Summary

Poor utilisation of health facilities in most communities is frequently blamed on ignorance or traditional beliefs. However, as observed early, poor quality care can reduce community's' confidence in the available health facilities thus leading to their under-utilisation. This chapter has revealed that there exists poor health infrastructure planning in Kisumu district as indicated by the maldistribution of beds, in public health facilities and manpower. The distribution of professional staff does not reflect the real needs and there is a concentration of key personnel in urban facilities. Winam division is most favoured in this respect because of its urban location, whereas other divisions especially those in rural areas are poorly served. This implies that mothers resident in rural areas have to travel long distances in search of medical attention in times of need. In circumstances where

transportation is not available or costly, unnecessary delays that can have fatal consequences to the mother and the infant are very likely.

This study has also revealed existence of acute shortages of essential drugs especially in the public health facilities. This is worse for the lower cadre facilities, that is, the health centres. This implies that the supplies have to be procured outside the facility by patients' relatives usually at exorbitant prices. For poor patients, treatment may be delayed while relatives go back to the village to collect money to buy these drugs. This lowers the morale of both patients and the medical staff. The latter feel discouraged when their efforts cannot help save a situation due to such avoidable circumstances. One thing that is clear from the observations is that the Ministry of Health is under-financing drug purchasing to the extent that the burden is left to the population who may not afford to purchase drugs from private pharmacies. The cost sharing scheme introduced as a means of generating revenue to supplement the government resources has seemingly failed to deliver. This is probably because the rising prices of drugs have eroded the purchasing power of the poor who therefore cannot afford to go for medical care until their condition becomes worse. On the other hand, the private-for-profit facilities showed no problem with drug supplies. They seem to have the funds to buy drugs probably because their clients tend to come from well-to-do households.

Kisumu district is also faced with a shortage of basic equipment especially at the health centre level. Since health centres are widely spread, they are likely to be places where most mothers go for pre-natal care. There is a danger of the prenatal screening exercise not being as thorough as required and this may lead to risky cases not being detected early for necessary referral.

Moreover, it has been shown that there is shortage of trained nurses/midwives in the area with the majority of them concentrated in urban hospitals and private sector facilities. This suggests that in the under-staffed centres, work is either left to aides who are not adequately trained or service is not offered at all. All these amount to poor quality service which may have a negative impact on utilisation of services in the medical community. The reality of the situation is that government salaries have not kept up with inflation and this makes their staff to prefer working in urban centres where they can supplement their salaries by having part-time jobs in private clinics that are mushrooming in each centre.

The foregoing discussion has shown that the health facilities in Kisumu district lack essential supplies thus making the quality of service rendered to be poor. The shortages are specifically acute in public institutions which are more open to all patients since they admit cases on the basis of need rather than their ability to pay as is the case with private sector facilities. Unless corrected, the poor health service delivery is likely to have a negative effect on the utilisation of facilities in the study area.

# CHAPTER FOUR
# RESULTS AND DISCUSSION

## LEVELS AND DETERMINANTS OF MATERNAL MORBIDITY AND MORTALITY IN KISUMU DISTRICT

### 4.0 Introduction

Maternal health is a key indicator of the health of women in reproductive age and an indirect measure of the quality of health care system. Maternal morbidity in this study refers to any sickness that results from obstetric complications of the pregnant states (pregnancy, labour, and the puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above. This can be temporary mild or severe conditions which occur during pregnancy and within 42 days of delivery. Maternal mortality on the other hand refers to a death to a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by pregnancy or its management but not from accidental or incidental causes. This chapter discusses the major maternal health problems that affected mothers who delivered in the four selected health facilities in the study area.

The results obtained from the analysis of data collected during the survey period indicate that many mothers who delivered in the four health facilities survived pregnancy, childbirth, and in some cases abortion without dying. However, most of them suffered physical impairment and infections that sometimes with potential for long term health problems. The complications that were common in the order of magnitude include: anaemia (22%), ante-partum haemorrhage (21%), caesarean delivery (18%), prolonged/obstructed

labour (16%), eclampsia (14%), post-partum haemorrhage (12%), sexually transmitted diseases (10%), episiotomy (9%), pre-eclampsia (9%), abortion (9%), vacuum delivery (6%),and maternal deaths (1%). Several factors are assumed to play a major role in determining maternal and perinatal health. The discussion below presents results of cross-tabulations and logistic regression analysis.

## 4.1. Levels and Determinants of Pre-eclampsia

Pre-eclampsia can occur any time during pregnancy although most common towards the end of pregnancy (after 28 weeks) Arkutu (1995). Pre-eclampsia has three major symptoms. First, is swelling of the feet, hands, fingers and face. Second, there is a rise in blood pressure, an increase to 140/90 mm Hg or above. Finally, there is an increase of protein in the urine. The causes of pre-eclampsia are not yet documented. In this study, 9 percent of all respondents were diagnosed as having suffered from pre-eclampsia. Table 4.1.0 shows the distribution of respondents with pre- eclampsia along selected socio-economic, demographic and environmental characteristics.

It can be observed from Table 4.10 that, pre-eclampsia was higher among respondents aged 31 years and above, those with high parities, low education level and not employed in formal jobs. It is also more common among respondents who are urban residents and those from lower socioeconomic status.

**Table 4.1.0: Percent Distribution of Respondents with Pre-eclampsia by Selected Background Characteristics (N=131)**

| Variable | % | Variable | % |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 21.5 | Brick/Stone | 25.2 |
| 21-30 | 27.6 | Clay/Wood etc. | 74.8 |
| 31+ | 50.9 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 16 | Piped | 36.8 |
| Ever married | 84 | Other | 63.2 |
| **Mother's Residence** | | **Location of Water Source** | |
| Urban | 60.7 | Within Compound | 35.6 |
| Rural | 39.3 | Outside compound | 64.6 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 71.2 | Available | 29.4 |
| Secondary + | 28.8 | Not Available | 70.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 80.4 | Visited | 21.5 |
| Employed/Business | 19.6 | Never visited | 78.5 |
| **Breadwinner** | | **Illness During Pregnancy** | |
| Spouse | 60.1 | Suffered | 84.7 |
| Self | 28.2 | Not Suffered | 15.3 |
| Other | 11.7 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 12.9 | Wanted | 85.3 |
| Non-motorized | 87.1 | Never Wanted | 14.7 |
| **Parity** | | | |
| 0 | 25.8 | | |
| 1-4 | 32.5 | | |
| 5+ | 41.7 | | |

Source: Calculated from 1997 Field Survey Data.

To determine the major risk factors of pre-eclampsia in Kisumu district, a case-control multiple regression logistic analysis was conducted and the results are presented in Table 4.1.1.

**Table 4.1.1. Factors Contributing to Pre-eclampsia Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -1.033 | 0.3559* |
| Mothers Residence (urban) | -0.5531 | 0.5752 |
| Past Miscarriage (yes) | 0.7742 | 2.1661* |
| Past Still-Births (yes) | 1.0607 | 2.8885 |
| Mothers Education Level (secondary+) | -0.6966 | 0.4983* |
| Anaemia During Pregnancy (yes) | -0.5133 | 0.5985 |
| Mode of Transport (motor vehicle) | 1.7513 | 5.7619*** |
| House Wall Material (brick/stone) | 0.8093 | 2.2464 |
| Availability of Garbage Dump (yes) | -2.1018 | 0.1222*** |
| Utilization of Ante-Natal Clinic (yes) | 0.0423 | 1.0432 |
| Contraception (ever used) | 1.4154 | 4.1180** |
| Source of Domestic Water (piped) | 0.3783 | 1.4598 |
| Mothers Occupation (not working) | -0.5556 | 0.5537 |
| Age of Mother (less 20) | -1.3985 | 0.2470** |
| Age of Mother (more than 30 years) | -1.1737 | 0.3092* |
| Parity (primiparous) | -0.9084 | 0.4032* |
| Parity (5+) | 2.2730 | 9.7082*** |
| Mothers Height in cm (less than 155 CM) | -0.7875 | 0.4550* |
| Breadwinner (self) | -1.5241 | .0.2178** |

Dependent variable 1= suffered pre-eclampsia 0= not suffered.
* significant at 0.1; ** significant at 0.05; ** Significant at 0.001.
Source: Computed from 1997 Survey data.

The results as presented in Table 4.1.1 reveal that the risk of having pre-eclampsia among pregnant mothers in Kisumu district is significantly high for mothers with past miscarriages, those who utilize motorized means of transport, those who have utilized contraceptives in the past, and those of high parities. Similarly, though not significant, the risk of pre-eclampsia is relatively high for mothers who had past still-births, those who come from good economic backgrounds as evidenced by ownership to permanent house and access to piped water and those who utilized ante natal services. The possible explanation for this is that these mothers could be having

inherent biological weaknesses that make them vulnerable to high blood pressure which leads to pre-eclampsia. This situation is worsened when mothers have many pregnancies. Poor past obstetric history has the potential of causing stress that can lead to pre-eclampsia probably due to the respondents' fear of the possibility of the problem reoccurring.

The factors that have a significantly negative effect and hence subsequently reduce the risk of experiencing pre-eclampsia are single motherhood, mothers having attained secondary level of education and above, good household sanitation, maternal age of below 20 years, and female autonomy as indicated by their self reliance for upkeep compared to those who rely on other people including their spouses and parents for daily care. The above results support the notion that high female education, improved economic status and autonomy reduce the risk of complications that may arise from pregnancy. In this respect, being single and teenage does not necessarily constitute a risk factor to pre-eclampsia as long as one has sufficient educational background and has some form of autonomy.

## 4.2.0 Levels and Determinants of Eclampsia

Full blown eclampsia comes about if pre-eclampsia is not detected early and subsequently treated. This is characterised by high blood pressure, kidney damage and increasing amount of fluid in the body (Arkutu, 1995). In this case, the baby may not receive enough food and oxygen leading to a small and weak body. The mother on the other hand experiences severe headaches, blurred vision, spots before her eyes and

vomiting. This situation can occur in late pregnancy, during delivery and shortly after delivery. The current study revealed that 14 percent of the respondents had developed full blown eclampsia. Table 4.2.0 shows the distribution of these respondents by selected background characteristics.

**Table 4.2.0: Distribution of Respondents With Eclampsia by Selected Background Characteristics (N=200)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 21.5 | Brick/Stone | 25.2 |
| 21-30 | 27.6 | Other | 74.8 |
| 31+ | 50.9 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 16 | Piped | 36.8 |
| Ever married | 84 | Other | 63.2 |
| **Mother's Residence** | | **Location of Water Source** | |
| Urban | 60.7 | Within Compound | 35.6 |
| Rural | 39.3 | Outside compound | 64.6 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 71.2 | Available | 29.4 |
| Secondary + | 28.8 | Not Available | 70.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 89.4 | Visited | 21.5 |
| Employed/Business | 19.6 | Never visited | 78.5 |
| **Bread-Winner** | | **Illness during Pregnancy** | |
| Spouse | 60.1 | Suffered | 84.7 |
| Self | 28.2 | Not Suffered | 15.3 |
| Other | 11.7 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 12.9 | Wanted | 85.3 |
| Non-motorized | 87.1 | Never Wanted | 14.7 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 33.7 | Yes | 24.5 |
| No | 66.3 | No | 75.5 |
| **Parity** | | **Contraception** | |
| 0 | 25.8 | Ever used | 44.0 |
| 1-4 | 32.5 | Never Used | 56.0 |
| 5+ | 41.7 | | |

Source: Computed from 1997 Survey Data.

Further examination of Table 4.2.0 indicates that eclampsia is high for mothers aged over 30 years (51%). It is lowest for single mothers compared to those who are

married. It is common among rural residents and those of parity five and above. It is also common among those with low education levels and those who are not engaged in any gainful employment and thus dependant on their spouses for support. Moreover, those who never attended prenatal care reported high incidences of eclampsia (78.5%) suggesting that the conditions could not be detected early enough to make the necessary reference for specialised medical care.

In order to find out the net effect of the different socioeconomic, demographic and environmental characteristics on eclampsia in the study area, a case--control logistic regression analysis was conducted and the results are presented in Table.4.2.1.

**Table 4.2.1: Factors Contributing to Eclampsia Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | Odds ratio |
|---|---|---|
| Marital Status (single) | 1.4164 | 4.1223*** |
| Mothers Residence (urban) | 0.8276 | 2.2879* |
| Past Miscarriage (yes) | 0.1838 | 1.2017 |
| Past Still-Births (yes) | -0.0291 | 0.9714 |
| Mothers Education Level (secondary+) | -0.0724 | 0.9302 |
| Anaemia During Pregnancy (yes) | -0.1074 | 0.8982 |
| Mode of Transport (motor vehicle) | 1.6191 | 5.0487*** |
| House Wall Material (brick/stone) | 0.0173 | 1.0175 |
| Availability of Garbage Dump (yes) | 0.6947 | 2.0032* |
| Utilization of Ante-Natal Clinic (yes) | -0.2245 | 0.7989 |
| Illness During Pregnancy (suffered) | 1.5483 | 4.7035*** |
| Contraception (ever used) | 0.6083 | 1.8374* |
| Wantedness of Pregnancy (yes) | -1.3909 | 0.2489** |
| Mothers Height in Cm's ( more than 155 cm) | -0.9392 | 0.3909*** |
| Source of Domestic Water (piped) | -0.9371 | 0.3918* |
| Mothers Occupation (Not working) | 0.7402 | 2.0965* |
| Age of Mother (less 20) | 0.2537 | 1.2888 |
| Age of Mother (more than 30 years) | 1.4760 | 4.3755*** |
| Parity (primiparous) | 0.6310 | 1.8795* |
| Parity (5+) | 2.0193 | 7.5332*** |
| Breadwinner (self) | 0.0723 | 1.0750 |

Dependent variable = 1 had eclampsia, 0 did no have eclampsia.
* = significant at 0.1; ** significant at 0.05, *** Significant at 0.001.
Source: Computed From 1997 Survey Data.

An examination of Table 4.2.1 shows that, the factors which significantly increase the risk of eclampsia in Kisumu district are mothers being single, access to motorised transport, illness during pregnancy, high parity, and high maternal age of 30 years and above. Mothers who are single are 4.1 times more likely to have eclampsia compared to those who are married. Mothers who have access to motorised transport are 5 times more likely to experience eclampsia compared to those who have no access to such transport. This probably indicates who utilises facilities more than the other. Mothers who suffered from some illness during the current pregnancy are 4.7 times more likely to have eclampsia compared to those who did not fall sick during pregnancy. The major illness reported were malaria, fever and sexually transmitted diseases. Maternal age also seems to play a significant role in determining eclampsia with those aged over 30 years and those below 20 years having the odds of 4.4 times and 1.3 times, respectively, compared to mothers aged between 20 to 30 years. This probably has something to do with their parities since teenage mothers are likely to be primiparous whereas old mothers are likely to be grand multiparous. All the same, both groups have been proved to be at high risk of being eclamptic. Grand multipara of 5 children and above are 7.5 times whereas primiparous are 1.9 times more likely to experience eclampsia compared to those with parities between 1 and 4.

The variables that have a significant negative effect on eclampsia are wantedness of pregnancy and mothers height of 155 cm and above. Other factors that reduce the risk of eclampsia are high level of maternal education of secondary and above, maternal utilisation of pre-natal services, availability of piped water within easy reach by the household. Possible explanation for this include the fact that educated mothers are likely to be in formal

employment and thus self reliant, a factor that enables them to seek early medical intervention and possibly control stress-related complications.

## 4.3. Levels and Determinants of Anaemia In Pregnancy

Anaemia describes a situation in which there is a reduction of the concentration of haemoglobin in the blood stream of pregnant women to a level below 110 g/1. Even if the woman had normal amount of iron before pregnancy, more is needed during pregnancy. This is due to growth of foetus and of the uterus and many other changes taking place in a pregnant mother that require many nutrients especially iron and folic acid (Royston and Armstrong, 1989). Studies conducted on the subject under discussion have indicated that anaemia can be caused by a number of factors. These include eating foods which are deficient in iron, and vitamins C. Similarly, parasitic infections like malaria, hook worm, schistomiasis in the blood of the mother reduce the amount of iron. Repeated pregnancies without adequate time in between for the mother to recover physically could also lead to anaemia. Lastly, heavy menstrual periods may also lead to anaemia since women lose iron during their periods each time it happens. Severe anaemia during pregnancy is thought to be an important contributor to maternal mortality and morbidity in developing countries (WHO, 1994). It can also cause cardiac failure and may lead to maternal death from haemorrhage or infection (Sarin, 1995). It is also said to increase perinatal morbidity and mortality by causing intrauterine growth retardation and pre-term delivery (Sarin, 1995).

In this study, 22 percent of the total sampled respondents were diagnosed as having suffered anaemia during pregnancy. Table 4.3.0. shows the percent distribution of all the respondents with anaemia according to selected background characteristics.

**Table 4.3.0: Percent Distribution of Respondents With Anaemia by Selected Background Characteristics (N=320)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 57.6 | Brick/Stone | 17.9 |
| 21-30 | 21.0 | Clay/Wood etc. | 82.1 |
| 31+ | 21.4 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 50.2 | Piped | 35.0 |
| Ever married | 49.8 | Other | 65.0 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 38.9 | Suffered | 40.1 |
| Rural | 61.1 | Never Suffered | 59.9 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 66.5 | Available | 23.3 |
| Secondary + | 33.5 | Not Available | 76.7 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 94.2 | Visited | 51.8 |
| Employed/Business | 5.8 | Never visited | 48.2 |
| **Bread-Winner** | | **Illness During Pregnancy** | |
| Spouse | 41.6 | Suffered | 80.2 |
| Self | 8.9 | Not Suffered | 19.8 |
| Other | 49.4 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 7.0 | Wanted | 49.4 |
| Non-motorized | 93.0 | Never Wanted | 50.6 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 43.7 | Yes | 34.5 |
| No | 56.3 | No | 65.5 |
| **Parity** | | **Contraception** | |
| 0 | 58.0 | Ever used | 20.6 |
| 1-4 | 22.6 | Never Used | 79.4 |
| 5+ | 19.4 | | |

Source: Computed from 1997 Survey Data.

From Table 4.3.0, it is evident that incidence of anaemia is high among teenage mothers, mothers resident in rural areas, primiparous mothers, mothers who are not in formal employment, and those who depend on either their spouses or other people for

financial support. Similarly, anaemia is high among women in low socio-economic status, specifically those who do not have access to motorised mode of transport, those who stay in houses made of clay and wood, those who do not have access to either piped water or to garbage dumping facilities within their respective compounds. Biomedical factors also evidently play a role in causing anaemia as the rates are highest for those mothers who suffered an illness during pregnancy, and those who never used any contraceptive method. Results of multivariate analysis on determinants of anaemia are presented in Table 4.3.1.

**Table 4.3.1: Factors Contributing to Anaemia Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio. |
|---|---|---|
| Marital Status (single) | -1.8995 | 0.1496*** |
| Mothers Residence (urban) | -1.0947 | 0.3346*** |
| Past Miscarriage (yes) | 0.7589 | 2.1360*** |
| Past Still-Births (yes) | 0.8886 | 2.4317*** |
| Mothers Education Level (secondary+) | -0.0926 | 0.9116 |
| Illness During Pregnancy (yes) | 0.8915 | 2.4389** |
| Mode of Transport (motor vehicle) | -1.4599 | 0.2323*** |
| House Wall Material (brick/stone) | -0.8408 | 0.4314*** |
| Availability of Garbage Dump (yes) | -0.0165 | 0.9837 |
| Utilization of Ante-Natal Clinic (yes) | -0.9332 | 0.3933*** |
| Contraception (ever used) | -0.0356 | 0.9650 |
| Source of Domestic Water (piped) | -0.5290 | 0.5892** |
| Mothers Occupation (working/business) | -0.8148 | 0.4427* |
| Age of Mother (less 20) | -1.2567 | 0.2846*** |
| Age of Mother (more than 30 years) | 0.3466 | 1.4143 |
| Parity (primiparous) | 0.1142 | 1.1210 |
| Height of Mother ( less than 155 cm) | 0.6465 | 1.9089** |
| Wanted Pregnancy (yes) | -0.6790 | 0.5071** |
| Parity (5+) | 2.4703 | 11.8254*** |
| Breadwinner (self) | -0.3127 | 0.7115 |

Dependent variable = 1 ( anaemic ) 0 (not anemic)
* significant at 0.1; ** is significant at 0.05, *** Significant at 0.001.
Source: Computed from 1997 Survey Data.

It will be observed from Table 4.3.1 that the risk of severe anaemia during pregnancy in Kisumu district is significantly high for women with past obstetric complications, grand multipara of 5 and above, those whose height is below 155 cm and

those who suffered from some other illnesses during pregnancy. Grand multipara of five or more viable births are 12 times more likely to be anaemic than those of parity 1 to 4. Mothers with poor past obstetric history of having a miscarriage and stillbirths are 2.1 and 2.4 times more likely to be anaemic, respectively, compared to mothers who have not experienced such reproductive health problems. This is probably due to their desire to have children in quick succession. This reduces the pregnancy intervals thus denying such mothers time to recover physically for another demanding task of carrying pregnancy. Mothers who suffered from some illness during current pregnancy have reported high significant chances of developing anaemia with odds being 2.4 . This supports the notion that malaria and other parasitic infections which are common in Kisumu district expose pregnant mothers to higher chances of having anaemia. Even though it is not significant, the risk of mothers suffering from anaemia is also higher for mothers aged 30 years and above and those pregnant for the first time.

Factors that significantly impact negatively on anaemia include mothers being single, being urban residents, mothers having high levels of education (of secondary and above), mothers young age (below 20 years), and enjoying high socio-economic status as indicated by good quality house, accessibility to motorised transport, and being self reliant for up-keep. The results as discussed suggest that teenagers are nutritionally stable and can therefore stand rigours of pregnancy especially if they are single, have higher levels of education, urban residents and self reliant.

## 4.4. Levels and Determinants of Abortions/Miscarriages

The two major categories of abortion are the induced and spontaneous. Induced abortion refers to that which is initiated voluntarily whereas spontaneous abortion refers to any miscarriage that happens accidentally on its own. In Kenya, induced abortion is restricted by law and hence it is difficult to come up with up-to-date data on such cases. This study therefore relied on data on respondents admitted to the sampled health facilities with complications related to abortion. It is important to point out here that the study may not reveal the prevalence of abortion in the study area since not all women with abortion cases go to hospital. Their decision to seek help after abortion depends on the accessibility (geographic and financial) of the health facility, social attitudes and attitudes of the hospital staff. However, it is hoped that the sample obtained gives an adequate insight into the risk factors of abortion in the study area. The major demographic characteristics reported from some countries where abortion is legalised include woman's age, number of prior births and marital status. Abortion is highest for teenagers and unmarried women, it is also high among old multiparous women ( David, 1983). In Africa, though data is deficient, the majority of those hospitalised for abortion complications are less than 25 years old, usually unmarried and of lower parity. Many young African women resort to abortion because pregnancy constitutes grounds of expulsion from most schools (Siwale, 1977). Of the total sample interviewed, 5 percent had either induced or spontaneous abortion. Table 4.4.0. shows the distribution of all respondents with abortion occurrences according to background characteristics.

