PREGNANCY OUTCOMES IN NEPAL: AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN SOCIOECONOMIC FACTORS, MATERNAL FACTORS AND FOETAL AND MATERNAL OUTCOMES IN A POKHARA SAMPLE

A thesis presented in partial fulfilment of the requirements for the degree

of Master of Arts

in Nursing at

Massey University

Pratima (Acharya) Poudel

1999

ABSTRACT

Good maternal reproductive health is a prerequisite for the health of babies and families. Social, cultural, economic and health systems also affect the wellbeing and survival of women during pregnancy and childbirth. In Nepal, a developing country, women are discriminated against in terms of legal status, access to education, access to food, and access to relevant health care services (Tuladhar, 1996). Where women do not have access to such services, maternal, perinatal, and infant mortality rates are comparatively high (The Ministry of Health & UNICEF, 1996).

There is a scarcity of research on the relationships between socioeconomic and maternal factors and pregnancy outcomes in the Nepalese context. The intention of the present study was to gain a greater understanding of factors affecting the health and behaviour of pregnant women in Nepal. Based on Mosley & Chen's (1984) and Maine's (1995) models of maternal and child survival, these factors were investigated to examine the relationships between socioeconomic and proximate determinants and pregnancy outcomes.

Data were collected on a cross-sectional basis from 215 women who gave birth at Western Regional Hospital, Pokhara, Nepal. Analyses revealed that, antenatal care utilisation, and nutritional intake were related to socioeconomic determinants such as income, residence, parental

qualifications, maternal occupation, ethnicity and religion. Furthermore, socioeconomic factors explained the greatest variance in birth weight, followed by general health behaviour and obstetric condition variables. The addition of reproductive health and behaviour variables did not add significantly to the explanation of variance in birth weight. Obstructed labour was studied in terms of length of labour, and the result revealed that, mode of delivery (normal or instrumental), gestational age, mother's age, and age at marriage were significantly related to the length of labour. Maternal mortality of 14.15 and perinatal mortality of 29 per 1000 live birth were reported during the study period of two months.

Findings are discussed in relation to previous literature. Limitations of the study and implications for future research are also discussed. Findings suggest that, the maternal and child health care services in the Western Region of Nepal need improvement. Strategic development of health care services with cost-effective and quality health services through primary health care and the Safe Motherhood programme are found to be a necessity for this region.

ACKNOWLEDGEMENTS

I have had the opportunity to learn an enormous amount about the processes essential to complete this work. I have come into contact with many people who have helped throughout the process of this research work. It is these people who I would like to acknowledge and to whom I express my gratitude.

My sincere gratitude goes to my supervisor Dr. Fiona Alpass. I appreciate her patience, knowledge and expertise in research and I value her honesty, support and guidance throughout this study. My sincere gratitude also goes to my second supervisor, Professor Jenny Carryer, who supported me and provided valuable feedback during the research. I would also like to thank Associate Professor Cheryl Benn for providing me with valuable suggestions, and relevant literature and support during the preparation of this thesis. I also appreciate the help received from Dr. Nicola North who introduced me to Massey University and helped to develop my professional career.

I would like to thank Dr. Ramesh Acharya for supplying relevant literature from Nepal throughout the year. I would like to express my gratitude to the Director of Western Regional Hospital, Dr. Somat Singh Tulachan, for granting me permission to undertake this research. My sincere thanks go to the Midwifes/ Nurses of the hospital and my sister Purnima Poudel for their cooperation during data collection. I wish to thank the participants who

willingly shared, often quite personal, aspects of their lives. I hope the information gained will be used for the future benefit of the health of mothers and children in Nepal.

The New Zealand Overseas Development Assistance, Massey University Graduate Research Fund, and Asia 2000 Foundation of New Zealand, all provided essential financial assistance. Without their help this research would not have been possible.

Finally, thanks to my partner Dinesh Acharya and son Atul Acharya for their help, patience, and understanding.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

BACKGROUND TO STUDY

This chapter begins with an introduction to the area under study. A situational analysis of maternal and child health in Nepal is provided followed by a brief description of the current structure of maternal and child health services. The aims for the study are introduced and the theoretical framework for the study is discussed.

1.1 Introduction

Maternal reproductive health is an essential component of child survival. However, human development has largely been seen in the context of child survival and development over the past decades. An important component of child survival, the health of the previous generation and their reproductive health, especially that of the mother, is sometimes underestimated (Turmen, 1994). Reproductive health determines the wellbeing of the mother, the foetus, the infant, and the child and in turn determines the health and reproductive capacity of the next generation's mothers (World Health Organisation (WHO), 1995). Thus, child development and survival, adolescent health, and the reproductive health of women, men, and families must be seen and addressed in its entirety.

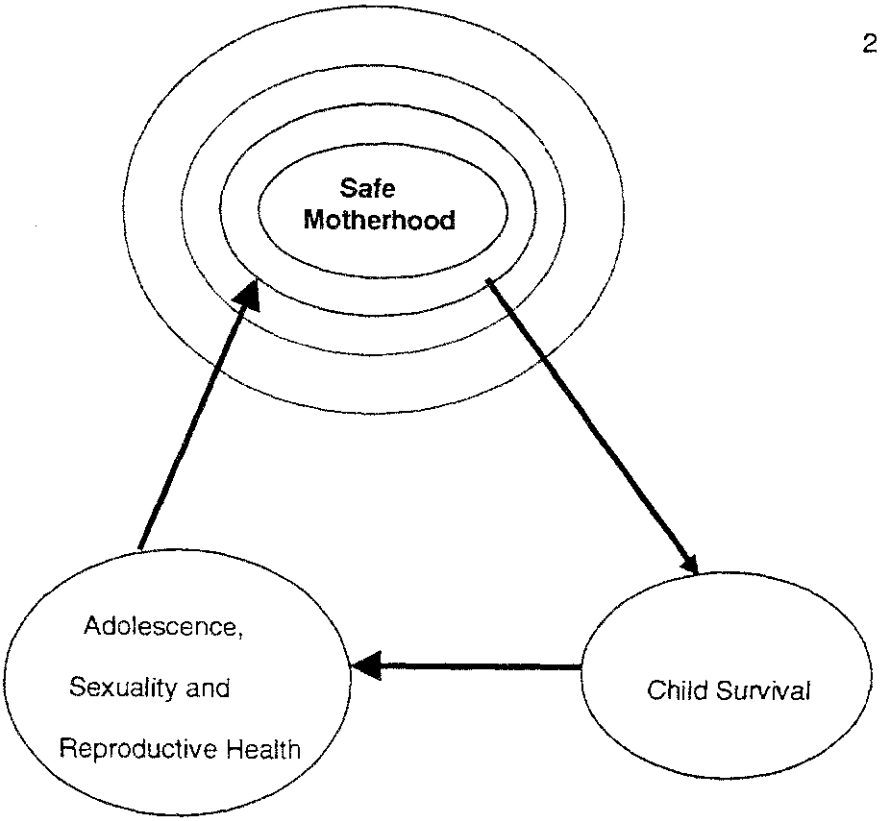


Figure 1: Human Development (Turmen, 1994:3)

