ESTIMATION OF MATERNAL MORTALITY USING THE INDIRECT SISTERHOOD METHOD IN FIKA L.G.A., YOBE STATE, NIGERIA.

BY

HAUWA LARAI GONI

A THESIS SUBMITTED TO THE POSGRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE MASTERS DEGREE IN PUBLIC HEALTH (MPH).

DEPARTMENT OF PUBLIC HEALTH AND PREVENTIVE MEDICINE
FACULTY OF MEDICINE
AHMADU BELLO UNIVERSITY
ZARIA
NIGERIA.

FEBRUARY, 2005

DECLARATION

I hereby declare that the work presented in this study for the award of Masters Degree in Public Health has not been presented either partly or wholly for any degree elsewhere.

The work is entirely the result of my research conducted under the supervision of Dr. C. L. Ejembi. The works of other researchers have been acknowledged accordingly in the section titled REFERENCES.

_____

HAUWA LARAI GONI

CERTIFICATION

This thesis titled ‘‘ESTIMATION OF MATERNAL MORTALITY USING THE INDIRECT SISTERHOOD METHOD IN FIKA L.G.A., YOBE STATE, NIGERIA’’ by Hauwa Larai Goni, meets the regulation and requirements governing the award of Masters Degree in Public Health of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

_____ _____

Project supervisor — Date
Dr. C. L. Ejembi, M.B.B.S., DTM & H, FMCPH,
Senior Lecturer, Department of Community Medicine
Ahmadu Bello University, Zaria.

_____ _____

Dr. A. U. Shehu, M.B.B.S., DTM & H, FWACP, — Date
Head of Department,
Department of Community Medicine
Ahmadu Bello University, Zaria.

_____ _____

External Examiner, — Date
Professor D.B. Parakoyi, MD, FWACP,
Professor of Epidemilogy and Community Health,
University of Ilorin.

_____ _____

Dean, Postgraduate School, — Date
Ahmadu Bello University, Zaria.

DEDICATION

I hereby dedicate this work to my late husband, Malam Adamu Muhammed Kukuri and my late sister, Barrister Hauwa Asabe Goni - who died a maternal death as well as all the other women that died of maternal causes. May their souls rest in perfect peace, Amin.

_____

HAUWA LARAI GONI

ACKNOWLEDGEMENT

First and foremost I am thankful to Almighty Allah for leading me through the various stages of this work.

I gratefully acknowledge the support of all that contributed towards the success of this work in one way or the other. My appreciation goes to the Yobe State Government for granting me the opportunity of study leave.

My sincere gratitude goes to my supervisor, Dr. Clara L. Ejembi, who made detailed and objective critism of every submission to her. She offered a number of useful suggestions without which the project would never have been written.

I also wish to register my thanks to Professors Audu Idrissa and P. Singha for their immense contributions towards this study. My gratitude also goes to Dr. Kole Shettima, Dr. Muhammad Isa Adamu, Mr.Wole Ogunleye and Al-Hussain Umar, for their encouragement and support during this project. In the same way my thanks go to Dr. Steve A.S. Olorunju, Mr. Joel Maidawa and Abdulazeez Bangdele for their untiring efforts during the data analysis and statistical interpretation of this research.

Similar acknowledgments go to the Executive Chairman of Fika Local Government Area, the entire staff of Fika L.G.A. in general, and staff of Primary Health Care Department in particular for their support and various worthy contributions. The contributions of Hassana Abdullahi, Garba Usman, Bala Umaru, Mohammed Abdullahi, Ajiya Bukar Sanda, Hauwa Bukar Sanda, Jummai Mohammed, Mallam Alhaji Mohammed Ba'aba, Zakar Alhaji Adamu, Musa Bah, Jafaru Tinja, Bah Bukar, Ajiya Usaini, Danlami and Ibrahim Sule who assisted with the data collection during the pre-test and final study are highly appreciated.

My sincere gratitude also goes to the entire members of my family especially my father, Alhaji Goni Fika: my mother, Hajiya Hauwa Goni: my son Ibrahim Adamu Mohammed Kukuri: my nephew Abubakar Sadiq Garba: my brother , Auwalu Goni and my sisters Fatima Goni and Amina Goni for their patience, love, endurance, support and encouragement during the study.

My sincere thanks also goes to the people of Anze, Fika, Ngalda and Sabon Garin Ngalda communities used for the study, without whose corporation this work would not have been possible. My thanks also goes to the entire staff of the Department of Community Medicine in the Faculty of Medicine, Ahmadu Bello University , Zaria, and the students of 2002-2003 Masters In Public Health programme for their various contributions during the study.

TABLE OF CONTENTS

CONTENT **PAGE**

Cover page

Title page…….……...…… …..i

Declaration…….…….……..…….ii

Certification…….…...…….....……...iii

Dedication……..……..…….……....…….…iv

Acknowledgement…….……..……..v

Table of content ……..…..……..….vii

List of tables…….….....x

List of figures……..……..……xii

List of appendices……..……..…….xiii

Abstract……..…..……xiv

CHAPTER ONE

1.1 Introduction……...……1

1.2 Problem definition…….……..……..……3

1.3 Aims and objectives of the study….…….5

1.4 Justification……..…..……....5

CHAPTER TWO: LITERATURE REVIEW

2.1 Magnitude of the problem…….……8

2.2 Determinants of maternal mortality……..…….……..…..10

2.3 Consequences of maternal mortality…….....…20

2.4 Prevention and control of maternal mortality……...…..…...…….21

2.5 Methods of assessment of maternal mortality……....27

2.6 The indirect sisterhood method of estimating maternal mortality…….30

CHAPTER THREE: METHODOLOY

3.1 Background information……..…..……...……..…….34

3.2 Materials and methods…….……...……...……..36

CHAPTER FOUR: RESULTS

4.1 Socio-demographic features of the respondents…….…….……...43

4.2 The results…….……...48

CHAPTER FIVE

DISCUSSIONS……...…….……..59

CHAPTER SIX

6.1 Conclusions…….……..…..65

6.2 Recommendations……..…….65

6.3 References……..…….69

APPENDICES

Appendix I (list of settlements/villages)

Appendix II (questionnaire)

Appendix (map of Fika L.G.A.)

Appendix (map of Yobe State)

Appendix (map of Nigeria)

LIST OF TABLES PAGE

Table 4.1.1 Distribution of respondents by districts and villages.....43

Table 4.1.2 Ethnic group of respondents ……..……..…..……45

Table 4.2.1 Number of ever married sisters born of the same mother reported by respondents…….…….……48

Table 4.2.2 Numbers of ever married sisters born of the same mother by age group of respondents…..…….…..…..49

Table 4.2.3 Number of ever married sisters alive reported by respondents…….……50

Table 4.2.4 Number of ever married sisters alive by age group of respondents…….…51

Table 4.2.5 Number of ever married sisters dead reported by respondents.....52

Table 4.2.6 Number of ever married sisters dead by age group of respondents.....53

Table 4.2.7 Number of ever married sisters that died of maternal causes reported by respondents……...…..…..……54

Table 4.2.8 Number of ever married sisters that died of maternal causes by age group of respondents...…….……55

Table 4.2.9 Analysis of proportional maternal mortality ratio and the Life-time risk of dying of maternal causes……56

LIST OF FIGURES PAGE

Figure 1 Analytical model of the conceptual framework of the determinants of maternal mortality…..….11

Figure 2 Religion of respondents…….……..……..……44

Figure 3 Age and sex distribution of respondents……..…….44

Figure 4 Distribution of respondents by educational qualification and sex…….46

Figure 5 Distribution of respondents by occupation and sex…….....…..…...47

LIST OF APPENDICES

Appendix I …….....List of villages/settlements

Appendix II.….....…….....……..……Sample questionnaire

Appendix III .....……...……...…….…….….Map of Fika L.G.A.

Appendix IV.……...…….……...…Map of Yobe State

Appendix V...…….....….Map of Nigeria

ABSTRACT

Context

Lack of reliable and timely population-based data is one of the major constraints in the planning, management and evaluation of programmes aimed at reducing the levels of maternal mortality. The study area, Fika Local Government Area, is a rural L.G.A. with hilly and rocky terrain and poor road network. In addition to a small number of private chemists, government health facilities for the L.G.A. include one general hospital and a number of Primary Health Care Facilities, dispensaries and health posts. Most people are subsistence farmers. Houses mainly have thatched roofs and mud walls and often have inadequate water supply and poor waste disposal.

The aims and objective of the study wass to ascertain the level of maternal mortality, the lifetime risk of dying from maternal causes and the proportional maternal mortality rate among women of childbearing age group in Fika L.G.A. and, in light of the study, make recommendations on strategies for the prevention of maternal mortality.

Methodology

In this study the indirect sisterhood method which is comparatively easy, reliable and cost effective community based cross sectional descriptive study was used to estimate the maternal mortality ratio in Fika L.G.A., a rural L.G.A. in Yobe state using a sample of 4,093 male and female respondents aged 15-49 years selected from 4 villages by three staged cluster sampling. The mean age of the respondents was 33.5 ± 9.8 years, 31.6 ± 9.5 years for the female respondents and 35.8 ± 9.7 for the male respondents.

The study collected data by means of four questions about the death of adult sisters based on the assumption that among siblings that survive to adulthood at least one becomes a principal source of information on all his or her sisters who have reached reproductive age.

Results

The study showed that the maternal mortality ratio among the study population was 3,200/100,000 Live births, the proportional maternal death to the total deaths from all causes for women of reproductive age is 46.5% and the overall lifetime risk of dying a maternal death by the end of reproductive period is 0.181 or 1 in every 6 women.

Conclusion

In conclusion, the level of maternal mortality ratio and estimated lifetime risk of dying a maternal death were found to be very high in Fika L.G.A. It is therefore recommended that community involvement in the planning, implementation and supervision of reproductive health services and the integration of reproductive health services into existing health programmes especially at the primary health care level as well as provision of good communication systems, emergency transportation and women empowerment educationally, economically, socially, and politically will increase access to family planning information and services, skilled attendance at delivery, emergency obstetric care, prevention and management of abortion complications, better reproductive health care for adolescents and the prevention and early management of sexually transmitted infections including HIV/AIDs, which will greatly reduce and maternal

mortality and morbidity. Reducing maternal mortality will also require the protection and promotion of a range of women's rights over a long period of time.

CHAPTER ONE

1.1 Introduction

Maternal mortality is a crucial though complex measure of a country's overall health and development status[1]. The journey through pregnancy and childbirth takes women along a risky maternal death road. The concept of maternal death road whose determinants include risk factors from birth also has entrants to the road near its end for women who develop life threatening situations[2] associated with pregnancy. The World Health Organisation defined maternal death as the death of a woman while pregnant or within forty two days after termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes[3]. Late maternal death is defined as the death of a woman from direct or indirect obstetric causes occurring more than 42 days but less than one year after the termination of the pregnancy[3].

The major direct causes of maternal death are unsafe abortion, anaemia, eclampsia, haemorrhage, obstructed labour and puerperal infections[4]. The direct causes leading to death is just the end of the road beset by many obstacles such as harmful traditional practices and underlying basic determinants of the status of women in the society. Factors underlying the causes of maternal deaths operate at several levels[4] to influence pregnancy outcomes. These include socioeconomic status of women in the society, cultural factors, health status of women, access to adequate reproductive health services, health seeking behaviour and reproductive behaviour among others.

The low social status of women in developing countries limits their access to economic resources and basic education and thus their ability to make decisions related to their health and nutrition. Some women are denied access to care when it is needed either because of cultural practices of seclusion or because decision-making is the responsibility of other family members. This lack of decision-making power and of alternative opportunities consigns many women to a life of repeated childbearing. Excessive physical work coupled with poor diet also contributes to poor maternal outcomes. Lack of access to and use of emergency obstetric care is a crucial factor that contributes to high maternal mortality.

Poor quality of services, including poor treatment by health providers, also makes some women reluctant to use services. The majority of women in developing countries receive no postpartum care. In very poor countries and regions, as few as 5% of women receive such care[5]. Moreover civil strife compounded with misgovernance, collapsed economy, destruction of public and private institutions and poorly functioning health system, all contribute to high rate of maternal mortality and morbidity.

The consequences of maternal death have implications for the whole family and an impact that rebounds across generations[4]. The complications that cause the deaths and disabilities of mothers also damage the infants they are carrying. Of nearly 8 million infant deaths each year, around two-thirds occur during the neonatal period, before the age of 1 month; 3.4 million of these neonatal deaths occur within the first week of life and are largely a consequence of inadequate or inappropriate care during pregnancy, delivery, or the first critical hours after birth. Moreover, for every neonate who dies at

least one other infant is stillborn[6]. The other consequences of maternal mortality include high rate of orphanhood, childhood malnutrition and infections, and increased incidence of delinquency due to maternal deprivation. There is also associated increased rate of sexually transmitted infections including HIV/AIDS due to husbands remarrying because of death of the wives and high incidence of divorce and polygyny. There is also great economic loss as a result of maternal death because these women die in their productive years both biologically and economically. The emotional, social and economic consequences are catastrophic; they affect every one of us[7].

1.2 Problem definition

Deaths from maternal causes represent the leading cause of death among women of reproductive age in most developing countries[4,8]. The first estimates of the extent of maternal mortality around the world were made in the late 1980s. They indicated that globally some 500,000 women die each year from pregnancy related causes[4]. In 1996, the World Health Organisation (W.H.O.) and United Nations Children's Fund (UNICEF) revised the estimates for the 1990 on the basis of the growing volume of information that has become available in recent years. These new estimates show that the scale of the problem is greater than has originally been suspected and that closer to 600,000 maternal deaths occur each year with the overwhelming majority of them in the developing countries[4,8,9]. That is one woman dying about every 5 minutes somewhere as a result of complications of pregnancy and childbirth. Over 99% of these deaths take place in the developing countries with ratios of 55/100,000 and 700 /100,000 live births in East Asia and West Africa respectively[8]. It is estimated that the highest risks occur in Africa,

particularly in Eastern and Western Africa, with ratios of over 1,000 maternal deaths per 100,000 live births[8]. The first time the problem was appreciated was in 1987 at the first International Safe Motherhood Conference in Nairobi, Kenya, where the goal of halving the 1990 levels of maternal mortality by the year 2000 was formulated[1]. This captured the world's imagination and many countries have also accepted it as a national goal. The goal was later adopted by National Governments and other International Conferences and it forms an integral component of the programmes of action following the 1990 World Summit for Children, the 1994 International Conference on Population and Development (ICPD) held in Cairo, Egypt, and the 1995 Fourth World Conference for Women in Beijing, China in 1995[3]. While regional and global estimates of maternal mortality may be adequate for drawing attention to the ‘‘neglected tragedy ’’ of maternal deaths, they only provide a rough baseline from which to launch action in developing countries. This has led to an increased pressure on governments to provide more accurate estimates of maternal mortality. However, maternal mortality is difficult to assess for various reasons. First of all, a maternal death is a somewhat infrequent event; even in areas with high ratios the absolute number of maternal deaths is relatively low. Secondly, maternal deaths tend to be underreported and/or misclassified even in countries with satisfactory vital registration systems[4,10]**.** The goal beyond 2000 is to reduce by three-quarters, by the year 2015, the 1990 levels maternal mortality ratio[11]. However non availability of accurate data on maternal mortality is a major limitation against measuring progress and monitoring the attainment of set targets[1,10,12]. Most data available are hospital based and results from hospital studies are rarely acceptable because either the numerator (the women who died) or the denominator (the births in the facility) or both are not

representative of the general population and the maternal mortality ratio is, therefore, biased in unpredictable ways[12].