**Table 4.4.0: Percent Distribution of Respondents Who Aborted by Selected Background Characteristics (N=73)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 90.4 | Brick/Stone | 9.6 |
| 21-30 | 9.6 | Clay/Wood etc. | 90.4 |
| 31+ | 0 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 90.4 | Piped | 26.9 |
| Ever Married | 9.6 | Other | 73.1 |
| **Mother's Residence** | | **Malaria during Pregnancy** | |
| Urban | 26.9 | Suffered | 63.5 |
| Rural | 73.1 | Never Suffered | 36.5 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 69.2 | Available | 15.4 |
| Secondary + | 30.8 | Not Available | 84.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 100 | Visited | 9.6 |
| Employed/Business | 0.0 | Never visited | 90.4 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 9.6 | Suffered | 86.5 |
| Self | 0.0 | Not Suffered | 13.5 |
| Other | 90.4 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 5.8 | Wanted | 9.6 |
| Non-motorized | 94.2 | Never Wanted | 90.4 |
| **Ever Miscarried** | | **Ever had a still -birth** | |
| Yes | 5.8 | Yes | 3.8 |
| No | 94.2 | No | 96.2 |
| **Parity** | | **Contraception** | |
| 0 | 92.3 | Ever used | 21.9 |
| 1-4 | 7.7 | Never Used | 78.1 |
| 5+ | 0.0 | | |

Source: Computed from Survey Data, 1997.

It is observed from Table 4.4.0. that abortion is high among those respondents who are aged below 20 years (90.4 %), single women (90.4 %), rural residents (73.1%), women who were not in formal employment (90.4 %), those who were pregnant for the first time (92.3 %), those who had never used any modern contraceptive method (78.1 %),

those who became pregnant unintentionally (90.4 %), those who never went for pre-natal care and those who suffered from some form of illness while pregnant (86.5 %).

A case-control multivariate analysis on all these variables was conducted in order to establish the major risk factors of abortion in the study area and the results are presented in Table 4.4.1.

**Table 4.4.1: Factors Contributing to Abortion Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | 1.1361 | 3.1145 |
| Mothers Residence (urban) | -1.4413 | 0.2366* |
| Past Miscarriage (yes) | 1.9979 | 7.3735*** |
| Past Still-Births (yes) | 0.6087 | 1.8381 |
| Mothers Education Level (secondary+) | 0.7051 | 2.0241* |
| Anaemia During Pregnancy (yes) | 0.4189 | 1.5203 |
| Mode of Transport (motor vehicle) | -0.3359 | 0.7147 |
| House Wall Material (brick/stone) | 0.7896 | 2.2025 |
| Availability of Garbage Dump (yes) | 0.0769 | 1.0799 |
| Utilization of Ante-Natal Clinic (yes) | -0.3359 | 0.7147 |
| Illness During Pregnancy (yes) | 0.3993 | 1.4907 |
| Contraception (ever used) | 0.6594 | 1.9337 |
| Wanted Pregnancy ? (yes) | 0.9594 | 2.6101 |
| Maternal Height (less than 155 cm) | 1.0638 | 2.8975 |
| Source of Domestic Water (piped) | -0.9231 | 0.3973 |
| Whether Suffered Hemorrhage During Pregnancy (yes) | 0.2757 | 1.3174 |
| Age of Mother (less 20) | -0.1763 | 0.8384 |
| Whether Booked Delivery Care (yes) | -0.4638 | 0.6289 |
| Parity (primiparous) | 0.5184 | 1.6793 |

Independent variable = 1 (had abortion) 0 ( had no abortion).
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed from 1997 Field Data.

It is observed from Table 4.4.1 that the only factor that significantly increases the risk of abortion in Kisumu district is mother having experienced a miscarriage or

abortion. Mothers with past miscarriages are 7 times more likely to experience another abortion compared to those who have never had any. Although not significant, the risk of mothers having an abortion is higher for single mothers, those with at least secondary level of education, those who suffered some illness during pregnancy, those who have previously used modern contraceptives, and primiparous mothers. Single mothers are 3 times more likely to have an abortion compared to married mothers. Mothers with poor obstetric history of still births are more likely to have an abortion than those with no such experience. This finding corroborates an earlier one by Tietze (1978) who cited five reasons that compositely explain why women with previous abortion experience are potential candidates for future abortions. First, is the age factor since most of them are young and in the most active prime reproductive age group. Second, it can be assumed that nearly all women who have had abortions were sexually active and probably resumed sexual activity after their abortion. Third, all women with abortion experience have been able to conceive, compared to those who have not. Fourth, women who have had one abortion are likely to resort to yet another to avoid future birth, whereas women at risk of having first abortion probably include a substantial number who would not choose or fear to terminate an unintended conception. Finally, there is a small group of women who consciously prefer to rely on abortion rather than on contraception plus a very large number who find it difficult to practice contraceptive vigilance consistently and effectively. These women are at high risk for both first and repeated abortions.

Respondents with secondary school education and above were twice more likely to have an abortion compared to those with primary level education and below.

The most plausible explanation for this could be the fear of being sent out of school due to unintended pregnancy. The risk of abortion is higher for those mothers in poor health condition with anaemia, hemorrhage and other diseases during pregnancy. It is also high for primiparous mothers which could be due to lack of experience in obstetric care. Lastly, it is interesting to note that mothers with knowledge and who have used contraception in the past are about 2 times more likely to have abortion compared to those who have never used any modern contraceptive method. A number of scholars have reached similar conclusions concerning women who have practiced contraception suggesting that they are more likely to resort to abortion than those who have not (David *et.al* , 1978, Potts *et.al,* 1977). This could be due to the fact that abortion is 100 per cent effective whereas some contraceptive methods require a considerable and more vigilant effort to be effective.

The only factor that has a significant negative effect on abortion is urban residence of the mother. However, the relative risk of abortion is reduced for mothers enjoying a high socioeconomic status as measured by availability of piped water, and access to motorized mode of transport to the household. Similarly, mothers aged less than 20 years but married, are less likely to have an abortion probably due to desire to have children.

## 4.5. Levels and Determinants of Obstructed/Prolonged Labour

Obstructed labour is one of the most common and dangerous complication of pregnancy in Africa (Arkutu, 1995). This condition arises because the space in the long

birth canal of the mother is either too small or too distorted by disease to permit easy passage of the head of a baby during labour (Armstrong and Royston, 1989). This in most cases leads to prolonged labour. If labour continues for too long, especially over twelve hours, both mother and baby may become exhausted, and this could be fatal. It could lead to maternal death, fistula, perinatal death and infection that can spread upwards towards the womb.

Studies conducted elsewhere have established that women in the following categories are more likely to have obstructed labour: those who are less than 150 cm tall, girls in their early teens, women with some abnormalities of the spine or lower limbs, women who have undergone female genital mutilation, women with babies who are usually big and those with babies who are lying abnormally in the womb (Arkutu, 1995; Acsadi *et al.*, 1994; Royston and Armstrong, 1989).

In this study, 16 percent of the respondents were observed to have suffered from obstructed and prolonged labour. Table 4.5.0. shows the percent distribution of respondents with obstructed labour by background characteristics.

It is observed from Table 4.5.0. that, among the women who were reported to have suffered from obstructed labour, the percentage is higher for teenage mothers (72%), those residing in the rural areas (59%), mothers pregnant for the first time (69.1%), those with primary level of education and below (60%), those who are from low socioeconomic groups as measured by their occupation, breadwinner, common mode of transport available to them and availability of garbage dumping facilities within their respective compounds. The percentage is also higher for those mothers

who suffered from some form of illness while pregnant and those who had never used any modern contraceptive method.

**Table 4.5.0: Percent Distribution of Respondents With Prolonged or Obstructed Labour by Selected Background Characteristics (N=232)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 72.1 | Brick/Stone | 36.0 |
| 21-30 | 20.6 | Clay/Wood etc. | 64.0 |
| 31+ | 7.4 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 39.0 | Piped | 45.6 |
| Ever married | 61.0 | Other | 54.4 |
| **Mother's Residence** | | **Whether Booked Delivery** | |
| Urban | 41.2 | Booked | 51.5 |
| Rural | 58.2 | Not booked | 48.5 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 59.6 | Available | 42.6 |
| Secondary + | 40.4 | Not Available | 57.4 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 83.8 | Visited | 85.3 |
| Employed/Business | 16.2 | Never visited | 14.7 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 46.3 | Suffered | 65.4 |
| Self | 15.4 | Not Suffered | 34.6 |
| Other | 38.2 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 23.5 | Wanted | 60.3 |
| Non-motorized | 76.5 | Never Wanted | 39.7 |
| **Ever Miscarried** | | **Ever Had a Still -Birth** | |
| Yes | 9.6 | Yes | 2.2 |
| No | 90.4 | No | 97. |
| **Parity** | | **Contraception** | |
| 0 | 69.1 | Ever used | 25.7 |
| 1-4 | 25.7 | Never Used | 74.3 |
| 5+ | 5.1 | | |

Source: Computed from 1997 Survey Data.

The factors discussed, above, however do not necessarily constitute the risk factors of the problem of prolonged labour in Kisumu district. Even if they do, it is not clear from the frequency table as to how each of them contributes to prolonged labour. In order to establish major risk factors and the direction of their effect, a multivariate case-control logistic analysis was conducted between various maternal background characteristics (as independent variables) and whether or not the respondents suffered obstructed labour (as a dependent variable). The results of this regression are presented in Table 4.5.1.

**Table 4.5.1: Factors Contributing to Obstructed Labour Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -0.4657 | 0.6277 |
| Mothers Residence (urban) | -0.5952 | 0.5515* |
| Past Miscarriage (yes) | 0.5329 | 1.7039* |
| Past Still-Births (yes) | 0.7943 | 2.2129* |
| Mothers Education Level (secondary+) | -0.6868 | 0.5032** |
| Anaemia During Pregnancy (yes) | -0.8799 | 0.4148 |
| Mode of Transport (motor vehicle) | -1.1575 | 0.3143*** |
| House Wall Material (brick/stone) | -1.1094 | 0.3298*** |
| Availability of Garbage Dump (yes) | -1.5880 | 0.2043*** |
| Utilization of Ante-Natal Clinic (yes) | 1.1151 | 3.0498** |
| Illness During Pregnancy (yes) | -0.3199 | 0.7262 |
| Contraception (ever used) | -0.5862 | 0.5564* |
| Mothers Height in CM (less than 155) | 0.1945 | 1.2147 |
| Source of Domestic Water (piped) | 0.8803 | 2.4117* |
| Mothers Occupation (Not working) | 0.3274 | 1.3874 |
| Age of Mother (less 20) | 1.7963 | 6.0296*** |
| Age of Mother (more than 30 years) | 0.0863 | 1.0901 |
| Parity (primiparous) | 0.8803 | 2.4117* |
| Parity (5+) | 2.4515 | 11.6052*** |
| Breadwinner (self) | 0.9177 | 2.5036* |

Dependent variable = 1 (suffered obstructed labour), 0 (had normal delivery)
* significant at 0.1; ** significant at 0.05, *** significant at 0.001.
Source: Computed From 1997 Survey Data.

The results presented in Table 4.5.1 from logistic regression analysis indicate that the risk of obstructed labour in Kisumu district is significantly higher for respondents who utilised pre-natal services, teenage mothers and those of parities 5 and above previous live births. The relative risk of obstructed labour is higher for respondents with past miscarriage, past still-births, and average height of less than 155 cm, the odds being 1.7, 2.2, and 1.2, respectively. Similarly, those aged over 30 years, those pregnant for the first time and those who are self reliant for upkeep have a higher probability of having prolonged labour compared to their counterparts. Similar findings have been obtained by Arkutu (1995) who indicates that babies of older women tend to be larger and heavier than average which in many instances leads to obstructed labour. The correlation between a woman's height and risk of prolonged labour has also been established by Royston and Armstrong (1989) who suggested that maternal stature and the size of the space in their pelvises are related. This relationship is such that the proportion of women with small pelvises decreases steadily with increasing height to the extent that difficult labour (due to small pelvis) is rare in tall women, and comparatively common in short women.

The risk of prolonged labour is significantly reduced for women who have attained at least secondary level of education, those who are well-to-do (as measured by type of house, availability of motorised transport and good sanitation). This is probably due to the fact that such mothers can afford good medical care and pay for appropriate surgical deliveries early enough to avoid painful prolonged labour that is more painful. This could also possibly suggest that such mothers are healthy well grown in stature and therefore their pelvises are equally developed thus reducing the risk of obstructed labour. The relative risk of prolonged labour is reduced for mothers who are single, urban residents and those

who have utilised contraception in the past. The results also reveal that mothers who were ill during pregnancy and suffered from anaemic conditions are less likely to have prolonged labour. This is possibly due to the fact that such mothers are also more likely to have low-birth weights and premature deliveries which cannot pose any risk of experiencing prolonged labour.

## 4.6. Levels and Determinants of Antepartum Haemorrhage

Bleeding after 28 weeks of pregnancy may be due to premature separation of the placenta or to injury or even disease affecting the lower genital tract (Royston and Armstrong, 1989). Some of the risk factors associated with antepartum haemorrhage include; high maternal age of 35 years or over, and a high parity of four or more previous births compared to those who are younger and of lower parities. The underprivileged are also more vulnerable to accidental haemorrhage than the well-to-do, though the reason for this difference is not well known.

In this study, 21 percent of the sample respondents were reported to have suffered from ante-partum haemorrhage. Cross-tabulations conducted with haemorrhage as a dependent variable and the maternal socio-economic demographic and environmental characteristics as independent variables yielded the results as presented in Table 4.6.0.

**Table 4.6.0: Percent Distribution of Respondents with Antepartum Haemorrhage by Selected Background Characteristics (N=305)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 57.0 | Brick/Stone | 25.3 |
| 21-30 | 30.5 | Clay/Wood etc. | 74.7 |
| 31+ | 12.4 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 49.4 | Piped | 41.0 |
| Ever married | 50.6 | Other | 59.0 |
| **Mother's Residence** | | **Malaria during Pregnancy** | |
| Urban | 40.2 | Suffered | 54.2 |
| Rural | 59.8 | Never Suffered | 45.8 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 62.2 | Available | 27.7 |
| Secondary + | 37.8 | Not Available | 72.3 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 87.6 | Visited | 52.2 |
| Employed/Business | 12.4 | Never visited | 47.8 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 39.8 | Suffered | 94.0 |
| Self | 12.9 | Not Suffered | 6.0 |
| Other | 47.4 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 17.3 | Wanted | 50.2 |
| Non-motorized | 82.7 | Never Wanted | 49.8 |
| **Whether Anaemic** | | **Whether Booked Delivery** | |
| Yes | 40.6 | Booked | 31.3 |
| No | 59.4 | Not booked | 68.7 |
| **Parity** | | **Contraception** | |
| 0 | 60.2 | Ever used | 31.3 |
| 1-4 | 27.7 | Never Used | 68.7 |
| 5+ | 12.0 | | |

Source: Computed from 1997 Survey Data.

It can be seen from Table 4.6.0, that among those mothers with antepartum haemorrhage, the percentage is higher among those aged below 20 years, those residing in the rural areas, those with primary level of education and below, those who

are not in formal employment and those who largely depend on other people for their upkeep, those who live in poor environmental conditions, those who suffer from some illness during pregnancy, those who have never used any contraceptive method and those who are pregnant for the first time.

Table 4.6.1 presents the determinants of antepartum hemorrhage in Kisumu district derived from logistic case-control regression analysis.

**Table 4.6.1. Factors Contributing to Antepartum Haemorrhage Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status ( single) | -0.8106 | 0.4446** |
| Mothers Residence (urban) | 0.3540 | 1.4248 |
| Past Miscarriage (yes) | 0.3562 | 1.4279 |
| Past Still-Births (yes) | 0.3075 | 1.3600 |
| Mothers Education Level (secondary+) | -0.4091 | 0.6643* |
| Anaemia During Pregnancy (no) | -0.3168 | 0.7285 |
| Mode of Transport (non-motorized ) | 0.0178 | 1.0179 |
| House Wall Material (brick/stone) | -0.2889 | 0.7491 |
| Availability of Garbage Dump (yes) | -0.0681 | 0.9342 |
| Utilization of Ante-Natal Clinic (yes) | -1.4001 | 0.2466*** |
| Illness During Current Pregnancy (no) | -2.4089 | 0.0899*** |
| Contraception (never used) | 0.5860 | 1.7968** |
| Mothers Height in CM (less than 155 cm) | 0.1276 | 1.1361 |
| Source of Domestic Water (piped) | -0.0118 | 0.9883 |
| Mothers Occupation (Not working) | 0.3890 | 1.4756 |
| Age of Mother (less 20) | -0.3422 | 0.7102 |
| Age of Mother (more than 30 years) | -1.10414 | 0.3530* |
| Parity (primiparous) | -0.5430 | 0.5810* |
| Parity (5+) | 1.9916 | 7.3272*** |
| Breadwinner (self) | -0.0445 | 0.9565 |

dependent variable 1 = experienced haemorrhage, 0 = never had haemorrhage.
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Survey Data.

It is evident from Table 4.6.1, that the risk of experiencing antepartum haemorrhage is significantly high only among those who have never used contraception and higher parities of 5 and above. Further, the relative risk of having antepartum haemorrhage in Kisumu district is high among urban residents, mothers with poor obstetric history of abortion and still births, mothers whose height is less than 155 Cm, and mothers who are not engaged in formal employment. Mothers with five or more previous births are 7.3 times more likely to have ante-partum haemorrhage compared to those of lower parities. The above results probably support the assumption that underprivileged mothers are at more risk than the well-to-do mothers.

The factors that significantly reduce the risk of antepartum haemorrhage are mothers being single, utilization of ante-natal clinics, mothers' relative during pregnancy. Further examination of Table 4.6.1 reveals that the relative risk of suffering from antepartum haemorrhage is lower among teenage mothers, those pregnant for the first time, and those who upon their own sources of income for survival. This supports the idea earlier advanced by Geronimus (1987) that young age alone is not a risk factor in the context of reproductive health problems experienced. This is mainly because physiologically, teenagers are more prepared to carry pregnancy compared to old multiparous mothers

## 4.7. Levels and Determinants of Postpartum Haemorrhage

Post partum haemorrhage can be due to a number of causes including; retained placenta, weak uterus due to prolonged labour, rapture of the uterus due to obstructed

labour and torn vagina or cervix if the baby is very large or if the presentation of the baby is breech or traverse. In some instances, female genital mutilation can lead to post partum haemorrhage. Women with multiple pregnancy and those who have had four or more previous births have been found to be at more risk of postpartum haemorrhage in the past (Royston and Armstrong, 1989).

Of the total sample respondents interviewed in this study, 12 percent experienced post partum haemorrhage. Cross-tabulation analysis between those with post partum haemorrhage and the various socioeconomic, demographic, environmental and biomedical variables has yielded interesting results (Table 4.7.0). It is observed from this table that out of all the respondents who suffered postpartum haemorrhage, the percentage is higher for those who are married compared to single mothers. Mothers in low socio-economic categories with low levels of education and those who suffered from some illness during pregnancy also show high percentages of suffering from postpartum haemorrhage.

**Table 4.7.0: Percent Distribution of Respondents with Postpartum Haemorrhage by Selected Background Characteristics (N=176)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 37.6 | Brick/Stone | 33.3 |
| 21-30 | 45.2 | Clay/Wood etc. | 66.7 |
| 31+ | 17.2 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 30.1 | Piped | 46.2 |
| Ever married | 69.9 | Other | 53.8 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 41.9 | Suffered | 46.2 |
| Rural | 58.1 | Never Suffered | 53.8 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 52.7 | Available | 35.5 |
| Secondary + | 47.3 | Not Available | 64.5 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 80.6 | Visited | 73.1 |
| Employed/Business | 19.4 | Never visited | 26.0 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 52.7 | Suffered | 77.4 |
| Self | 19.4 | Not Suffered | 22.6 |
| Other | 28.0 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 17.2 | Wanted | 35.5 |
| Non-motorized | 82.8 | Never Wanted | 64.5 |
| **Parity** | | **Contraception** | |
| 0 | 41.9 | Ever used | 33.3 |
| 1-4 | 45.2 | Never Used | 66.7 |
| 5+ | 12.9 | | |

Source: Computed from 1997 Survey Data.

The results of a multivariate analysis between various background characteristics and occurrence of postpartum hemorrhage are presented in Table 4.7.1. It is observed from the Table that the factors which significantly increase the risk of postpartum haemorrhage are maternal illness during pregnancy, high parity of 5 and above,

and women who are not in formal employment hence economically disadvantaged. Further examination of the results indicate that the relative risk of experiencing postpartum haemorrhage is comparatively higher for single mothers, rural residents, mothers with past obstetric loss, mothers who were anaemic, women are less than 155 cm. tall, teenage mothers and those aged more than 30 years. Single mothers are 1.2 times more likely to suffer postpartum haemorrhage compared to married mothers. A possible explanation is lack of support from a male partner leading poor obstetric care. Women residing in urban areas are 1.2 times more likely to have postpartum haemorrhage compared to their rural counterparts. Mothers with past history of miscarriage are 1.7 times more likely to suffer from post partum haemorrhage compared to mothers who have never experienced a miscarriage. Similarly, mothers who have experienced a stillbirth in the past and who suffered from anaemia during pregnancy have a higher chance of experiencing postpartum haemorrhage. One explanation for this is the fact that such women may be physiologically weak to carry any pregnancy to term due to the poor health condition they may be in. Mothers who are less than 155 cm tall are 1.5 times more vulnerable to postpartum haemorrhage. This could be due to injuries caused during child birth, either spontaneously or during operative delivery. Rupture of the uterus, tears in the cervix and vagina all associated with prolonged labour common among stunted women can also cause post partum haemorrhage. The analysis also shows that women aged more than 30 years are 2.7 times more likely to suffer postpartum haemorrhage compared to those aged between 20 - 30 years. This is probably because of over-stretching the uterine muscles as a result of age and previous births. In most cases the muscles are less able to contract normally and hence can easily rapture leading to haemorrhage.

**Table 4.7.1: Factors Contributing to Postpartum Haemorrhage among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | 0.2105 | 1.2343 |
| Mothers Residence (rural) | 0.2380 | 1.2687 |
| Past Miscarriage (yes) | 0.5783 | 1.7830 |
| Past Still-Births (yes) | 0.8946 | 2.4462 |
| Mothers Education Level (secondary+) | -0.6675 | 0.5130* |
| Anaemia During Current Pregnancy (yes) | 0.0073 | 1.0073 |
| Mode of Transport (motor vehicle) | -1.7515 | 0.1735*** |
| House wall material (clay/wood etc.) | 0.2201 | 1.2462 |
| Availability of Garbage Dump (yes) | -1.7362 | 0.1762* |
| Utilization of Ante-Natal Clinic (yes) | -0.1337 | 0.8749 |
| Illness During Current Pregnancy (yes) | 1.2817 | 3.6028** |
| Contraception (ever used) | -0.2546 | 0.7752 |
| Maternal Height (less than 155) | 0.2869 | 1.3322 |
| Source of Domestic Water (piped) | -1.0640 | 0.3451* |
| Mothers Occupation (Not working) | 1.0251 | 2.7874** |
| Age of Mother (less 20) | -0.3926 | 0.6753 |
| Age of Mother (more than 30 years) | 1.0204 | 2.7744 |
| Parity (primiparous) | -0.2474 | 0.7809 |
| Parity (5+) | 1.7197 | 5.5831*** |
| Breadwinner (self) | -1.0394 | 0.3537*** |

Dependent Variable 1 = experienced postpartum haemorrhage, 0 = never experienced postpartum haemorrhage.
* is significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed from 1997 Survey Data.