Safe Motherhood[1] and reproductive health including the sexual and reproductive health of adolescents, lies at the centre of human development (Turmen, 1994).

Figure 1 shows the interrelation between safe motherhood, child survival, adolescence, sexuality, and reproductive health. Improvement in the reproductive health of mothers has a positive and multiple effect on the next generation.

Pregnancy and childbirth are unique events in the reproductive lives of women. Pregnancy is not only a time of great hope and joyful anticipation but may also be a time of fear, suffering, and sometimes even death. While

[1] Safe Motherhood: this is a programme designed to enable women to identify pregnancy, ensure care for prevention and treatment of complications, provide access to trained birth attendants and special care during emergency and after childbirth to avoid death and disability (Feuerstein, 1993).

pregnancy is a normal physiological process, it is associated with certain risks to health and survival both for the woman and the infant. These risks are present in every society and setting. In developed countries, they have been largely overcome by the provision of proper care during pregnancy and childbirth for all pregnant women (WHO, 1998a). In developing countries, most women do not have the privilege of access to care and support during pregnancy and each pregnancy represents a journey into the unknown from which many women never return (WHO, 1998a).

Social, cultural, economical and health systems also affect the wellbeing and survival of women during pregnancy and childbirth. Maternal and perinatal death can be largely prevented through educating women about healthy lifestyles and nutrition during pregnancy as well as by providing quality health services using trained staff, particularly at the critical time of birth (UNDP/UNFPA/WHO/World Bank, 1997)[2]. In Nepal, a developing country, women are discriminated against in terms of legal status, access to education, access to food, and access to relevant health care services (Tuladhar, 1996). Where women do not have access to such services, maternal, perinatal, and infant mortality rates are comparatively high (The Ministry of Health & UNICEF, 1996). Very few studies have been undertaken exploring the causes of high mortality in the Nepalese context. The present research will investigate the relationships between socio-economic factors, reproductive health and behaviour, general health and

---

[2] UNDP- United Nation's Development Programme
UNFPA- United Nation Federation of Parenthood Association
UNICEF-United Nation's Children's Fund

behaviour during pregnancy and their relationship to pregnancy outcome (both maternal and foetal) in women delivered at Western Regional Hospital, Pokhara, Nepal.

1.2 Situational analysis: Maternal and child health in Nepal

1.2.1 Women and girls in Nepal: Health seeking behaviour

Women's image, status, behaviour, and their roles vary from culture to culture, and society to society. In developing countries, there is a sub-culture within the cultural display, where various representations of women exist ranging from traditional, illiterate, and uneducated to modern autonomous and educated. Furthermore, women's thinking, behaviour, status and roles are completely dependent upon the social class or community to which they belong (Bali, 1995) and these social factors can affect women's health-seeking behaviour.

Nepalese society is predominantly patriarchal, governed by Hinduism as a strong ideological force (UNICEF, 1996a). The growth, development and status of Nepalese children are shaped by social structure, class and value systems informed by the patriarchal tradition. Within this tradition, sons are considered the economic insurance against the insecurities of old age (UNICEF, 1996a). On the other hand, daughters are to be given away in marriage to care for her husband's parents and family. Nepalese girls face early marriage, that is, before the age of twenty (UNICEF, 1996a). Moreover, women's subordination is supported by traditional practices. For instance, the paying of a bride price by which men acquire the exclusive

right to the wombs of women (Medical Women's International Association, 1995). This practice implies that a married woman should be faithful to her husband, and in practical terms means a wife has no right to the regulation of her reproductive and sexual functioning. This in-turn delays decision making with regard to medical and obstetric health seeking behaviour.

Women's status can underly and shape their access to health services and may directly affect decisions and delays to seek care. For instance, studies on maternal death and its relation to women's status in developing countries conducted in Nigeria, India, Ethiopia, Korea, and Tunisia (Thaddeus & Maine, 1994) show that women are often not able to decide on their own to seek timely care, awaiting decisions from senior members of the family, such as their spouse or their mother-in-law. Moreover, women's mobility is often limited because they require permission from their mother-in-law or spouse to travel away from home. This is a prominent cultural prescription in developing countries (Thaddeus & Maine, 1994). This cultural practice is common in Nepal too, both in rural and urban areas (Poudel, 1995). When women face obstetric complications, they tend to use only health care facilities available within their own community because of cultural restrictions. Often these obstetric care facilities are inadequate and such cultural practices increase maternal and perinatal mortality.

The socialisation of children during childhood can affect the development of levels of confidence and self-esteem, which in turn affects decision making abilities about health care matters (UNICEF, 1996a).

Practices of self-denial, self-effacement, gentleness, sacrifice, unassertiveness, and other so-called "feminine" qualities are common elements of girls' upbringing in Nepal (UNICEF, 1996a). Further, decision-making, opinion-formation, strength of expression, and assertion of needs is inherently discouraged in the socialisation process of girls. Most social interaction for girls is confined to the inside world of the home (Tuladhar, 1996). Besides economic dependency, this type of socialisation may force them to depend on their husband and his family, and seek decisions from others on their own health care. This may contribute to delay decisions on seeking health care during pregnancy and childbirth.