1.3 Aims and objectives of the study

1.3.1 Aim

To ascertain the level of maternal mortality among women of child bearing age group in Fika Local Government Area in Yobe State, Nigeria.

1.3.2 Specific objectives

1. To estimate the maternal mortality ratio among women of child bearing age in Fika L.G.A.
2. To estimate the lifetime risk of dying from maternal causes among women of child bearing age in Fika L.G.A.
3. To estimate the proportional maternal mortality rate among women of child bearing age in Fika L.G.A.
4. In light of the study, to make recommendations on strategies for the prevention of maternal mortality.

1.4 Justification

Information on the magnitude and causes of maternal death is crucial. Fika L.G.A. like Nigeria has a high level of obstetric morbidity and mortality with no accurate data because majority of childbirth occur at home with the assistance of the traditional birth attendants, the untrained relatives who just happen to be around at the time of delivery

and sometimes the women deliver alone. These deliveries are mostly not recorded. In Fika L.G.A. and Nigeria in general, like most developing countries vital registration systems are incomplete. Results from hospital studies are rarely acceptable because they are not true representatives of the general population[11,12]. In such settings, other approaches such as the sisterhood method provide reliable data needed to estimate the level of maternal mortality[1,4,8].

The sisterhood method[13] of estimation of maternal mortality is an indirect community based technique of estimation of the level of maternal mortality based on the assumption that siblings are a reliable source of obtaining information on maternal death. Among the siblings surviving to adulthood at least one becomes a principal source of information on all his or her sisters who have reached reproductive age.

In Fika L.G.A. being a rural L.G.A. therefore, this study will provide an insight into the actual level of maternal mortality in the rural community. These estimates can be used to gain a general sense of the size of the problem, sensitize policy makers, programme managers, health service providers and community leaders in Fika L.G.A. and Yobe State in particular and in Nigeria in general. The information can also be used to stimulate discussions and actions, prioritise the health service delivery at the National level and to mobilize local, National and International resources for maternal health. The estimates can also be used to measure progress of programmes aimed towards reduction of maternal mortality over a long period.

Results of the study will also be useful in proper channelling of resources in an ongoing personal project by the researcher on the reduction of maternal mortality through research advocacy and community participation supported by the MacArthur Foundation

Leadership Development programme which is in its second year in six communities namely: Fika, Ganjuwale, Gashua, Maruwa, Gangawa and Diwidi in the Local Government. The results of the study will also assist in identifying the strength of the Sisterhood Method for possible future application.

CHAPTER TWO

LITERATURE REVIEW

2.1 Magnitude of the problem

Pregnancy and childbirth are special events in women's lives and indeed the lives of their families. This can be a time of great hope and joyful anticipation. It can also be a time of fear, suffering or even death. Although pregnancy is not a disease, but a normal physiological process, it is associated with certain risks to the health and survival of both the women and the infants they bear[4,6,14]. In the developed countries these risks have been largely overcome because every pregnant woman has access to special care during pregnancy and childbirth, unlike in the developing countries where each pregnancy represents a journey into the unknown[14.]

Globally maternal mortality rate is about 400 per 100,000 live births[15]. The figure is 22/100,000 live births for the more developed countries, 440/100,000 live births for the less developed countries, 1,000/100,000 live births for the least developed countries[16]. In Nigeria there are regional variations in maternal mortality figures even within the country. In 1999 the national maternal mortality figure was 740/100,000 live births, 165/100,000 live births in the South-west region, 286/100,000 live births in the South East, 1,025/100,000 live births in the North-west and 1,549/100,000 live births in the North-east[17]. The figures are also different for rural and urban areas which are 351/100,000 live births and 828/100,000 live births respectively. Maternal mortality ratio is said to increase with increasing fertility[4,9]. The the total fertility rate is 5.7 for Nigeria, 4.9 for the urban women and 6.1 for the rural woman[18].

Women's lifetime risk of death from pregnancy related complications in 2000 was 1 in 20 for least developed regions, 1 in 61 to for less developed regions, 1 in 160 for more developed regions, 1 in 2,800 for the most developed regions and 1 in 74 Worldwide[16].

The first test of the sisterhood method was done in Gambia in 1987[13]. The study gave an estimated lifetime risk of maternal mortality of 0.0584 or 1 in 17 women and maternal mortality ratio of 1005 per 100,000 live births which was comparable to figures of 1050 and 950 from other sources for the Gambian region[13]. In the Gambia, since 1982 the British medical research Council (MRC) has maintained a rural population surveillance system which provided data for comparison with the result of the survey[13].

In another study carried out in the Kilombero District, Morogoro Region, in Southeastern Tanzania, total of 10,507 sisters reached the age of 15 years, including the 558 now dead. Maternal causes accounted for 19% of total mortality in women in reproductive age. The lifetime risk of dying due to maternal causes, q(w), was 0.026 or 1 in 39 women aged 15–49 years old. The maternal mortality ratio is 448 maternal deaths per 100 000 live births[8].

Also in a study of maternal mortality using the 'Sisterhood Method' in Swaziland, a total fertility rate of 6.36, as given in the 1986 Swaziland census, was used in estimating these indicators and the study revealed the estimated maternal mortality to be 229 and the life-time risk of maternal death to be 1 in 69 women[19]

2.2 Determinants of maternal mortality

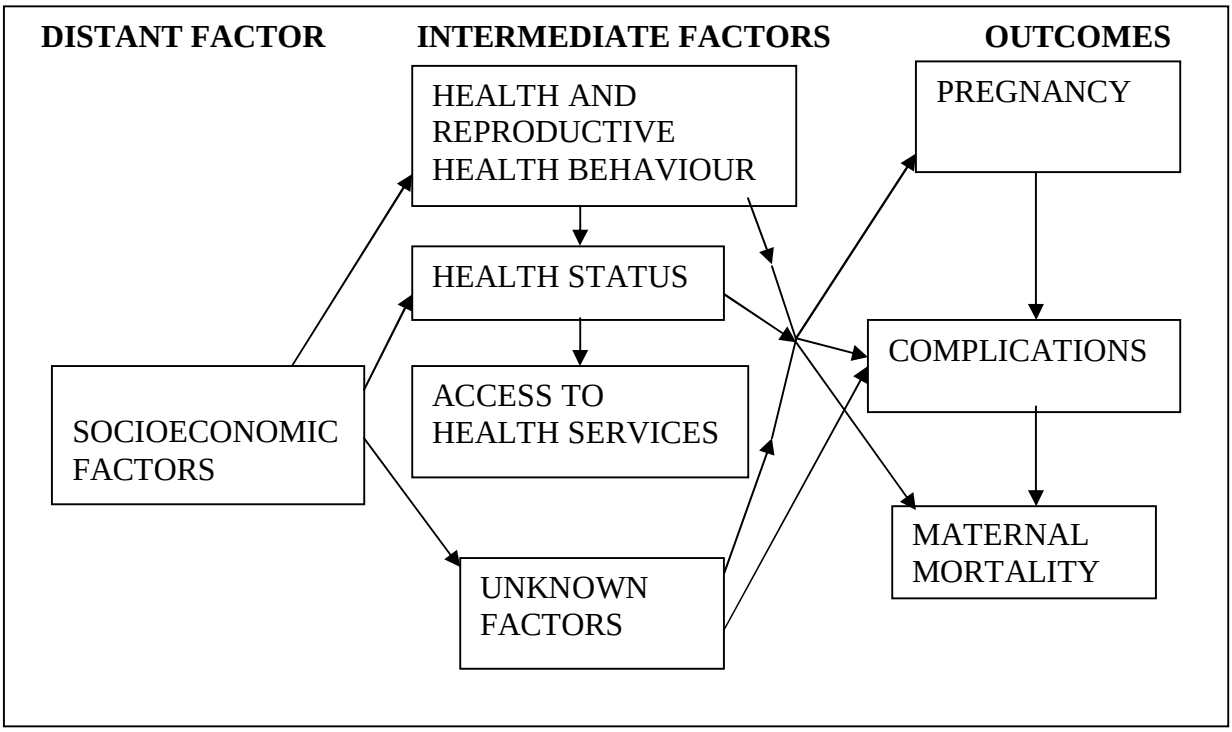
Deaths due to pregnancy and childbirth-related complications are the major causes of death of women in the reproductive age group in the developing world[2,9.10]. At least 40% of women experience complications during pregnancy, childbirth or the period after delivery and an estimated 15% of these women develop potentially life-threatening problems[5.] The tragedy is that these women die not from diseases but during the normal life enhancing process of procreation. The ‘‘Road to Death’’[20] concept illustrates the various levels of the causes of maternal death. Rather than focusing on the medical diagnosis, it shows how the health services, the woman's reproductive history and socioeconomic factors all contribute to maternal death. For example, a woman does not just die because she has a postpartum haemorrhage. She dies because she does not receive adequate timely medical treatment for the haemorrhage. The haemorrhage might have been caused by having too many children. In turn she may have wished to stop childbearing but either does not know about modern contraceptives or does not have access to family planning services. And finally, her lack of knowledge about or access to family planning and medical services may have been due to the fact that she was poor and illiterate and lived in a poor, rural area with few roads[9,21].

The determinants of maternal mortality are seen to cause maternal deaths by causing one or more of these four delays: delay in recognizing the complication due to lack of awareness of the danger, delay in deciding to seek emergency obstetric care, delay in reaching an emergency obstetric care facility; and delay in actually receiving care after

arriving at the facility [9,22] which influence how long it takes for a woman to receive adequate emergency obstetric care.

The conceptual framework model of the determinants of maternal mortality[23] analyzes the determinants of maternal mortality in four groups of variables: women's health and reproductive behavior, women's health status, women's access to health services, and unknown factors (Figure 1). This framework is important because it can help set program priorities, design strategies to reduce maternal deaths, and develop indicators for the utilization and quality of care.

Figure 1 Analytical model of the conceptual framework of the determinants of maternal mortality



SOURCE: McCARTHY, J., THE CONCEPTUAL FRAMEWORK OF THE PMM (PREVENTION OF MATERNAL MORTALITY) NETWORK. INTERNATIONAL JOURNAL OF GYNECOLOGY & OBSTETRICS 59, (SUPPL. 2):S15–S21 (NOVEMBER 1997).

The components of the conceptual framework of the determinants of maternal mortality model shall be discussed briefly below.

Outcomes

i) **Pregnancy:** Pregnancy is a precondition for maternal death. Women face risk of death and disability each time they become pregnant. Developing countries they face these risks much more often, since they bear many more children than women in the developed world[24]. For any individual woman the risk of maternal death is influenced by the risk associated with being pregnant and this increases each time she becomes pregnant again[25] making the outcomes of each subsequent pregnancy riskier than the previous one.

ii) **Obstetric complications:** Direct obstetric deaths occur due to complications of pregnancy, delivery or the postpartum period including abortion complications. They account for 80% of maternal deaths globally[4] and three quarters of maternal deaths in the developing counries[24]. These direct causes of maternal death are haemorrhage, infection, hypertensive disorders of pregnancy especially eclampsia, prolonged obstructed labour and complications of unsafe abortion[4,9,24,25]. Bleeding (haemorrhage) especially postpartum accounts for a quarter (25%)[4] of maternal deaths. It is generally unpredictable, sudden in onset, more dangerous when a woman is anaemic and can lead to sudden death. Sepsis (infection), which is often a consequence of poor hygiene or untreated Sexually transmitted diseases (S.T.Ds) accounts for some 15% of maternal deaths[4], hypertensive disorders of pregnancy, particularly eclampsia (convulsions) are the cause of approximately 12%[9], and

prolonged obstructed labour accounts for about 8% of maternal deaths[4]. This is often caused by cephalo-pelvic disproportion (when the baby's head cannot pass through the maternal pelvis) or by abnormal lie (when the baby's presenting part is incorrectly positioned for passage through the birth canal). Disproportion is more common where short stature (height less than 1 metre) as a result of malnutrition is endemic especially among populations with various traditional food taboos restricting what girls and women can eat. It is worse where girls who marry young are expected to prove their fertility, often before they are fully grown[4.]

Abortion complications are responsible for one in eight maternal deaths. In some parts of the world one third or more of all maternal deaths are associated with unsafe abortions[4]. Every day, 55,000 unsafe abortions take place – 95% of them in developing countries. Abortions are done by women for a variety of social and economic reasons[26] that include: they are unmarried, have been abandoned by their partners, are adolescents, in an unstable partnership, have too many children to support, and/or live in poverty, had failed contraception or they are victims of rape that got pregnant.

Indirect obstetric deaths are those that occur due to existing medical conditions that are made worse by the pregnancy or delivery or their management. They account for approximately 20% maternal deaths[4]. Some of the most significant of these indirect causes of death are: anaemia, cardiovascular arrest, hepatitis, malaria and HIV/AIDS. Pregnant women on

drugs and/or alcohol also have higher maternal mortality. Many of these conditions are relative or absolute contraindications to pregnancy[4]. Affected women need to be informed so that they can avoid getting pregnant while the conditions are being treated.

Intermediate factors

i) Health and reproductive behaviour

Health behaviour means the things that people do or don't do for their health[25]. These are influenced by various aspects of socioeconomic status. They include the utilisation of prenatal care services and actions taken when women develop obvious obstetric complications. For example if women with prolonged labour stay at home because they are afraid of the hospital, or if they are kept at home because there are only male doctors at the local hospital their chances of dying increases[25].

Reproductive behaviour includes age at pregnancy, pregnancy order, birth spacing, pregnancies too early due to early marriage/teenage pregnancy, pregnancies too late (mother's age more than 40 years) and wantedness of pregnancy[25].

Age: Pregnancy-related complications are the main causes of death for 15–19 year old girls worldwide[27] probably due in part to the fact that their pelves are not yet mature and they often have poor access to family planning information and services. They are also more likely to delay pregnancy termination until late in pregnancy when the risk of complications is higher and also they have

fewer social contacts and less financial means to obtain the abortion safely[28] especially if they are unmarried. Older women might have accumulated various health problems such as hypertension and diabetes during their life which can cause obstetric complications[25].

Pregnancy order: women having their first pregnancies are more likely to die than those having their second or third and then the risk increases after the fourth pregnancy[25]. While women get older as they have more pregnancies, age and pregnancy order have been shown to have independent relationship with maternal mortality[25].

Birth spacing Women who have pregnancies too close (less than two years apart) have a higher risk of maternal death[9,24]. Each time a woman becomes pregnant again the risk of maternal death increases and adds up over her lifetime[25]. Thus high fertility increases the chances of maternal death and anything that reduces fertility such as family planning and contraception will (all things being equal) reduce maternal death in the population[25].

Wantedness of pregnancy: Having an unwanted pregnancy predisposes the women to illicit and unsafe abortion[9,25] and its various complications especially if out of wedlock. Such women are also less likely to get adequate health care due to poverty, shame or both.

ii) Health status

Health status is influenced by a lot of distant and intermediate factor. For example anaemia can occur as a result of lack of money to buy food (low

socioeconomic status) or poor eating habits (health behaviour). Health status may in turn affect maternal mortality by influencing the likelihood that a woman will develop complications and by influencing the likelihood that women with complications will survive[25].

iii) Lack of access to health services

Access to health services not only implies that the facilities exist but also that people have the information they need to use the facilities properly, the facilities can be reached by people who need them, the cost of care is reasonable, the supplies and equipment are adequate, and that services are provided in a manner acceptable to patients and families[25]. Poor information among women and other community members on how to recognise, prevent or treat pregnancy complications, or when and where to seek medical help is another major contributor to maternal mortality [9,25,29].