The factors which significantly reduce the risk of postpartum haemorrhage are women attaining at least secondary level of education, coming from a well-to-do household, and women being self reliant for their upkeep. Further to this, the results reveal that the relative risk of having postpartum haemorrhage is low for women who utilised prenatal services, had access to piped water for domestic use, those pregnant for the first time and those aged below 20 years. A possible explanation of the linked between education and maternal health is the major role on skills and knowledge an educated

woman may have attained about appropriate measures for prevention and treatment of diseases. Education also reflects a change of a woman's status in the community that permits her to act more effectively on that knowledge, for example seeking prenatal services without hesitation (Joshi, 1994). Use of prenatal care also reduces chances of haemorrhage because of good care and screening that accompany prenatal services.

## 4.8. Operative Deliveries

Under some cases, especially those involving some complications, medical personnel perform operative deliveries on mothers. Operative deliveries take several forms. Manipulations needed to extract the baby are either carried out vaginally through vacuum, episiotomy or forceps extraction. Alternatively, operative delivery can be performed through the abdomen by caesarean section. All these operative deliveries carry risks to both the mother and infant. These risks arise partly from the nature of the operations, procedures which go with such operations (e.g. anaesthesia and blood transfusion) and in some instances, from pregnancy complications that necessitated such operations. In this study, 18 percent of respondents were delivered through caesarean section, 9 percent had episiotomy whereas 6 percent had vacuum evacuation.

### 4.8.1 The Risk factors of Caesarean section

Several reasons make caesarean section necessary and these include prolonged labour, abnormal presentation of baby, heavy bleeding before birth, severe hypertension and

history of previous stillbirth or caesarean delivery. Table 4.8.0. shows the distribution of respondents with caesarean delivery by background characteristics.

**Table 4.8.0: Percent Distribution of Respondents with Caesarean births by Selected Background Characteristics (N=262)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 48.6 | Brick/Stone | 33.2 |
| 21-30 | 26.9 | Clay/Wood etc. | 66.8 |
| 31+ | 24.5 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 24.5 | Piped | 36.5 |
| Ever married | 75.0 | Other | 63.5 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 33.2 | Suffered | 33.2 |
| Rural | 66.8 | Never Suffered | 66.8 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 63.5 | Available | 37.5 |
| Secondary + | 36.5 | Not Available | 62.5 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 81.2 | Visited | 79.8 |
| Employed/Business | 18.8 | Never visited | 20.2 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 55.2 | Suffered | 72.6 |
| Self | 22.2 | Not Suffered | 27.4 |
| Other | 22.6 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 19.7 | Wanted | 76.0 |
| Non-motorized | 80.3 | Never Wanted | 24.0 |
| **Ever Miscarried** | | **Whether Booked Delivery** | |
| Yes | 22.1 | Booked | 48.1 |
| No | 77.9 | Not booked | 51.9 |
| **Parity** | | **Contraception** | |
| 0 | 46.6 | Ever used | 36.5 |
| 1-4 | 32.2 | Never Used | 63.5 |
| 5+ | 21.2 | | |

Source: Computed from 1997 Survey Data.

Of the respondents who had caesarean deliveries, teenage mothers, those residing in rural areas, those pregnant for the first time, those with primary level of education and below, those who come from poor environments with no access to clean piped water recorded comparatively high percentages. The percentage was also high for those mothers

who were ill during pregnancy, and those who utilised pre-natal health care services. It is however worth noting that of all those who had caesarean sections, only 48 percent booked to deliver in a health facility which implies that the remaining 52 percent were emergency deliveries.

In order to establish the major risk factors of cesarean delivery, a case-control logistic regression analysis was conducted. The dependent variable is dichotomous ( i.e. whether a mother had cesarean delivery = 1, a normal delivery = 0). The results are presented in Table 4.8.1.

**Table 4.8.1: Factors Contributing to Caesarean deliveries Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -1.0486 | 0.3504* |
| Mothers Residence (urban) | 0.4885 | 1.6299* |
| Past Miscarriage (yes) | -0.0130 | 0.9871 |
| Past Still-Births (yes) | 0.3619 | 1.4360 |
| Mothers Education Level (secondary+) | -0.4342 | 0.6478* |
| Anaemia During Pregnancy (yes) | 0.1620 | 1.1759 |
| Mode of Transport (non-motorized) | -0.5239 | 0.5922* |
| House Wall Material (brick/stone) | 0.2109 | 1.2348 |
| Availability of Garbage Dump (yes) | 0.4280 | 1.5342* |
| Utilization of Ante-Natal clinic (yes) | -0.1991 | 0.8195 |
| Illness During Current Pregnancy (yes) | -0.5069 | 0.6023** |
| Contraception (ever used) | -0.2249 | 0.7986 |
| Wantedness of Pregnancy (yes) | 1.6273 | 5.0902*** |
| Mother's Height in cm (less than 155 cm) | -0.4641 | 0.6287* |
| Source of Domestic Water (piped) | -0.1675 | 0.8458 |
| Mothers occupation (Not working) | 0.4610 | 1.5857 |
| Age of Mother (less 20) | -1.4821 | 0.2272*** |
| Age of Mother (more than 30 years) | 0.1625 | 1.1764 |
| Parity (primiparous) | -0.7632 | 0.4662** |
| Parity (5+) | 2.1551 | 8.6287*** |
| Breadwinner (self) | 0.1907 | 1.2101 |

Dependent Variable, 1 = had Caesarean birth, 0 = had normal delivery.
* is significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Field Survey Data.

The analysis shows that the factors which significantly increase the risk of a caesarean delivery are wantedness of pregnancy and high parity of 5 and more live births. The relative risk of caesarean delivery is high for women who are urban residents, those who have experienced still-births in the past, those who are from well-to-do families and self reliant for upkeep. Urban residents are 1.6 times more likely to have a cesarean birth compared to their rural counterparts. This is possibly because of the availability of emergency obstetric care services in the urban areas which makes it easy to do an operation once the need for it arises. There is also a possibility that since urban residents utilize pre-natal services more regularly, it is easier to detect complicated pregnancies early and make quick referral for specialized care. Mothers with past still-births are 1.4 times more likely to have cesarean delivery compared to those who have no history of still births. Past intrauterine death that leads to still birth is normally considered a high risk case that necessitates caesarean delivery. Mothers who are not in formal employment, those aged more than 30 years, and grand multipara of five and above are also more vulnerable to caesarean delivery than their counterparts. A possible explanation is that the same group are more susceptible to prolonged labour that may necessitate caesarean birth. It is also interesting to note that mothers who come from well-to-do families as indicated by quality of house and self reliance for their daily upkeep are more vulnerable to caesarean delivery. This suggests that cesarean delivery is not restricted to the disadvantaged people only. Indeed there are people who may be willing and able to undergo operative deliveries such as cesarean section, a simple and perhaps better alternative compared to pain and suffering associated with prolonged labour. Some studies have, however, revealed that

cesarean deliveries are sometimes unjustified medically and performed for medical gains by the concerned doctors who charge more money for such deliveries (Tinker *et. al,* 1994).

## 4.8.2 Levels and Risk Factors of Episiotomy

An episiotomy is a deliberate clean cut made at the outside entrance of the vagina. It is done when it appears that the delivery of a baby is likely to cause tear in the opening of the vagina. It is also done to speed up delivery of a distressed baby. This is not a complicated delivery and with proper management (pain killing injection and sterile stitches with antibiotics), mothers heal within very few weeks (Arkutu, 1995). In this study 9 percent of the total sample had an episiotomy. Table 4.9.0. shows percent distribution of these respondents by background characteristics. Mothers aged below 20 years, those who were pregnant for the first time, those with secondary school level of education, recorded higher percentage cases of episiotomy.

On the other hand, Table 4.9.1 presents the results of a multivariate analysis indicating the nature of the relationship between maternal background characteristics and the risk of having an episiotomy. The dependent variable is dichotomous response variable whether a mother had an episiotomy (1) or a normal delivery (0).

**Table 4.9.0: Percent Distribution of Respondents with Episiotomy by Selected Background Characteristics (N=131)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 56.2 | Brick/Stone | 46.7 |
| 21-30 | 37.1 | Clay/Wood etc. | 53.3 |
| 31+ | 6.7 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 34.3 | Piped | 53.3 |
| Ever married | 56.7 | Other | 46.7 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 47.6 | Suffered | 27.6 |
| Rural | 52.4 | Never Suffered | 72.4 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 41.9 | Available | 51.4 |
| Secondary + | 58.1 | Not Available | 48.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 77.1 | Visited | 91.4 |
| Employed/Business | 22.9 | Never visited | 8.6 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 50.5 | Suffered | 52.4 |
| Self | 16.2 | Not Suffered | 47.6 |
| Other | 33.3 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 34.3 | Wanted | 65.7 |
| Non-motorized | 65.7 | Never Wanted | 34.3 |
| **Ever Miscarried** | | **Whether Booked Delivery** | |
| Yes | 14.3 | Booked | 64.8 |
| No | 85.7 | Not booked | 35.2 |
| **Parity** | | **Contraception** | |
| 0 | 67.6 | Ever used | 39.0 |
| 1-4 | 25.7 | Never Used | 61.0 |
| 5+ | 6.7 | | |

Source: Computed from 1997 Field Survey Data.

**Table 4.9.1: Factors Contributing to Episiotomy Deliveries Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status ( single) | 1.1904 | 3.2884* |
| Mothers Residence (urban) | -0.1422 | 0.8675 |
| Past Miscarriage (yes) | -0.8505 | 0.4272* |
| Past Still-Births (yes) | -0.5054 | 0.6033 |
| Mothers Education Level (secondary+) | 0.5056 | 1.6581 |
| Anaemia During Recent Pregnancy (yes) | -0.0895 | 0.9144 |
| Mode of Transport (motor vehicle) | -0.4616 | 0.6303 |
| House Wall Material (brick/stone) | 0.6066 | 1.8341* |
| Availability of Garbage Dump (yes) | 1.8763 | 6.5291*** |
| Utilization of Ante-natal Clinic (yes) | 0.9308 | 2.5366* |
| Illness During Current Pregnancy (yes) | -0.1816 | 0.8338 |
| Contraception (ever used) | 0.3096 | 1.3628 |
| Wanted to be Currently Pregnant? (yes) | -0.0099 | 0.9902 |
| Whether Booked Delivery (yes) | 0.5239 | 1.6887 |
| Mothers' Height in cm (less than 155 cm) | -1.1905 | 0.3041*** |
| Source of Domestic Water (piped) | -0.1407 | 0.8687 |
| Mothers Occupation (Not working) | -1.9737 | 0.1389*** |
| Age of Mother (less 20) | -0.6565 | 0.5186* |
| Age of Mother (more than 30 years) | -1.5611 | 0.2099 |
| Parity (primiparous) | -1.4315 | 0.2390*** |
| Parity (5+) | 3.8315 | 46.13*** |
| Breadwinner (self) | 0.1076 | 1.1136 |

* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Field Survey Data.

It is observed from Table 4.9.1. that variables which have a significant effect on increasing the effect of episiotomy are high parity and good household sanitation as measured by availability of garbage dumping facility. The result reveal further that the relative risk of episiotomy is high among women who are single, those who have attained at least secondary level of education, women from well-to-do households, those who have used contraceptives before, those who booked delivery, those who utilised pre-natal clinic and those who are self-reliant for upkeep. Mothers with five or more previous live births

are 46 times more likely to have an episiotomy compared to those of lower parities. This is probably because with every birth, the uterine muscles become over-stretched and are less likely to contract normally and to facilitate delivery without episiotomy. Single mothers are 3 times more likely to have an episiotomy compared to married mothers, whereas mothers who visited antenatal clinics and those from well-to-do households are more vulnerable to episiotomy. This is probably due to the likelihood of such mothers having over-weight babies that cannot pass thorough the birth canal without causing some tear.

The factors that significantly reduce the risk of episiotomy are: mothers short stature, women not being in formal employment, and those being pregnant for the first time. The relative risk of episiotomy is low for women with past obstetric complications, those who are anaemic, those who suffered other forms of illness during pregnancy, teenage mothers and those women aged over 30 years. This is probably due to the fact that such women are more likely to give birth to babies with low birth weights who may be delivered normally without any surgical operation.

### 4.8.3 Levels and Risk Factors of Vacuum Delivery

Vacuum deliveries are usually done when there is prolonged labour and a woman is too exhausted to make the final effort to push the baby out. Signs of foetal distress can also necessitate the use of vacuum delivery. Of the sample respondents in this study, 6 percent were delivered by vacuum extraction. Table 4.10.0 shows the percent distribution of respondents with vacuum extraction by various maternal background characteristics.

An examination of Table 4.10.0, shows that of all the respondents with vacuum delivery, the percentage is higher for: mothers aged below 20 years (50.0%), single mothers (53.8%), rural residents (70%), primiparous mothers (52.8), mothers who are not in formal employment (44.3%), those who suffered from some form of illness during current pregnancy (86.1%), and those who never utilised prenatal services (58.3%).

**Table 4.10.0: Percent Distribution of Respondents with Vacuum delivery by Selected Background Characteristics (N=87)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 50 | Brick/Stone | 15.3 |
| 21-30 | 16.7 | Clay/Wood etc. | 84.7 |
| 31+ | 33.3 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 53.8 | Piped | 29.2 |
| Ever married | 47.2 | Other | 70.8 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 30 | Suffered | 51.4 |
| Rural | 70 | Never Suffered | 49.6 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 70.8 | Available | 23.6 |
| Secondary + | 29.2 | Not Available | 76.4 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 72.9 | Visited | 41.7 |
| Employed/Business | 27.1 | Never visited | 58.3 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 37.5 | Suffered | 86.1 |
| Self | 18.1 | Not Suffered | 13.9 |
| Other | 44.4 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 6.9 | Wanted | 50 |
| Non-motorized | 93.1 | Never Wanted | 50 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 27.8 | Yes | 25.0 |
| No | 72.2 | No | 75.0 |
| **Parity** | | **Contraception** | |
| 0 | 52.8 | Ever used | 20.8 |
| 1-4 | 18.1 | Never Used | 79.2 |
| 5+ | 29.2 | | |

Source: Computed from 1997 Field Survey Data.

In order to establish the risk factors of vacuum delivery, a case-control logistic regression analysis was conducted between maternal background characteristics and a dichotomous dependent variable in which mothers who had vacuum deliveries were coded 1 and those with normal delivery were coded 0. The results of this analysis are presented in Table 4.10.1.

**Table 4.10.1: Factors Contributing to Vacuum Deliveries Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -2.6239 | 0.0725*** |
| Mothers Residence (urban) | -2.0499 | 0.1287** |
| Past Miscarriage (yes) | 1.0759 | 2.9326 |
| Illness During Current pregnancy (yes) | -0.2102 | 0.8104 |
| Mothers Education Level (secondary+) | 0.1136 | 1.1203 |
| Anaemia During Current Pregnancy (yes) | -0.6264 | 0.5345 |
| Mode of Transport (motor vehicle) | -2.8619 | 0.0572*** |
| House Wall Material (brick/stone) | -1.6610 | 0.1899* |
| Availability of Garbage Dump (yes) | -2.6875 | 0.0681*** |
| Utilization of Ante-Natal Clinic (yes) | 0.8936 | 2.4438 |
| Contraception (ever used) | -1.5991 | 0.2021*** |
| Source of Domestic Water (piped) | 1.1546 | 3.1728 |
| Mothers Occupation (Not working) | -0.9222 | 0.3976 |
| Mother' Height in cm (less than 155 CM) | 1.8244 | 6.1990*** |
| Age of Mother (less 20) | 1.4868 | 4.4231* |
| Age of Mother (more than 30 years) | 0.7238 | 2.0622 |
| Parity (primiparous) | -0.8752 | 0.4168 |
| Parity (5+) | 1.2047 | 3.3357 |
| Breadwinner (other) | 1.8225 | 6.1874* |

Dependent Variable 1 = had vacuum delivery, 0 = had normal delivery.
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Field Survey Data.

It is observed from Table 4.10.1. that the factor which significantly increases the risk of vacuum evacuation is maternal height of less than 155 cm. Mothers whose height is below 155 cm are 6.2 times more likely to have vacuum evacuation compared to those whose height is more than 155 cm. Stunted stature makes womens' pelvises smaller, a factor that contributes to obstructed labour that may necessitate vacuum delivery. Further

examination of the Table reveals that the relative risk of vacuum evacuation is high among mothers with past experience of miscarriage whereby mothers with this experience are 2 times more likely to have vacuum delivery. Mothers who utilised pre-natal care are 2.4 times more likely to have vacuum delivery compared to those who never went for any prenatal care. This could imply that prenatal care which is regarded to be efficient helps to screen and detect impending danger and enables mothers to make early arrangements for specialised care in a facility that can offer vacuum delivery. Teenage mothers aged less than 20 years are also 4 times more likely to be delivered through vacuum extraction compared to those aged between 20 and 30 years. Similarly, mothers aged more than 30 years are more vulnerable to vacuum delivery compared to those aged 20 to 30 years. Mothers who are self reliant for their upkeep are 6 times more likely to be delivered through vacuum compared to those who depend for their upkeep upon spouses and relatives. This is probably because they are financially able to seek specialised services early making it possible for medical personnel to screen and detect the risky conditions and hence recommend surgical intervention. Poor mothers may in this case be dying before the evacuation is conducted.

On the other hand, the factors that significantly reduce the risk of vacuum evacuation are: women being single, urban residents, coming from well-to-do households, and having previously used contraceptives. The risk is relatively reduced for primiparous mothers.

## 4.9. Levels and Determinants of Sexually Transmitted Diseases

Sexually transmitted diseases (STD's) are diseases that are passed from one person to another through sexual intercourse. In some cases this impairs future fertility and even brings complications that may lead to maternal and perinatal death. The scope of involuntary childlessness and infecundity is not known in Kenya. For women in the developing countries, it often implies social stigma, divorce, or even physical abuse within the family as well as personal distress that failure to bear child can wreak (Acsadi *et.al.*, 1994). For this reason, screening of all pregnant women who go for ante-natal care has for long been advocated as an attempt to control the spread of STD's. Several factors have been found to contribute to a much higher incidence and prevalence of STD's among women as compared to men (van Dam, 1995). These include: biological, cultural, and socioeconomic factors. Biologically, women are more susceptible than men, as the vagina offers a larger mucosal surface and a more conducive environment for the growth of bacteria and protozoa. Culturally, women tend to marry or have sex with older men who usually are sexually more experienced, have had more partners, and are thus more likely to have become more infected.

In this study, the particulars of diseases were not included in the questionnaire, however, the data collected indicate that 10 percent of the respondents suffered from STD's. Table 4.11.0 shows the percent distribution of all respondents who had STD's by selected background characteristics.

**Table 4.11.0: Percent Distribution of Respondents with STD's by Selected Background Characteristics (N=145)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 64.7 | Brick/Stone | 23.3 |
| 21-30 | 28.4 | Clay/Wood etc. | 76.7 |
| 31+ | 6.9 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 54.3 | Piped | 50.9 |
| Ever married | 45.7 | Other | 49.1 |
| **Mother's Residence** | | **Location of Water Source** | |
| Urban | 50 | Within compound | 29.3 |
| Rural | 50 | Outside compound | 70.7 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 55.2 | Available | 19.8 |
| Secondary + | 44.8 | Not Available | 80.2 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 87.9 | Visited | 31.0 |
| Employed/Business | 12.1 | Never visited | 69.0 |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 18.1 | Wanted | 52.6 |
| Non-motorized | 81.9 | Never Wanted | 47.4 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 26.7 | Yes | 17.2 |
| No | 73.3 | No | 82.8 |
| **Parity** | | **Contraception** | |
| 0 | 64.7 | Ever used | 31.9 |
| 1-4 | 33.6 | Never Used | 68.1 |
| 5+ | 1.7 | | |

Source: Computed from 1997 Field Survey Data.

An examination of Table 4.11.0 shows that among those respondents who had STD's, the percentage was higher for mothers aged less than 20 years, for those pregnant for the first time, those who are in formal employment, for those who never visited antenatal clinic, and for those who had not used any modern contraceptive method.

A case control logistic regression analysis was conducted between various maternal background characteristics as independent variables and a dichotomous dependent variable of whether or not the respondents had STD's. The results are presented in Table 4.11.1 . The factors that positively affect occurrence of STD's in mothers are past poor obstetric history, low levels of maternal education, maternal unemployment, age of mother and

parity. Mothers with past intrauterine deaths are likely to have STD's compared to those who have none. Mothers who utilised prenatal services are likely to have had an STD. This is probably due to screening which enables prompt diagnosis. Mothers who are not in formal employment, and those aged more than 30 years, are at more risk of having an STD compared to their counterparts.

Factors that have a negative effect on STD's include: being single, urban residence, being self reliant for upkeep and mothers aged below 20 years and those of parity 5 and above. The findings show that the risk of STD's is higher among married women than single women, women in their most active reproductive life compared to those in their early and late years. Studies done elsewhere (van Dam, 1995; WHO, 1993) have indicated that factors which contribute to a high incidence of STD's among women are, to a large extent, related to economic and social gender inequalities. In most parts of the world, women have little or no control over decisions leading to sexuality, nor sexual behaviour of their male partners or the use of condoms for prevention of STD's. Stigmatisation, and in some cases, cultural unacceptability of undergoing a genital examination, impedes appropriate health care seeking behaviour, while at times adequate clinical services for diagnosis and treatment may not be available for those who seek heath care for a genital complaint.

**Table 4.11.2 : Factors Contributing to STD's Among Pregnant Mothers in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -1.3962 | 0.2475** |
| Mothers Residence (urban) | -0.2672 | 0.7655 |
| Past Miscarriage (yes) | 0.4797 | 1.6155* |
| Past Still-Births (yes) | 0.5309 | 1.7004 |
| Mothers Education Level (secondary+) | -0.3154 | 0.7295* |
| Wanted Current Pregnancy (yes) | 0.2291 | 1.2575 |
| Mode of transport (motor vehicle) | -0.9501 | 0.3867*** |
| House Wall Material (brick/stone) | -1.0118 | 0.3636*** |
| Availability of Garbage Dump (yes) | 0.4411 | 1.5544 |
| Utilization of Ante-Natal Clinic (yes) | 0.8639 | 2.3783* |
| Contraception (ever used) | -0.0415 | 0.9594 |
| Whether Booked Delivery (yes) | -1.1789 | 0.3076** |
| Mothers' Height in cm (less than 155 cm ) | 0.1062 | 1.1121 |
| Mothers Occupation (Not working) | 0.6005 | 1.8230 |
| Age of Mother (less 20) | -0.2667 | 0.7659 |
| Age of Mother (more than 30 years) | 0.2399 | 1.2711 |
| Parity (primiparous) | 0.2746 | 1.3160 |
| Parity (5+) | -0.3024 | 0.7390 |
| Breadwinner (self) | -0.1491 | 0.8615 |

Dependent variable, 1 = had STD's, 0 = had no STD's.
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Field Survey Data.

Even though HIV/AIDS is known to adversely affect pregnancy outcome by raising the incidence of abortions, stillbirths and premature births, data on its prevalence was not collected. This is because it is not routinely collected and tests can only be conducted when patients give consent. In addition, the health centres that were sentinel facilities do not have AIDS screening equipment.

## 4.10. Levels and Risk Factors of Maternal Mortality

Maternal mortality is among the leading causes if not the leading cause of death among women in reproductive years in the developing world. About 1.6 percent of respondents in the selected health facilities died of obstetric related causes in the course of data collection. This gives a health facility maternal mortality ratio of 1882 deaths per 100,000 live births. There are, however, some limitations to this estimate based on health service data, which tend to be high. One is that the proportion of births which take place in a health facility is small and it is difficult to know the true number of live births that took place. A large number of women who deliver in hospitals are emergency admissions who had intended to give birth at home but were transported to hospital when they developed life threatening conditions. From the sample, 61.1 percent of the cases were not booked deliveries compared to 38.9 percent who had booked. Women who gave birth safely at home do not therefore appear in the denominator when calculating maternal mortality ratio. However, the information obtained gives valuable insights on the major risk factors associated with maternal deaths in the study area. Table 4.12.0 shows the distribution of maternal deaths by background characteristics.