Women's status also interacts with the cost of treatment in the decision to seek care. The preference for sons that prevails in Asian countries, indicates that the consideration of cost in the decision to seek care may be gender biased. Hossain & Glass (1988), in a study in Bangladesh found that doctors were consulted three times as often for sons as for their daughters by parents. Further, purchases of drugs prescribed by physicians were approximately three times as frequent when the prescription was for a boy as when it was for a girl. Such discrimination is common in Nepal (Personal experiences).

Maternal mortality and morbidity have some of their origins in women's lives before pregnancy (Mahler, 1987). A study conducted in Asia (Glik, Parker & Hetegikamana, 1986) found that parents' health care behaviour and expenditure often reveal a preferred investment in their son's health especially when resources are scarce. Further, they found that even where

health care and transportation costs are free of charge, parents use services more frequently for ill boys than girls. Thus, the low value placed on girls adversely affects their utilisation of health services, a factor, which has been generally overlooked. Many Nepalese parents invest in the education, nutrition, and health care of their sons rather than daughters (UNICEF, 1996a). Nutritional deficiency in girls, such as insufficient intake of vitamins and minerals including calcium, iron and vitamin 'D', in their childhood and adolescence may result in contracted pelvis, obstructed labours and chronic iron deficiency and often death due to severe haemorrhage during childbirth. Royston & Armstrong (1989), however concluded that the impact of gender discrimination on maternal mortality has been largely ignored, and has been subsumed within the general issues of poverty and underdevelopment which is assumed to put everyone at equal disadvantage in health terms.

In many developing countries, women consider childbearing as their only means of gaining status (Thaddeus & Maine, 1994). Therefore, women often find themselves in a paradoxical situation. They take high fertility as a means of giving birth to more male babies hoping to improve their status, but this increases the risk of maternal death. In developing countries, even where women are economically independent, women's pride and prestige is determined primarily through their roles as mothers (Van de Walle & Ouaidou, 1985). Thus, pregnancy and childbirth award women status in developing countries.

A study conducted by Sargent (1985) in Benin showed that birth represents a rare opportunity for women to demonstrate their courage and

bring honour to their family and their husband by self-possessed conduct* during pregnancy and childbirth, which has direct implications for recognising complications and deciding to seek care without delay. In Nepal, self-possessed conduct during pregnancy and childbirth is expected by the family, especially by mother-in-laws (WHO, 1998b). This practice is transmitted generation to generation, from mother-in-law to daughter-in-law and so on.

Thus, this type of practice increases the risk of maternal death and disability. These cultural and behavioural practices are more apparent in Indo-Aryan ethnic groups (Bhramin and Chettri), comprising the majority of the Nepalese population (UNICEF, 1996a). Even among the Tibeto-Burman communities, there is an increasing trend towards the adoption of Indo-Aryan values and norms, which dominate society (UNICEF, 1996a).

In summary, the health of both men and women depends on a combination of genetic, environmental, and healthcare factors. However, socio-economic, cultural and political environments differ in every society, and the chances of women being affected by these factors are often high (Medical Women's International Association, 1995). In developing countries, women are discriminated against in terms of legal status, access to education, access to food and access to relevant health care services from birth to adulthood. The combinations of factors such as limited power over reproduction, poor general health, gender discrimination, and inadequate perinatal practices expose Nepalese women to high-risk pregnancies, perinatal complication and sometimes death.

---

* Self-possessed conduct: having control of one's emotions and behaviours.

1.3 The structure of maternal and child health services in Nepal

The population of Nepal is 18.5 million and mothers and children constitute 64% of the total population (Census, 1996). Their survival is closely related to the availability and use of basic maternal health services. Maternal, perinatal, neonatal, and infant mortality are indices of the quality of maternity care services in any given country (Thapa, 1996; The Ministry of Health & UNICEF, 1996; WHO, 1996b).

Nepal's health policy principally relates to the Primary Health Care (PHC) services including maternal and child health as well as family planning. Health care facilities such as Sub-Health Posts (SHP), Health Posts (HP), and Primary Health Care (PHC) centres in various parts of the country have been established to make health care services accessible to rural populations. Nepal is predominantly rural, with 91% of the population living in rural areas (The Ministry of Health 1996a; UNICEF, 1996a; Census, 1996).