Non accessibility of reproductive health services due to geographical distance to the nearest health facility, poor or lack of all season's road, lack of vehicles to convey patients and lack of communication facilities are also major contributors of maternal mortality. Most rural women (80%) live more than five kilometres from the nearest hospital[30]. Vehicle shortages and poor road conditions mean that walking is often the main mode of transportation, even for women in labour.

The high cost of reproductive health services makes them unaffordable to majority of the people where such services exist. For example families of

women in labour may be forced to purchase drugs and supplies to bring to the hospital[22], which can cause fatal delays.

Non availability and/or poor quality reproductive health services are ascribed to inadequate number of health facilities and skilled personnel to deal with obstetric emergencies, lack of family planning information and services, delay in referral from peripheral units, failure of women to attend prenatal and postnatal services, and, failure to organize outreach services to supervise home births[31]. Less than half of women in developing countries get adequate health care during and soon after childbirth, despite the fact that most maternal deaths take place during these periods[30]. At least 35% of women in developing countries receive no antenatal care during pregnancy, almost 50% give birth without a skilled attendant and 70% receive no postpartum care in the six weeks following delivery[5]. Lack of access could be due to traditional disclination towards modern medical practice which leads to non utilisation of health facilities even if the facilities exist[9,25]. Non utilisation of health facilities could also be due to the hostile attitude of health workers in some instances or simply due to the fact that rural people feel intimidated and out of place in such an environment. Other factors include: a lack of privacy; run-down physical facilities; inconvenient operating hours; and restrictions on who can stay with a woman at the health facility[32]. Some women may shun affordable, accessible maternity care because they feel that hospitals violate women's privacy during childbirth and because many of the health providers are men[33].

iv) Unknown factors

These include all those factors that are not understood but that influence the pregnancy outcome. This is because a large proportion of obstetric complications are not accounted for by any known risk factors[25]. The unknown factors also influence other parts of the model as well, for example it is not always clear why one patient dies and the other lives when their conditions and treatment are similar[25].

Distant factors

Even when good quality health services are available, social, economic and cultural limitations can prevent women from using these services as well as limit their access to good nutrition. The distant factors will be discussed briefly below.

Poverty: Women account for 70% of the 1.3 billion people who live in absolute poverty[34]. Poverty leads to non utilisation of available health facilities even if they exist.

Social status: Maternal mortality is an indicator of disparity and inequality between men and women and its extent is a sign of women's low status in the society[4]. The poor health and nutrition of women and lack of care that contributes to their death in pregnancy and childbirth also compromise the health and survival of the infants and children they leave behind[4]. Women's powerlessness in the society and unequal access to employment, finances, education, basic health care and other resources set the stage for poor maternal

health even before a pregnancy occurs, and make it worse once pregnancy and childbearing have begun[35]. The underlying reasons for low status of women in are tradition, culture, illiteracy, ignorance and poverty among other things[4,9,25]. In some cultures the woman is not part of the decision making process even in matters affecting her life and health for example it is usually the mother-in-law and husband who make the decision to seek (or not seek) care and they are often the least likely to know about pregnancy-related complications and their possible fatal consequences[36]. In other cultures the woman is not supposed to show pain[9,45] so her suffering may not be noticed by others. Single parent/mother also stands higher risk of maternal death due to societal stigma about pregnancy out of wedlock and there may be shame associated with a maternal death, particularly if the woman was not married or if the death was abortion-related[1].

Education: Women who have some secondary schooling are less likely to give birth during adolescence[37]. On average, women with seven or more years of education marry four years later and have 2.2 fewer children than those with no education[38]. However, reproductive health problems and deaths are more common among sexually active adolescents than among women in their 20's and early 30's[37] because adolescents often have poor information about reproduction and sexuality, and little access to family planning and reproductive health services. All young people should have information on sexuality, reproduction, contraception, decision-making skills and gender

relations in order to help them make informed decisions about sexuality and to negotiate abstinence or safer sex[39]. Sensitive, respectful and confidential reproductive health counseling and services for married and unmarried adolescents should emphasise the prevention of unwanted pregnancy, unsafe abortion and sexually transmitted diseases (STDs).

Illiteracy and Ignorance: Illiteracy and Ignorance increases the chances of maternal death[37] because they can lead to non utilisation of available facilities due to misconceptions and misinformation about danger signs during pregnancy[9].

Cultural values: In many developing countries, female status is equated with marriage and motherhood. Adolescents often marry early; more than 50 countries allow marriage at age 16 or below, and some even allow marriage as early as age 12 years[40]. Even the youngest brides face immediate pressure to prove that they are fertile[38]. Harmful traditional beliefs and practices including food taboos that prevent pregnant women from eating proteinous food can lead to anaemia, malnutrition, stunted growth and obstructed labour[4,9,25].

Legislature: Weak reproductive health laws and policies also contribute to the high maternal mortality[9,25]. For example strict abortion laws predispose women to unsafe abortions with all its implications even if they were victims of rape, or failed contraception[26]. Safe motherhood is a human right issue[41]and includes making available safe abortion to those who need it.

2.3 Consequences of maternal mortality

For every woman that dies many more suffer from serious conditions that can affect them for the rest of their lives[4]. In addition to maternal death, women experience more than 50 million maternal health problems annually[42]. As many as 300 million women, that is, more than one-quarter of all adult women living in the developing world, currently suffer from short or long-term illnesses and injuries related to pregnancy and childbirth[43]. Most of these deaths and disabilities could be avoided if preventive measures were taken and adequate care provided[4].

2.4 Prevention and control of maternal mortality

The prevention and control of maternal mortality will involve activities that can be examined in light of the conceptual framework model of the determinants of maternal mortality[22] discussed above. The various interventions should not be seen as mutually exclusive but their relative importance and potential for reducing maternal deaths should be estimated[25] depending on the local situation on ground.

i) **Improving the socioeconomic status of women:** formal education improves the health behaviour of women which in turn affects their health status positively. Better access to food improves nutritional status and prevents stunting, anaemia**,** severe vitamin A deficiency, Iodine deficiency, lack of dietary calcium and other micronutrient deficiencies. This can directly affect the health status of women before and during pregnancy for example by improving their blood count and the sizes of their pelves. While major

haemorrhage can kill anyone if untreated, the severely anaemic woman is more likely to die of haemorrhage than a woman with adequate blood count[25]. Also improved nutrition with corresponding increased access to operative delivery can reduce the incidence of obstructed labour, obstetric fistulae and stillbirth due to cephalopelvic disproportion where the baby that developed optimally due to improved maternal nutrition is too large for the pelvis of a woman that is stunted due to poor nutrition during her own childhood.

ii) **Health and reproductive behaviour changes:** Positive changes in traditional cultural behaviour such as delayed marriage, prevention of teenage pregnancies and changes in reproductive health behaviour will help a long way in reducing maternal mortality. With adequate knowledge there will be proper utilisation of accessible health care facilities and the end result is a safer pregnancy and childbirth, improved family health and nutrition, increase in contraception use and desirable social changes in the status of women[4].

iii) **Improving the health status of women:** Improvement of the health status of women influences better pregnancy outcomes[25]. For example antimalarial prophylaxis prevents anaemia and maternal deaths due to malaria.

iv) **Improving access to family planning:** Increased access to family planning information and services will increases access to and utilisation of health facilities which can then facilitate positive changes in reproductive behaviour. The changes in reproductive behaviour can then reduce maternal mortality by reducing the number of pregnancies, thus reducing women's risk of exposure to maternal mortality, and also by reducing the proportion of pregnancies that

are high risk and consequently the number that result in obstetric complications[25]. Complications of unsafe abortion can be prevented if women have access to family planning information and services, care for abortion related complications and by safe abortion care where abortion is not prohibited[4,26].

v) **Ante natal services:** antenatal care involves screening for high risk women[25] who can be treated or referred to an adequate medical facility where they can receive early treatment for any complications[9,25]. At least 40% of all pregnant women will experience some type of complication during their pregnancies and for about 15%, this complication will be potentially life-threatening, and will require immediate obstetric care[44]. However it is almost impossible to predict which individual woman will develop a life-threatening complication[45,46]. Low risk women do develop complications and most obstetric complications occur among women with no risk factors, therefore it is best to consider that every pregnant woman faces a risk[45,46] and treat all as such.

vi) **Access to emergency obstetric care services:** Provision of health facilities as close as possible to communities, reduction of the cost of services as well as availability of skilled personnel are all essential in ensuring access. Increased access to essential Obstetric services including skilled attendants, equipment and drugs at the time of delivery are the most important factors in preventing maternal deaths. People generally know perfectly well whether a particular facility has competent, concerned staff and key services available[44]. Such

essential obstetric health facilities could be basic essential obstetric care (EOC) health facilities that can provide parenteral antibiotics, Oxytocic drugs, anticonvulsant drugs for pre-eclampsia, manual removal of placenta, removal of retained products via manual vacuum aspiration and assisted vaginal delivery; or a comprehensive EOC facility which must be able to perform surgery (i.e., caesarian section) and blood transfusions[45,47] in addition to the all of the basic services. The central fact is that most life-threatening obstetric complications cannot be predicted or prevented, but they can be successfully treated[25,45.] Adequate equipment, drugs and supplies are essential to enable skilled attendants to provide good quality care. In addition, skilled attendants need to be supported by appropriate supervision. When delivery is taking place in the village (at home or in a local health facility), an emergency transport system must be available to take women to facilities that can provide more advanced care[9,25] when the need arises.

vii) **Skilled attendant at delivery:** Skilled attendants include doctors, nurses, midwives and other health workers with midwifery skills who can diagnose and manage complications during childbirth, as well as assist normal deliveries[9,25]. The World Health Organisation estimates that at least 15% of all pregnant women require skilled obstetric care in the absence of which they will suffer serious long term morbidities and disabilities[44,45]. Traditional birth attendants that assist home deliveries should be closely supervised by professionally trained health workers. They should also be trained to recognize problems during delivery and quickly refer women with obstetric

complications to the formal healthcare system[9,25,38], otherwise they can cause more harm than good.

viii) **Training of traditional birth attendants (TBAs):** Training of TBAs alone, in the absence of back-up from a functioning referral system, good transportation system and support from professionally trained health workers, is not effective in reducing maternal mortality[38,48],although they can provide culturally appropriate nurturing in the community setting, offer a first-line link with the formal healthcare system, and provide some simple services such as the distribution of nutrition supplements. A useful strategy in a range of settings has been to train TBAs to recognize problems during delivery and, when necessary, to guide women to and through the formal healthcare system. Where TBA training is undertaken, it should be part of a broader strategy that includes a built-in mechanism for referral, supervision, and evaluation[49].

ix) **Community information and mobilisation** Families and communities have a major role to play in facilitating access to emergency obstetric care[4] for the prevention of maternal mortality. Programmes should target mother in laws, husbands, fathers, adolescents and everyone in the community because these may well be the persons who decide to seek care or the only persons at home when a woman begins a haemorrhage or develops a complication. Community education efforts are essential to reverse widespread beliefs and practices that militate against adequate nutrition for pregnant women and to raise awareness that preparation for successful pregnancy and childbirth begins well before adulthood, with adequate nutrition for girls. Communities should be consulted

not only on the identifying the nature of their problems, but on the solution as well. Women with pre-existing conditions that can be exacerbated by pregnancy or its management, some of which are relative or absolute contraindications to pregnancy, need to be informed of this to prevent further pregnancy while the conditions are being treated[4].

x) **Role of the Media:** the role of the media in the dissemination of information on nutrition and the causes and prevention of maternal mortality will greatly lead to improvement in the health status, health seeking behaviour, reproductive health behaviour and the utilisation of health facilities which will lead to better pregnancy outcomes[9,25].

xi) **Legislature:** Weak reproductive health laws and policies also contribute to the high maternal mortality in Nigeria. Maternal mortality is an indicator of disparity and inequity between men and women and its extent a sign of women's place in society and their access to social, health, and nutrition services and to economic opportunities[4]. The death of a woman during pregnancy or childbirth is not only a health issue but also a matter of social injustice. Even if all women who don't want to become pregnant were using an effective method of contraception there would still be need for safe legal abortion services because there is no perfect method of contraception[9,25]. Studies in the United States of America have sown that among women that had induced abortion half were using some form of contraception during the month they conceived[25]. Thus, there is the need for advocacy to review the existing abortion law in Nigeria to reduce the incidence of unsafe abortion, provide safe

abortion services when medically indicated and apprehend offenders that commit illegal abortions. Policies should address regulatory, social, economic, and cultural factors that limit women's control over sexuality and reproduction, so that pregnancies that are too early, too late, or too frequent may be avoided[38]. Many of the Human Rights currently acknowledged in National constitutions and in regional and international treaties can be applied to Safe Motherhood. Many of such treaties are based on the 1984 declaration of Human Rights[48] and they include the Convention on the Elimination of all forms of Discrimination against women[49], the convention on the Rights of the Child[50], the European American Convention for the protection of Human rights and Fundamental Freedom[51] and the African Charter on Human and People's Rights[52]. Human Rights of relevance to Safe Motherhood can be grouped under the following four principal categories[4]:

i) Rights relating to life, liberty and security of the persons.

ii) Rights relating to the foundation of Families and Family life.

iii) Rights relating to health care and the benefit of scientific progress, including health.

iv) Rights relating to equality of life and non-discrimination.

2.5 Methods of assessment of maternal mortality

Worldwide, maternal mortality is difficult to measure and generally underestimated because of misclassification or underreporting of maternal deaths[1,8]. All currently available methods of measuring maternal mortality tend to underestimate maternal deaths in early pregnancy[1] which occurs frequently with first trimester maternal

deaths and deaths due to complications of abortions[1,46,47]. All these methods rely on accurate reporting of deaths of pregnant women and of the cause of death. This is always difficult even where all deaths are notified and registered because often the persons reporting on deaths of women of reproductive age do not know if the deceased was pregnant when she died; they do not know the medical cause of death; and there may be shame associated with a maternal death, particularly if the woman was not married or if the death was abortion-related. Misclassification of maternal deaths and under reporting of maternal mortality is also common even in developed countries with good vital registration systems[1,46,47] and places where sophisticated computerized linkages of fetal birth and death certificates to the death certificates of the mother exists[47]. The commonly used approaches for estimating the levels of maternal death are many and they vary between countries. However no single method is exhaustive. Some of the different techniques used to estimate maternal mortality are described below[47]:

i) **Reproductive Age Mortality Surveys (RAMOS):** The method utilizes single as well as multiple methodologies to obtain death related information.

ii) **Household surveys using direct estimation:** This require very large sample sizes to provide reliable and representative results, the confidence intervals for estimates are typically wide and maternal mortality indicators are therefore imprecise.

iii) **Vital Registration:** this is a well known method of maternal mortality data collection used in developed and some developing countries. This method is only feasible in countries where there is accurate recording of all births and deaths, hence the method is not appropriate for our country where we have no

proper vital registration system and most births and deaths occur at home and are mostly not recorded.

iv) **The WHO/ UNICEF estimates** try to compensate for problems of underreporting and misclassification. The method involves a dual strategy:

- Where maternal mortality estimates already exist, the figures are adjusted to account for underreporting and misclassification.
- Where no reliable estimates are available, a model based on fertility rates and the proportion of births that are assisted by skilled personnel generates an estimated figure. These estimates have wide margins of error and should be seen as providing orders of magnitude only.

v) **Hospital source of maternal death data:** this method is largely unacceptable as a valid estimate where majority (more than 80%) of childbirth occurs at home with the assistance of the traditional birth attendants or the untrained relatives who just happen to be around at the time of delivery, and are mostly not recorded.

vi) **The indirect sisterhood method:** this is an indirect community based method of estimating maternal mortality. The reference period of the estimate is at least 10–12 years before the survey.

vii) **The direct sisterhood method**: this method is used in demographic and health surveys also asks respondents to provide the date of death, which permits the calculation of more recent estimates, but even then the reference period tends to center on 0–6 years before the survey.

viii) **Maternal mortality death review:** this method combines confidential enquiry and verbal autopsy. Recently adopted by WHO and the Centers for Disease Control and Prevention. It demonstrates the "road to maternal death concept[2]. This approach involves a qualitative, in-depth analysis of maternal deaths collected from a small number of selected hospitals. It emphasizes the cause rather than the magnitude of maternal mortality[31].