Of those mothers who died due to obstetric related conditions, the percentage was higher for the respondents aged below 20 years, single mothers compared to married mothers, those who were pregnant for the first time compared to multipara, those respondents who had primary level of education and below, those who were not employed in formal jobs, those who came from poor socio-economic backgrounds as indicated by

poor housing, lack of piped water. Similarly, the percentage is higher for those who never utilised antenatal medical care and those who were sick during the current pregnancy.

**Table 4.12.0: Percent Distribution of Maternal Deaths by Selected Background Characteristics (N=23)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 65.2 | Brick/Stone | 26.1 |
| 21-30 | 30.4 | Clay/Wood etc. | 73.9 |
| 31+ | 4.3 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 69.6 | Piped | 47.8 |
| Ever married | 30.4 | Other | 52.2 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 47.8 | Suffered | 78.3 |
| Rural | 52.2 | Never Suffered | 21.7 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 65.2 | Available | 30.4 |
| Secondary + | 34.8 | Not Available | 69.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 91.3 | Visited | 21.7 |
| Employed/Business | 8.7 | Never visited | 78.3 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 21.7 | Suffered | 73.9 |
| Self | 17.4 | Not Suffered | 26.1 |
| Other | 60.9 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 17.4 | Wanted | 39.1 |
| Non-motorized | 82.6 | Never Wanted | 60.9 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 8.7 | Yes | 8.7 |
| No | 91.3 | No | 91.3 |
| **Parity** | | **Contraception** | |
| 0 | 73.9 | Ever used | 4.3 |
| 1-4 | 21.7 | Never Used | 95.7 |
| 5+ | 4.3 | | |

Source: Computed from 1997 Survey Data.

In order to establish the major risk factors of maternal mortality in Kisumu district, a case-control logistic regression was conducted. The dependent variable was dichotomous categorical variable indicating 1 if the respondent died, and 0 if the respondent never died. The independent variables were various background

characteristics considered to play a role in determining pregnancy outcome. The results of this regression are presented in Table 4.12.1.

**Table 4.12.1: Factors Contributing to Maternal Deaths in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | 1.1875 | 3.2788* |
| Mothers Residence (urban) | -0.1909 | 0.8262 |
| Past Miscarriage (yes) | 0.4149 | 1.5142 |
| Past Still-Births (yes) | 0.5274 | 1.6945 |
| Mothers Education Level (secondary+) | -0.5156 | 0.5972 |
| Anaemia During Current Pregnancy (yes) | 2.5434 | 12.7206*** |
| Mode of Transport (motor vehicle) | -0.5795 | 0.5602 |
| House Wall Material (brick/stone) | -0.4962 | 0.6088 |
| Availability of Garbage Dump (yes) | -0.4460 | 0.6402 |
| Utilization of Ante-Natal Clinic (yes) | -0.0173 | 0.9828 |
| Illness During Pregnancy (yes) | 1.7989 | 6.0429** |
| Contraception (ever used) | -0.1855 | 0.8337 |
| Whether Booked for Delivery (no) | 0.0426 | 1.0436 |
| Mothers Height in cm (less than 155 cm) | 0.0053 | 1.0053 |
| Source of Domestic Water (piped) | -0.3149 | 0.7299 |
| Mothers Occupation (not working) | 1.5240 | 4.5906* |
| Age of Mother (less 20) | 1.3273 | 3.7710 |
| Age of Mother (more than 30 years) | -0.7785 | 0.4591 |
| Parity (primiparous) | 0.8787 | 2.4078 |
| Parity (5+) | 0.8787 | 1.3006 |
| Breadwinner (self) | -1.8742 | 0.1535** |

Dependent variable, 1 = maternal death, 0 = mother never died.
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed From 1997 Field Survey Data.

The analysis presented in Table 4.12.1 reveals that the risk of maternal mortality is significantly higher for women who suffered anaemia during pregnancy and those who suffered from other illnesses during pregnancy. Mothers who suffered from anaemia during pregnancy are 12.7 times more likely to die from obstetric related complications compared

to those who were not anaemic. These results are supported by research done elsewhere which indicates that women in their reproductive years require three times as much iron per day as do adult men (Royston and Armstrong, 1989). However, very few women are able to get as much as they need, and hence the higher rates of anaemia. Because anaemia has been found to starve the body of oxygen, it makes women tired and restless, and also increases the danger of haemorrhage and other complications in childbirth. This also explains why mothers who were ill during current pregnancy are 6 times more likely to die compared to those who were never sick. The relative risk of maternal death is also high for women who are single, who have poor past obstetric history, whose height is less than 155 cm, those who not in formal employment, teenage mothers and primiparous and grand multipara. Single mothers are 3.3 times more likely to die from obstetric related complications compared to married mothers. Mothers with past obstetric related complications of miscarriage and still-births are 1.5 and 1.7 times more likely to die from obstetric related causes compared to their counterparts who have no past obstetric complications..

Parity is also a major risk factor for maternal mortality. Mortality is lowest for parity two, three and four and highest for those with no children and those with five or more children. This is probably because women who have not born any children may be immature, a potential factor to complications in pregnancy and delivery. Some studies have established that it is not parity alone that is a risk factor but rather parity in conjunction with age ( Acsadi and Johnson-Acsadi, 1986; Rinehart and Kols, 1984). Lastly, maternal occupation plays a role in determining mortality since mothers who are not engaged in formal jobs are 4.6 times more likely to die of obstetric complications compared to those

who are either in formal employment or engaged in business activities. This is probably related to their social status since those who are not in formal jobs may not have the opportunity and income to decide on their diet, when to rest and if and when to seek care from appropriate health facilities.

The variables with a negative effect on maternal deaths include: urban residence and high level of maternal education of at least secondary school and above. Respondents who come from well-to-do families with good housing, access to motorised mode of transport and those who utilised ante-natal services are less vulnerable to maternal mortality.

## 4.11. Chapter Summary

This chapter has revealed that maternal health in Kisumu district is plagued with a myriad of problems which at worst lead to untimely and avoidable death. The most common obstetric related complications reported amongst mothers who delivered in the four sentinel facilities during six months of field survey are: anaemia in pregnancy, haemorrhage, obstructed labour, operative deliveries, sexually transmitted diseases, hypertensive related disease of pregnancy, abortion and maternal mortality. Statistical analysis of the data reveals that all the reported complications are a consequence of a combination of many factors which include: physiological, demographic environmental and socioeconomic disadvantages of both the mother and their respective dwellings.

Young maternal age is not associated with the risk of most of the obstetric related complications reported in the study area such as pre-eclampsia, anaemia, hemorrhage, operative deliveries and neonatal health problems. Young age seem to

be a significant risk factor in vacuum delivery and maternal deaths which were relatively few in terms of magnitude. Whilst this finding does not corroborate observations from other biomedical researches in the past, it supports the notion of developmental superiority of teenagers for childbearing that has been propounded by early researchers (Dwyer, 1974, Merrit *et. al*, 1980, Rothenberg *et al.* 1981, Geronimus, 1987). This study has shown that socioeconomic and environmental factors are the most important determinants of pregnancy outcome in Kisumu district. A woman whose health is not sound from the onset of pregnancy is likely to suffer multiple health problems. The physiological demands of pregnancy further superimpose themselves on the mother and hence affect pregnancy outcome. What this implies for policy formulation is that prevention of pregnancy during adolescence alone would be inappropriate policy because unlike reproductive immaturity, this disadvantage may not be expected to disappear as a woman in a high risk population grows in age. The disadvantage is likely to remain and possibly worsen with increasing age.

High maternal age is very risky as it relates to reproduction. Old mothers with high parities are more likely to experience most reproductive health problems which include: eclampsia, severe anaemia, prolonged labour, cesarean deliveries, vacuum extraction and infection with sexually transmitted diseases. This could imply two things; One, although older women with their advantage of years are perhaps more 'established' and experienced to provide appropriately for their health requirements during pregnancy, the decline in stamina due to previous births and heavy workload that accompany old age effectively affect their health capability. On the other hand,

aging as it relates to childbearing may not be thought of as a process of biological maturation and deterioration but rather an indicator of length of exposure to the life conditions that undermine health status in case of mothers from low socioeconomic group.

Maternal infection during pregnancy has been found to have adverse effects on pregnancy leading to many complications. The infections reported mostly were malaria and sexually transmitted diseases. Variations by socioeconomic status have been observed in the prevalence in these infections especially malaria and STD's which are more prevalent among the low income population whose economic and environmental conditions are favorable for the spread and transmission of such infections.

Past poor obstetric history of mother particularly experience of miscarriage and still-births is a common risk factor in most complications experienced in the study area. Specifically, mothers who have had a miscarriage or a still-birth in the past are more likely to experience many reproductive morbidity's including the possibility of dying from obstetric complications. This implies that the conditions that may have led to the past obstetric complications amongst these mothers may still be present.

Nutritional status of the mother before and during pregnancy has been proved to have an effect on pregnancy outcome. Long term malnutrition could be responsible for maternal stunted growth which exposes most mothers to many obstetric complications such as obstructed labour. The latter often leads to operative deliveries. Maternal malnutrition during pregnancy has also been associated with retarded fetal growth which leads to low birth weights and still births amongst mothers. Malnutrition is also believed to heighten a woman's susceptibility to infections and their sequalae.

Since maternal malnutrition is usually a result of low socioeconomic status, it implies that socioeconomic conditions are responsible for most maternal health problems experienced in Kisumu district.

Mothers who utilize the existing health facilities for prenatal care are less likely to suffer from any obstetric complication. Unfortunately, such services are not offered equally to all pregnant women as a matter of public health policy. Some mothers may not afford to pay consultation fees while others may for a variety of reasons not see the need to go for prenatal services.

Education of the mother has been found to have an impact on pregnancy outcome. Higher education levels especially of secondary school level and above increases ability for a woman to benefit from health information, make use of health services and follow health instructions. The participation of women in formal employment which in turn increases their autonomy is also partially linked to their levels of education. This finding suggests the need to make continuos effort to promote universal education for women and reduce any temptations that make girls to drop out of school early.

Female autonomy is a major risk factor to most reproductive health problems experienced in Kisumu district. Two indicators were used to measure autonomy that is; occupation and major breadwinner, In general, a greater percentage of women interviewed were not in formal employment. The majority were either farmers or housewives who, therefore, depend on either their spouses or parents for their upkeep. Poverty has some influence on health because it means less money is available to purchase nutritious foods. Substandard living conditions indicated by poor housing,

deficient standards of hygiene, unhealthy sources of water, lack of garbage collection services expose the population to diseases thus making childbearing more risky.

The findings here also indicate that maternal morbidity and mortality are typically lowest at parities two, three and four, and highest for primiparous and multiparous women. A possible reason for this is that women who have not previously borne a child are often too young and physiologically immature, a factor that complicates pregnancy and delivery. Older women are also more likely to have had many children and to have incurred health problems. Thus, each successive higher order pregnancy and birth carries increasingly greater health and mortality risks. Maternal reproductive health problems experienced in Kisumu district may therefore be said to result from a complex web of causes that require an integrated approach to effectively handle the situation.

# CHAPTER FIVE

# RESULTS AND DISCUSSION

# DETERMINANTS OF PERINATAL HEALTH IN KISUMU DISTRICT

## 5.0. Introduction

At no other age is life so tenuous and the risk of death so great as in the perinatal period. Perinatal health reflects both the health of the woman and the quality of care during pregnancy, delivery and neonatal period (Walsh *et. al,* 1993). Research has indicated that a large proportion of infant deaths and disabilities have their origin in the perinatal period (WHO, 1986). This chapter presents findings on the levels and determinants of the perinatal heath problems that were observed during delivery and follow-up home visits made in the first week of birth in Kisumu district. Specifically, the chapter examines birthweights, foetal deaths, early neonatal mortality and morbidity.

## 5.1. Levels and Risk Factors of Low Birth Weights

The birth weight of an infant is the single most important determinant of the survival of the new-born (WHO, 1992). Low birth-weight is defined by WHO for international comparison as that less than 2,500 gms irrespective of the gestation period. Past studies indicate that birth weight is governed by two major processes; duration of gestation and intrauterine growth rate (WHO, 1992). Low birth weight is, therefore, caused by either a short gestation period or retarded intrauterine growth or combination of both. When gestation lasts less than thirty-seven weeks, the infant is considered pre-term.

Intrauterine growth retardation is also called "small-for-gestation-age". In this study there is no distinction between pre-term infants and those due to intrauterine retarded growth since both are treated as low birthweights.

Out of the total number of respondents interviewed in this study, 42 percent had low birth weights. Table 5.1.0 shows the distribution of respondents with low birth weight by selected background characteristics.

**Table 5.1.0: Percent Distribution of Respondents with Low Birthweights by Selected Background Characteristics (N=611)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 39.0 | Brick/Stone | 23.1 |
| 21-30 | 36.4 | Clay/Wood etc. | 76.9 |
| 31+ | 24.6 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 69.2 | Piped | 36.8 |
| Ever married | 30.8 | Other | 63.2 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 37.2 | Suffered | 46.1 |
| Rural | 62.8 | Never Suffered | 53.9 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 65.9 | Available | 31.2 |
| Secondary + | 34.1 | Not Available | 68.6 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 85.3 | Visited | 66.1 |
| Employed/Business | 14.7 | Never visited | 33.9 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 55.8 | Suffered | 80.2 |
| Self | 16.7 | Not Suffered | 19.8 |
| Other | 27.5 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 11.6 | Wanted | 68.4 |
| Non-motorized | 88.4 | Never Wanted | 31.6 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 25.8 | Yes | 17.8 |
| No | 74.2 | No | 82.2 |
| **Parity** | | **Contraception** | |
| 0 | 42.1 | Ever used | 31.8 |
| 1-4 | 35.1 | Never Used | 68.2 |
| 5+ | 22.7 | | |

Source: Computed from 1997 Survey Data.

The data shows that the percent was slightly higher for those whose age was below 20 years (39.0%), single mothers (69.2%), rural residents (62.8%), those pregnant for the first time (42.1%), those with primary level of education and below (65.9%), those from low socio-economic status who were either not in formal employment or business, and those who were anaemic and ill during current pregnancy.

In order to establish the net effect of various socioeconomic and demographic characteristics on low birth weight in the study area, a case-control logistic regression analysis was conducted between these variables and low birth weight . The results of this analysis are presented in Table 5.1.1. It is observed that the risk of low birth-weight is significantly high for mothers with past miscarriage and still-births who have odds ratios of 2.0, and 2.1, respectively. Similarly the probability of low birth weight is significantly high for mothers who of high parity and those who were anaemic. The relative risk of low birth weight is higher for: single mothers, women who ill while pregnant, those who are stunted, and teenagers.

The factors that reduce chances of having low birth-weight include urban residence for mother, high level of maternal education, high socio-economic status, previous utilization of prenatal consultation services, and past use of contraception. These results corroborate early studies (WHO, 1992; Walsh *et.al,* 1993) which conclude that important risk factors of low birth-weight include: socio-economic status, maternal height, parity, history of previous low birth-weight, general morbidity and episodic illness during pregnancy, reproductive tract infections and malaria during pregnancy. What comes out clearly is that any behaviour or incidence that compromises the health of the mother during

pregnancy is likely to lead to retardation of intrauterine growth and subsequently to low birth-weight.

**Table 5.1.1: Factors Contributing to Low Birthweight in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | 0.0566 | 1.0582* |
| Mothers Residence (urban) | -0.4649 | 0.6282 |
| Past Miscarriage (yes) | 0.7081 | 2.0301*** |
| Past Still-Births (yes) | 0.7934 | 2.2108*** |
| Mothers Education Level (secondary+) | -0.3065 | 0.7360* |
| Anaemia During Current Pregnancy (yes) | 0.8203 | 3.4403** |
| Mode of Transport (motor vehicle) | -0.6060 | 0.5455** |
| House Wall Material (brick/stone) | -0.2358 | 0.7900 |
| Availability of Garbage Dump (yes) | -0.9412 | 0.3901** |
| Utilization of Ante-Natal Clinic (yes) | -1.4336 | 0.2384** |
| Illness During Current Pregnancy (yes) | 0.0454 | 1.0464 |
| Contraception (ever used) | -0.2808 | 0.7552* |
| Source of Domestic Water (piped) | -0.0731 | 0.9295 |
| Wanted to currently pregnant (yes) | -0.3110 | 0.7327 |
| Mothers' Height in CM (less than 155 cm) | 0.1398 | 1.8695* |
| Mothers Occupation (Not working) | 0.2596 | 2.7713* |
| Age of Mother (less 20) | 0.0268 | 1.0271 |
| Age of Mother (more than 30 years) | -0.0183 | 0.9819 |
| Parity (primiparous) | -0.1734 | 0.8408 |
| Parity (5+) | 1.0288 | 2.7977*** |
| Breadwinner (self) | -0.1347 | 0.8740 |

Dependent variable: 1 = less than 2500 gms 0 = more than 2500 gms.
* significant at 0.1; ** significant at 0.05; *** significant at 0.001.
Source: Computed from 1997 Survey Data.

## 5.2. Levels and Determinants of Still births

Data collected in this study indicate that 11 percent of births delivered were still-born. These data, however, are not detailed enough to explain the causes of still births. However, research studies done elsewhere have shown that major causes of still births

include: infection of amniotic fluid, congenital explictis, abruptio placentae, compression of umbilical cord, premature rapture of membranes, obstructed labour, birth trauma and congenital malformations (Walsh et al, 1993).

**Table 5.2.0: Percent Distribution of Respondents with Still-births by Selected Background Characteristics (N=168)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 41.5 | Brick/Stone | 15.1 |
| 21-30 | 20.8 | Clay/Wood etc. | 84.9 |
| 31+ | 37.7 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 64.2 | Piped | 24.5 |
| Ever married | 35.8 | Other | 75.5 |
| **Mother's Residence** | | **Malaria During Pregnancy** | |
| Urban | 24.5 | Suffered | 54.7 |
| Rural | 75.5 | Never Suffered | 45.3 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 71.7 | Available | 24.5 |
| Secondary + | 28.3 | Not Available | 75.5 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 90.6 | Visited | 20.8 |
| Employed/Business | 9.4 | Never visited | 79.2 |
| **Breadwinner** | | **Illness During Pregnancy** | |
| Spouse | 52.8 | Suffered | 88.7 |
| Self | 11.3 | Not Suffered | 11.3 |
| Other | 35.8 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 9.4 | Wanted | 64.2 |
| Non-motorized | 90.6 | Never Wanted | 35.8 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 67.9 | Yes | 66.0 |
| No | 32.1 | No | 34.0 |
| **Parity** | | **Contraception** | |
| 0 | 47.2 | Ever used | 26.4 |
| 1-4 | 22.6 | Never Used | 73.6 |
| 5+ | 30.2 | | |

Source: Computed from 1997 Survey Data.

The distribution of respondents with cases of stillbirths by selected socio-economic characteristics is shown in Table 5.2.0. It may be observed from this table that among those respondents who had still-births, the percent is highest for teenage mothers, low for those aged 21 - 30, and rising again for those aged above 30 years. The percentage of still birth is also high for single mothers, rural residents, and those who have history of miscarriage. It is also high for those who are primiparous, those with low levels of education, those who are not in formal employment hence dependant upon others for financial support and those who never visited prenatal clinic for consultations while pregnant. The percentage is similarly higher among mothers in poor environmental conditions such as poor housing, lack of piped water, those with no garbage dumping facilities. Finally, it is high among mothers who suffered an illness during pregnancy and who have never used any contraception.

To assess the net effect of each of the above factors on stillbirths in the study area, a case-control logistic regression analysis was conducted the results of which are presented in Table 5.2.1. The risk of stillbirths is significantly high amongst women who have poor obstetric history, those who are anaemic, and those of high parities. For instance, mothers who suffered past reproductive complication through a miscarriages are 5.9 times more likely to have a stillbirths compared to those who never suffered any. On the other hand, mothers who have had stillbirths in the past are 29.6 times more likely to be victims of yet another still birth compared to those who had not experienced any stillbirth in the past. Maternal health during pregnancy also plays a role in determining the risk of still births. Mothers who were ill, anaemic and those who suffered antepartum haemorrhage are shown to be more vulnerable to the risk of still birth compared to their counterparts. Mothers

residing in urban areas are 2.2 times more likely to have a still birth compared to their rural counterparts. This probably could be due to the possibility of under-reporting of still births in the rural areas especially those that take place out of a health facility. Alternatively, this pattern could imply the declining standards of living in the urban centres leading to common cases of infection and malnutrition. High maternal age and high parity of 5 children and above are also seen to increase the risk of still birth among mothers in Kisumu district.

**Table 5.2.1: Factors Contributing to Mothers Having Stillbirths in Kisumu District**

| VARIABLE | B | odds ratio |
|---|---|---|
| Marital Status (single) | -2.3415 | 0.0962 |
| Mothers Residence (urban) | 0.7821 | 2.1860 |
| Past Miscarriage (yes) | 1.7800 | 5.9300* |
| Past Still-Births (yes) | 3.3879 | 29.6038*** |
| Mothers Education Level (secondary+) | -0.2067 | 0.8133 |
| Anaemia During Current Pregnancy (yes) | 1.2166 | 3.3758* |
| Mode of Transport (motor vehicle) | -1.6002 | 0.2019** |
| House Wall Material (brick/stone) | 0.0122 | 1.0123 |
| Availability of Garbage Dump (yes) | -0.0096 | 0.9904 |
| Utilization of Ante-Natal Clinic (yes) | -0.2971 | 0.7430 |
| Illness During Pregnancy (yes) | 2.5341 | 12.5800*** |
| Whether Suffered Antepartum Hemorrhage (yes) | 1.1876 | 3.2791 |
| Contraception (ever used) | -2.1374 | 0.1180** |
| Wanted Current Pregnancy? (yes) | -1.0720 | 0.3423* |
| Mothers Height in cm (less than 155 cm) | -0.0094 | 0.9906 |
| Source of Domestic Water (piped) | -1.0057 | 0.3658 |
| Mothers Occupation (Not working) | -1.2320 | 0.2917 |
| Age of Mother (less 20) | -1.3844 | 0.2505* |
| Age of Mother (more than 30 years) | 2.9722 | 19.5355* |
| Parity (primiparous) | -1.0851 | 0.3379 |
| Parity (5+) | 0.1963 | 1.2169 |
| Breadwinner (self) | -0.2164 | 0.8054 |

Dependent Variable, 1 = Had a Stillbirth, 0 = Had a normal birth.
* is significant at 0.1; ** is significant at 0.05 *** significant at 0.001.
Source: Calculated From 1997 Field Survey Data.

The analysis also reveals that women who are single, those who have attained secondary level of education and above, those from well-to-do families with access to motorised transport, garbage dumping facilities, have reduced chances of having stillbirths.

Utilisation of ante-natal services while pregnant, knowledge and past use of contraceptives, desire to be currently pregnant and being self dependent for upkeep all combine to reduce the risk of exposure to stillbirth. All these factors point to the need for improved social status of women that will enhance their ability to decide when to seek medical care and when to be pregnant.