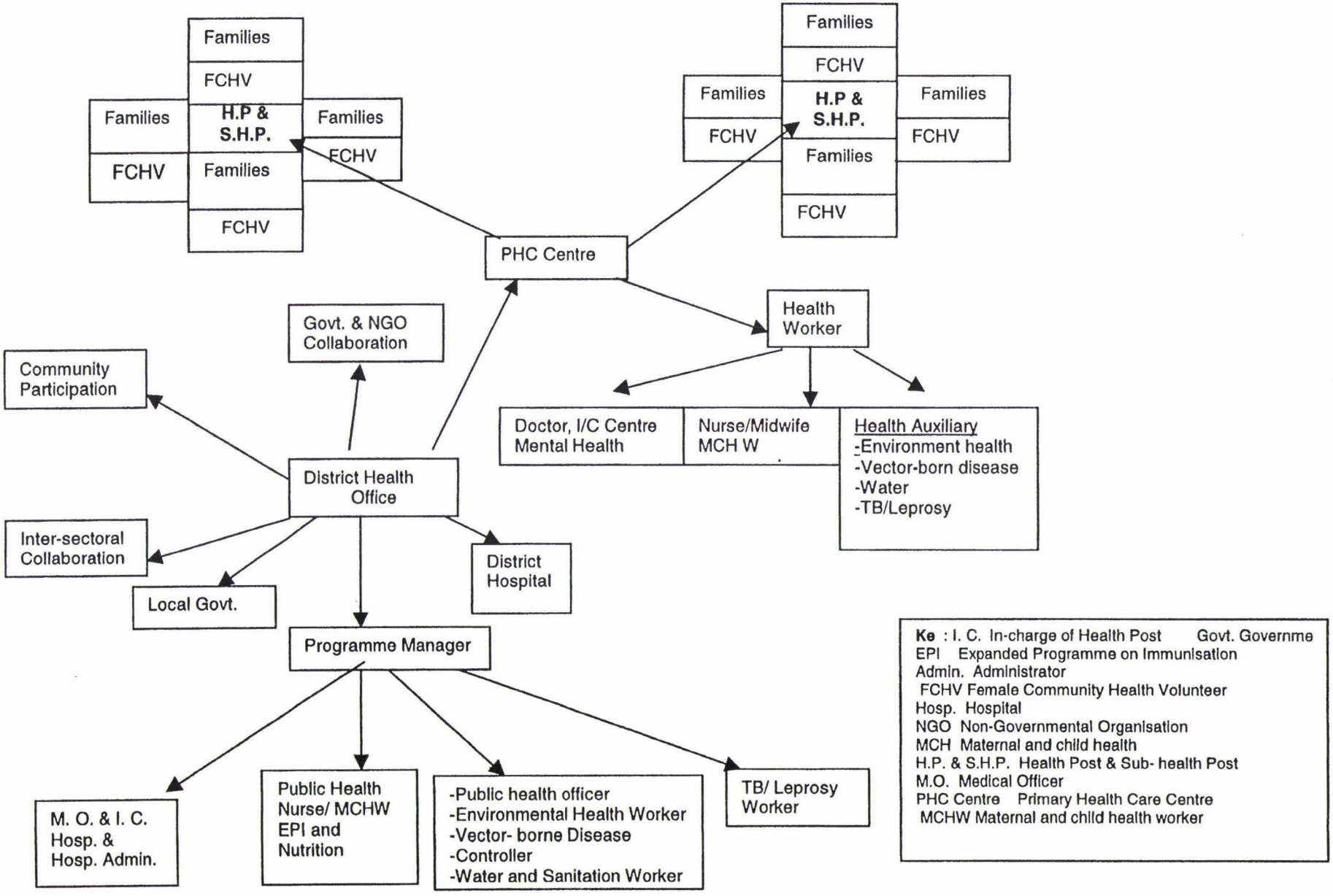
Recently, attention has been drawn to Safe Motherhood Initiatives. The Ministry of Health of Nepal gives priority to the Safe Motherhood Programme to provide quality maternity care (The Ministry of Health & UNICEF, 1996). The major challenges of Safe Motherhood initiatives are the reallocation of available resources and further review of existing health policies to improve the health of girls and women in particular. In Nepal's revised health policy, attempts have been made to include a Safe Motherhood Programme in each level of the primary health care delivery system. Therefore, the Safe Motherhood Programme becomes a major component of primary health care in Nepal. Within the hierarchy of the health care

delivery system, attempts have been made to establish basic maternity and neonatal health care services, which help to meet the reproductive needs of women throughout the country. Figure 2 shows the prescribed coordination patterns of the health care delivery system within Primary Health Care, developed by the World Health Organisation (WHO, 1979). Nepal used this pattern to establish good referral systems from each community level to each district level to meet reproductive health needs during pregnancy and delivery.

1.3.1 Safe Motherhood Programme in Nepal

Safe Motherhood has become the focus of health care planning since the Nairobi conference, Kenya in 1987. This is a programme designed to enable women to identify pregnancy, ensure care for prevention and treatment of complications, provide access to trained birth attendants and special care during emergency and after childbirth to avoid death and disability (Feuerstein, 1993). Therefore its aim is to reduce the maternal mortality rate by at least half by the year 2000 (WHO, 1993). The Ministry of Health of Nepal set the aim of reducing the maternal mortality rate from 539 to 400 per 1 00 000 live births by the end of 2002 (Western Regional Health Service Directorate, 1997). It also aims to improve the status of women by bringing about attitudinal, behavioural, and societal changes in women's health concerns (The Ministry of Health, 1996a).

Figure 2: Level of Primary Health Coordination Pattern



This aim will be met by promoting inter-sectoral collaboration; strengthening and expanding basic maternity care services, including family planning, at all institutional levels; raising women's status to enable them to seek care and use services; and conducting research on Safe Motherhood practices (see Appendix one for a description of the Safe Motherhood Programme of Nepal). The implementation of the Safe Motherhood Programme will involve close cooperation and coordination of many activities within the Ministry of Health and other related ministries, donors, and non-governmental organisations (The Ministry of Health, 1996a).

1.3.2 The implementation of Safe Motherhood strategies

The implementation of Safe Motherhood strategies is difficult in Nepal for a number of reasons. Firstly, there is the necessity for the reestablishment and reallocation of human and material resources for the Safe Motherhood Programme within the existing primary health-care delivery system. Secondly, operating theatres at district hospitals (first level referral centres) are not functioning due to lack of resources (The Ministry of Health & UNICEF, 1996). Thirdly, services are often inadequate in the sense of quality, uniformity, and accessibility in rural areas, because health care providers' (VHW/MCHW) lack the appropriate knowledge and skills to meet the needs of pregnant women.

Although, the capabilities of the various health carers differ according to their categories, most of them who work at grass root level are unable to respond women's needs appropriately (The Ministry of Health & UNICEF, 1996). The trained female health workers such as Auxiliary Nurse Midwives

(ANM) and Staff Nurses hesitate to work away from their family due to cultural barriers and lack of security. In Nepal it has not been usual for unmarried women to live and work away from their own area. Under the new Safe Motherhood Initiatives women posted to a rural area, other than their own, may have difficulty being accepted by the local people.

Positions for trained health workers, especially doctors, health assistants, and staff nurses remain unfilled in district hospitals due to topographical difficulties, lack of basic resources for functioning, and again the unwillingness on the part of health personnel to stay away from urban centres (The Ministry of Health & UNICEF, 1996). Health services in some areas of Nepal are less than ideal. Sometimes drugs run out before the new supply arrives or equipment breaks down and cannot be repaired (The Ministry of Health, 1996b).

Finally, the biggest problem in implementing the Safe Motherhood Programme is the difficult terrain, with its lack of infrastructure such as roads and communication systems. Many women live in remote rural areas, sometimes a day's walk or longer from antenatal services, family planning facilities, hospitalisation for caesarean section, and blood transfusion (The Ministry of Health, 1996b).

Three main types of delay contribute to the many maternal deaths in developing countries (Thaddeus & Maine, 1994) including the rural part of Nepal (The Ministry of Health, Nepal, 1996b). These causes of delay are:

- Delay in seeking care. Families and other community level health workers do not recognise the severity of the complications and believe

that by just waiting a while everything will be fine. If the severity does not abate, then the decision is too late to seek care;

- Delay in arriving at a facility, which can provide care. Long distances, bad weather, difficult roads, no transportation, and the unwillingness of transporters (porters, drivers) can cause this delay. Delay may also be caused by an inadequate health facility (staff and equipment) not recognising the severity of the health problem or being unable to treat it, and failing to arrange for timely referral ; and
- Delay in starting treatment, when an appropriate facility has been reached. Shortage of drugs, absence of staff, operating theatres not ready or simply staff not reacting with sufficient urgency can cause delays.