2.6 The indirect sisterhood method of estimating maternal mortality

The indirect sisterhood method for estimating the level of maternal mortality was developed at the London School of Hygiene and Tropical Medicine[53]. In a study in Bali the results of the indirect sisterhood maternal mortality study were compared with the results of a direct community-based study. The authors concluded that the sisterhood method was faster and cheaper and appeared to be as accurate as direct methods. World Health Organisation later issued guidance notes on the sisterhood method for potential users[1,24].

This indirect sisterhood method of estimation of maternal mortality collects data by means of four questions[1,13,54] about the death of adult sisters from a sample of men and women aged 15–49 based on the assumptions that among siblings reaching adulthood at least one becomes a principal source of information on all his or her sisters that reached reproductive age. Information is needed on the five-year age group of the respondent. These questions can be inserted in any survey instrument among all adults in the survey sample. Direct interviews are recommended.

The first test of the method was in The Gambia in 1987. The results estimated maternal mortality as 1005 per 100,000 live births[13]. This figure was comparable to figures of 1050 and 950 from other sources[13]. The World Health Organization fact book on Maternal Mortality cites the sisterhood method as the source for its published estimates[53], a demonstration of the level of acceptance of the method[13]. While a community-based sampling is best, the method was successfully used in Nicaragua among a population attending government health facilities[53].

In deriving the single estimate of lifetime risk of dying of maternal causes, the risk of exposure to maternal death is weighted towards the reports of respondents at ages where residence apart from other siblings are common, that is after marriage. However multiple reporting among siblings is not considered to be a problem[52] because the sisterhood method is based on proportional relationship; it can be shown empirically that the number of sisters entering the reproductive period who are counted more than once in the denominator is matched proportionately by repeat counting in the numerator of sisters dying of maternal causes[13].

Also in a study in Swaziland[18], the use of the indirect sisterhood method allowed a more precise estimate of maternal mortality for the general population. The study revealed the estimated MMR to be 229 and the life-time risk of maternal death to be 1 in 69. These values were most probably stable throughout the 6 to 7 year period before the survey. The more the study is population based the more it reflects the magnitude of the maternal mortality since most of the women deliver at home[47].

Advantages of the indirect sisterhood method

The 'Sisterhood Method' allows a more precise estimate of maternal mortality for the general population[19]. The method is inexpensive and simple to use, therefore it is considerably more cost- effective than household surveys using direct estimation. There is simplicity of calculations and it is beneficial in the ease of adding four more questions to an already existing survey instrument. It has small sample size requirements than for other methods of estimating maternal mortality; it provides opportunity for more detailed community follow-up and there is the option of using an opportunistic sample such as the cluster sample. The method can be used for comparing results from household and health facility-based samples as in the a study in Nicaragua where the estimate obtained from a health facility based survey was essentially identical to that from a household-based survey conducted in the same region eight months earlier[55].

Disadvantages of the indirect sisterhood method

The disadvantages of the method[53] are that it does not provide an estimate of current maternal mortality levels, it is subject to wide margins of error that relate to sample size, the overall results relate to a point around 10-12 years prior to the survey if respondents aged 60 years and above were included in the survey. However, it is possible to calculate estimates for more recent periods by limiting the upper age of the respondents to, say, adults aged below 30 years old. In this case, the overall maternal mortality estimate would relate to a period some seven years prior to the survey. The disadvantage of limiting the upper age of respondents is, however, that larger numbers of households need to be visited to achieve the desired sample size of adult respondents[1].

Limitation of the indirect sisterhood method

The major limitations of the method[53] are that it uses retrospective data, does not provide a current estimate for the year of the survey and gives orders of magnitude rather than precise cause of maternal death. There is also the possibility of contamination of results if out-migration is high and potential inappropriateness of the average age specific fertility profile in areas with either very high or low fertility (less than 3). The method ignores those who die with no children (big problem for maternal mortality). It also excludes deaths of those who were never married and is best only if restricted to deaths of those who reached adulthood. Sisterhood studies cannot be used to monitor changes in maternal mortality over a short period or to assess the impact of safe motherhood programmes in the short term. It may not give the true picture where women move to their husband's village (when they marry and it is outside the sampled area) and is not particularly effective at detecting early pregnancy-related deaths such as those due to ectopic pregnancy or complications of abortion because these are based on knowledge of the pregnancy status of the dead sister, something that may well not be known by the responding sibling. The method cannot be used for comparing geographic areas (that is, comparing sub-national estimates) or studying trends. The possible sources of error include non response and female respondents including themselves among the sisters reported. However the method is appropriate for our setting because there is no proper recording of maternal deaths and poor vital registration system[4,47].

CHAPTER THREE

METHODOLOGY

3.1 Background information

Fika Local Government Area (L.G.A.), a rural L.G.A. is one of the seventeen (17) L.G.As in Yobe State in the North-East geopolitical zone in Nigeria. It has four districts, namely; Fika, Dumbulwa, Maluri and Ngalda districts and a total of 84 settlements or villages (APPENDIX I). It covers an area of about 350 square kilometres and is bounded by Nangere L.G.A. on the North, Fune L.G.A. on the North-East, Gujba L.G.A. on the East, Gombe State on the South and Bauchi State on the West.

The estimated population in 2003 was about 241,943, with male: female ratio of about 100:105. The adult literacy level is 22.7%, there is no record of female literacy level[56]. There are 28 primary schools and 2 secondary schools in the L.G.A. the primary school enrolment is 4,000 for boys and 2,200 for girls in the year 2003. The average age at first marriage is between 14-17 years.

The average total fertility rate is 5.7 for Nigeria, 4.9 and 6.1 for the urban and the rural woman[18] respectively. According to the 1999 national demographic and health survey the total fertility rate (TFR) is 8.4% for Yobe State[56]. Islam and Christianity are the predominant religions in Fika L.G.A and the major ethnic groups are: Bolewa, Fulani, Kare-kare, Ngamo, Ngizim and a few kanuri and Hausa migrants. Farming and fishing are the major occupation of the people. Majority of the people are subsistence farmers, growing mainly guinea corn, millet and maize. They also grow groundnut and beans which form the backbone of their revenue. During the rainy season they engage in gardening, weaving of mats and hats and other income generating activities before the

next farming season. Women also engage in farming in addition to housekeeping. Few women are employed in Government work.

The terrain is mainly hilly and rocky and in some places very sandy in the dry season. The soil becomes sticky and slippery in the rainy season with cart *(amalanke)* as the only means of transportation. Access to some areas is only possible on market days. There is a trunk B road that passes through Fika which links Potiskum in Yobe State with Gombe, the Gombe State capital. Roads that link the district Headquarters are untarred while villages are also linked with untarred roads and footpaths.

There are forty two (42) health facilities comprising of a general hospital in Fika, the L.G.A. headquarters, twenty four (24) primary health care (P.H.C.) centres, eleven (11) Dispensaries, six (6) Health Posts and several chemists and patent medicine shops. The general hospital at Fika provides comprehensive emergency obstetric care (EOC), while basic obstetric care (BOC) is provided by the P.H.C. Facilities. Family planning services, tetanus toxoid immunisation, Antenatal care and Hospital delivery services are the Maternal Health services, in addition to the child welfare services that are provided by the General Hospital and the P.H.C. facilities. The Health posts, chemists and patent medicine stores and occasionally the dispensaries are the first points of contact with the patients. The dispensaries also serve as first level referral facilities while the General Hospital is the third level of referral. Funding for the general hospital is from the State while for the P.H.C. facilities, dispensaries, and health posts it is from the Local Government. Chemists and patent medicine stores are owned by private individuals. Majority (more than 80%) of the childbirths occur at home with the assistance of the 49 trained traditional birth attendants (T.B.A.s) or the untrained relatives alone who just

happen to be around at the time of delivery. Sometimes the women deliver alone. Contraception use is very low, less than 3% according to data from the family planning unit of General Hospital, Fika. The major causes of maternal mortality according to hospital data are haemorrhage, eclampsia, sepsis, and malaria[56]. The deaths usually occur in patients due to late presentation and delay in intervention. Infection, anaemia, chronic pelvic and back pains are frequent complaints following spontaneous abortion that occurred at home. Complications of Induced abortion are not reported[57].

Currently there is an ongoing project by the researcher on the reduction of maternal mortality through research, advocacy and community participation supported by the MacArthur Foundation Leadership Development programme. The project is in its second year in six communities in the L.G.A. namely, Ganjuwale, Gashua, Maruwa, Gangawa Diwidi and Fika. All the project communities except Fika have no health facility and have only rocky seasonal roads. The project supports activities to sensitise the communities and the health workers at the Fika general hospital for positive health behaviour changes which will increase access to Emergency Obstetric care services and subsequent ownership of the programme by the communities.

3.2 Materials and methods

3.2.1 Study design: The study design is cross sectional descriptive Study.

3.2.2 Study population: The study population consisted of men and women aged 15 - 49 years in Fika Local Government Area, in Yobe State.

3.2.3 Sample size: The sample size was calculated from the following formula[58].

$n = 4P(1-P)/e^2$

where:

n = Sample size

P = proportion of respondents to maternal deaths

= 45% = 0.45

e = maximum error that will be tolerated in the proportion, for this study 2.5% was used = 0.025 at 97.5 % confidence interval

Therefore,

$$n = \frac{4P(1-P)}{e^2} = \frac{4(0.45)(1-0.45)}{(0.025)^2}$$

$$= \frac{0.99}{0.000625} = 1,584$$

To allow for design effect of using cluster sampling, the derived number of respondents was rounded up to the next 1,000[58] as per the guidelines to the use of the method.

Therefore, since

n = 2,000 and, adding 10 % to take care of possible errors: therefore,

$$n = 2,000 + (10\% \text{ of } 2,000) = 2,000 + \frac{10 \times 2,000}{100}$$

= 2,000 + 200

= 2,200 = minimum sample size

A total of 4,093 respondents comprising of 48.6% (1,989) males and 51.4% (2,104) females were interviewed.

3.2.4 Sampling technique

The sampling frame[59] was a list of all the 84 villages (APPENDIX I) in the four districts of Fika L.G.A. obtained from the local Government authority. Four villages were selected for the study from two districts by a three staged cluster sampling as follows:

STAGE 1: The four districts in the L.G.A. were stratified into central and peripheral districts with each group having two districts based on their proximity to the L.G.A. Headquarters. From each stratum one district was selected using lottery method.

STAGE 2: In each of the selected districts all the settlements were listed and two villages selected by lottery method giving a total of four villages.

STAGE 3: In each of the selected villages, all eligible respondents, that is, all men and women aged 15 – 49 years old were sampled. All households were visited and information sought and obtained from all adult males and females aged 15 – 49 years resident in the houses. All such individuals were included in the sample.

3.2.5 Instrument for data collection

The instrument for the data collection was an uncoded, open ended, interviewer administered questionnaire. The questionnaire had two parts: the first part contained the biodata of the respondents but excluding the name while the second part contained the four original sisterhood method's questions on the number of adult sisters (15 years and above) born to the same mother, exluding the respondent[8], (see APPENDIX II, questionnaire). The term sister 'born to the same mother' was used to help to overcome some of the ambiguities in the term 'sister' which in some populations may be used

differently by different individuals for a wide variety of relations. In Nigeria for example due to polygamous marriages and remarriages due to divorce and other reasons individuals may have the same mother but different fathers or they may have the same father and different mothers and the term 'sister' is used as a general term of endearment.

The questionnaire was pre-tested to assess respondents' appreciation and understanding of the questions, decide which data were relevant to collect and which ones were not, if the sequence of questions was logical, if questions were clear and translations accurate, if spaces for answers were adequate and also to determine the average time that would be needed to administer the questionnaire. The questionnaire was revised based on the findings of the pre-test.

3.2.6 Data collection technique

The data was collected by fifteen interviewers over six days using interviewer administered questionnaire. The data collectors were selected from the local community with the assistance of the staff of Primary Health Care Department of Fika L.G.A. They consisted of individuals with at least secondary school education who can read and write English and also who understood the local languages. All households in the selected villages were visited and all male and female respondents aged 15-49 years found in the households were interviewed.

3.2.7 Data quality control

The data collectors were trained on the method of data collection. The training consisted of three days classroom teaching and role-play followed by field testing, observation and continuous supervision. The questionnaire was pre-tested to assess

respondents' appreciation and understanding of the questions. The questionnaire was translated into the various local languages to standardise the method of data collection so as to reduce inter-observer variations.

Field supervision was conducted during the data collection and all questionnaires were reviewed for completeness and correctness of recording. Data validation was done at the end of each day by the researcher with the assistance of two senior officers of Fika L.G.A. Primary Health Care Department. People that were absent from the households were re-visited to minimize non-response.

3.2.8 Data analysis technique

The data was computer analysed using statistical packages for social sciences (S.P.S.S.) version 10. To compute the different rates the following formulae[13] were used:

IF: r = Number of maternal deaths in the i^{th} age group

p(u) = proportion of sisters dying from maternal causes as reported by the respondents aged u

q(u) = probability of dying from maternal causes

q(w) = probability of death due to maternal cause by end of reproductive age

B_i = the number of sisters entering into the reproductive period as reported by the respondents in the age group i adjusted to get the sister units of exposure to the risk of maternal death over the whole of reproductive period.

Therefore: Probability of dying from maternal causes by age u = q(u)

$$= \frac{\text{Number of maternal deaths in the } i^{th} \text{ age group u}}{\text{Corresponding sister units } B_i} = r_i / B_i$$

And, probability of death due to maternal cause by end of reproductive age = q(w)

Where: $q(w) = \sum r_i / \sum B_i$

Since, Maternal mortality ratio (MMR) = 1 – (1 – lifetime risk of dying a maternal death)

Then, MMR = $1 - (\sum r_i / \sum B_i)^{1/TFR}$

Where: TFR = Total Fertility Rate = 6.1 for Nigerian rural woman[18.]

Therefore: MMR = $1 - (\sum r_i / \sum B_i)^{1/6.1}$

3.2.9 Ethical issues

Permission was obtained from Fika Local Government Authority and community leaders in each village surveyed. Verbal informed consent was obtained from all participants and they did not receive any monetary or material compensation.

Interviews were conducted in a setting with no one present except the interviewer and the interviewee to ensure confidentiality. The respondents were reassured that all the information they gave would be kept confidential and used solely for the study. The respondents' names were not recorded, only the names of heads of household were taken for record purposes.

3.2.10 Limitations of the study

The results of this study were based on the information that the respondents provided. Limitations to the study included exclusion of deaths of sisters in early pregnancy because the respondents may not be aware of the pregnancy status of the

sister(s) at the time of death and this may mean exclusion such maternal deaths as those due to ruptured ectopic pregnancy. Also deaths due to complications of induced abortion might be omitted either because of lack of knowledge of its occurrence or because it is not legal[1,13,] in Nigeria. Also women that died of maternal causes but were never married would also be omitted. Limiting the age of the respondents to those that reached 15 years also meant omitting those women that died of maternal causes whose siblings have not reached 15 years old[1,13,]. The method also excluded those women that died of maternal causes but had no siblings and those who were never married.