## 5.3. Levels and Determinants of Early Neonatal Death

Early neonatal death describes mortality to live-born children in the first seven days of life. In most cases, what happens to neonates during this first week of life is linked to the environment of the foetus in the womb and the things that happen during or immediately after birth (WHO, 1986). The incidence of morbidity and mortality among neonates has not yet attracted adequate research attention. However, a study done in a Madras Maternity Hospital showed that with efficient obstetric and paediatric care, 20 percent of the babies born suffered some illness during neonatal period out of which 4 percent died. The most common causes for the death were: low birth weight, infections, asphyxia and obstetric injuries (Thirugnanamsabandham *et. al,* 1986).

In the current study, 9 percent of infants born alive died before attaining the seventh day. Of those who died, 54 percent was due to pre-maturity, 23 percent due to congenital malformations, 13 percent died of unknown causes while 10 percent died due to respiratory problems. Most of these problems could have been avoided if early screening and referral had been done. Table 5.3.0 shows the percent distribution of early neonatal death by selected background characteristics.

**Table 5.3.0: Percent Distribution of Early Neonatal Deaths by Selected Background Characteristics (N=131)**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 54.7 | Brick/Stone | 15.8 |
| 21-30 | 25.3 | Clay/Wood etc. | 84.2 |
| 31+ | 20.0 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 44.2 | Piped | 24.2 |
| Ever married | 58.8 | Other | 75.8 |
| **Mother's Residence** | | **Illness during Pregnancy** | |
| Urban | 27.4 | Suffered | 71.6 |
| Rural | 72.6 | Never Suffered | 28.4 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 61.1 | Available | 25.3 |
| Secondary + | 38.9 | Not Available | 74.6 |
| **Mothers Occupation** | | **Birth Weight** | |
| Not working | 88.0 | Less than 2500 gms | 90.5 |
| Employed/Business | 12.0 | More than 2500 gms | 9.5 |
| **Bread Winner** | | **Anaemia During Pregnancy** | |
| Spouse/other | 87.4 | Suffered | 23.2 |
| Self | 12.6 | Not Suffered | 76.8 |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 7.4 | Wanted | 53.7 |
| Non-motorized | 92.6 | Never Wanted | 46.3 |
| **Ever Miscarried** | | **Ever Had a Still-Birth** | |
| Yes | 26.3 | Yes | 15.8 |
| No | 73.7 | No | 84.2 |
| **Parity** | | **Whether Premature Baby** | |
| 0 | 52.6 | Yes | 58.9 |
| 1-4 | 21.1 | No | 41.1 |
| 5+ | 26.3 | | |

Source: Computed from 1997 Survey Data.

Among the infants who died during the early neonatal period, the percentage is higher for those whose mothers are married, reside in the rural areas, have low levels of education, and come from poor environments with semi-permanent houses with no garbage disposal facilities. The percent is also high for infants who were prematurely

born, had low birth weights, were first born and those whose mothers were aged below 20 years and depended on their spouses or other people for daily upkeep. In order to identify the major risk factors of early neonatal mortality in the area, a case-control logistic regression analysis was conducted between a dichotomous dependent variable (where 1= neonatal death, and 0 = neonate alive). The results are presented in Table 5.3.1.

**Table 5.3.1: Factors Contributing to Neonatal Deaths in Kisumu District**

| VARIABLE | B | Odds ratio |
|---|---|---|
| Marital Status (single) | 0.3196 | 1.3765 |
| Mothers Residence (urban) | -1.4006 | 0.2465** |
| Past Miscarriage (yes) | 1.7731 | 5.8892*** |
| Past Still-Births (yes) | 2.8835 | 17.8774*** |
| Mothers education level (secondary+) | -0.0591 | 0.9426 |
| Anaemia During Current Pregnancy (yes) | 2.5954 | 13.4007*** |
| House Wall Material (brick/stone) | -1.2506 | 0.2863* |
| Availability of garbage dump (yes) | -2.0399 | 0.1300*** |
| Illness During Current Pregnancy (yes) | 0.7903 | 2.2041 |
| Contraception (ever used) | -0.9564 | 0.3843 |
| Wanted Current Pregnancy? (yes) | -0.2578 | 0.7728 |
| Bread-Winner (Self) | -3.6535 | 0.0259*** |
| Mothers Height in cm (less than 155 cm) | -0.4920 | 0.6114 |
| Source of Domestic Water (piped) | -1.4716 | 0.2296* |
| Mothers Occupation (Not working) | 0.8648 | 2.3745 |
| Age of Mother (less 20) | 0.5063 | 1.6592 |
| Age of Mother (more than 30 years) | 1.7416 | 5.7066** |
| Parity (primiparous) | 0.4040 | 1.4978 |
| Parity (5+) | 2.9968 | 20.0218*** |
| Whether Premature Baby (yes) | 1.0988 | 3.0007 |

Dependent Variable 1 = neonatal death, 0 = neonate alive.
* is significant at 0.1; ** is significant at 0.05; *** significant at 0.001.
Source: Calculated from 1997 Survey Data.

The risk of early neonatal mortality in Kisumu district is significantly high for babies born to women with past obstetric losses, anaemic mothers, mothers aged over 30 years, and those of high parities. Babies born to mothers who have a poor obstetric history of abortion and still births are 5.9 and 17.9 times more likely to die during early neonatal period, respectively compared to their counterparts. A possible explanation is

that the mothers of such babies have a higher risk of giving birth to low birth weights and premature babies who are inherently weak and therefore more vulnerable to infection and subsequently death. Infants born to mothers who were anaemic are 13.4 times more likely to die at neonatal period compared to those whose mothers were not anaemic. This probably is because such infants are likely to be under-weights and at the same time their malnourished mothers may not be in a position to adequately breast-feed them. Maternal age is also a risk factor since data suggests that infants born to teenagers and old mothers are at higher risk of dying during the neonatal stage compared to those born to mothers aged 20 to 30 years old. Babies born to single mothers are 1.5 times more likely to die during the neonatal period compared to those born to married mothers. Prematurely born infants are 3.0 times more likely to die at the neonatal stage compared to those who completed their full term. This is probably because premature babies are comparatively weaker and easily susceptible to infection thus raising their chances of death if proper neonatal care is not provided.

Factors that reduce the risk of early neonatal mortality include: urban residence for mothers, high maternal education, good sanitary conditions for instance quality housing, access to piped water, and improved economic status for women which makes them self reliant rather than depend upon their spouses or other people. This finding further supports the idea that female education, autonomy, improved economic status can play a significant role in improving womens' health and the survival chances of their infants.

## 5.4: Levels and Determinants of Early Neonatal Morbidity

In order to establish the health conditions of the neonates, respondents were visited in their respective homes seven days after delivery and asked questions pertaining to the condition of their newly born babies. Of the total live-births, 43.7 percent were reported to be sick. Out of this, 78.5 percent had developed respiratory problems, 30 percent had developed fever, while the remaining 8.6 percent had other minor complications. Table 5.4.0 shows the percent distribution of all infants who were reported sick on their seventh day by selected characteristics.

Of all children found to be sick on the seventh day after delivery, the percentage was higher for those born to mothers residing in the rural areas, those whose mothers had low levels of education, those whose mothers were not in formal employment, those whose households had no access to piped water and garbage dumping facilities, those whose mothers had fallen sick while pregnant, infants whose birth-weight was below 2500 grams and babies whose mothers solely depended on other people for daily upkeep.

A case-control logistic multivariate regression analysis was conducted between a dichotomous dependent variable (where those infants reported sick were coded 1 and those who were not sick were coded 0) and various background characteristics considered independent variables. The results are presented in Table 5.4.1.

**Table 5.4.0: Percent Distribution of Infants Sick on Seventh Day after birth by Selected Background Characteristics**

| Variable | Percent | Variable | Percent |
|---|---|---|---|
| **Maternal Age** | | **Wall Material** | |
| Less than 20 years | 33.2 | Brick/Stone | 24.8 |
| 21-30 | 41.5 | Clay/Wood etc. | 75.2 |
| 31+ | 25.3 | | |
| **Marital Status** | | **Source of Water** | |
| Single | 22 | Piped | 35.8 |
| Ever married | 78 | Other | 64.2 |
| **Mother's Residence** | | **Location of Water Source** | |
| Urban | 34.7 | Within Compound | 32.6 |
| Rural | 65.3 | Outside compound | 61.4 |
| **Ever Miscarried** | | **Ever Had a Still-birth** | |
| Yes | 25.6 | Yes | 13.6 |
| No | 74.4 | No | 86.4 |
| **Mother's Education Level** | | **Garbage Dump** | |
| Primary and below | 65.3 | Available | 33.9 |
| Secondary + | 34.7 | Not Available | 66.7 |
| **Mothers Occupation** | | **Prenatal Clinic** | |
| Not working | 84.6 | Visited | 85.1 |
| Employed/Business | 15.4 | Never visited | 14.9 |
| **Bread Winner** | | **Illness During Pregnancy** | |
| Spouse | 62.7 | Suffered | 72.8 |
| Self | 18.3 | Not Suffered | 27.2 |
| Other | 19.1 | | |
| **Mode of Transport** | | **Wantedness of Pregnancy** | |
| Motor Vehicle | 12.5 | Wanted | 78.3 |
| Non-motorized | 87.5 | Never Wanted | 21.7 |
| **Parity** | | **Birthweight** | |
| 0 | 32.1 | Less than 2500 | 59.8 |
| 1-4 | 44.9 | More than 2500 | 40.2 |
| 5+ | 23.0 | | |

Source: Computed from 1997 Field Survey Data.

**Table 5.4.1: Risk Factors of Early Neonatal Sickness in Kisumu District**

| VARIABLE | B | Odds ratio |
|---|---|---|
| Marital Status (single) | 1.4284 | 4.1721*** |
| Mothers Residence (urban) | -0.3181 | 0.7275* |
| Past Miscarriage (yes) | 0.3491 | 1.4178* |
| Past Still-Births (yes) | 0.1026 | 1.1080 |
| Mothers Education Level (secondary+) | -0.1280 | 0.8799 |
| Anaemia During Current Pregnancy (yes) | 0.3666 | 1.4429* |
| Mode of Transport (motor vehicle) | -0.5903 | 0.5541** |
| House Wall Material (brick/stone) | -0.0450 | 0.9560 |
| Availability of Garbage Dump (yes) | 0.1652 | 1.1796 |
| Illness During Pregnancy (suffered) | 0.4727 | 1.6043* |
| Wantedness of Pregnancy (yes) | 0.1478 | 1.1593 |
| Mothers Height in Cm's ( less than 155 cm) | 0.6713 | 1.9567** |
| Source of Domestic Water (piped) | -0.4826 | 0.6172* |
| Mothers Occupation (Not working) | 0.5793 | 1.7848** |
| Age of Mother (less 20) | 0.5648 | 1.7592** |
| Age of Mother (more than 30 years) | 0.5690 | 1.7664*** |
| Parity (primiparous) | 0.3990 | 1.4903 |
| Parity (5+) | 1.3820 | 3.9829*** |
| Breadwinner (self) | -0.0886 | 0.9152 |

Dependent Variable, 1 = neonate sick, 0= neonate well.
* = significant at 0.1; ** significant at 0.05, *** significant at 0.001.
Source: Computed From 1997 Survey Data.

From Table 5.4.1, it is observed that the variables that have a significant effect of increasing the risk of early neonatal morbidity include: single motherhood, mothers' short stature, mothers not being in formal employment, young maternal age, high parity and maternal age of over 30 years. The relative risk of early neonatal morbidity is high for babies whose mothers have poor past obstetric history, poor health during pregnancy, poor sanitary condition within family's compound and low maternal socioeconomic status. Infants born to single mothers are 4 times more likely to be sick compared to those born to married mothers. This underscores the

importance of shared parentage in terms of baby care. Babies whose mothers have poor obstetric history of miscarriage and still births are more likely to fall sick in the early neonatal period compared to their counterparts. This could possibly imply that the conditions that are responsible for early misfortunes are still present and thus leading to poor neonatal health. The risk of disease is high for infants whose mothers belong to grand multipara of more than five past live births and those who are primipara compared to those of lower parities of between 2 and 4. On the other hand, the risk of disease is lower for children whose mothers have high levels of education, have access to piped water, have access to motorized transport and are generally self reliant for their daily upkeep. This supports the notion that maternal education and autonomy play a significant role in reducing infant morbidity.

## 5.5. Chapter Summary

This chapter has revealed that perinatal health in Kisumu district is faced with some key problems including; low birth-weight, stillbirths, neonatal deaths and early neonatal morbidity. Indeed, reduction of perinatal morbidity and mortality should be top priority since their rates in Kenya are high and have lagged behind strides made in the overall reduction of infant and child mortality levels. The analyses done in this chapter have revealed that the underlying risk factors of perinatal morbidity and mortality relate to the health and the nutritional status of the woman during pregnancy, the quality of care during pregnancy and delivery, and the immediate care of the newborn infant.

There is a clear indication that parity has a role in determining the risk of infants to low birth-weight, stillbirth, and neonatal morbidity. First born children and those of parity five and above are at higher risk of morbidity and mortality. First-born children could be at more risk because their mothers may be young and inexperienced in obstetric care. Children in high parities may be at more risk because their mothers are advanced in age and have been worn down by the effects of many pregnancies. Many pregnancies have an effect of reducing physiological and nutritional capacity to bear healthy infants.

It is important to note that high education for mothers of up to secondary school level and above shows a clear-cut reduction in the risk of mortality and morbidity during perinatal period. The mechanisms through which education improves the health and survival chances of infants have been discussed earlier. These include the observation that educated mothers are more willing to utilize modern medical services, they are willing and able to follow public health measures, and they are more likely to be in formal employment and hence have more autonomy to make decisions regarding their nutrition and health status.

It has been shown in this chapter that the physical and social environment of the household and its economic conditions strongly influence perinatal health. The variables selected for this analysis were; source of water for domestic use, type of material used in construction of residential house, and availability of garbage dumping facilities within the households. The risk of perinatal problems and mortality is high for the poor households who do not have access to piped water, live in houses made of clay and have no garbage dumping facilities. On the other hand, perinatal infections

and mortality are lower in the following circumstances; in households whose members obtain water from nearby taps and hand pumps, those who have access to garbage dumping facilities and whose houses are made of bricks and stone walls.

Mothers with previous reproductive loss tend to have higher chances of suffering further losses. Similarly, mothers who never sought prenatal care from trained medical personnel have high chances of having children who are exposed to higher risk of disease and mortality. Mothers who suffered from some form of illness during pregnancy give birth to babies who are at higher risk of morbidity and mortality.

Further evidence suggests the existence of rural-urban differentials in perinatal morbidity and mortality with the urban residents having an advantage over their rural counterparts. The advantageous position enjoyed by residents of urban areas is associated among other things with: a variety of better medical, hospital and public health facilities as well as higher levels of education and greater earnings and better sanitation. In summary, the levels and rates of perinatal health problems in Kisumu district are alarming. This has a negative effect on development since it has the potential to drain the resources of the family and health services particularly when money is required to purchase drugs.

# CHAPTER SIX

# FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Introduction

The purpose of this study was threefold. First, to conduct a situation analysis on obstetric health care facilities in Kisumu district by evaluating the extent to which these facilities are equipped for the purpose of providing safe motherhood as per the World Health Organisation's specifications. Second, to establish the incidence of maternal and perinatal health problems and find out the risk factors associated with each of the reported health problems. Finally, in view of the importance and the link that exists between maternal/perinatal health, and national socioeconomic development, use the findings to make recommendations that can help in the improvement of maternal and perinatal health in the study area.

Chapters one and two have provided the context and background to the study problem. Chapter three has presented findings on the quality, availability, and accessibility of obstetric care services in the study area. Chapters four and five have, on the other hand, discussed the maternal and perinatal health problems in Kisumu district pointing out the associated risk factors.

## 6.2 Major Findings

This section which discusses the major findings of the study is subdivided into four subsections. The first part looks at the quality of health facilities in the study area, whereas the second and third subsections present the major maternal and perinatal problems

identified respectively. Finally, the last section presents the determinants of maternal and perinatal health problems in the study area.

## 6.2.1. Quality of Health Facilities

This study has revealed that health facilities in Kisumu district are unevenly distributed with urban areas having more facilities which are better equipped and with more manpower compared to those in rural areas. For example Winam division which is basically urban has a bed/population ratio which almost equals that of Maseno, Nyando, Lower Nyakach and Upper Nyakach divisions all put together. This is in spite of the geographical area covered by the divisions, the latter covering a vast area of 1,127 square kilometres compared to the former which covers an area of only 279 square kilometres. This implies that mothers from the rural areas have to travel for long distance to reach the nearest health facility for both prenatal and delivery care. Since most households in the study area use non-motorised means of transport, fewer women without complications will utilise the heath facilities for delivery care. Some women, may experience unexpected complications and any delay in reaching a health facility reduces their chances of survival. This aside, long distances make it difficult for the sick to utilize curative services and discourage women from seeking preventive services such as immunisation, hygiene education and pregnancy related-counselling or family planning services.

The study has also indicated that the existing government sponsored health facilities have deteriorated in terms of equipment and supplies to the extent that they cannot perform basic functions such as screening for diagnostic and therapeutic purposes.

Findings further indicate that most public health facilities lack essential drugs, equipment and manpower to offer essential maternal care, including basic supplies such as; resuscitative tools (e.g. intravenous fluids, blood, drugs and antibiotics), surgical supplies (e.g. gloves, sutures and anaesthetic agents). These inadequacies result from general under-financing and poor maintenance and repairs of public health sector facilities. It is obvious that a facility that is near peoples' homes will have little impact on their health if it lacks basic supplies. Quite often, patients' next of kin have to procure essential drugs and supplies from private pharmacies at exorbitant prices. For poor patients, treatment is often delayed thus aggravating their health conditions. Lack of essential supplies may also lower the morale of staff who in most cases prescribe drugs that are not available in their pharmacies. Many a time, they are unable to save lives because of unavailability of essential drugs and supplies.

The study has also revealed a mismatch between the distribution of professional staff and health needs. The nurse/population ratio in the district is low compared to that found in developed countries. Rural areas with a nurse/population ratio above the national average are essentially privately run health centres and nursing homes. These are only accessible to well-to-do patients who are able to pay for services. The shortage of trained manpower in the study area is indeed worrisome given the important role they play. From first prenatal visit, delivery care, through postnatal care, trained personnel are required for effective care. The shortages of trained personnel in the area implies that work is sometimes left to untrained support staff who may not be able to screen and identify risky cases for early referral. This can lead to maternal and perinatal health complications which could otherwise be avoided.

## 6.2.2. Maternal Health Problems in Kisumu District

This study has revealed that there is high incidence of maternal morbidity and mortality in Kisumu district. Most of the health complications have life-long effects to mothers. These complications include; severe anaemia, haemorrhage, obstructed labour, operative deliveries, pre-eclampsia, eclampsia, sexually transmitted diseases, abortion and maternal mortality. Of the total respondents in the study, 22 percent suffered severe nutritional anaemia, 33 percent had haemorrhage, whereas 23 had pregnancy induced hypertension. Incidence of operative deliveries were high with 33 percent of respondents having either minor or major operations. On the other hand, 10 percent of the respondents had sexually transmitted diseases whereas 5 percent had abortions.

## 6.2.3. Perinatal Health In Kisumu District

Results of analysis of field data presented in chapter five reveal that perinatal morbidity and mortality rates in Kisumu district are equally high. This is specifically so because perinatal health is related to maternal health, type of maternal care received during pregnancy and management of complications that may arise during pregnancy and delivery. Birth weight is one key measure of perinatal health. Out of all births delivered in the study area during this research, 42 percent were classified as low birth-weights. Because it was not possible to obtain information about gestation age, this study was unable to establish the low birth-weights resulting either from prematurity or attributable to dysmaturity. Thus, all weights below 2,500 grams were treated as low birth weights.

Intrauterine deaths resulting into stillbirths contributed 11 percent of all the total deliveries, whereas 9 percent of children born died during the first one week of extra-uterine life. The main causes of early neonatal deaths were given as prematurity (54%), congenital malformations (23%), respiratory problems (10%), with the remaining 13 percent dying of unknown reasons. Morbidity rates for the new-born infants were reportedly high in the fist seven days of extra-uterine life. Of those born alive, 43.7 percent were reported to have suffered from some kind of illness in the first seven days. The common sicknesses as reported were: respiratory infections, fever and other minor but not diagnosed discomforts.

### 6.2.4. Determinants of Maternal and Perinatal Health Problems in Kisumu District

This study has also demonstrated that maternal and perinatal health issues are determined by a complex web of biomedical, socio-economic, demographic and environmental factors. These include maternal age, poverty, marital status, level of maternal education, parity, disease during pregnancy, wantedness of pregnancy, low use of contraception, lack of prenatal care, poor household sanitary conditions, lack of motorised transport facilities, poor obstetric history, maternal rural residence and, malnutrition of mother as measured by her height at birth.

Maternal and perinatal health complications that lead to mortality are higher among women who are primiparous and grand multipara's of 5 and above previous live-births. Consequently, the risks of health impairment are much lower when women avoid childbearing at the extremes of their reproductive life-span. Childbearing is safer when

confined between ages 20 and 30 years. This study, however, indicates that there is high prevalence of teenage and old age childbearing in the study area.

Socioeconomic factors affect maternal health by determining their exposure to disease and injury during pregnancy. Education at secondary school level and above for instance, has been associated with lower risks of disease and mortality. Education of women allows them direct access to knowledge related to health care, hygiene and family planning. Such knowledge improves their chances of adopting more healthful reproductive behaviour. Higher education also gives women economic independence and makes them avoid life of grinding poverty and dependency which would eventually imperil their health and well-being. In addition, education also enables women gain access to formal employment and hence have additional income. Women in formal employment are more likely to afford balanced diets which helps to improve their health and that of their infants.

Most mothers interviewed in the study area were not engaged in formal employment. Only 24 percent were involved in formal jobs or businesses, whereas the remaining 76 percent were either farmers (28%), students (19%), or housewives (28%). Two percent did not state their occupation. This suggests that most women depend on other people for their daily upkeep. Indeed, of all the respondents, 56 percent depended on their spouses, 21 percent depended on their parents whereas only 22 percent were self-reliant. The implication arising from this is that most mothers are probably not able to utilize heath facilities that require medical fees since they have little disposable income to spend. Moreover, non formal employment especially farming is exhausting and physically demanding. This heavy work has a potential to; damage women's spine and pelvis, aggravate prolapsed uterus and complicate childbirth. In addition, pesticides and herbicides

used on farms have the potential of exposing pregnant women to the risk of spontaneous abortion, stillbirth and premature births.

The general level of development in the study area has also been found to pose additional health risks to womens' health. Roads are in a generally poor state and the major mode of transport used by most respondents is that of the non-motorised type (i.e. bicycle, walking and cart). Indeed, the sample data indicates that 75 percent of all respondents interviewed used non-motorised transport. Since most health facilities are located far from most homes, a large proportion of mothers are forced to walk for long distances in search of health care. This can easily aggravate their health conditions.

Effects of environmental constraints on maternal and perinatal health are evident in the study area. Lack of access to safe drinking water and for other domestic uses, lack of garbage dumping facilities, and substandard housing for most households have contributed to increased risks of obstetric complications and disease outbreaks. For instance, of all those interviewed, 46 per cent have access to piped water whereas 54 per cent rely on other sources; mainly river and wells. Scarcity of clean water further exposes mothers to risk of disease by compromising household hygiene and sanitary conditions. Since the sources of water are located far away from most compounds, there is a likelihood of facing difficulties in water collection, a task normally undertaken by women. In addition, 55 per cent of women interviewed also indicated that they do not have garbage disposal facility in their compound. This could further expose them to the risk of contracting diseases.