These three types of delays may discourage people from using health services and reduce faith in health services in the future. Although it would be ideal if all district hospitals of Nepal could provide comprehensive essential obstetric care and all Health Post and Health Centres could provide basic obstetric care according to Safe Motherhood guidelines, this is still not possible (The Ministry of Health, 1996b). The Safe Motherhood Programme of the Ministry of Health of Nepal is working in ten districts with financial and technical support from bilateral and multilateral donor agencies to make comprehensive essential obstetric health care available in district hospitals (The Ministry of Health, 1996b).

1.3.3 Summary

Good maternal health is a prerequisite for a healthy mother and baby as well as a healthy family. The mother's health is affected by the social, cultural, economical and health care delivery systems of the country in which she lives. In Nepal, most women do not have access to basic health services. In addition to lack of health infrastructure, transportation and communication, other factors such as gender inequality, illiteracy, and cultural constraints delay decisions to seek care even in the case of complications during pregnancy and childbirth. Since the last decade, attention has been drawn to the Safe Motherhood Programme. This is a cost-effective way to fulfil mothers and infants health needs in developing countries. In Nepal, the Safe Motherhood Programme is included within the existing Primary Health Care delivery system.

1.4 Theoretical framework

The present research adopts and applies two theoretical models. Firstly, an analytical framework for the study of child survival in developing countries (Mosley, & Chen 1984; Gortmaker & Wise, 1997; Census, 1996) and secondly, an analytical model of maternal mortality (Maine, 1995).

1.4.1 Analytical framework for the study of child survival in developing countries

Infant and child mortality rates are relatively higher in developing countries than developed countries (Mosley & Chen, 1984). Parental characteristics such as education, knowledge of appropriate treatments, and lower fertility are important determinants of child health and in particular,

women's education influences health-seeking behaviour during pregnancy and childhood (Mosley & Chen, 1984). The amount and type of education a women has received, helps to develop awareness of utilisation of services, and is related to nutrition, hygiene, and immunisation (Mosley & Chen, 1984; Raghupathy, 1996). Social science research on mortality has traditionally focused on the association between socio-economic status and levels and patterns of mortality in populations (Mosley & Chen 1984). Correlations between mortality and socio-economic characteristics are used to generate causal inferences about mortality determinants (Mosley & Chen 1984). Income and maternal education are two commonly measured determinants of child mortality in populations of developing countries. However, medical research focuses primarily on the biological processes of diseases and less frequently on mortality (Mosley & Chen 1984). While both the social and medical sciences have made major contributions to the understanding of child mortality in developing countries, the differing concerns and methodologies have set apart such knowledge and constrained the development of potentially more useful approaches to understanding child survival. Therefore, a new analytical approach is needed to incorporate both social and medical science methodologies into a coherent analytical framework of child survival.

According to Mosley & Chen (1984, p. 32), the combination of social and medical sciences, or the proximate determinant approach for the study of child survival, is based on the following premises:

- In an optimal setting, over 97 % of new-born infants can be expected to survive through the first five years of life.

- Reduction in this survival probability in any society is due to the operation of social, economic, biological and environmental forces.
- Socio-economic determinants (independent variables) must operate through basic proximate determinants that in turn influence the risk of disease and the outcome of disease processes.
- Specific disease and nutrient deficiencies observed in a surviving population could be viewed as biological indicators of the operation of the proximate determinants.
- Growth faltering and ultimately mortality in children (the dependent variable) are the cumulative consequences of multiple disease processes (including their bio-social interactions). Only infrequently is a child's death the result of a single isolated disease episode.

The key to the model is the identification of a set of proximate determinants or intermediate variables that directly influence the risk of morbidity and mortality. All social and economic determinants operate through the variables that affect child survival. The proximate determinants may be grouped into five categories: (see Figure 3)

- Maternal factors such as age, parity, and birth interval. Each of the maternal factors will exert an independent influence on pregnancy outcome and infant survival through its effects on maternal health.
- Environmental contamination: air, food, water, fingers, skin, soil, inanimate objects, and insect vectors. Environmental contamination refers to the transmission of infectious agents to mothers and children through these different factors.