The migration of siblings out of the communities due to marriage, occupation or other reasons is another limitation in that if all the living siblings had migrated out of the study community where their sister died of maternal cause there will be none to report her death during the study and this will lower the number of maternal deaths and hence the maternal mortality ratio and the lifetime risk of dying of maternal death in the community[1,13].

CHAPTER FOUR

RESULTS

A total of 4093 respondents consisting of 2104 females and 1989 males aged 15-49 years were interviewed from four clusters of villages in two districts in Fika L.G.A. The response rate was 100%. Respondents were asked the four sisterhood questions[1,13,24] (see appendix I questionnaire) concerning their ever married adult sisters in addition to their socio-demographic characteristics. The results are presented in the following and figures and tables.

4.1 Socio-demographic characteristics of the respondents

Table 4.1.1 Distribution of respondents by district and village

District	Village	Frequency	Percent
Fika (A central District)	Anze	519	12.7
	Fika	1591	38.9
Ngalda (A peripheral District)	Ngalda	1678	41.0
	S/Garin Ngalda	305	7.5
Total		**4,093**	**100.0**

A total of 4093 respondents were interviewed from four clusters of villages in two districts in the L.G.A. Of the total respondents 51.6% (2110) were from Fika district, a central district, while 48.4% (1933) were from Ngalda district, a peripheral district.

Figure 2

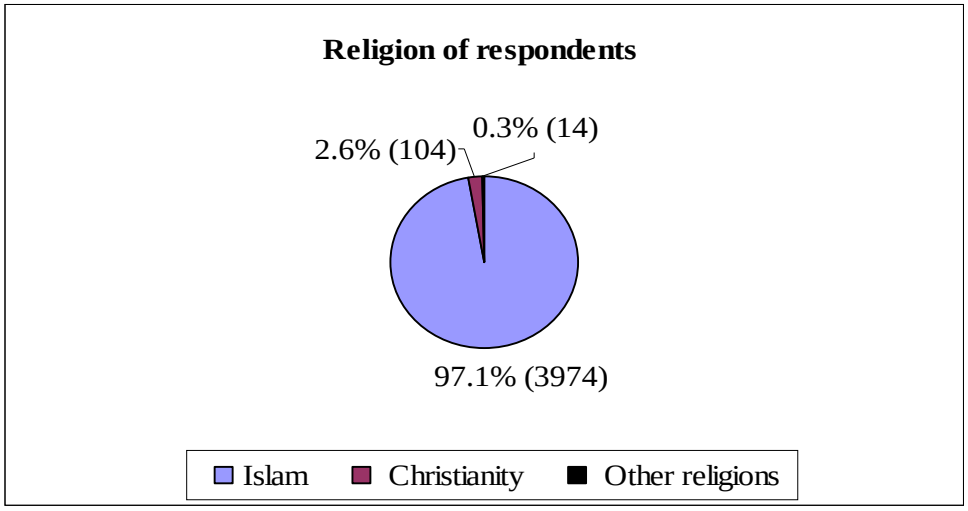


Figure 2 shows the religions of the respondents were 97.1% (3975) Islam, 2.6% (104) Christianity and 0.3% (14) other religions which included traditional religion.

Figure 3

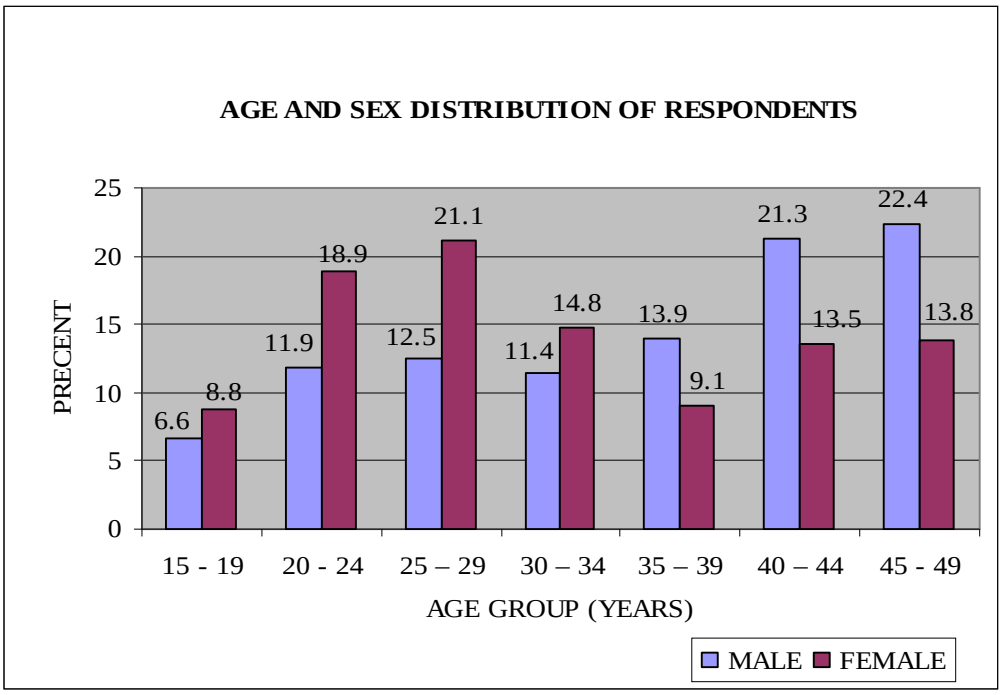


Figure 3 shows the age and sex distribution of the four thousand and ninety three respondents interviewed. Females constituted 51.6% (2,104) while males constituted

48.4% (1989) of the respondents. The mean age of the respondents was 33.5 ± 9.8 years. For the female respondents the mean age was 31.6 ± 9.5 years while for of the male respondents the mean age was 35.8 ± 9.7 years.

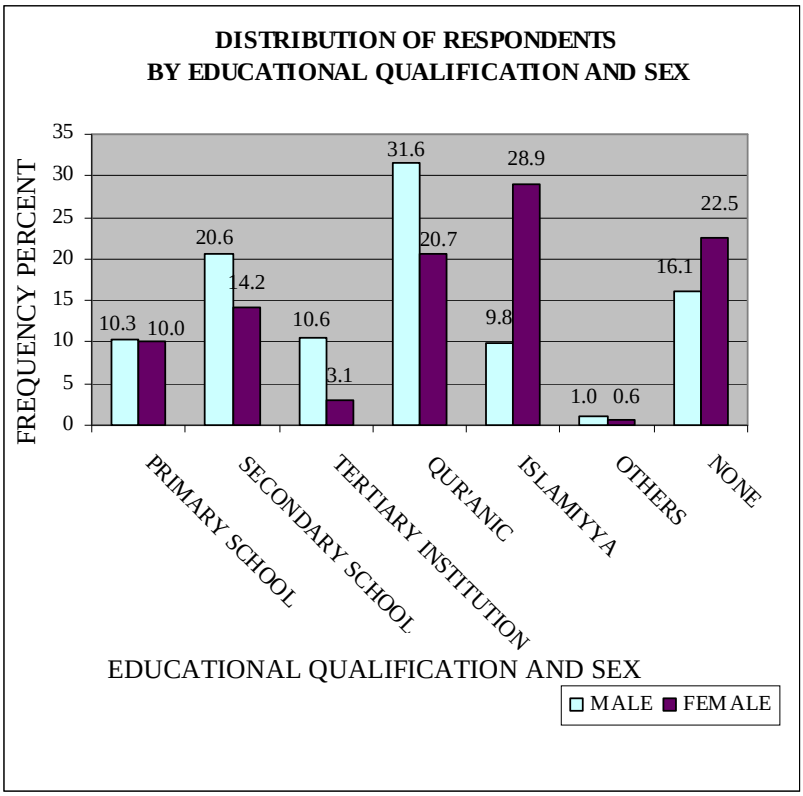
Of the 2104 female respondents interviewed 8.8% (186) fell into the 15 -19 years age group compared to 6.6% (132) of the 1989 males. The 15 -19 years age group constituted 7.8% (318) of the total respondents. Majority of the respondents, 71.0% (1494) of the females and, 77.4% (1540) of the males fall within the 20 - 44 years age group.

Table 4.1.2 Ethnic group of respondents

Ethnic Group	Frequency	Percent
Bolewa	1858	45.4
Fulani	527	12.8
Hausa	320	7.8
Kare-Kare	612	15.0
Ngamo	471	11.5
Ngizim	221	5.4
Others	86	2.1
Total	4093	100.0

Table 4.1.2 shows the ethnic group of respondents. Bolewa constituted 45.4% (1858), Kare-kare made up 15% (612), Fulani made up 12.8% (527), Hausa 7.8% (320), Ngamo 11.5% (471), Ngizim 5.4% (221) while other tribes which included Igbo, Yoruba, Kanuri, Babur, Marghi, Tiv, Gbagi and Nupe made up to 2.1% (86) of the respondents.

Figure 4



Of the 2104 females interviewed only 27.3% (574) had had formal education compared to 41.48% (825) of the males as shown in figure 3. This formal education included primary school, secondary school, and tertiary education. 20.7% (436) of the females had Qur'anic education and 28.9% (609) had Islamiyya education and 0.6% had other forms of education compared to 31.6% (629) Qur'anic education, 9.8% (194) Islamiyya education and 1.0% (19) other forms of education for the male respondents. The other forms of education included adult literacy programmes, vocational training and apprenticeship in various fields such as car mechanics, carpentry, welding vulcaniser and so on. The Islamiyya education consists of formal education including sciences in addition to the Islamic religious knowledge whereas the Qur'anic education consists solely of the Islamic religious knowledge.

Figure 5

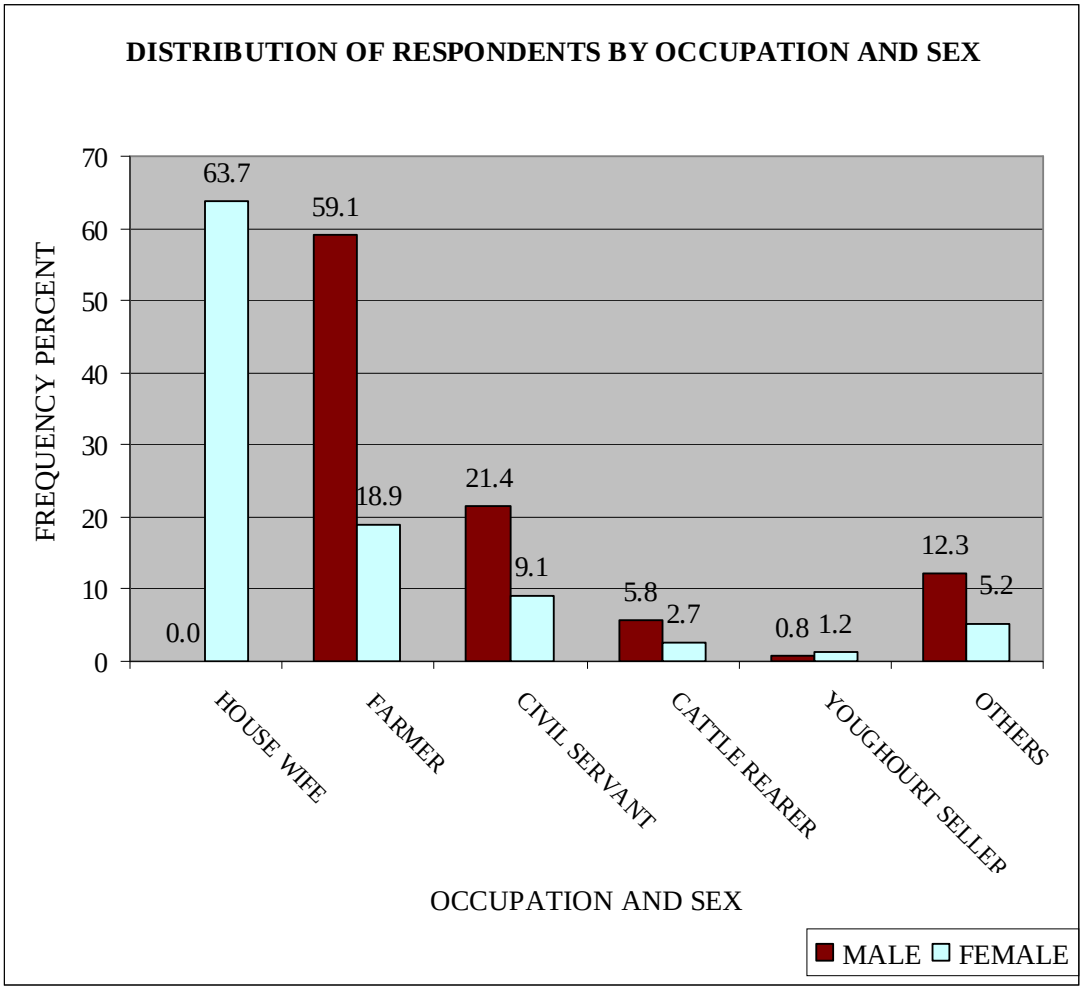


Figure 5 shows the distribution of respondents by occupation and sex. The chart shows that 63.7% (1338) of the 1989 female respondents are full time housewives, 18.9% (397) farmers, 9.1% (191) civil servants, 2.7% (57) cattle rearers, 1.2% (25) yoghurt sellers while other occupations which included hair dressing, tailoring, and mat weaving made up 5.2% (109). Of the 2104 male respondents 59.1% (1175) were farmers, 21.4% (425) civil servants 5.8 (116) cattle rearers, 0.8% (16) youghourt sellers and other occupations which included blacksmiths, butchers, mechanics, vulcanisers and daily paid labourers made up 12.3% (244) of the respondents.

4.2 The results

Table 4.2.1 Number of ever married sisters born of the same mother reported by respondents

Number of ever married sisters reported by the respondents	Numbers of respondents	Percent	Total ever married sister units born of the same mother
0	318	7.8	0
1	552	13.6	552
2	793	19.4	1586
3	720	17.7	2160
4	597	14.6	2388
5	295	7.2	1475
6	312	7.6	1872
7	224	5.5	1568
8	113	2.8	904
9	89	2.3	801
10	29	0.7	290
11	34	0.3	374
12	6	0.2	72
13	7	0.2	91
14	3	0.1	42
15	1	0.0	15
Total	**4,093**	**100.0**	**14,190**

The term sister 'born to the same mother' was used to help to overcome some of the ambiguities in the term 'sister' which in some populations may be used differently by different individuals for a wide variety of relations[13]. In Nigeria for example due to polygamous marriages and remarriages due to divorce and other reasons individuals may have the same mother but different fathers or they may have the same father but different mothers and the term 'sister' is used as a general term of endearment[13].

The average number of ever married sisters 'born to the same mother' was 4 sisters per respondent. Of the 4093 respondents majority (793) representing 19.4%

reported having 2 sisters and 1 respondents (representing less than 1.0%) reported having 15 sisters born of the same mother. The total of ever married sister units was obtained by multiplying the reported number of sisters by the corresponding number of respondents.