The general health status prevalent in Kisumu district has been found to determine pregnancy outcome and perinatal health. Mothers who were malnourished and who suffered from any one disease especially malaria during pregnancy, have high chances of

experiencing complications. Their children are exposed to more risk of complications and mortality. Inadequate nourishment limits the physical development of women, compromises their health and threatens their ability to bear healthy infants. Similarly, mothers who had poor obstetric history like previous pregnancy losses and intrauterine death face higher risk of repeat obstetric complications.

The data has also shown that contraceptive prevalence among women in childbearing age in Kisumu district is low. This is evident from the fact that 54 percent of the total sample had not utilised any type of contraception prior to this study. This probably accounts for many unwanted pregnancies and consequently high abortion rates noted in the study area. Out of the total study population of 1455 cases, 24 percent never intended to be pregnant. Similarly, of all the respondents who had abortions, 90 percent had unintended pregnancies. This is an indication of high prevalence of induced abortion for mothers who conceive unwillingly.

It is worth noting, however, that there is data deficiencies area as regards maternal and perinatal health in the study area. Information on obstetric complications in the available birth registers is largely inadequate or inconsistent. Existing case notes were not designed to highlight information on complications, and background characteristics of the patients. This influenced the approach used in data collection in this study with reliance on interviewing mothers as they came to respective health facilities for maternity care. The problem of lack of good records has serious implications on the evaluation and monitoring of health situation of any area.

## 6.3. Recommendations for Policy Making

This study has revealed that maternal and perinatal health is a result of mutually reinforcing socio-economic, demographic, environmental and biomedical factors. It will therefore be illusory to attempt to improve maternal and perinatal health in Kisumu district and indeed elsewhere through a single intervention. This study, therefore, recommends a broad-based intervention approach comprising of all components of basic needs that can lead to the achievement of good health and desired low mortality levels. The recommendations can be broadly classified into three categories including short-term actions, medium-term actions and finally long-term actions. Details of these policies are outlined below.

### 6.3.1. Short-Term Measures

These are actions that are likely to demand immediate priority. Almost all of them fall largely within the public domain given the government's critical leadership role in creating an enabling environment for better health as well as its substantial involvement in the financing and delivery of health services. Chief among these measure include:

(a) Identifying the most disadvantaged women in the area and improving their status by close monitoring and management. In particular, screening mechanisms should be developed and implemented at clinic level to isolate those with poor obstetric history, teenage mothers, those of high parities, those who are poor and depend on other people for upkeep and those who have been attacked by malaria or any other disease like anaemia and STD's in the past. Such people should be encouraged to

seek care quite often at a higher level facility (preferably referral hospital) where the possibility of offering subsidised or free care should also be explored.

(b) On the basis of identified needs, the government should establish an inventory for essential drugs for safe motherhood for each level of care that can last at least one financial year. This should further be based on cost-effective criteria of selecting and purchasing the drugs using competitive bidding for generic drugs. Once this is implemented, the issue of shortage of drugs would be minimised.

(c) All health institutions should be encouraged to establish a working system that ensures inventories are made to check for equipment that are out-of-order so as to have them repaired or replaced. This would help in making laboratories and operating theatres functional hence provide expected essential care.

(d) There is also an urgent need to draw up a profile of staff required to operate each health facility efficiently. Trained personnel should be distributed to all facilities according to the demand. This would go a long way in reducing the imbalance that currently exists between rural and urban based facilities.

(e) Closely related to the above, the government should consider upgrading all the existing rural health centres to enable them handle emergency obstetric care (EMOC) cases. This can only be possible if these centres are well equipped with essential supplies and trained manpower. Other than having a constant supply of safe delivery kits and drugs, each health centre should have enough stock of EMOC packs. This is a package designed for patients with obstetric complications who are slated for surgical interventions. Each package contains surgical consumables such as; sutures, gauze, drugs for general anaesthesia,

intravenous fluids, oxytocic drugs, syringes, needles and gloves (Ifenne *et.al*, 1997). Each health centre should be run by a trained medical officer who can perform complicated deliveries with the assistance of trained midwifes and other paramedical staff. In this line, the government and other NGO's participating in health care delivery should be encouraged to establish more training institutions for health personnel. This would go a long way in reducing the shortage of trained manpower in the rural health facilities. In addition to this, special allowances should be introduced to motivate and encourage those staff working in rural settings that may not have many amenities enjoyed in urban areas.

(f) The current drug policy where the Ministry of Health purchases drugs centrally and distributes them to health facilities is wanting. Drugs are either not equitably distributed or are mismanaged and stolen. There is need for each community to be involved in the purchasing of drugs so as to be accountable for any shortages. Communities should be encouraged not to rely excessively on government funding for drug purchase and instead establish community drug funds. The initial stock of drugs and supplies can be purchased by the government and these could then be sold to the community at prices that allow for full cost recovery. The revenues ccrued could be used to replace the stock and finance other operating costs. For the poor population who cannot afford to pay immediately, drug revolving funds can be set up where the beneficiaries can be treated and allowed to pay later after recovery. This concept of drug revolving funds has been tried and proved successful in Nigeria and Sierra Leone (Ifenne *et.al* 1997; Thuray *et al.*, 1997). However, caution should be taken so as to avoid over pricing the drugs since this

may discourage the poor population who are not as yet accustomed to paying for public sector health services.

(g) The Ministry of Health and other non-profit making NGO's should consider financing mobile maternal health clinics aimed at reaching pregnant mothers near their homes. Mobile units should be composed of staff who are well trained and equipped and hence can screen, and detect complicated cases, and make prompt referral to the nearest health centre or hospital. Such mobile units could visit specific rural locations at given intervals that should be well known by the local communities.

(h) The Ministry of Health and other NGO's operating health facilities in the area should also consider investing in emergency transport mechanisms where each health centre could have a four-wheel drive ambulance vehicle to be used when need arises. This would reduce unnecessary delays in seeking, reaching or receiving life-saving treatment. Patients could be made to pay some fees to cover cost of maintenance and operation of the ambulance. Interest free transport loans can be established to assist those patients who are financially constrained so long as this can be repaid back. The beneficiaries of the loan could be given some grace period before they begin repaying. The local administration can be used to ensure repayment is done without default. The concept of emergency funds to maintain and facilitate transportation of emergency obstetric care patients has been tried and proved successful in Sierra Leone (Samai and Sengeh, 1997).

(i) Since shortage of facilities makes it difficult to attain 100 percent coverage in delivery care, the Ministry of Health and other NGO's should continue the training

of Traditional Birth Attendants (TBAs) on issues touching on basic hygiene, safe delivery and danger signs that need prompt referral. The TBA's should be encouraged to handle only simple deliveries and refer complicated cases to a health facility with trained medical personnel.

(j) Health planners should consider introducing the concept of maternity waiting homes in the district. This concept has been used in many countries such as Ethiopia, Botswana, Cuba, Columbia, and Ghana (Wilson *et.al,* 1997). Traditionally, a maternity waiting home is a house constructed on the hospital grounds where patients come with their bedding and cooking utensils and stay on before delivery. The purpose of such homes is to bring women at higher risk of obstetric complications within close proximity to a hospital with emergency obstetric care services for easy transferral when labour begins. Even though there are inherent strategic problems in this concept namely; its selectivity due to the risk approach and the low coverage rates, it has proved popular and successful where it has been tried. If tried in Kenya, the concept could considerably reduce problems of access to emergency obstetric services due to lack of transport, poor roads, high fares or a combination of some of these factors.

(k) To achieve widespread and efficient coverage of maternal-child health, the Kenya government needs to encourage the private health sector to extend their services to the rural areas rather than concentrate their activities in urban areas alone. This could be achieved if basic infrastructure facilities like roads, electricity and telephones are improved.

## 6.3.2. Medium-Term Measures

These recommendations incorporate those aimed at encouraging community participation and hence making public expenditure on health more efficient, equitable, and sustainable. Medium-term measures include:

(a) Implementing cost-sharing, first at the referral level where those who bypass the ower cadre centres can be assessed at full cost. This can later be complemented with cost-sharing at dispensary and health centre level with a predetermined amount to be retained by the facility. However, there should no compensatory reductions in overall government funding because of cost-sharing. The quality of services should be improved at the same time as fees are being increased.

(b) Using information, education , and communication (IEC) programmes to improve the health related practises of individuals, households, and communities. Community leaders who include: chiefs, elected leaders, teachers, religious leaders, traditional birth attendants and women groups leaders, need to counsel and advise teenagers not to rush into childbearing until they are fully grown and physiologically mature. Teenagers should also be advised that attainment of adequate education will assure them some measure of economic independence, an important factor in safe motherhood. The following policy options are worth pursuing; raising minimum age at marriage through legislation, discouraging cultural practises that require women to prove their fertility at an early age, and giving more attention to education programmes that train the youths to avoid adolescent sexuality. Education programmes to sensitise

adolescents should be conducted through schools, religious organisations and youth associations operating within the area. In the same line, community health workers and other personnel involved in health education should make efforts of educating mothers about the risks involved in too many pregnancies at advanced ages. At the same time, mothers should be made aware of the importance of seeking constant care from trained medical personnel if they belong to the risky age category. This would have an effect of closely monitoring pregnancy and taking prompt interventions where need arises. Gender discriminations in school fees payment and forced early marriages should be discouraged. Supplementary efforts should be made by relevant government authorities to encourage adults to attend literacy programmes so as to make it easier for them to access information on basic hygiene and good nutritional practises. Finally, the Kenya government and NGO's should encourage women to start programmes that can diversify their sources of income and make them more self reliant. For instance, women can be encouraged to organise themselves into autonomous self-help groups with the aim of promoting education, information, apprenticeship, professionalism, and technical training. Such groups can assist women to cope with problems of health, housing, employment, economic deprivation, and subordination. Indeed, when women have more economic clout and their productive contributions are recognised, the legal, social and political impediments to good maternal health should eventually diminish.

## 6.3.3. Long-Term Measures

These include progressive expansion of health systems and using financial commitments to make health systems more self sustaining. Some important policies in this category include:

(a) Implementing sustainable inter-sectoral interventions at community level through provision of safe water and improved sanitation. Safe water is an essential pillar of health. Yet large areas of Kisumu district are deprived of safe drinking water. Poor sanitation and disposal of domestic waste further complicate matters especially in ural areas and peri-urban slums where seepage and run-off can contaminate ponds, streams, rivers and wells. Access to clean water is a basic human right. It is ironic that despite being located close to Lake Victoria which is the world's second l argest fresh water body, the district lacks clean water. There is need to initiate projects that can tap the available water resources by pumping and treating it before use. The local community should also be educated on sound water management to avoid pollution. Improved sanitation should be encouraged through community mobilization in construction of pit latrines and garbage dumping facilities for every household. This would definitely reduce the rate and incidence of infections.

(b) There is urgent need for public health information campaign in the whole district. Better care during pregnancy, labour and delivery have the potential to reduce maternal mortality rates anywhere from 50 to 80 percent and perinatal mortaiity

rates by 30 to 40 percent (Lettenmeier *et al,* 1988). Evidence from this research has shown that most mothers do not go for prenatal care services and this contributed to obstetric complications that sometimes were detected late. There is need for public health officials to launch and intensify community education programmes in Kisumu district to sensitise the population on the need to utilise the available health facilities for obstetric services. More emphasis should be placed on informing women on maternal and perinatal problems that are common in the area and showing them how these can be easily solved by attending a health facility. The information should be packaged in a language that is clear, simple, to the point and easy to understand by the whole population. The information can be disseminated through print, folk media, mass, and electronic media. The information campaign should include the following issues:

(I) that although there is high incidence of maternal and perinatal morbidity in the area, this can easily be avoided.

(ii) the five serious complications could occur during pregnancy, delivery or up to 42 days of birth . These complications include: haemorrhage, obstructed labour, eclampsia, neonatal tetanus and puerperal sepsis.

(iii) that it is possible to recognise these conditions and they must not be allowed to persist if death is to be avoided.

(iv) That men ought to pay greater attention to the needs of pregnant women within the community and try to solve some of the problems they face such as lack of transport when medical care is needed.

(v) that pregnant women should make sure that they seek prenatal care from trained medical personnel as often as possible to reduce risk of complications.

To supplement these campaigns, the Ministry of Health and other NGO's should recruit and train local residents to be used as community motivators whose tasks would involve facilitating referrals and encouraging women with health complications to go to health facilities and to disseminating education materials to the population. Such people could be encouraged to work alongside the existing community care providers. Among the criteria for selection as a community motivator would be willingness to offer volunteer service with minimum remuneration, knowledge of the local language, respect in the community, charisma and initiative. The motivators should also be literate because such people would be required to collect and provide information for monitoring and evaluating the success of the programme. Motivators would also be required to undergo some training on health education, community mobilisation methods and how to recognise major obstetric complications that require immediate referral. This idea has been tried and proved successful in Sierra Leone (Kandeh *et. al.*, 1997).

Womens' organisations have in the past been identified and recognised as having an important role to play in promoting maternal child health (WHO, 1987). This is because they have special characteristics which make them a key factor in community involvement and an ideal entry point and partner in health care. Women organisations have been proved to be traditionally supportive, motivated and interested in health care, they are able to understand and carry out inter-sectoral activities basic to primary health care, they have positive attitudes towards voluntary work especially where the goal is to satisfy the

immediate needs of their members. The government and NGO's responsible in promoting heath care in Kisumu district should therefore identify and encourage formation of women groups to work as community educators and motivators in matters of maternal health.

(c) There is need to improve general health status of women before conception and during pregnancy. Evidence from this study has shown that chances of experiencing obstetric complications were higher for mothers who were sick and anaemic compared to those who were healthy. The Ministry of Health and NGO's involved in promoting health should give preference to programmes that target improvement in the following areas: immunisations, health education, screening for anaemia and its prevention through provision of iron and folate supplements, screening women with past obstetric complications and referring them for specialised care and management. Since malaria is endemic in Kisumu district and was the most common disease reported by most mothers, there is need to encourage communities in the study area to start programmes that can reduce incidence of malaria. This could be achieved in many ways including: reduction of man-mosquito contacts through the use of bed nets, destruction of adult mosquitoes through spraying of insecticides, destruction of mosquito larvae through peri-domestic sanitation intermittent drying of water containers and environmental sanitation, social and community participation in environment management through public health education programmes. Finally, the government and other organisations responsible for health provision in the study area can control spread of malaria through early diagnosis and treatment.

(d) There is urgent need to conduct research and develop appropriate technologies for

maternal care at community and household level in Kisumu district. Such technologies should be scientifically sound, adaptable to local health needs and acceptable to those who apply it and those for whom it is meant. It must also be affordable by the community and the country at large and be capable of being maintained locally. Above all, it must have an easy supply and replenishment system. An example of maternal and new-born health care technology discussed by Shah (1994). The technology is used in India and may be applied in Kisumu district. It has the following characteristics:

(i) Home-Based Maternal Records designed to cover the entire reproductive period of women. The record covers the menstrual status, previous obstetric history, immunisation status against tetanus, breastfeeding history, and family planning method used among others.

(ii) Development of a mechanism to measure maternal height. A cut-off point for predicting cephalo-pelvic disproportion and low-birth weight is likely to fall between 140 and 150 cm (Krasovec and Anderson, 1991). At the grassroots level , a colour coded stick with measurement can be used to detect women at risk.

(iii) Research has indicated that maternal arm circumference can be used as an indicator of maternal nutritional status in non-pregnant and pregnant women because of its high correlation with maternal weight or weight-for-height and for risk of low birth weights, late foetal and early neonatal mortality (Shah, 1994). Arm circumference cut-off points for assessing biological risk of low birth weight and foetal mortality are fairly consistent. An arm circumference taken at any time during pregnancy may serve as a useful proxy for determining pre-pregnancy weight in communities

where average weight gain is low during pregnancy. A tri-coloured arm tape with bands of colours indicating severe malnutrition, moderate malnutrition and normal nutrition can be devised and used by mothers for self assessment.

(iv) Anaemia detection techniques to be developed to help community health workers to diagnose mild, moderate and severe anaemia. For example, we could have images with different eye conjunctiva shade intensities.

(v) Portable weighing scales to be used to weigh new-borns and adults.

(vi) Gravidogram to measure fundal height can be used to monitor foetal growth. This can detect risk of low birth weight or over weight.

(vii) Development of foetal mobilogram for mothers to monitor foetal movements. For example, a colour-coded or shaded mobilogram has been developed in India where a woman is trained to cross a vertical line each time she counts a foetal movement. If in 12 hours the crosses on the vertical lines are fewer than ten in the shaded or coloured areas, the foetal movement needs to be repeated for confirmation the next day, prior to referral of a woman to the hospital (Shah, 1994). The above discussed technology is simple and can be adopted in Kenya.

(viii) Tool kit for care during labour and delivery can be locally devised for home use. This would involve the development of a disposable clean delivery kit which is simple to use, low in cost and can be locally assembled by community groups. Basic equipment include: a small plastic bag containing sterile gauze pieces, strings, cotton swabs, nail sticks, a piece of soap, and a new razor blade. In addition, a plastic sheet of one meter is provided to the birth attendant. The kit is designed for those who assist in deliveries or to mothers, themselves, for use at the time of

delivery. Depending on availability of resources, more items can be added to the kit.

(e) There is need to sensitise public transport owners and operators on safe motherhood so as to make them offer transport during emergencies. This study has established that mothers who lack access to motorised mode of transport are at higher risk of experiencing obstetric complications and their children are equally exposed to the risk of disease and mortality. This probably is due to the fact that the cost of transportation deters such mothers from making prompt decisions to seek care in health facilities that are in most cases far from their homes. Since commercial vehicles are the only reliable and sustainable transport option in the area, there is need to mobilise the communities to effectively utilize this means so as to minimise unnecessary delays. This can be done by community leaders sensitising the *Matatu* vehicle owners on the need to provide humanitarian service to the community by providing timely transport at reasonable cost. On the other hand, community members should be told that it is impossible for the government to provide ambulance vehicles to cater for their needs. In this regard, each member of the community can contribute initial seed money to establish some revolving fund that can cater for transportation costs at the time of need. Members who use these funds would be required to pay back at no interest. Community health workers operating in the area should also organise training programmes for *matatu* drivers on basics of reproductive health, pregnancy and its complications and how to convey a woman experiencing an emergency. Drivers would be counselled to

avoid bad behaviour like smoking, talking loudly and showing impatience while handling emergency cases.

(f) The success of any health intervention programme depends on monitoring and evaluation of the projects being implemented. This requires detailed, accurate and complete information. Records provide a visible evidence of what the health programmes are accomplishing. If the records are not accurate and complete, proper evaluation is rendered difficult. This study has indicated that there is lack of data on obstetric complications especially in the government sponsored health facilities. Registers used in the admission section are scanty in details and sometimes vary in detail depending on the competence of the person who is writing them. To overcome this problem, there is need to develop registers that will be distributed in all health facilities and to all health care providers for the purpose of data collection. Training programmes should be arranged to update the knowledge and skills of personnel handling medical records. To promote the implementation and maintenance of the improved record keeping system, monitoring and supervisory mechanisms should be set up where medical officers in-charge should evaluate the exercise on a monthly or weekly basis.

## 6.4. Recommendations for Further Research

While it is not possible to list all the areas that require further research on issues related to the current theme of study, an attempt has been made to recommend research that would further strengthen and improve antenatal, pregnancy, delivery and neonatal care.

1. First, there is need for a study to establish why mothers who have knowledge of contraception and have used contraceptives before, are at higher risk of having an abortion than those who have not utilised any modern contraceptives before.
2. Second, future studies should examine whether males are actively involved in promoting health status of their pregnant wives. Such studies should focus how much money men (husband's) spend on food requirements and medical care in comparison to women (wives).
3. Third, there is need for future studies to isolate mothers with past obstetric complications and conduct an in-depth research to look at the circumstances under which these problems took place and whether any corrective measures were taken before current pregnancy.
4. Fourth, there is also need for a community-based study to investigate knowledge and perception of the community health workers in matters related to safe motherhood. This should focus on various health issues e.g. contraception, utilisation of heath facilities, knowledge of basic hygiene, nutrition etc. This kind of research will go along way in providing information required to design programs that allow women with complications to get the care they need.
5. Finally, there is need to conduct operations research to determine the financial viability of implementing the policies recommended above. Information on cost is essential in dispelling the common assumption that improving health care is prohibitively expensive and needs foreign assistance to be successful.

## REFERENCES


Abbas A. A. and G. J. Walker (1986) "Determinants of Utilization of Maternal and Child Health services in Jordan" **International Journal of Epidemiology 15(3).**

Acharya, S. (1995) "How Effective is Antenatal Care to Promote Neonatal Health?" **International Journal of Gynecology and Obstetrics.** Vol 50 Supp 2.

Acsadi, G. T. F. Johnson-Acsadi, G. and M. Vlassoff (1994) **Safe Motherhood in Latin America and Caribbean: Socio-Cultural and Demographic aspects of Maternal Health**. Family Care International.

Acsadi. F. T. F. and G. Johnson-Acsadi (1986) "Optimum Conditions of Childbearing" **International Planned Parenthood Federation**. London.

Aggarwal, V. P (1980) "Obstetric Emergency referrals to Kenyatta National Hospital". **East African Journal of Medicine.** 57 (2).

Aggarwal, V. P and J. K. Mati (1980) "Review of Abortions at Kenyatta Hospital Nairobi" **East African Medical Journal** Vol. 57 No 2.

Aggarwal, V. P and Mati, J. K. G. (1982) "Epidemiology of induced abortion in Nairobi, Kenya" **Journal of Obstetrics and Gynaecology for Eastern and Central Africa. 54(3) 142-148.**

Alaudin, M. (1986) "Maternal mortality in rural Bangladesh: The Tangail District" **Studies in Family Planning** Vol. 17.

AMREF (1987) **Primary Health Care Needs in Kisumu District.** African Medical Research Foundation.

Ankrah, E (1991): "AIDS and The Social Side of Health" **Social Science and Medicine 32 (9).**

Annis, S (1981) "Physical Access and Utilization of Health Services in Rural Guatemala" **Social Science and Medicine** Vol 15 (1).

Arkutu, A .A (1978) "A Clinical Study of Maternal Age and Parturition in 2791 Tanzanian Primiparae" **International Journal of Gynaecology and Obstetrics**. Vol 16 .

Arkutu, A. A. (1995) **Healthy Women, Healthy Mothers: An Information Guide.** Family Care International, New York.

Bamisaye, A (1984): "Selected Factors Influencing The Coverage of an MCH/FP Clinic in Lagos, Nigeria" **Journal of Tropical Paediatrics** 30(5).

Barber, C. R. (1966) "An Enquiry Into Possible Social Factors Making For Acceptance of Institutional Delivery in a Predominantly Rural Area in Western Nigeria" **Journal of Tropical Medicine and Hygiene** Vol. 69.

Bender D. E and D. Ewbank (1994) "The Focus Group as a Tool For Health Research: Issues in Design and Analysis in **Health Transition Review** Vol. 4 No. 1.

Bhatia, J.C. (1993) "Levels and Causes of Maternal Mortality in Southern India" **Studies in Family Planning.** Vol 24 (5).

Boerma, J. T (1987) "The magnitude of maternal mortality in problem in Sub- Saharan Africa" **Social Science and Medicine, 24(6), 551-558.**

Bross, D and S. Shapiro (1982) "Direct and Indirect Association of Five Factors With Infant Mortality" **American Journal of Epidemiology.** Vol 115(1).

Bullough, C. H. W (1981) "Analysis of maternal deaths in central region of Malawi". **East African Medical Journal** Vol. 58.