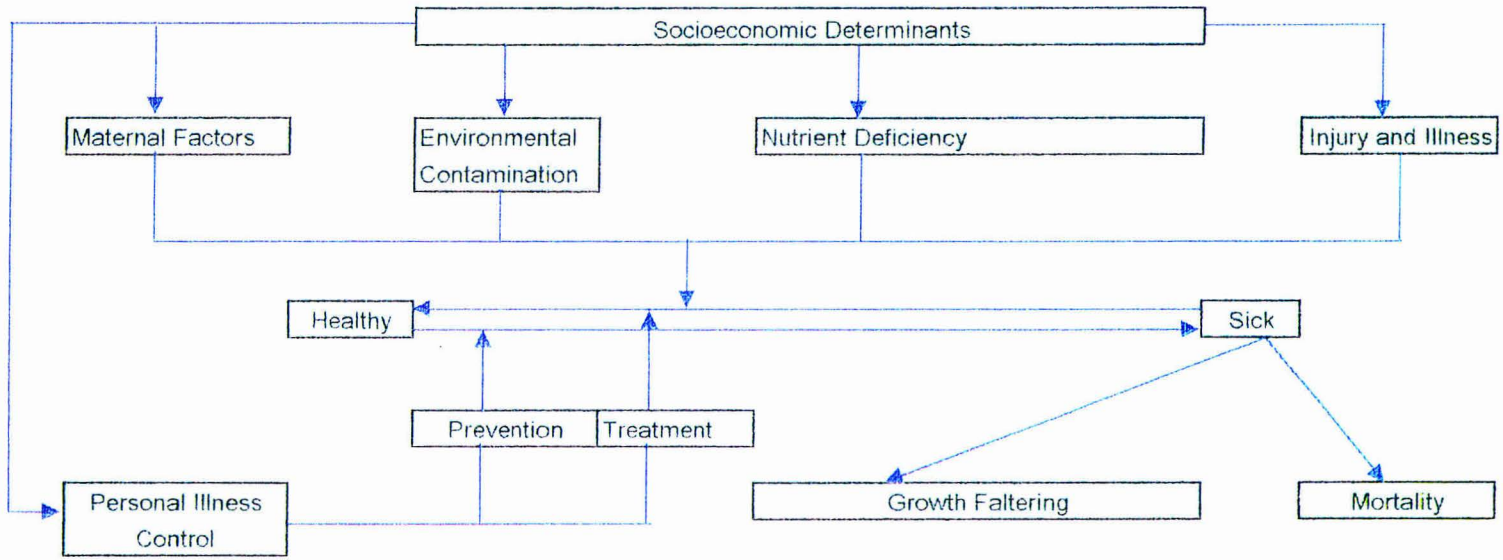


Figure 3: Proximate Determinants' Framework by Mosley & Chen (1984)

- Nutrient deficiency: calories, protein, and micronutrients (vitamins and minerals). Nutrient deficiency relates to the intake of the three major classes of nutrients: calories, protein, and micronutrients.
- These factors influence the survival of children and mothers. Maternal diets and nutrients available during pregnancy may influence the quantity and nutrient quality of breast milk during lactation.
- Exposure to illness and injuries: accidental, and intentional.Personal illness control: preventive measures, and medical treatment. As a component in personal illness control, healthy individuals take preventive measures to avoid diseases. These include traditional behaviours like taboos, and modern practices. These are important factors in the practices and quality of care during pregnancy and childbirth. The category of medical treatment relates to measures taken to cure diseases after they become manifest.

1.4.2 Analytic model of maternal mortality

Maternal mortality is one of the major public health-problems in many developing countries. Mosley & Chen (1984) describe a comprehensive child-survival model, whereas this second model (Maine, 1995) describes an analytical model of maternal mortality (see Figure 4). Both of these models are based on the presumption that all social and economic determinants operate through a common set of biological or proximate (intermediate) determinants, to exert an impact on maternal and child mortality.

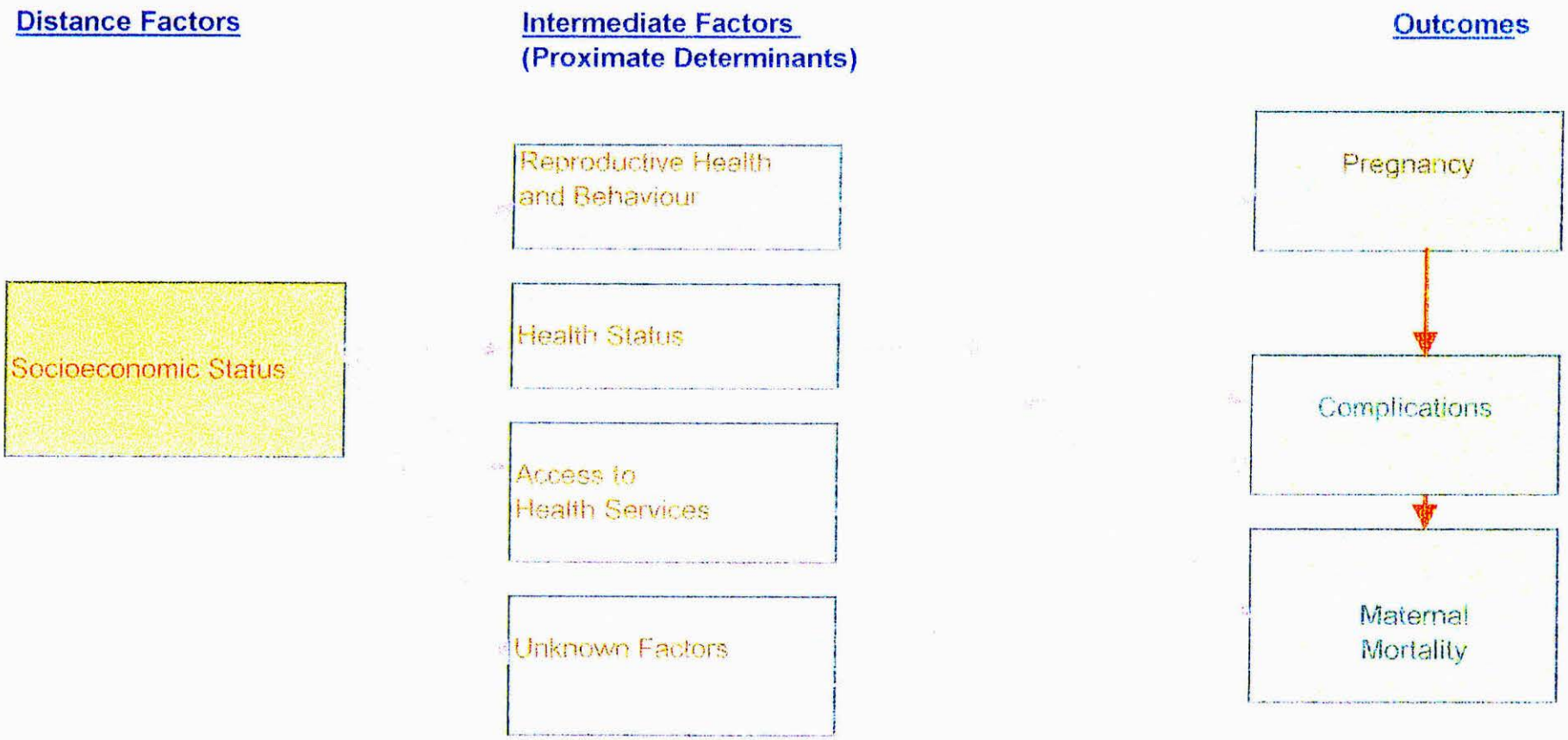


Figure 4: Analytic Model of Maternal Mortality by Maine (1995)