Table 4.2.2 Number of ever married sisters born of the same mother by age group of respondents

Numbers ever married sisters reported	Age group of respondents (years)							Total	Percent
	15-19	20-24	25-29	30-34	35-39	40-44	45-49		
0	65	57	57	32	36	40	31	318	7.8
1	58	82	99	76	76	57	104	552	13.6
2	56	128	128	106	111	137	127	739	19.4
3	41	109	100	89	70	164	147	720	17.7
4	34	97	102	52	67	114	131	597	14.6
5	19	48	38	41	26	58	65	296	7.2
6	15	50	81	45	17	48	56	312	7.6
7	20	24	48	42	23	37	30	224	5.5
8	8	16	16	32	16	10	15	113	2.8
9	2	16	9	14	14	20	14	89	2.3
10	-	3	9	4	1	4	8	29	0.7
11	-	2	4	-	7	15	6	34	0.3
12	-	-	-	1	2	2	1	6	0.2
13	-	-	-	3	2	-	2	7	0.2
14	-	-	-	1	-	2	-	3	0.1
15	-	1	-	-	-	-	-	1	0.0
Total	**318**	**633**	**691**	**538**	**468**	**708**	**737**	**4093**	**100.0**

The total number of ever married sister units for each age group was obtained by summing the products of the number of ever married sisters reported and the corresponding number of respondents in that age group.

Table 4.2.3 Number of ever married sisters born of the same mother alive reported by respondents

Number of ever married sisters alive reported by respondents	Number of respondents	Percent	Total ever married sister units alive
0	493	12.1	0
1	798	19.5	798
2	1053	25.6	2106
3	738	18.0	2214
4	495	12.1	1980
5	253	6.2	1265
6	121	3.0	726
7	59	1.5	413
8	35	0.8	280
9	23	0.5	207
10	22	0.5	220
11	2	0.1	22
12	-	0.0	0
13	1	0.0	13
Total	**4,093**	**100.0**	**10,244**

The average number of ever married sisters born of the same mother alive was 3 sisters per respondent. The total number of ever married sister units alive was obtained by multiplying the reported number of sisters alive by the corresponding number of respondents.

Table 4.2.4 Numbers of ever married sisters born of the same mother alive by age group of respondents

Number of sisters ever married sisters alive	Age group of respondents (years)							Total	Percent
	15-19	20-24	25-29	30-34	35-39	40-44	45-49		
0	83	73	99	50	55	61	72	493	12.1
1	63	135	124	102	100	119	155	798	19.5
2	58	169	146	126	130	224	200	1,053	25.7
3	48	104	119	98	82	140	147	738	18.0
4	43	91	93	69	46	70	83	495	12.1
5	12	29	52	61	22	44	33	253	6.2
6	9	17	38	17	12	13	15	121	2.9
7	2	7	13	5	11	11	10	59	1.4
8	-	5	-	4	5	11	10	35	0.9
9	-	1	5	2	2	6	7	23	0.6
10	-	2	2	2	3	9	4	22	0.5
11	-	-	-	1	-	-	1	2	0.1
12	-	-	-	-	-	-	-	-	0.0
13	-	-		1	-	-	-	1	0.0
Total	**318**	**633**	**691**	**538**	**468**	**708**	**737**	**4,093**	**100.0**

The total number of ever married sister units alive for each age group is obtained by summing the products of the number of ever married sisters born of the same mother alive reported and the corresponding number of respondents in that age group.

Table 4.2.5 Number of ever married sisters born of the same mother dead reported by respondents

Number of ever married Sisters dead reported by respondents	Number of respondents	Percent	Total ever married sister units dead
0	2018	49.3	0
1	1101	26.9	1101
2	527	12.9	1054
3	224	5.5	672
4	129	3.1	516
5	81	1.9	405
6	11	0.3	66
7	2	0.1	14
Total	**4,093**	**100.0**	**3,828**

The average number of ever married sisters born of the same mother dead was 1 sister per respondent. The total number of ever married sister units dead was obtained by multiplying the reported number of sisters dead by the corresponding number of respondents.

Table 4.2.6 Numbers of ever married sisters born of the same mother dead by age group of respondents

Number of sisters ever married sisters dead	Age group of respondents (years)							Total	Percent
	15-19	20-24	25-29	30-34	35-39	40-44	45-49		
0	196	307	343	269	261	311	331	2018	49.3
1	71	179	191	107	113	215	225	1101	26.8
2	25	93	81	87	36	109	96	527	12.9
3	17	28	43	31	20	33	52	224	5.5
4	6	16	25	27	22	10	23	129	3.2
5	2	7	8	12	16	28	8	81	1.9
6	1	3	-	4	-	1	2	11	0.3
7	-	-	-	1	-	1	-	2	0.1
Total	**318**	**633**	**691**	**538**	**468**	**708**	**737**	**4093**	**100.0**

The total number of ever married sister units dead for each age group is obtained by summing the products of the number of ever married sisters dead reported and the corresponding number of respondents in that age group.

Table 4.2.7 numbers of ever married sisters born of the same mother that died of maternal causes reported by respondents

Numbers Of Sisters that died of maternal causes	Number of respondents	Total percent	Cumulative percent	Total sister units that died of maternal causes
0	2819	68.8	68.9	0
1	929	22.6	91.5	929
2	266	6.5	98.0	532
3	58	1.4	99.4	174
4	17	0.5	99.9	68
5	-	-	-	-
6	-	-	-	-
7	4	0.1	100.0	28
Total	**4,093**	**100.0**		**1731**

The average number of ever married sisters born of the same mother that died of maternal causes was 0.4 sister per respondent. The total number of ever married sister units that died of maternal causes was obtained by multiplying the reported number of sisters that died of maternal causes by the corresponding number of respondents.

Table 4.2.8 Numbers of ever married sisters born of the same mother that died of maternal causes by age group of respondents

Number of ever married sisters that died of maternal causes reported	Age of respondents (years)							Total	Percent
	15-19	20-24	25-29	30-34	35-39	40-44	45-49		
0	234	436	468	353	322	478	528	2819	68.9
1	72	146	168	111	100	172	160	929	22.7
2	9	45	41	58	29	49	35	266	6.5
3	1	4	14	10	12	7	10	58	1.4
4	2	2	-	6	5	2	-	17	0.4
5	-	-	-	-	-	-	-	-	0.0
6	-	-	-	-	-	-	-	-	0.0
7	-	-	-	-	-	-	4	4	0.1
Total	**318**	**633**	**691**	**538**	**468**	**708**	**737**	**4093**	**100.0**

The total number of ever married sister units dead that died of maternal causes for each age group is obtained by summing the products of the number of ever married sisters dead that died of maternal causes reported and the corresponding number of respondents in that age group.

For the two younger age groups, 15–19 and 20–24, an additional calculation was carried out before deriving the estimates of the lifetime risk of maternal death [13], q(w). The numbers of ever married sisters in the younger age group, 15–19 and 20–24 years age group, in column C are the figures adjusted after multiplying the number of

respondents in this age group by the average number of ever married sisters per respondents in the age group 25 and above to obtain the expected ultimate number of ever married sisters for these age groups as follows:

$$\frac{\text{Total number of ever married sisters}}{\text{Total number of respondents aged 25 and above}} = \frac{14{,}034}{3142}$$

$$= 4.466582 = 4.47$$

(Reported number of ever married sisters are: 15-19 years age group = 836, and for the 20-24 years age group = 2100 respectively).

Column G gives the proportional maternal death to the total deaths from all causes and column H shows the adjustment factors which were reproduced from the original article[13]. The lifetime risk of dying a maternal death for each age group, q(w), in column J, is the ratio between r_i , the number of deaths due to maternal causes in column D, and, the corresponding sister units in column I, B_i ,

Where: B_i = the number of sisters entering into the reproductive period as reported by the respondents in the i^{th} age group adjusted to get the sister units of exposure to the risk of maternal death over the whole of reproductive period obtained by multiplying the number of sister units reported by the respondents in column C and the corresponding adjustment factor in column H = CH

Therefore: The overall lifetime risk of dying a maternal death by the end of reproductive period = q(w) = $\sum r_i / \sum B_i$

$$= \frac{1731}{9582} = 0.181$$ or 1 in every 6 women of reproductive age.

Since,

Maternal mortality ratio (MMR) = 1– (Probability of survival)

= 1– (1– lifetime risk of dying a maternal death)

= $1 – (1 - \sum r_i / \sum B_i)^{1/TFR}$

Where,

TFR = Total Fertility Rate = 6.1 for rural Nigerian women[18]

Then,

MMR = $1 – (1 - \sum r_i / \sum B_i)^{1/6.1}$

= $1 – (1 – 0.181)^{0.164}$

= $1 – (0.819)^{0.164}$

= $1 – 0.968$

= 0.032

= 3,200 /100,000 live births

CHAPTER FIVE

DISCUSSION

From the study the average number of ever married sisters per respondent was 4 sisters. The mean age of the respondents was 32.8 years for all respondents, 31.5 years for the female respondents and 35.4 years for the male respondents.

The lifetime risks of maternal death declines from 0.253 for the 15-19 year age group to 0.132 for the 20 -24 year age group, then peaked to 0.352 for the 25-29 year age group and then becomes relatively stable and declining to 0.122 for the 44-49 years age group. The overall lifetime risk of dying a maternal death by the end of reproductive period is 0.181 or 1 in every 6 women of reproductive age, which is much higher than the figure of 1 in 20 for Africa, 1 in 61 for less developed regions and 1 in 74 worldwide[16]. The age group specific proportional maternal deaths to all causes of deaths also showed a similar pattern. The overall proportional maternal mortality from all cause of death is 46.5% for women of reproductive age group in the study population.

The estimated maternal mortality ratio from this study of 3,200/100,000 live births is much higher than the 1999 national maternal mortality figure of 740 per 100,000 live births or even the 1,549/100,000 live births in the North-east [17.] .

This result is in contrast to the first test of the sisterhood method done in Gambia in 1987[13] which gave an estimated lifetime risk of maternal mortality of 0.0584 or 1 in 17 women of reproductive age and maternal mortality ratio of 1005 per 100,000 live births the results of the Gambian study was comparable to figures of 1050 and 950/ 100,000 live births obtained from other sources for the Gambian region. This contrast could be as result of non existence of reliable population based record of surveillance on maternal

mortality in Nigeria, the figures given are only estimates: whereas in the Gambia, since 1982 the British medical research Council (MRC) has maintained a rural population surveillance system [13] which provided data for comparison with the result of the survey.

Similarly the results of this study showed a much higher maternal mortality ratio than the study carried out in the Kilombero District, Morogoro Region, in Southeastern Tanzania where total of 10,507 sisters reached the age of 15 years, including the 558 now dead. Maternal causes accounted for 19% of total mortality in women in reproductive age group. The lifetime risk of dying due to maternal causes, q(w) was 0.026 or 1 in 39 women aged 15–49 years old. The maternal mortality ratio is 448 maternal deaths per 100 000 live births[8].

Also in a study of maternal mortality using the 'Sisterhood Method' in Swaziland, a total fertility rate of 6.36, as given in the 1986 Swaziland census, was used in estimating these indicators and the study revealed the estimated maternal mortality to be 229 and the life-time risk of maternal death to be 1 in 69 women of reproductive age[19] which are much lower than the findings of this study.

It is evident from this study that the level of maternal mortality is very high (3,200/100,000 live births) among rural women in Nigeria. This could be attributed to the high fertility level, total fertility rate of 8.4% for Yobe State[56] which could be due to poor access to family planning information and services[28]. The mountainous and difficult to reach areas could be having higher maternal mortality levels due to lack of access to resources and geographical difficulties[8,24,29]. Being a population based study the results

reflect the actual level of maternal mortality in the community since most of the women deliver at home[19,47] in the study communities.

Results of the study also showed very low literacy levels (only 27.3% of the females respondents and 41.5% of the male respondents had formal education) found in the study. Illiteracy and ignorance increases the chances of maternal death[37,38] because they can lead to non utilisation of available facilities[9,25,28] including family planning information and services skilled attendance at delivery, essential emergency obstetric care , post abortion care and prevention of sexually transmitted infections and HIV/AIDS. Illiteracy and ignorance also cause delay in recognizing the complication due to lack of awareness of its danger, misconceptions and misinformation about danger signs during pregnancy[9] and this leads to delay in deciding to seek emergency obstetric care thus leading to delay in reaching the health facility[9,22] which can be fatal.

The estimated level of maternal mortality from this study could be lower than the actual level due to exclusion of deaths of sisters in early pregnancy because the respondents may not be aware of the pregnancy status of the sister at the time of death and this may mean exclusion of such maternal deaths as those due to ruptured ectopic pregnancy. Also deaths due to complications of induced abortion might also be omitted either because of lack of knowledge of its occurrence or because this is not legal[1,13,] in Nigeria. Also women that died of maternal causes but were never married or had no siblings would also be omitted. Limiting the age of the respondents to those that reached 15 years also mean omitting those women that died of maternal causes whose siblings have not reached 15 years old[1,13].

Clustering of adult siblings within households or communities could reduce the number of independent reports[12,52] however this study was conducted in communities where residence apart from other siblings are common in adulthood especially after marriage although migration of all siblings due to marriage, occupation or other reasons out of the study community where their sister died of maternal cause means there will be none to report her death during the study and this will lower the number of maternal deaths and hence the maternal mortality ratio and the lifetime risk of dying of maternal death in the community[1,13].

Multiple reporting among siblings was not considered to be a problem[52] because the sisterhood method is based on proportional relationship; it can be shown empirically that the number of sisters entering the reproductive period who are counted more than once in the denominator were matched proportionately by repeat counting in the numerator of sisters dying of maternal causes[13]. The problem of female respondents including themselves in the number of sisters reported on was very minimal due to careful translation of the questionnaire in the local languages.

Because most deliveries occur at home in this environment and it is almost impossible to predict which individual woman will develop a life-threatening complication[45] everyone in the community should be informed about recognising problems during delivery[38,48]. Programmes should target mother in laws, husbands, fathers, adolescents and everyone in the community because these may well be the persons who decide to seek care or the only persons at home when a woman develops pregnancy related complication[9,23]. Traditional birth attendants that assist deliveries at

home should be backed up with functioning referral system, good communication and transportation systems and support from professionally trained health workers in terms of supervision, and evaluation [38,48,49].

Knowing the maternal mortality ratio is necessary because these estimates can serve as a starting point for action, thus permitting the use of vital scarce resources for assessing some of the underlying causes of maternal death and identifying the most appropriate and feasible interventions possible. The results of this study should be seen to provide only the orders of magnitude[53] of the level of maternal mortality in the study communities and more investigations should be conducted to analyse all maternal deaths, whether they take place in a health facility, at home or between the two. This could starts from deaths identified within health facilities and tracing the path of the woman back through the health care system and into the community with the aim of helping health care providers and community members understand the factors that underlie every maternal death and identify those that could have been avoided[1].

Pregnancy is a precondition for maternal death. Thus anything that reduces fertility will also reduce maternal deaths[25] all things being equal. Maternal mortality is an indicator of disparity and inequality between men and women and its extent is a sign of women's low status in the society. The poor health and nutrition of women and lack of care that contributes to their death in pregnancy and childbirth also compromise the health and survival of the infants and children they leave behind[4]. Lack of access to and utilisation of existing health facilities and associated limited prospects of dramatic improvements, strengthen the need for population based estimates such as the sisterhood

method to be able to overcome the constraints on planning management and evaluation of programmes aimed at reducing levels of maternal mortality[13] in Nigeria. The indirect sisterhood method of estimating maternal mortality is hereby recommended for use by researchers in Nigeria in that it is an easy, cost effective and reliable method that allows a more precise estimate of maternal mortality for the general population[19] appropriate for the Nigerian setting where there is no adequate vital registration and most deliveries occur at home and are not registered. The sisterhood questions can be added to the already existing survey instrument[1,8,13,15,19,55] such as the acute flaccid paralysis (AFP) surveillance questionnaire and disease surveillance and notification (DSN) forms and this will help in resolving the problems related to the more accurate measurements of maternal mortality in Nigeria.