Buvinic C. M and J. Leslie (1981) "Health Care for Women in Latin America and Caribbean" **Studies in Family Planning .** Vol 12 (3).

Buvinic, M *et. al* (1992) "The fortunes of adolescent mothers and their children: The transmission of poverty in Santiago, Chile" **Population and Development Review. Vol. 18(2).**

Caldwell J.C and P. Caldwell (1985) " Education and Literacy as Factors in Health" in. S. B Halstead, J. A Warren, and K. S Walsh **Good Health at Low Cost** eds. New York, Rockefellor Foundation.

Caldwell, J. C (1979): "Education as a Factor of Mortality Decline: An Example of Nigerian Data" **Population Studies** 33(3).

Campell, C. (1990): "Women and AIDS" **Social Science and Medicine.** 30(4).

Cardoso, U. F (1986) "Giving Birth is Safer Now" **World Health Forum .**Vol 7 No (4).

Chimere-Dan, O . (1997) "Non Marital Teenage Childbearing in Namibia" **African Population Studies** Vol 2 No 12.

CHRD (1990) **Health Research: Essential Link to Equity in Development.** Commission for Health Research for Development. Oxford University Press.

Cleland, J. G and van Ginneken (1988) " The Search For Pathways of Influence. **Social Science and Medicine**. 27 (12).

Daniels, D. L., S. N. Cousens, L. N. Makoae, and R. G. Feachem (1990) "A case-control study of the impact of improved sanitation on diarrheal morbidity in Lesotho" **Bulletin of World Health Organization 68 (4): 435-63.**

David H. P (1983) "Abortion : Its Prevalence, Correlates and Costs" In R A Bullatao, R. D Lee *et. al* (eds.) **Determinants of Fertility in Developing Countries.** New York, Academic Press.

David, H. P, H. L Friedmann, J. Van der Tak and M. J Sevilla (eds.) (1978) **Abortion in Psycho-Social perspective: Trends in Transnational Research.** New York, Springer.

Dhutia, H. P. (1981) "Primigravida at Coast" **Medicom** Vol 3 (1).

Diejmoah, F. M .E. *et.al.* (1980) "Pre-eclampsia and Eclampsia at the University of Benin Teaching Hospital- A Review of 226 Cases" **Tropical Journal of Obstetrics and Gynaecology.** 1 (1).

Dixon-Mueller, R and J. Wasserheit (1991): **Reproductive Tract Infections Among Women in The Third World**. International Women Health Coalition, New York.

Dwyer, J. (1974) "Teenage pregnancy" **American Journal of Obstetric and Gynaecology.** 118(3).

Ebrahim, G. J. (1983) **Nutrition in Mother and Child Health.** London, Macmillan Press.

Erinosho, O. A. (1991) "Health Care and Medical Technology in Nigeria" **International Journal of Technology Assessment in Health Care. 7(4): 545-52.**

Esrey, S. A, J. B. Potash, L. Roberts, and C. Schiff (1991) "Effect of improved water supply and sanitation (excreta disposal) on Ascaris, Diarrhea, Dracunlosis, Hookworm, Schistomiasis, and Trachpma" **Bulletin of World Health Organization 69 (5): 602-21.**

Fallis, B. (1986) "Obstetrics in rural African population" **East African Medical Journal**. Vol. 63

Farah, A. M and El-Ghouayel H. B (1994): "Too many births, too many deaths" **World Health Forum** 15(1).

FCI (1995) " Commitments to Sexual and Reproductive Health and Rights for All" **Family Care International.** New York.

Feierman, E. K (1981): "Alternative medical services in rural Tanzania: A Physician's view" **Social Science and Medicine 15(3).**

Fortney, J. *et al.* (1986) "Reproductive mortality in two developing countries" **American Journal of Public Health** Vol 76 (2).

Frenk. J. *et.al.* (1989) "A conceptual model for public health research" **PAHO Bulletin.** 22.

Geronimus, A. T (1987) "Teenage child bearing and neonatal mortality in United States" **Population and Development Review** Vol. 2.

Graham, J. W and G. Airey (1987) "Maternal mortality: levels, trends and data" in, Feachem, R. G and D. T Jamison (eds.) **Diseases and Mortality in Sub-Saharan Africa** World Bank.

Gray, R. H (1990) "Epidemiological Methods and Case-Control Studies of Mortality and Morbidity" in Valin, J. D'Souza, S. and A. Palloni (eds.) **Measurement and Analysis of Mortality: New Approaches.**

Grech, E. S *et al* (1989) "Maternal mortality in Uganda" **International Journal of Gynaecology and Obstetrics** Vol. 7.

Gyepi-Garbrah, B. (1985) **Adolescent Fertility in Sub-Saharan Africa.** Boston; Pathfinder.

Haiek, L. and S.A. Lederman (1988) "The Relationship Between Maternal Weight for Height and Birthweight in Teens and Adult Women" **Journal of Adolescent Health Care.** 10.

Hair F. J *et al* (1987) **Multivariate Data Analysis: With Readings.** New York, Macmillan.

Harrison, K.A. (1985) "Childbearing Health and Social Priorities: A Survey of 22,774 Consecutive Hospital Births in Zaria, Northern Nigeria". **British Journal of Obstetric and Gynaecology 92 (S5).**

Hart, C and J. Bain (eds.) (1989) "Foetus at Risk" in **Child Care Practise.** Churchill and Livingstone, London.

Howard, D. (1987) "Aspects of Maternal Mortality: The Experience of Less Developed Countries" In, **Advances in Maternal and Child Health** Vol. 7 Oxford University.

Ifenne, D. *et.al* (1997) "Improving quality of obstetric care at teaching hospital, Zaria Nigeria" **International Journal of Gynaecology and Obstetrics Vol 59 Sup. No. 2.**

Jejeebhoy, S.J (1995) **Women's Education, Autonomy and Reproductive Behaviour: Experience From Developing Countries.** Claredon Press.

Joshi, A. R. (1994) "Maternal Schooling and Child Health: Preliminary Analysis of Intervening Mechanisms in Rural Nepal" **Health Transition Review. Vol 4 (1).**

Kahn, A.H and C.T, Sempos (1989): **Statistical Methods for Epidemiology.** New York, Oxford University Press.

Kandeh, H.B.S *et. al.*, (1997): "Community Motivators Promote Use of Emergency Obstetric Services in Sierra Leone" **International Journal of Gynecology and Obstetrics**. Vol 59 (2).

Kapesa, A. T. (1985) "The Pattern of Eclampsia in Dar el Salaam Tanzania" **Journal of Obstetrics and Gynaecology for Eastern and Central Africa.** Vol 4.

Kenya Republic of (1994a) **Kenya Demographic and Health Survey 1993 Final Report**. National Council for Population and Development

Kenya Republic of (1992) **Children and Women in Kenya: A Situation Analysis.** GoK/UNICEF

Kenya, Republic of, (1996a) **Kenya Population Census Analytical Report Vol X: Housing.** Central Bureau Of Statistics, Ministry of Planning and National Development.

Kenya, Republic of (1994b) **Kenya's Health Policy Framework.** Nairobi, Ministry of Health.

Kenya, Republic of, (1992) **Children and Women in Kenya: A Situation Analysis, 1992.** GOK/UNICEF.

Kenya, Republic of, (1994b) **Kenya's Health Policy Framework.** Ministry of Health.

Kenya, Republic of, (1996b) **National Reproductive Health Strategy 1997-2010.** Nairobi. Ministry of Health.

Kenya, Republic of, (1997) **Kisumu District Development Plan 1997-2001.** Office of The Vice President, Ministry of Planning and National Development.

Kenya, Republic of, (1997): **Kisumu District Development Plan 1997-2001**. Office of The Vice-President and Ministry of Planning and National Development. Government Printer.

Kitts J and J. H. Roberts (1996): **The Health Gap: Beyond Pregnancy and Reproduction**. Ottawa, IDRC.

Kloos, H. *et.al,* (1987) "Illness and Health Behaviour in Addis Ababa and Rural Central Ethiopia" **Social Science and Medicine. 25 (9).**

Koenig, M A. *et al* (1988) "Maternal Mortality in Matlab Bangladesh: 1976-85" **Studies in Family Planning** Vol. 19 (21).

Kramer, M. S. (1987) "Determinants of low birth weights: Methodological assessment and meta-analysis" **Bulletin of WHO.** 65 (5).

Krasovec, K. and M. A Anderson (eds.) (1991) "Maternal Anthropometry for Prediction of Pregnancy Outcomes" **PAHO Scientific Publication.** No 527.

Kreutner, A.K and D. R. Hollingsworth (1978) **Adolescent Obstetric and Gynaecology.** Chicago Year Book Medical Publishers.

Kwast, B.E and J.M Liff (1988) "Factors Associated with Maternal Mortality in Addis Ababa, Ethiopia" **International Journal of Epidemiology.** 17(1).

Kwast, B.E. *et al* (1986) "Maternal mortality in Addis Ababa, Ethiopia. **Studies in Family Planning**" Vol. 17 (6).

Kwast, B.E. *et.al* (1986) "Maternal Mortality in Addis Ababa Ethiopia" **Studies In Family Planning.** 17 (6).

Kwast, B.E. *et.al.* (1984) "Report on Maternal Mortality in Addis Ababa, Sept. 1981-Sept. 1983: A Community Based Survey on the Incidence and Etiology of Maternal Mortality and The Use of Maternal Services, and Confidential Inquiries into Maternal Deaths in Addis Ababa , Ethiopia" **Safe The Children Federation,** Ethiopia.

Lasker, J. N. (1981) "Choosing Among Therapies: Illness Behaviour in Ivory Coast" **Social Science and Medicine.** 15 (A).

Lemeshow.S and D.W. Hosmer Jr (1982) "A Review of Goodness of Fit Statistics For Use in The Development of Logistic Regression Models" **American Journal of Epidemiology.** Vol 115 (1).

Lennox, C. E (1984) "Assessment of Obstetric High Risk Factors in a Developing Country" **Tropical Doctor**.

Lettenmeier, C. *et.al* (1988) "Mothers' Life's Matter: Maternal Health in Community" **Population Reports L 7.** John Hopkins University; Population Information Program; Baltimore.

Lopez, A. D (1990) "Causes of Death: An Assessment of Global Patterns of Mortality Around 1985". **World Health Statistics Quarterly.** 43.

Lwanga, C. (1977) "Abortion in Mulago Hospital" **East African Medical Journal.** 54 (3).

Maine, D and R. McNamara (1985) **Birth Spacing and Child Survival.** New York; Columbia University, Centre for Population and Family Health.

Maine, D. *et. al.* (1997) **The Design and Evaluation of Maternal Mortality Programs.** Centre for Population and Family Health, Columbia University.

Maine, D. *et.al.* (1987) "Prevention of Maternal Mortality in Developing Countries" Paper Prepared for **Safe Motherhood International Conference,** Nairobi.

Makinson, C. (1985) "The Health Consequences of Teenage Fertility **"Family Planning Perspectives** Vol. 7 No. 3.

Makokha, A (1980) "Maternal Mortality in Kenyatta National Hospital" **East African Medical Journal** Vol. 57 (7).

McGuire, J. S. and J. E. Austin (1986) **Beyond Survival: Children's Growth for National Development.** Cambridge: James E. Baldwin and Associates.

Mensch, B. (1993) "Quality of Care: A Neglected Dimension" In, M. Koblinsky, J. Timyan and J Gay, (eds.); **The Health of Women: A Global Perspective**. Boulder, Columbia Westview Press.

Meredith-Davies, J. B (1972): **Preventive Medicine, Community Health and Social Services.** Baillere, Tindall and Casell LTD.

Merrit, T. A, R. Lawrence, and R. Naeye (1980) "The infants of Adolescent Mothers" **Paediatrics Annals**. 9(3).

Mtimavalye, L. A *et.al* (1984) Survey on Institutional Maternal deaths in four Regions of Tanzania. In S. Thaddeus and D. Maine. "**Too Far To Walk: Maternal Mortality in Context".**

Muller, S.A. and J.K van Ginneken (1991) "Morbidity and Mortality in Machakos Kenya, 1971-1981". In R. G. Feachem and D.T. Jamison (eds.) **Disease and Mortality in Sub-Saharan Africa.** World Bank.

Murphy, M. (1981) "Social Consequences of Vesico-Vaginal Fistula in Northern Nigeria" **Journal of Biosocial Science, 13.**

Najera, J. A, B. H. Liese and J. Hammer (1993) "Malaria" in, DT. Jamison *et.al.* eds. **Disease Control Strategies in Developing Countries.** World Bank.

Narone, R. K. *et. al.* (1983) "A Study of Spontaneous Abortions in Zambia". **Journal of Obstetrics and Gynaecology for Eastern and Central Africa.** (2).

Ngoka, W and Y. P Bansal (1987) "Maternal Mortality in Pumwani Maternity Hospital 1975-1984. **East African Medical Journal** Vol. 64.

Nortiman, D. (1974). "Maternal Age as a Factor in Pregnancy Outcome and Child Development" **Report on Population Family Planning No. 16.** Population Council New York.

Ojeda, S. N (1992): "Evaluation of maternal and child health services in Latin America" **World Health Forum** 13(3).

Ojengbede, D. A. *et.al* (1987) "Pregnancy Performance of Nigerian Women aged 16 years and below as seen in Ibadan, Nigeria" **African Journal of Medicine and Medical Science.** Vol !6.

Ojo, V.A *et al.* (1988) "Characteristics of Maternal Deaths Following Caesarean Section in a Developing Country" **International Journal of Gynaecology and Obstetrics.** 27.

Omran, A. R. (1985) "The Latin American Experience" **Fertility and Health.** Pan American Health Organization, WHO, Washington DC.

Omran, A.R. (1971) "The Epidemiological Transition: A Theory of Epidemiology of Population Change" **Milbank Memorial Fund Quarterly, 49.**

Omu, A. E (1981) "Traditional Midwives in Nigeria" **Lancet.**.

Ondimu, K. N (1997) "Determinants of Adolescent Reproductive Health Problems in Kenya: Evidence From Health Service data" **African Population Studies.** No. 12 (2).

Orubuloye, I.O. and J.C. Caldwell (1975) "The Impact of Public Health Services on Mortality: A Study of Mortality Differentials in a rural area of Nigeria" **Population Studies.** 29 (2).

Parker, L.; G. R. Gupta; K. Kurtz and K. Marchant (1990) **Better Health For Women: Research Results From Maternal Health Care Programme**. International Centre For Research For Women. Washington, DC.

Potts, M. , P. Diggorry, and J. Peel (1977): **Abortion.** Cambridge, Mass: Cambridge University Press.

Price, T. G. (1984) "Preliminary report on maternal deaths in South highlands of Tanzania in 1983". **Journal of Obstetrics and Gynaecology of East and Central Africa.** 3 (103).

Rehan. N. and S. Sani (1982) "Eclampsia in Housa Women" **Journal of Obstetrics and Gynaecology for Eastern and Central Africa.** Vol 1.

Rinehart, W and A. Kols (1984) "Healthier mothers through family planning" **Population Reports Series J** No 27.

Roemer, N. I. (1993) **National Health Systems of the World: Vol 11 The Issues.** New York, Oxford University Press.

Rothenberg, P. B. and P. E. Verga (1981) "The Relationship Between Age of Mother and Child Health and Development" **American Journal Of Public Health.** &1 (8).

Royston, E and S Armstrong (1989): **Preventing Maternal Deaths**. WHO, Geneva.

Rutestein, S. O (1984) "Demographic Differentials in Infant and Child Mortality" **WFS Comparative Studies/Cross National Summaries.** WFS, London.

Samai. O. and P. Sengeh (1997) "Facilitating Emergency Obstetric Care Through Transportation and Communication, Bo, Sierra Leone." **International Journal of Gynaecology and Obstetrics.** Vol 59 (2).

Sanghvi, H. C. *et. al.*(1983) "Nairobi Birth Survey: Outcome of Pregnancy in Teenage Mothers in Nairobi Kenya" **Journal of Obstetrics and Gynaecology for Eastern and Central Africa.** 69 (3).

Sarin, A. R (1995): "Severe Anaemia of Pregnancy: Recent Experience" **International Journal Of Gynaecology and Obstetrics.** Vol 50 (2).

Schlesselman, J.J. (1982) **Case Control Studies: Design, Conduct Analysis.** New York: Oxford University Press.

Senderowitz, J. and J.M. Paxman (1985) "Adolescent Fertility: World-wide Concerns" **Population Bulletin** Vol 40 No 2.

Shah. P. M (1994) "Appropriate Technologies for Mother-Baby Care at Community and Home Level" **International Child Health: A Digest of Current Information.** Vol 5 (3).

Siwale, S. H (1977) View From Zambia. In D. J Bogue, K. Oettinger, M.Thompson and P. More (eds.) **Adolescent Fertility.** Chicago, University of Chicago Community and Family Health Centre.

Stinson, W. (1986) **Women and Health.** World Federation Health Association. Washington DC.

Tahzib, F. (1983) "Epidemiological Determinants of Vesico-Vaginal Fistulas". **British Journal of Obstetrics and Gynaecology, 90.**

Tekce, B. and F. C. Shorter (1984) "Determinants of Child Mortality: A Study of Squatter Settlements in Jordan". In Mosley, W. H and L. C Chen (eds.) Child Survival Strategies for Research. **Population and Development Review** Supp. 10.

Thaddeus, s and D. Maine (1990): **Too Far To Walk: Maternal Mortality in Context.** Columbia University.

Thirugnanasambandham, C, S. Gopaul and T. Sivakumar (1986) "Pattern of Early Neonatal Morbidity: Observations in a Referral Maternity Hospital". **Journal of Tropical Paediatrics.** Vol 33.

Thuray, H. *et.al.*(1997) "Establishing cost recovery system for drugs, Bo, Sierra Leone". **International Journal of Gynaecology and Obstetrics Vol 59 Sup. No. 2.**

Tietze, C. (1978) "Repeat Abortions: Why more?" **Family Planning Perspectives.**

Tinker, A. *et. al.*(1994) **Women's Health and Nutrition: Making a Difference**. World Bank, Discussion Papers 256.

Torotich-Ruto, C. (1997) The determinants of Teenage Sexuality and Their Understanding of STD's/HIV/AIDS in Kenya" **African Population Studies** Vol 2 no 12.

USAID (1993) "Nutrition of infants and young children in Nigeria" **Africa Nutrition Chartbooks.** Macro International Inc. Washington D. C.

van Dam, C. J (1995) "HIV, STD's and their current impact on reproductive health: the need for control of sexually transmitted diseases" **International Journal of Gynaecology and Obstetrics Vol 50 Sup. No. 2.**

Vaughan, P. (1992) "Health Personnel Development in Sub-Saharan Africa" **Policy Research Working Paper 914.** World Bank, Population and Human Resources Dept. Washington D. C.

Viegas, O.A.C *et al*(1992) "Safe child-birth needs more than medical services' **World Health Forum** 13(1).

Walker, G. J .A. *et.al.* (1986) Maternal Mortality in Jamaica" **Lancet 1.** 486-488.

Walsh, J *et al* (1993) "Maternal and Perinatal Health" In Jamison D.T *et al* (eds.) **Diseases Control Priorities in Developing Countries**. World Bank, Oxford University Press.

Wangombe, J.K.(1989) "Cost-Sharing: Issues Relating to The Financing Health Services In Kenya" in J.E.O Odada and L.O. Odhianbo (eds.) **Report On Proceedings On Cost-Sharing In Kenya.** UNICEF, Kenya.

Ware, H (1984): "Maternal variables and child mortality" in, Mosley W. H and L.C. Chen (eds.) **Child Survival Strategies Population and Development Review Supplement 10.**

Whitehead, R. G (ed.) (1983) **Maternal Diet, Breast-feeding Capacity and Lactational Infertility.** United Nations University.

WHO (1994a) **Mother-Baby Package: Implementing Safe Motherhood In Countries.** Geneva.

WHO (1977) **International Classification of Diseases, 1975 Revision** Geneva

WHO (1978) **A WHO Report on Social and Biological Effects on Perinatal Mortality.** WHO Budapest Hungary

WHO (1986) **Maternal Care For The Reduction Of Perinatal And Neonatal Mortality: A Joint WHO/UNICEF Statement**. Geneva.

WHO (1988) **The World Drug Situation.** Geneva.

WHO (1992) **Antenatal Care and Maternal Health: How Effective is it? A Review of Evidence.**

WHO (1993) **Coverage of Maternity Care: A tabulation of available information.** Geneva: Division of Family Health.

WHO (1994a) **Indicators to Monitor Maternal Health Goals. A Report of a Technical Working Group.**

WHO (1994b): **Care of Mother and Baby at Health Centre: A Practical Guide**. Geneva, Maternal Health and Safe Motherhood Programme.

WHO (1996) **Studying Unsafe Abortion: a practical guide.** Geneva: Division of Reproductive Health.

WHO (1999) **Reduction of Maternal Mortality: A joint WHO/UNFPA/UNICEF/World Bank Statement.** Geneva.

Wilson, J. B *et. al.* (1997) "The maternity waiting home concept: the Nsawam, Ghana, experience. **International Journal of Gynaecology and Obstetrics Vol 59 Sup. No. 2.**

Wong, E.L *et.al* (1987) "Accessibility, quality of care and prenatal use in Philippines". **Social Science and Medicine** 24(11).

World Bank (1989) **Social Indicators of Development.** Washington DC.

World Bank (1994) **Better Health for Africa: Experiences and Lessons Learned.** Washington D. C.

Worthington-Roberts, B. S (1989) "Promotion of Maternal and Infant Health" in, B. S. Worthington-Roberts and S. R Williams (eds.) **Nutrition in Pregnancy and Lactation. Toronto, Times,** Mirror and Morby.