Maine's (1995) analytical model of maternal mortality proposes that, improving the socio-economic status of women can reduce maternal mortality. This concept is quite similar to Mosley and Chen (1984). Firstly, socio-economic status seems to have an effect on at least one of the intermediate factors: health and reproductive health behaviour, health status, and access to health services. Secondly, the chain of effects must be extended to one or more of the three outcomes in the model: pregnancy, development of complications, and death and disability. This model also addresses the direct or indirect and intermediate causes of maternal mortality as follows:

- People's risk of dying is strongly influenced by the society they live in and their position within it. Mortality is higher in poor and disadvantaged groups than among the wealthy. This is true in the case of maternal mortality. Maternal mortality is higher in developing than developed countries. However, class differences will also affect mortality.
- Direct obstetric death is due to complications of pregnancy, delivery or the postpartum period, including abortion complications. An indirect death is due to existing medical conditions that are made worse by the pregnancy or delivery. These deaths are often due to malaria, hepatitis, anaemia or heart diseases.
- Intermediate factors include health and reproductive behaviours, and access to health services. Reproductive health and behaviours affect maternal mortality through health status, pregnancy, and complication. Different cultural barriers and socioeconomic factors, as described earlier influence the utilisation of health care services during pregnancy especially when complications arise. Reproductive health behaviours

such as extremes of maternal age, birth order and birth spacing increase the risk of maternal death. Access to health services for the mother during pregnancy is crucial. Sophisticated medical technology is not necessary for many cases but simple, quality health care should be provided to women who need it. However, access to information, financial factors, physical accessibility and availability of health services in the entire community will affect utilisation of health services by mothers and this will help to decrease maternal death. Maine (1995) also includes as intermediate factors those factors that affect maternal outcome, which are indeterminable (i.e. unknown factors).

In summary, socio-economic factors are considered as distance factors in both the analytical model of child survival (Mosley & Chen, 1984) and maternal mortality model (Maine, 1995). Social and economical determinants affect the reproductive health and behaviour of women (biological or proximate / intermediate determinants) which consequently may lead to unfavourable pregnancy and obstetric conditions that influence infant and maternal outcome. Based on these two models, a framework for understanding factors which affect maternal and infant outcomes in Nepal is proposed (see Figure, 5).

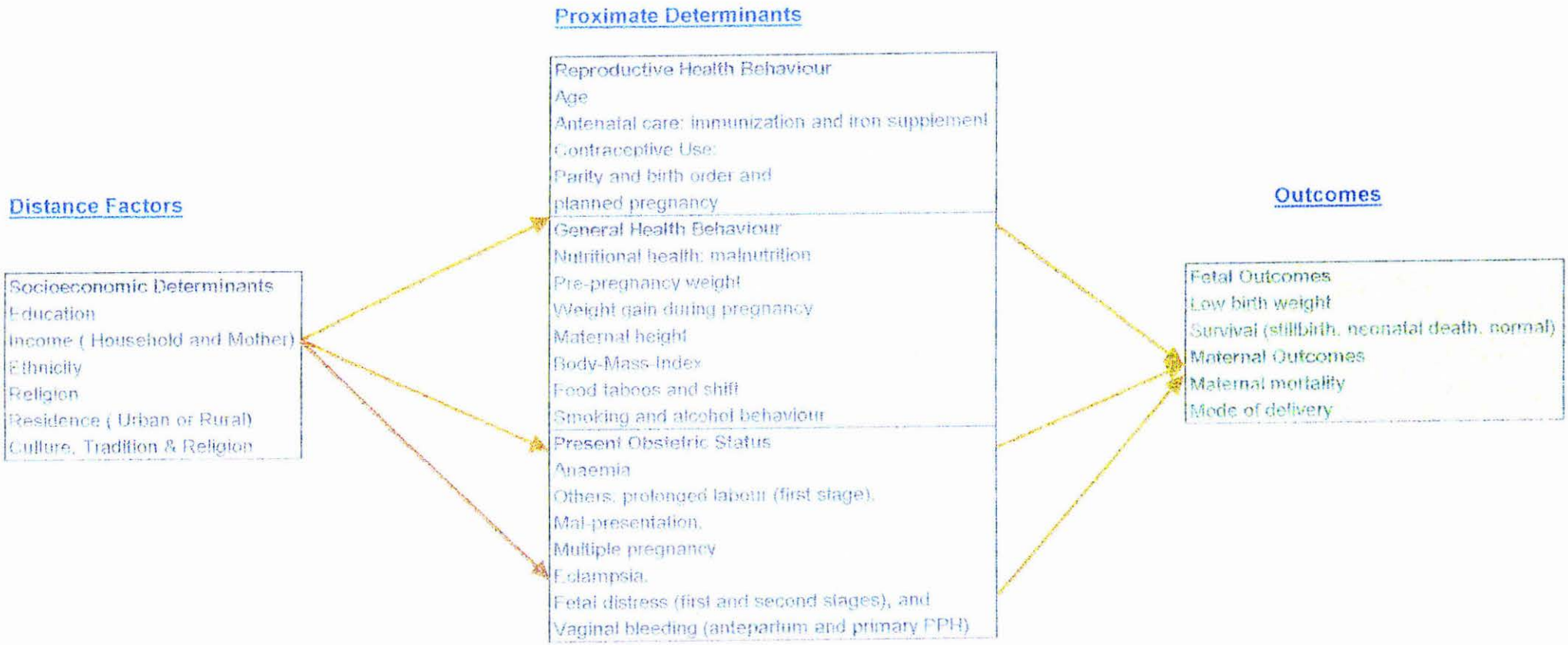


Figure 5: Modified Framework for Present Research Based on Mosley & Chen (1984) and Maine (1995) Models

1.5 Research aims

Aims of the study

Child health and survival fully depend upon the mother's reproductive health, not only during foetal life but also throughout childhood. Children are the future of a nation and they are important human resources for sustainable development. The reproductive health of the mother should, therefore, be a matter of global concern. In the international arena, various studies have been conducted on child survival and reproductive health, and attention has been given to women's health, their status, their empowerment, and improvement of their legal status. However, in Nepal, only a limited number of descriptive studies have been conducted to assess the situation at both national and regional levels and these have not explicitly addressed the affect of reproductive health behaviour on pregnancy outcome (UNICEF,1996a; Demographic Health Survey, 1996). Therefore, the overall research aim of the present study is to investigate the relationships between distance (socio-economic) factors, and proximate determinants and their relationships to foetal and maternal outcomes in the western region of Nepal. Specific aims include:

Aim One: To investigate socio-economic determinants and their relationships with selected proximate determinants (see Figure 5).