CHAPTER SIX

6.1 Conclusions

Results of this study of maternal mortality ratio of 3,200/100,000 live births, proportional maternal mortality of 46.5 % and an estimated lifetime risk of dying a maternal death of 0.181 or 1 in every 6 women of reproductive age are very high.

Safe motherhood interventions for the reduction of maternal mortality in these communities should include literacy programmes that target every one in the community including mother in laws, husbands, women groups and youths who might be the ones that take decisions on what should be done or the only ones at home when a woman develops pregnancy related complications. This will serve as entry point to improving overall outcome of pregnancies and reducing maternal mortality. Interventions should also include the strengthening of the primary health care system, poverty alleviation programmes and community involvement in the provision of emergency transportation and effective communication between the health system and communities to increase access to essential obstetric care.

6.2 Recommendation

In view of the finding of the study which showed a very high maternal mortality ratio of 3,200/100,000 live births, proportional maternal mortality of 46.5 % and an estimated lifetime risk of dying a maternal death of 0.181 or 1 in every 6 women of reproductive age the following are made, if the millennium development goals[11] of reducing the level of maternal mortality by three-quarters from its 1990 level by the year 2015 is to be achieved in Nigeria the following are recommended:

1. Increasing community knowledge on the causes and prevention of maternal mortality through local traditional means such as village elders forum, town announcers and existing community groups like youths and market women groups will increase utilisation of existing health care facilities and the end result will be a safer pregnancy and childbirth improved family health and nutrition, increase in contraception use and desirable social changes in the status of women.
2. The high level of maternal mortality can be reduced by investing in education of women and health which will lead to prompt health care-seeking behavior when the need arises.
3. Improving status of women through by educating them and involving them in decision making, eradication of poverty and eradication of harmful tradition and cultural practices go a very long way in reducing maternal mortality.
4. Strengthening of the primary health care system and the provision of equipment and drugs by government at all levels will increase access to family planning information and services, improve the quality of antenatal and postpartum

obstetric care, skilled attendants at birth care and ensure better access to essential obstetric care (including post abortion care) .

5. Parents should teach all children about the risks of unprotected sex and help them to develop the skills needed to protect themselves from sexual coercion.
6. Expanding access to midwifery care in the community by training and deploying a range of health care providers such as Doctors, community midwives and community health extension workers (CHEWS) at community levels. Traditional birth attendants should be trained in early recognition and prompt referral of obstetric complications
7. Provision of incentives to rural health workers to motivate them to stay and put in their best and also to mobilize others. Rural postings should be rotated among health workers.
8. Provision of effective communication and transportation systems through community effort to quickly transport women with obstetric complications to the nearest health facility and ensure continuity of care.
9. Advocacy for comprehensive human rights based strategy for safe motherhood such as the reforming of laws to expand women's access to health services and to promote women's health interests ,reform of the existing abortion law in Nigeria to reduce the incidence of unsafe abortion, provision of safe abortion services when medically indicated and apprehension of offenders that commit illegal, most often unsafe abortions.
10. Advocacy for political commitment to facilitate the integration of safe motherhood interventions into the health care systems at the federal, state and local levels.

11. Involvement of national and international donors, non governmental organisations, the public and private health sectors to safe motherhood activities to facilitate the delivery of maternal health services and increase access to basic obstetric care (BOC) and emergency obstetric care (EOC)
12. Involvement of the community members especially women and their families, health care providers, and local leaders in the planning and implementation of safe motherhood activities to ensure programme success and sustainability.
13. Proper planning coordination and integrations of donor activities in safe motherhood programmes at the federal level to avoid duplication and wastage of resources and also to reduce the running of vertical programmes.
14. Involvement of the print and electronic mass media in the dissemination of information on the causes and prevention of maternal mortality when and where to seek medical care when the need arises in local languages and in culturally acceptable manner such as drama, jingles posters and the use of locally famous dance groups.
15. Involvement of the religious leaders in the dissemination of correct information concerning positive health seeking behaviour and the protection of women's right and health from the religion perspective.
16. Innovative means of data collection such as the use of existing community based groups, priests, imams, women groups and so on. Maternal mortality should continue to be studied so that the data can be used as an awareness-creating tool and as a quality of care performance indicator.
17. Funding of the health care system at all levels should be improved.

18. Safe motherhood programs should encompass prevention of maternal disease, disability, discomfort, and dissatisfaction as well as mortality.

6.3 References

1. World Health Organization (WHO) and United Nations Children's Fund (UNICEF), The sisterhood method for estimating maternal mortality: guidance notes for potential users. Reproductive Health and Research, World Health Organization (WHO) 1211 Geneva 27, Switzerland), 1999, document WHO/RHT/97.28.
2. Mahmoud F. Fathalla, Reproductive rights and reproductive wrongs, the case of maternal mortality as a reproductive wrong, International Lecture Series On Population Issues, The John D. and Catherine T MacArthur Foundation, February 17th, 2004 pp 1- 16.
3. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. Tenth Revision. Geneva, World Health Organization. Vol. 1: Tabular list. 1992. Vol. 2: Instruction manual. 1993.
4. World Health Organisation (W.H.O.), United Nations Populations Fund (U.N.F.P.A.) and World Bank joint statement: Reduction of maternal mortality, 1999, ISBN 9 2 4 156195 5.
5. World Health Organization, "Coverage of Maternal Care: A Listing of Available Information, Fourth Edition". World Health Organization, Geneva, Switzerland, 1997.

6. World Health Organization, Perinatal mortality: a listing of available information. Reproductive Health and Research, World Health Organization, 1211 Geneva 27, Geneva, Switzerland, 1996, (document WHO/FRH/MSM/96.7,.)

7. Thoraya A. Obaid, United Nations Population Fund, On the occasion of World Population Day, 11 July 2004 pp 1-2.

8. Font, F., González, M.A., R. Nathan et al, Maternal mortality in a rural district of southeastern Tanzania: an application of the sisterhood method, International Journal of Epidemiology, 2000; 29: pp107-112.

9. White ribbon alliance, Saving mothers' lives: what works, a field guide for implementing best practices in safe motherhood, White ribbon alliance India, 2002, pp 1 - 159.

10. AbouZahr, C., Maternal mortality. In: Murray,C.J.L. and Lopez,A.D. (Eds) Health dimensions of sex and reproduction: the global burden diseases and injuries series. Havard School of Public Health and World Bank, 1998, pp 111 - 159.

11. United Nations General Assembly, Millennium Development Goals and targets, United Nations, A/RES/55/2, Distr.: General, Fifty-fifth session, 18 September 2000, Agenda item 60 (b) ,00 55951 .

12. Royston, E. and AbouZahr, C., Measuring maternal mortality. British Medical Journal, 1992, 92 (?): pp 540-543.

13. Graham, W., Brass, W., and Snow, R.W. ‘‘Estimating Maternal Mortality: The Sisterhood Method’’ Studies in Family Planning 1989, 20 (3) pp: 125-135

14. Reproductive Health Update (RH) Update, Nigeria celebrates Safe Motherhood Day, vol. 1, No. 1, November, 2002 pp3 – 4.

15. United Nations Children's Fund (UNICEF) statistics, : Maternal Mortality in 2000 - Estimates Developed by World Health Organisation (WHO), United Nations Children's Fund (UNICEF) and United Nations Populations Fund (UNFPA), October, 2003.

16. AbouZahr C, Wardlaw, T. Maternal Mortality in 2000: Estimates Developed by World Health Organisation(WHO), United Nations Children's Fund (UNICEF) and United Nations Populations Fund (UNFPA). World Health Organisation: Geneva, Switzerland; 2000.

17. National Population Commission (NPC), Federal Republic of Nigeria, [Nigeria]. Nigeria Demographic and Health Survey 2003 Calverton, Maryland, U.S.A.: National Population Commission and ORC/MACRO, 2004 p 1 - 21.

18. National Population Commission (NPC), Federal Republic of Nigeria, [Nigeria]. Nigeria Demographic and Health Survey 2003 Calverton, Maryland, U.S.A.: National Population Commission and ORC/MACRO, 2004 pp 51 - 60.

19. Lech, M. and Zwane, A. Survey on maternal mortality in Swaziland using the sisterhood method. Paediatric and Perinatal Epidemiology Volume 16: Issue 2, April 2002, pp 101–107.

20. Fathalla, M.F., ''the causes of Maternal Deaths: A Global Review.'', World Health Organisation: Geneva, Switzerland, World Health Organization (WHO) Document No.FHE/pmm/85.9.7.

21. Goodburn, E. and Campbell, O., Reducing maternal mortality in the developing world: sector-wide approaches may be the key. British Medical Journal 322:9, 2001, pp 17 – 920.

22. S. Thaddeus and D. Maine, "Too Far to Walk: Maternal Mortality in Context". Social Science Medicine 38(8), 1994.

23. McCarthy, J. The conceptual framework of the PMM Network International Journal of Gynecology & Obstetrics 59 (Suppl. 2):S15–S21 (November 1997).

24. World Health Organization, "Revised 1990 Estimates of Maternal Mortality: A New Approach by World Health Organization (WHO) and United Nations Children's Fund (UNICEF)". World Health Organization, Geneva, April 1996, WHO/FRH/MSM/96.11

25. Maine, D., Safe Motherhood Programs: Options and Issues. Columbia University, Center for Population and Family Health, New York, 1991, pp 1-42.

26. Population Action International, Expanding Access to Safe Abortion: Key Policy Issues. Washington, DC, September 1993.

27. United Nations Children's Fund (UNICEF) "Too Old for Toys, Too Young for Motherhood", (UNICEF), New York, 1994.

28. Population Reports,"Care for Postabortion Complications: Saving Women's Lives". Vol. 24, No. 2. September 1997.

29. H. Odoi-Agyarko, N. Dollimore, O. Owusu-Argyei, "Risk Factors in Maternal Mortality: A Community-Based Study in Kassena Nankani District". Paper

presented at the National Consultative Meeting on Safe Motherhood, Accra, Ghana, January 1993.

30. C. AbouZahr, "Improve Access to Quality Maternal Health Services". Presentation at Safe Motherhood Consultation in Colombo, Sri Lanka, 18–23 October 1997.

31. M.H. Baldo, Reflections on maternal mortality in two decades, Studies in Family Planning, Volume 6, Issue 4, 2000, pp712 – 722.

32. C. AbouZahr, C. Vlassoff and A. Kumar, "Quality Health for Women: A Global Challenge". Health Care for Women International, Vol. 17, 1996.

33. J. Leslie and G.R. Gupta, "Utilization of Formal Services for Maternal Nutrition and Health Care". International Center for Research on Women, Washington, DC, February 1989.

34. United Nations: Human Development Report 1995, United Nations Development Programme, New York, 1995.

35. S.J. Jejeebhoy, "Empower Women, Ensure Choices: Key to Enhancing Reproductive Health". Presentation at Safe Motherhood Technical Consultation in Sri Lanka, 18-23 October 1997.

36. Ministry of Health and Family Welfare, Bangladesh, "Safe Motherhood: A Woman’s Right to Life, Information Kit". Ministry of Health and Family Welfare, Bangladesh, 1997.

37. J. Senderowitz, "Adolescent Health: Reassessing the Passage to Adulthood". Washington, DC, World Bank Discussion Papers #272, 1995.

38. N. Sadik, The State of World Population, United Nations Population Fund (UNFPA) 1997, New York, 1997.

39. Family Care International, Safe motherhood fact sheets: Colombo Technical Consultation, Family Care International, October 1997. New York, 1998.

40. World Health Organization (W.H.O.) ,"Adolescent Health and Development: The Key to the Future". World Health Organization (W.H.O.), Geneva, Switzerland, 1995.

41. R.J. Cook, "Advancing Safe Motherhood through Human Rights". Presentation at Safe Motherhood Technical Consultation in Colombo, Sri Lanka, 18-23 October 1997.

42. A.O. Tsui, J. N. Wasserheit, and J.G. Haaga, eds. "Healthy Pregnancy and Childbearing," in: Reproductive Health in Developing Countries: Expanding Dimensions, Building Solutions, National Academy Press, Washington, DC, 1997.

43. United Nations Children's Fund (UNICEF), The Progress of Nations. UNICEF, PL and A, Oxfodshire, UK, 1996.

44. The Prevention of Maternal Mortality (PMM) Network, "Barriers to Treatment of Obstetric Emergencies in Rural Communities of West Africa." Studies in Family Planning, 23(5): September/October 1992, pp 279-91

45. World Health Organization, Mother- Baby Package: Implementing Safe Motherhood in Countries, Maternal Health and Safe Motherhood Programme, Division of Family Health, World Health Organization, Geneva, Switzerland, 1994, WHO/FHE/MSM/9411.

46. W. Graham, "Every Pregnancy Faces Risk". Presentation at Safe Motherhood Technical Consultation in Sri Lanka, 18-23 October 1997.

47. Dr. Nasr Abdalla Mohammed, Consultant Obstetrics and Gynaecology, Sudan Ministry of Health, Review prepared for the 12th Postgraduate Course in Reproductive Medicine and Biology, WHO/UNICEF/UNFPA, World Health Organization, Geneva, Switzerland, 1995 (4).

48. United Nations General Assembly, Universal declaration of human rights, United Nations, New York, 1984 (United Nations General Assembly Resolution, A/Res/217 A (111)).

49. United Nations General Assembly, The Convention on the Elimination of all forms of Discrimination against Women. United Nations, New York, 1979 (United Nations General Assembly Resolution, A/Res/34/180).

50. United Nations General Assembly, the Convention on the Rights of the Child. United Nations, New York, 1989 (United Nations General Assembly Resolution, A/RES/44/25).

51. Council of Europe, The European Convention on Human Rights, Council of Europe, Rome, 1950), the American Convention on Human Rights (American Convention on Human Rights. 1969.

52. Organisation of African Unity, African Charter on Human and People's Rights, Organisation of African Unity, Rome, 1981.

53. GrahamW., The sisterhood method for estimating the level of maternal mortality. Seven years' experience, 1: Kangaroo. 1994 Dec;3(2): pp184-9.

54. Hanley, J.A., Hagen C.A. and Shiferaw T. Confidence intervals and samples size calculations for the sisterhood method of estimating maternal mortality. Studies in Family Planning 27 (4) July / August 1996: pp220 – 227.

55. Danel, I. Graham, W. Stupp, P. and Castillo, P. Applying the sisterhood method for estimating maternal mortality to a health facility-based sample: A comparison with results from a household-based sample. International Journal of Epidemiology, 1996, 25 (5):p 1017-1022.