# Appendix 1

HEALTH FACILITY EVALUATION SCHEDULE:
A) DRUG SCORE SHEET (Health Centre)

NAME OF FACILITY _____

| | DRUG NAME | SCORE 1 = YES 0 = NO | SCORE |
|---|---|---|---|
| **(a)** | **Anesthetics** | | |
| 01 | Diazepam (injection) | | |
| 02 | Oxygen (gas) | | |
| 03 | Ketamine (injection) | | |
| **(b)** | **Anesthetic (local)** | | |
| 04 | Lidocaine (injection) | | |
| **(c)** | **Analgesics** | | |
| 05 | Paracetamol (tablets) | | |
| 06 | Acetsalicylic acid (tablets) | | |
| 07 | Pethidine (injection) | | |
| 08 | Morphine (injection) | | |
| **(d)** | **Antiallergic** | | |
| 09 | Epinephrine (injection) | | |
| **(e)** | **Anthelminthic** | | |
| 10 | Albendazole | | |
| 11 | Levamisole | | |
| 12 | Mebendazole | | |
| 13 | Pyranthel | | |
| **(f)** | **Antibiotics** | | |
| 14 | Ampicilin (capsules and injection) | | |
| 15 | Benzanthine penicilin (injection) | | |
| 16 | Benzylpenicilin | | |
| 17 | Procaine benzylpenicilin | | |
| 18 | Cefriaxone | | |
| 19 | Chloramphenicol | | |
| 20 | Clotrimazole | | |
| 21 | Gentamicin | | |
| 22 | Kanamicin | | |
| 23 | Metronidazole | | |
| 24 | Silver Nitrate | | |
| 25 | Sulfamethoxazole | | |
| 26 | Tetracycline (eye ointment) | | |
| 27 | Tetracyclin (capsules) | | |
| **(g)** | **Antimalarials** | | |
| 28 | Choloroquine (tablets) | | |

| | | | |
|---|---|---|---|
| 29 | Quinine (injection) | | |
| 30 | Proguanil (tablets) | | |
| 31 | Sulfadoxine and Pyrimethamine (tablets) | | |
| **(h)** | **Antianaemia drugs** | | |
| 32 | Ferrous sulfate (tablets) | | |
| 33 | Folic acid (tablets) | | |
| 34 | Iron dextran (solution) | | |
| **(i)** | **Anticonvulsives** | | |
| 35 | Diazepham (injection) | | |
| 36 | Magnesium sulphate (injection) | | |
| **(j)** | **Disinfectants** | | |
| 37 | Chlorohexidine / cetrinide / iodine (solution) | | |
| 38 | Surgical spirit | | |
| **(k)** | **Contraceptives** | | |
| 39 | Subdermal implants | | |
| 40 | Ethinylestradiol and Levonorgestral (tablets) | | |
| 41 | Norethisterone (tablets) | | |
| 42 | Depot medroxy-prgestrone acetate | | |
| **(l)** | **Barrier methods** | | |
| 43 | Condoms | | |
| 44 | Diaphragms | | |
| 45 | Intra uterine devices | | |
| **(n)** | **Sera and vaccine** | | |
| 46 | Tetanus | | |
| 47 | BCG vaccine | | |
| 48 | Poliomyelitis vaccine | | |
| 49 | Immunoglobulin (human) | | |
| **(o)** | **Oxytocics** | | |
| 50 | Ergometrine injection/tablets | | |
| 51 | Oxytocin injection | | |
| **(p)** | **Intraveneous Solutions** | | |
| 52 | Water for injections | | |
| 53 | Sodium lactate compound solution | | |
| 54 | Sodium hydrogen carbonate | | |
| 55 | Glucose 5% 50% | | |
| 56 | Glucose with sodium chloride | | |
| 57 | Dextran 70 | | |

# Appendix 2

HEALTH FACILITY EVALUATION SCHEDULE
B) EQUIPMENT SCORE SHEET (Health Centre)

NAME OF FACILITY _____

| | EQUIPMENT | SCORE 1 = YES 0 = NO | SCORE |
|---|---|---|---|
| **(a)** | **Basic** | | |
| 01 | Sphygmomanometer | | |
| 02 | Baby weighing scale | | |
| 03 | Fetal stethoscope | | |
| 04 | Instrument sterilizer | | |
| 05 | Spring type dressing forceps | | |
| 06 | Kidney basins | | |
| 07 | Sponge bowls | | |
| 08 | Clinical oral thermometer | | |
| 09 | Low reading thermometer | | |
| 10 | Heat source | | |
| 11 | Syringes and needles | | |
| 12 | Suture needles/material | | |
| 13 | Urinary catheters | | |
| 14 | Adult ventilator bag/mask | | |
| 15 | Surgical gloves | | |
| 16 | Scissors | | |
| **(b)** | **Delivery Pack** | | |
| 17 | Artery forceps | | |
| 18 | Cord cutting blunt ended scissors | | |
| 19 | Cord ties | | |
| 20 | Plastic sheeting | | |
| 21 | Gauze swabs | | |
| **(c)** | **Perineal/vaginal/cervical Repair Pack** | | |
| 22 | Sponge forceps | | |
| 23 | Artery forceps (large and small) | | |
| 24 | Needle holder | | |
| 25 | Stitch scissors | | |
| 26 | Dissecting forceps (toothed) | | |
| 27 | Vaginal speculum - large | | |
| 28 | Vaginal speculum (Hamilton Bailey) | | |
| **(d)** | **Equipment for Vacuum Extraction** | | |
| 29 | Vacuum extractor | | |
| 30 | Obstetric forceps, outlet, midcavity, breech | | |
| **(e)** | **Neonatal Resuscitation Pack** | | |

| | | | |
|---|---|---|---|
| 31 | Mucus extractor | | |
| 32 | Infant face masks | | |
| 33 | Ventilatory bag | | |
| 34 | Suction catheter Ch 12 | | |
| 35 | Suction catheter Ch 10 | | |
| 36 | Infant laryngoscope | | |
| 37 | Endotracheal tubes | | |
| 38 | Suction apparatus | | |
| **(f)** | **Equipment for Uterine Evacuation** | | |
| 39 | Vaginal speculum (sims) | | |
| 40 | Single tooth tenaculum forceps | | |
| 41 | Uterine curettes | | |
| 42 | Vacuum aspirator pack | | |
| 43 | Insertion and removal of IUD Pack | | |
| 44 | Equipment for insertion and removal of contraceptive subdermal implants | | |
| **(g)** | **Side Laboratory (Equipment to Perform)** | | |
| 45 | Preparation and staining thin blood films | | |
| 46 | Thick blood films for malarial parasites | | |
| 47 | Total differential leucocyte count | | |
| 48 | Estimation of haemoglobin | | |
| 49 | Erythrocyte volume fraction | | |
| 50 | Detection of glucose in urine | | |
| 51 | Detection of ketones in urine | | |
| 52 | Detection of protein in urine | | |
| 53 | Detection of bile pigments in urine | | |
| 54 | Detection of urobilinogen in urine | | |

# Appendix 3.

HEALTH FACILITY EVALUATION SCHEDULE
A) DRUG SCORE SHEET (Hospital and Nursing Homes)

NAME OF FACILITY _____

| | DRUG NAME | SCORE 1 = YES 0 = NO | SCORE |
|---|---|---|---|
| **(a)** | **Anaesthetics** | | |
| 01 | Diazepham (injection) | | |
| 02 | Oxygen (gas) | | |
| 03 | Ketamine (injection) | | |
| 04 | Nitrous oxide & other general anaesthetics | | |
| 05 | Thiopental (injection) | | |
| 06 | Atropine (injection) | | |
| 07 | Suxamethonium | | |
| **(b)** | **Anesthetic (local)** | | |
| 08 | Lidocaine (injection) | | |
| **(c)** | **Analgesics** | | |
| 09 | Paracetamol (tablets) | | |
| 10 | Acetsalicylic acid (tablets) | | |
| 11 | Pethidine (injection) | | |
| 12 | Morphine (injection) | | |
| **(d)** | **Antiallergic** | | |
| 13 | Epinephrine (injection) | | |
| **(e)** | **Anthelminthic** | | |
| 14 | Albendazole | | |
| 15 | Levamisole | | |
| 16 | Mebendazole | | |
| 17 | Pyranthel | | |
| **(f)** | **Antibiotics** | | |
| 18 | Ampicilin (capsules and injection) | | |
| 19 | Benzanthine penicilin (injection) | | |
| 20 | Benzylpenicilin | | |
| 21 | Procaine benzylpenicilin | | |
| 22 | Cefriaxone | | |
| 23 | Chloramphenicol | | |
| 24 | Clotrimazole | | |
| 25 | Gentamicin | | |
| 26 | Kanamicin | | |
| 27 | Metronidazole | | |
| 28 | Silver Nitrate | | |
| 29 | Sulfamethoxazole | | |

| | | | |
|---|---|---|---|
| 30 | Tetracycline (eye ointment) | | |
| 31 | Tetracyclin (capsules) | | |
| **(g)** | **Antimalarials** | | |
| 32 | Choloroquine (tablets) | | |
| 33 | Quinine (injection) | | |
| 34 | Proguanil (tablets) | | |
| 35 | Sulfadoxine and Pyrimethamine (tablets) | | |
| **(h)** | **Antianaemia drugs** | | |
| 36 | Ferrous sulfate (tablets) | | |
| 37 | Folic acid (tablets) | | |
| 38 | Iron dextran (solution) | | |
| **(i)** | **Anticoagulant and antidote** | | |
| 39 | Heparin (injection) | | |
| 40 | Protamine sulphate (injection) | | |
| **(j)** | **Antihypertensive and other related drugs** | | |
| 41 | Methyldopa (tablets) | | |
| 42 | Hydralazine | | |
| 43 | Propanolol (tablets) | | |
| **(k)** | **Diuretics** | | |
| 44 | Furosemide (injection) | | |
| **(l)** | **Anticonvulsives** | | |
| 45 | Diazepham (injection) | | |
| 46 | Magnesium sulphate (injection) | | |
| **(m)** | **Disinfectants** | | |
| 47 | Chlorohexidine/ cetrinide / iodine (solution) | | |
| 48 | Surgical spirit | | |
| **(n)** | **Contraceptives** | | |
| 49 | Subdermal implants | | |
| 50 | Ethinylestradiol & Levonorgestral (tablets) | | |
| 51 | Norethisterone (tablets) | | |
| 52 | Depot medroxy-prgestrone acetate | | |
| **(o)** | **Barrier methods** | | |
| 53 | Condoms | | |
| 54 | Diaphragms | | |
| 55 | Intra uterine devices | | |
| **(p)** | **Sera and vaccine** | | |
| 56 | Tetanus | | |
| 57 | BCG vaccine | | |
| 58 | Poliomyelitis vaccine | | |
| 59 | Immunoglobulin (human) | | |
| **(q)** | **Oxytocics** | | |
| 60 | Ergometrine injection/tablets | | |

| | | | |
|---|---|---|---|
| 61 | Oxytocin injection | | |
| **(r)** | **Intraveneous Solutions** | | |
| 62 | Water for injections | | |
| 63 | Sodium lactate compound solution | | |
| 64 | Sodium hydrogen carbonate | | |
| 65 | Glucose 5% 50% | | |
| 66 | Glucose with sodium chloride | | |
| 67 | Dextran 70 | | |
| **(s)** | **Endocrine drug** | | |
| 68 | Insulin | | |

# Appendix 4.

HEALTH FACILITY EVALUATION SCHEDULE

B) EQUIPMENT SCORE SHEET (Hospital/Nursing Homes)
NAME OF FACILITY _____

| | EQUIPMENT | SCORE 1 = YES 0 = NO | SCORE |
|---|---|---|---|
| **(a)** | **Basic** | | |
| 01 | Sphygmomanometer | | |
| 02 | Baby weighing scale | | |
| 03 | Fetal stethoscope | | |
| 04 | Instrument sterilizer | | |
| 05 | Spring type dressing forceps | | |
| 06 | Kidney basins | | |
| 07 | Sponge bowls | | |
| 08 | Clinical oral thermometer | | |
| 09 | Low reading thermometer | | |
| 10 | Heat source | | |
| 11 | Syringes and needles | | |
| 12 | Suture needles/material | | |
| 13 | Urinary catheters | | |
| 14 | Adult ventilator bag/mask | | |
| 15 | Surgical gloves | | |
| 16 | Scissors | | |
| **(b)** | **Delivery Pack** | | |
| 17 | Artery forceps | | |
| 18 | Cord cutting blunt ended scissors | | |
| 19 | Cord ties | | |
| 20 | Plastic sheeting | | |
| 21 | Gauze swabs | | |
| **(c)** | **Perineal/vaginal/cervical Repair Pack** | | |
| 22 | Sponge forceps | | |
| 23 | Artery forceps (large and small) | | |
| 24 | Needle holder | | |
| 25 | Stitch scissors | | |
| 26 | Dissecting forceps (toothed) | | |
| 27 | Vaginal speculum - large | | |
| 28 | Vaginal speculum (Hamilton Bailey) | | |
| **(d)** | **Equipment for Vacuum Extraction** | | |
| 29 | Vacuum extractor | | |
| 30 | Obstetric forceps, outlet, midcavity, breech | | |
| **(e)** | **Neonatal Resuscitation Pack** | | |

| | | | |
|---|---|---|---|
| 31 | Mucus extractor | | |
| 32 | Infant face masks | | |
| 33 | Ventilatory bag | | |
| 34 | Suction catheter Ch 12 | | |
| 35 | Suction catheter Ch 10 | | |
| 36 | Infant laryngoscope | | |
| 37 | Endotracheal tubes | | |
| 38 | Suction apparatus | | |
| **(f)** | **Equipment for Uterine Evacuation** | | |
| 39 | Vaginal speculum (sims) | | |
| 40 | Single tooth tenaculum forceps | | |
| 41 | Uterine curettes | | |
| 42 | Vacuum aspirator pack | | |
| 43 | Insertion and removal of IUD Pack | | |
| 44 | Equipment for insertion and removal of contraceptive subdermal implants | | |
| **(g)** | **Obstetric laparatomy/ceaeserean section pack** | | |
| 45 | Stainless steel instrument tray with cover | | |
| 46 | Towel clips | | |
| 47 | Uterine homeostasis forceps 20cm | | |
| 48 | Hysterectomy forceps | | |
| 49 | Mosquito forceps | | |
| 50 | Tissue forceps | | |
| 51 | Uterine tenaculum forceps | | |
| 52 | Surgical knife handle | | |
| 53 | Surgical knife blades | | |
| 54 | Triangular point suture needles | | |
| 55 | Round bodied needles | | |
| 56 | Abdominal retractors | | |
| 57 | Curved operating scissors | | |
| 58 | Straight operating scissors | | |
| 59 | Suction nozzle | | |
| 60 | Intestinal clamps | | |
| **(h)** | **Equipment for craniotomy** | | |
| 61 | Decapitation hook | | |
| 62 | Breech hook | | |
| 63 | Craniotomy bone forceps | | |
| 64 | Cranial perforator | | |
| 65 | Embryotomy forceps | | |
| 66 | Scalp forceps | | |
| **(i)** | **Equipment for mini-laparatomy** | | |
| 67 | Tenaculum forceps | | |
| 68 | Uterine elevator | | |

| | | | |
|---|---|---|---|
| 69 | Proctoscope | | |
| **(j)** | **Equipment for anesthesia** | | |
| 70 | Anesthetic face masks | | |
| 71 | Oropharyngeal airways | | |
| **72** | Laryngoscopes | | |
| **73** | Endotracheal tubes | | |
| 74 | Intubing forceps | | |
| **75** | Endotracheal tube connectors | | |
| 76 | Spinal needles | | |
| **77** | Anesthesia apparatus | | |
| 78 | Oxygen cylinder | | |
| **(k)** | **Essential materials for the provision of blood donor transfusion** | | |
| 79 | Sodium chloride solution | | |
| 80 | Bovine albumen | | |
| 81 | Centrifuge | | |
| 82 | Incubator | | |
| 83 | Pipettes | | |
| 84 | Test tubes | | |
| 85 | Compound microscope | | |
| 86 | Microscope illuminator | | |
| **(g)** | **Side Laboratory Equipment** | | |
| 87 | Preparation and staining thin blood films | | |
| 88 | Thick blood films for malarial parasites | | |
| 89 | Total differential leucocyte count | | |
| 90 | Estimation of haemoglobin | | |
| 91 | Erythrocyte volume fraction | | |
| 92 | Detection of glucose in urine | | |
| 93 | Detection of ketones in urine | | |
| 94 | Detection of protein in urine | | |
| 95 | Detection of bile pigments in urine | | |
| 96 | Detection of urobilinogen in urine | | |

# Appendix 5.

## INDIVIDUAL QUESTIONNAIRE

**(a) Background**

Hospital _____

Interviewer's Name _____

Date Questionnaire completed ____/____/____
D M Y

Date Checked ____/____/____ Checked by _____
D M Y

Date Coded ____/____/____ Coded by _____
D M Y

Questionnaire Number _____

Mother's Name _____

**(b) Demographic Characteristics of Mother**

(I) Age in years _____

(ii) Current marital status
1 = single
2 = married
3 = divorced or separated
9 = not known

(iii) If married, ask which type of union
1 = monogamous
2 = polygamous with 2 wives
3 = polygamous with 3 wives
4 = polygamous with more than 3 wives
7 = other (specify)

(iv) Place of residence
1 = urban
2 = rural

(v) How many times have you been pregnant including this time _____

(vii) Have you ever been pregnant before this current one?

Yes
No

(viii) Have you ever experienced a pregnancy which ended as a miscarriage or an abortion before it was due?

Yes
No

(ix) Have you ever experienced a pregnancy which ended as still birth - that is a baby did no cry at birth?

Yes
No

(x) How many ended as a still births?

**Now to make sure that I have this information correctly, please let me complete this table.**

Obstetric History Table
List in order of birth successfully finishing with most recent one.

| No. of pregnancy | (1) Result of pregnancy | (2) Nature of birth | (3) Sex of child | (4) Survival of child | If dead, age of dead in months |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |

**Key for columns.**

**1)** 1 = live birth
2 = still birth
3 = aborted
7 = other

**2).** 1 = spontaneous birth
2 = caesarean
3 = vacuum
4 = forceps
5 = tear
6 = episiotomy
7 = other

**3)** F = female
M = male

**4)** 1 = living
2 = dead

**(c) Cultural and socioeconomic characteristics respondents**

(i) Education of the mother
Have you attended school?
1 = Yes
2 = No
9 = NK

**If yes, ask the highest grade attained**
1 = primary 2 = secondary 3 = post secondary

At what age did you leave school _____

(ii) Ethnic group _____

(iii) Activity or work status
1 = Student
2 = House worker
3 = Employed outside farm
4 = Farmer
7 = Other (specify)

(iv) What is the main activity that brings your household more income? ----------

(v) Religion
1 = Atheist
2 = Catholic
3 = Protestant
4 = Moslem
7 = Other (specify)

(vi) Who is the person in your place of residence on whom you primarily depend?
1 = Your spouse
2 = Yourself
3 = Your child
4 = A member of your family

5 = A member of your spouse family
6 = A friend
7 = Other (specify)

**If answer is 1 or 2 skip question (vii). If answer is either 3,4,5,6 or 7**

(vii) What is the person's main activity?
1 = Student
2 = House worker
3 = Employed outside farm (formal employment)
4 = Unemployed
7 = Other (specify)

(viii) What is the mother's (respondent's) height _____

(ix) What is the respondent's weight _____

(x) What is the respondents haemoglobin count _____

(xi) Does your household have access to transport which could be used if urgent medical care was needed by you or one of your family?

Yes
No

(xii) If yes, which is available?

(1) Daytime only.
(2) Anytime of day or night

(xiii) What mode of transport is commonly used by your household?

(1) Motor vehicle
(2) Bicycle
(3) Donkey cart
(4) Walk

**(d) Mother's dwelling**

(i) What are the walls of the house you live in made of?
1 = Brick or stone
3 = Wood
4 = Other (specify)

(ii) What is the roof made of?
1 = Sheet metal or tiles

2 = Thatch
7 = Other (specify)

(iii) Apart from the kitchen, bathroom or toilet how many rooms does your dwelling have?

(iv) How many people live in the house including you? _____

(v) How do you get drinking water?
1 = Tap
2 = Well
3 = Spring
4 = Stream/River
7 = Lake
6 = Other (specify)

(vi) Where is the source of water?
1 = In the house
2 = Within your property (land)
3 = Outside your property (land)

(vii) Is there a garbage dump in your neighbourhood?
1 = Yes
2 = No
9 = NK

(viii) How many times is garbage removed in one month? _____

(ix) Is there a toilet in your compound?
1 = Yes
2 = No

**(e) Characteristics of latest pregnancy**

(i) Did you have prenatal consultations with a practitioner?
1 = yes
2 = No
9 = NK

(ii) If No why?
1 = did not know I should
2 = could not afford fees
3 = I felt all right
7 = other specify

**If yes**

(iii) How many months pregnant were you when you began _____

(iv) How many prenatal visits did you make _____

(v) What type of facility did you visit?

1 = Hospital
2 = Health centre
3 = Mobile MCH/FP Clinic
7 = Other

(vi) Why did you choose this type of facility?

1 = it is closet to where I live
2 = its services are cheaper
3 = your friends go there
4 = the physician working there has good reputation
5 = the physician working there is a family friend
6 = no reason
7 = other specify

(vii) Were you ill during pregnancy?

1 = Yes
2 = No
9 = NK

**If yes**

(viii) Did you have the following diseases during pregnancy? (Check prenatal consultation records)

1 = high blood pressure
2 = fever
3 = malaria
4 = STD
5 = anaemia
7 = other specify
9 = NK

(ix) Did you seek medical treatment for any of the above diseases?

1 = Yes
2 = No
9 = NK

(x) Did you have haemorrhage or threatened abortion or labour during the current pregnancy?

1 = Yes
2 = No
9 = NK

(xi) Are you aware of means or methods of preventing or delaying pregnancy?

1 = Yes
2 = No
9 = NK

**If yes**

(xii) Did you use any before this pregnancy?

1 = Yes
2 = No
9 = NK

(xiii) What method did you use?

1 = Pill
2 = IUD
3 = Rhythm
4 = Withdrawal
5 = Injection
7 = Other specify

(xiv) Did you intend to be pregnant?

1 = Yes
2 = No
9 = NK

**(f) Birth**

(i) Date of birth ____/____/____
D M Y

(ii) Who conducted the delivery?

1 = Doctor
2 = Nurse/Midwife
3 = Other specify

(iii) Did you arrange or book to deliver here?

1 = Yes
2 = No
9 = NK

**If yes**

(iv) Why?

1 = closest to my place
2 = it is cheap

3 = friends gave birth here
4 = referred to the place by the person consulted for prenatal care
7 = Other (specify)

(v) Complications of birth (see mother's medical report and check appropriately)
1 = None
2 = Placenta previae
3 = Membrane broke over 24 hrs before birth
4 = Eclampsia
5 = Disproportion between fetus and pelvis
7 = Other (specify)

(vi) How did the birth go?
1 = Spontaneous birth
2 = Caesarean
3 = Vacuum
4 = Forceps
5 = Episiotomy/tear
6 = Other specify

vii) How did the child present?
1 = Head
2 = Breach
3 = NK

(viii) Are you suffering from an illness?
1 = haemorrhage
2 = fever
3 = other specify
9 = NK

(ix) How many children given birth to?
1 = One
3 = Triplets
2 = Twins
4 = Quadruplets

**(g) New-born Characteristics**

(I) How is the child?
1 = well
2 = ill
3 = dead

(ii) If ill, what is the illness?
1 = Respiratory problems
2 = Fever
3 = Anaemia
4 = Congenital malformation
5 = Other specify
9 = NK

(iii) If dead, when did the child die?

1 = before birth
2 = during delivery
3 = after birth

(iv) If died before birth, what did the child die of?
1 = Obstetrical trauma
2 = Mother's death
3 = Cord circulation
4 = Placental disease
5 = Membrane rapture
7 = Other specify
9 = Not known

(v) If died during delivery, what did the child die of?
1 = Mother's death
2 = cord prolapse
3 = Surgical and instrumental intervention
4 = Membrane rapture
7 = Other specify
9 = NK

( vi) If died after delivery, what did the child die of?
1 = Respiratory problems
2 = Trauma (fall)
3 = Prematurity or dysmaturity
4 = Congenital malformations
5 = Fever
6 = Anaemia
7 = Other specify
9 = NK

(vii) What did the child weigh at birth? _____

(viii) What is the child's length? _____

(ix) What is the child's sex?
1 = Male 2 = Female

(x) What anomalies did the child show at birth, if any?

**(h) Home Visit on 7th Day**

(i) Has the child had the following vaccinations?
1 = BCG 2 = Tetanus
3 = Smallpox 7 = Other

(ii) How is the child?
1 = Well 2 = Ill 3 = Dead 9 = NK

(iii) If well, has it been ill?
1 = Yes 2 = No 3 = NK

(iv) If yes, was he cared for by,
1 = Physician 2 = Lay practitioner
3 = Nurse 4 = Mother 5 = None

(v) If ill, what is the current illness?
1 = respiratory problems 2 = tetanus
3 = diarrhoea 7 = other 9 = NK

(vi) Mother's survival
1 = Mother alive
2 = Mother dead
3 = Mother ill
9 = NK