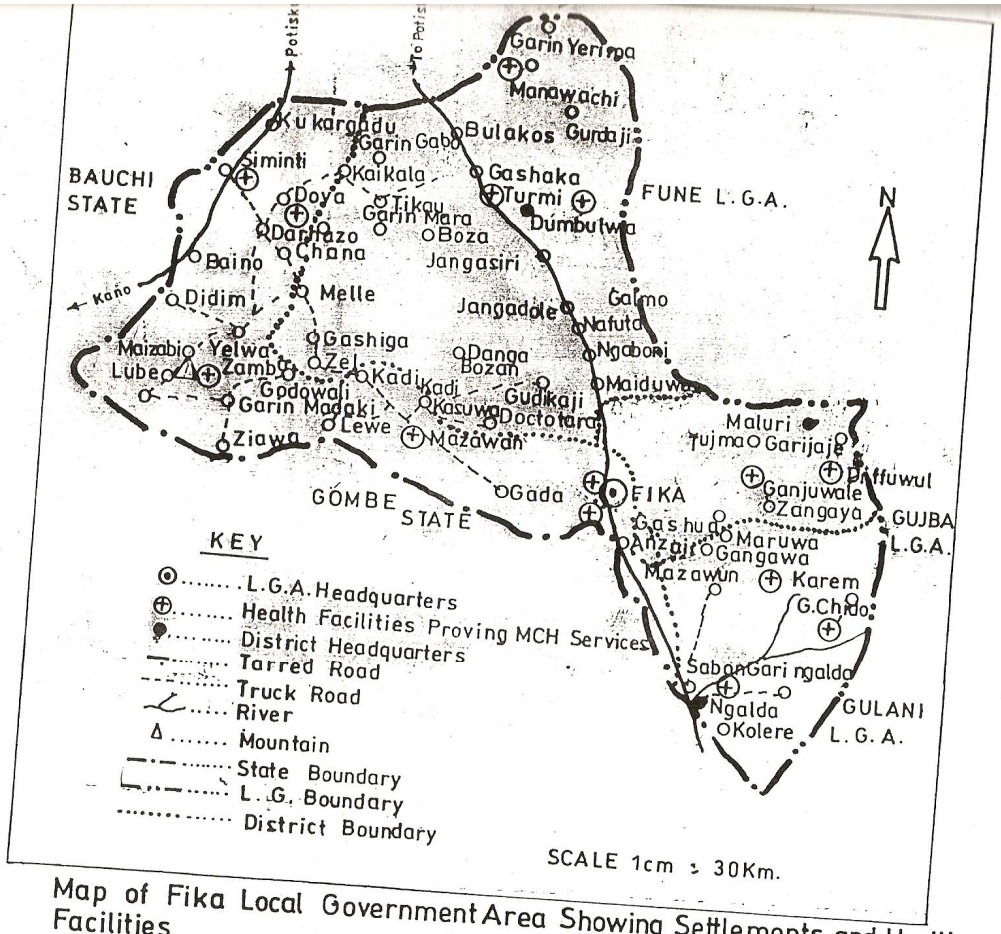
56. Yobe State Government, Health profile and State Demography, (unpublished), 2003, pp 1-4.

57. Records of admissions and delivery from January 1999 to December 2003, Maternity unit, General Hospital Fika, 2003 (unpublished).

58. World Health Organisation. International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, World Health Organisation, Geneva, 1992. Sample size formula: n = 4P(1-P)/e2 where n = number of respondents; P = proportion of respondents to maternal deaths; and e = maximum error that will be tolerated in the proportion, generally 10%. P = average number of adult sisters per respondents divided by estimated lifetime risk of maternal death. This formula assumes a simple random sampling scheme. To allow for design effect of using more complex sampling schemes, such as cluster sampling, the derived number of respondents should be rounded up to at least the next 1000.

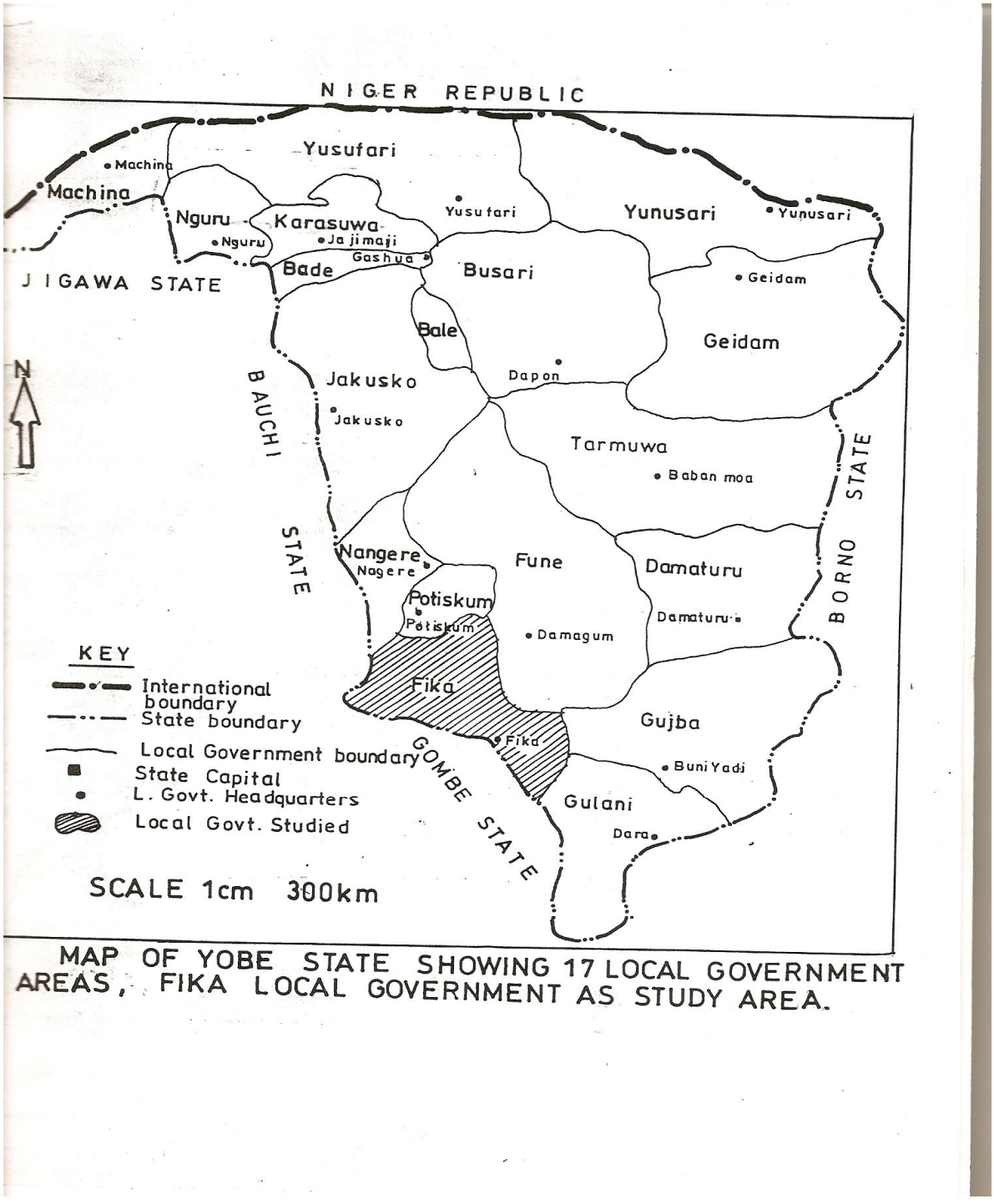
59. Corlien M.Varkevisser, Indra Panthmanathan, Ann Browniee: Designing and conducting Health System Research Projects, Volume 2 Part 1, 1991, pp 63 - 78.

APPENDIX III (MAP OF FIKA L.G.A.)



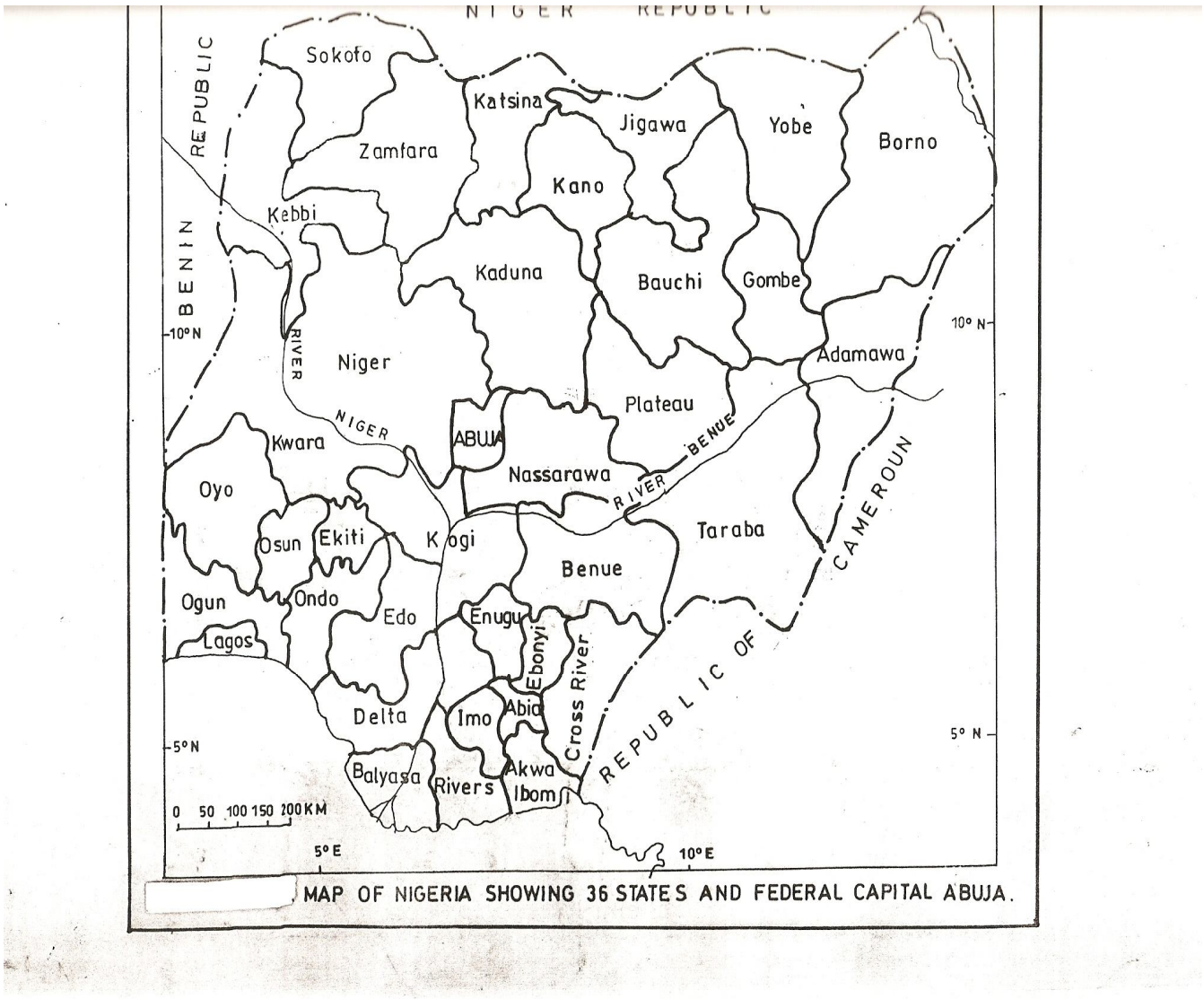
Map of Fika Local Government Area Showing Settlements and Health Facilities.

APPENDIX IV (MAP OF YOBE STATE)



MAP OF YOBE STATE SHOWING 17 LOCAL GOVERNMENT AREAS, FIKA LOCAL GOVERNMENT AS STUDY AREA.

APPENDIX V (MAP OF NIGERIA)



APPENDIX I

LIST OF DISTRICTS AND SETTLEMENTS/VILLAGES IN FIKA L.G.A., YOBE STATE

I. FIKA DISTRICT		II. DUMBULWA DISTRICT		IV. NGALDA DISTRICT	
1	FIKA	1	DUMBULWA	1	NGALDA
2	ANZE	2	TADANGARA	2	SABON GARIN NGALDA
3	BANALE	3	JIGAWA	3	JIGAWA
4	BADAWA	4	SABON LAYI	4	GANTSI
5	GARIN WAYO	5	GARIN MAI BUNDI	5	DANDUME
6	GADANA A,B, and C	6	LAMIDO HAMISU	6	YAYARU
7	MEBI NJELU	7	DUNDUME	7	DOM GUSHO
8	MEBI YARA			8	GOLE
9	MAZAWUN	III. MALURI DISTRICT		9	JAJERI
10	DURURU	1	MALURI	10	DANDI
11	GANGAWA	2	TURMI A,B and C	11	GARIN CHINDO
12	ZANGAYA	3	DOGON KUKA II	12	SHEHURI
13	GAREDDE	4	DOGON DAJI	13	GARIN GAMJI
14	DOGON KUKA 1	5	YOLA	14	KADIBU
15	GUDUWI	6	NASARAWA	15	GARIN JEJI
16	GARIN ALHAJI SAMBO	7	ABAKIRE A and B	16	GABASA
17	GABOLA	8	DUFFUYEL	17	FEROL
18	DIWIDI	9	NGEL AKUYA	18	ZUMEL
19	MARUWA	10	GARIN ABJIN	19	KEREM
20	GASHUWA	11	MBOLAYA	20	WASANDE
21	ZAMBA A and B	12	YOLDE YABO	21	MADARA
22	BULABURIN	13	MUSURU	22	GARIN AMAN
23	MOI DUWA SOUTH	14	DOGON BAUSHE	23	KAUGAMA
24	NAFUTA A and B	15	GARIN ARI	24	GARIN LAMIDO
25	FOKKITOK	16	INNAHAZA		
26	MANGARNA	17	MANAWACHI		
27	SHANGA	18	GURJAJI		
28	TASHAR ADUA	19	MURA		
29	KAUCHINKANI	20	GARIN WAKILI HALILU		
30	GARIN DALA	21	LAFFAJE		
31	NGEL DINGALI	22	GARIN GALI		

APPENDIX II

(SAMPLE QUESTIONNAIRE)

AHMADU BELLO UNIVERSITY, ZARIA, FACULTY OF MEDICINE, DEPARTMENT OF COMMUNITY MEDICINE

QUESTIONNAIRE FOR A STUDY TO ASSESS THE LEVEL OF MATERNAL MORTALITY IN FIKA L.G.A. IN YOBE STATE, NIGERIA, BY THE INDIRECT SISTERHOOD METHOD

Dear respondent,

This questionnaire is a tool for a study for assessing the level of maternal mortality among women of child bearing age group in Fika L.G.A. in Yobe state Nigeria. Participants are expected to answer all the questions with all sincerity. All information will be treated with total confidentiality.

Thank you.

…….
Dr. HAUWA LARAI GONI
(RESEARCHER)

NOTE TO INTERVIEWER: Please put a check mark for the correct option(s) and fill in the blank spaces appropriately.

PART A

BIODATA

1. Serial Number----------**(*FOR RESEARCHER'S USE ONLY*)**
2. ADDRESS: a)Village name:---------- b)District----------
3. What is the name of the head of this household?----------
4. How old are you? (in years):

   a) 15-19 □ b) 20-24 □ c) 25-29 □ d) 30-34 □

   e) 35-39 □ f) 40-44 □ g) 45-49 □
5. Sex : a)Male □ b) Female □

QUESTIONNAIRE (CONTINUED)

6. What is your religion?

   a) Islam □ b) Christianity □ c) Others (Specify) □----------
7. What is your ethnic group?

   a) Bolewa □ b) Fulani □ c) Hausa □ d) Kare-kare □

   e) Ngamo □ f) Ngizim □ g) Others (specify) □----------
8. What is your (highest) educational qualification?

   a)Primary School □ b)Secondary School □ c)Tertiary Institution □

   d)Qur'anic □ e) Islamiyya □ f) None □ g) Others(specify) □----------
9. What is your (major) occupation?

   a) House wife □ b) Farmer □ c) Civil servant □ d) Cattle rearer □

   e) Yoghurt seller □ f) Others (specify) □----------

PART B

1. How many sisters (born to the same mother) have you ever had who were ever married (including those who are now dead)?----------
2. How many of these ever-married sisters are alive now?----------
3. How many of these ever-married sisters are dead?----------
4. How many of these dead sisters died while they were pregnant, or during childbirth, or during the six weeks after the end of pregnancy?----------

THANK YOU