Aim Two: To examine the relationships between selected socio-economic and proximate determinants and foetal outcomes (low birth-weight, perinatal mortality) (see Figure 5).

Aim Three: To examine the relationships between selected socio-economic and proximate determinants and maternal outcomes (mode of delivery and maternal mortality) (see Figure 5).

The proposed study will contribute to the description, and understanding of the existing situation for maternal, and child health in Nepal. This study will also contribute to the contemporary research on maternal and child health.

This thesis is divided into five chapters. In the **first chapter,** background information has been given briefly covering health seeking behaviours, and health policies in the area of maternal and child health in Nepal. A framework for the present research is discussed and research aims are presented. In the **second chapter**, a review of the relevant literature on socio-economic determinants (distance factors) and proximate determinants (maternal factors), and their relationships with pregnancy outcomes is presented. **Chapter three** details the research design and methodology. The **fourth chapter** presents the findings of the present study. Finally, the **fifth chapter** discusses the results in light of the research aims and previous research and presents conclusions.

CHAPTER TWO

LITERATURE REVIEW

This chapter begins with a definition of reproductive health status. The literature relating to socioeconomic determinants (distance factors), which affect pregnancy outcomes, will be reviewed. Then literature relating to proximate determinants affecting pregnancy outcomes is discussed. Finally, the relevant literature relating to pregnancy outcomes will be reviewed.

2.1 Reproductive health status

> *"Reproductive health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes" (Family Care International (FCI), 1994, p.10).*

Reproductive health refers to women capable of having a responsible, satisfying and safe sex life, who have the capability to reproduce and the freedom to decide when and how often to do so. Women have a right to be informed and to have access to safe, effective, affordable, and acceptable methods of family planning or other methods for regulation of fertility according to their choice, which are not against the law. In addition, they have the right of access to health care services that make it possible for

women to proceed safely throughout pregnancy and delivery and that provides the couple with the best chance of having a healthy baby (UNDP/ UNFPA/ WHO/World Bank, 1997, p.3).

Reproductive health is concerned with health problems that may occur during pregnancy, childbirth, the immediate post-partum period, lactation, and infertility or contraception. Further, it is also concerned with reproductive tract infections, sexually transmitted disease, and female cancers (Paolisso & Leslie, 1995). It not only includes counselling and cares related to reproduction and sexually transmitted diseases but also includes sexual health, which enhances life and personal relations. Thus, reproductive health is a composite concept, which includes methods, techniques, and services that contribute to reproductive wellbeing by preventing and solving reproductive health problems throughout the woman's life.

The reproductive health of women to a large extent is determined by general health. During pregnancy and around the time of childbirth, the health of the woman depends on her pre-pregnancy health status and access to health care. When women's needs are neglected during the reproductive years there are extreme implications for women and future generations. According to WHO and the World Bank, poor reproductive health accounts for over one third of the overall burden of disease in women in their reproductive age compared to only 12% for men (Turmen, 1994).

The reproductive health of women is also affected by economic circumstances such as levels of education, housing, and employment

(Turmen, 1994). Women's reproductive behaviours are influenced by a combined set of biological, cultural, and psychosocial factors. Although, reproductive health status focuses on the entire reproductive life of women the present research only focuses on women's reproductive health and behaviour surroundings pregnancy and its effect on pregnancy outcomes.

2.2 Distance factors: Socioeconomic determinants

Socio-economic factors play a significant role in the health of mother and baby. These factors differ greatly between developed and developing nations and largely account for differences in health between the two. AbouZahr and Royston (1992) found a greater discrepancy in maternal health and survival between developed and developing countries. Similarly, the infant mortality rate is still high in developing countries, but in decline in developed countries (Gortmaker & Wise, 1997).

The models of Mosley & Chen (1984) and Maine (1995) shown in Figures 3 and 4, attempt to examine socio-economic determinants as distance factors affecting proximate determinants (see Figure 5). Mosley & Chen (1984) identify the following socio-economic determinants: parental education, parental income, ethnicity, and residence among others. These factors are closely interrelated in developing countries and are thus discussed concurrently and presented below. Ethnicity and culture are presented separately.

2.2.1 Father's education, occupation and income

Three elements that determine the individual productivity of household members are skill, health, and time (Mosley & Chen, 1984). Skill is measured by level of education. In the urban sector of developing countries, the father's education correlates especially strongly with occupation (Mosley & Chen, 1984). The father's education is a strong determinant of wealth such as household property, commercial commodity, and household expenditure. Therefore, the relationship between the family's health and the educational level of fathers, largely appears to operate on proximate determinants through the income effect. The education level of the father also influences attitudes including consumption of foods and decisions on the use of health care services for his wife and infant. These effects are most critical for infant and maternal health, especially when the educational gap between husband and wife is wide (Mosley & Chen, 1984).

A variety of goods, services and assets available at their own house, largely determined by husband's income, operate on the health of the mother and child. Some major factors affected by household income which influence maternal, infant and child health, are the availability of food, the quality of drinking water, availability of transportation, housing and sanitary conditions and the availability of sources of information such as radio, television (Mosley & Chen, 1984).

2.2.2 Women's education, income and occupation

In developing countries women's education can enhance female autonomy by increasing confidence and the capability for making decisions

regarding her and her infant's health. Raghupathy (1996), found that maternal education considerably influenced the use of maternal and child health services in Thailand. Kalipeni (1993) found that maternal education played an important role in reducing the levels of infant mortality at regional and district levels in Malawi. For instance, the northern region of Malawi has a higher rate of female literacy than central and southern regions and infant mortality is lower in the northern region than the central and southern regions, and vice versa. Kalipeni concluded that, female education has a direct impact on female autonomy, which helps to reduce infant mortality rates. The women of the northern region were more aware of infant health than the other regions. Thus, the mother's level of education affects her choice, and increases her skills in health care practices related to antenatal care, contraception, nutrition, child care, hygiene, preventive care, complication, and disease treatment.

Women's education may also be related to a decline in fertility rates, which in turn decreases the risk of dying for women of childbearing age. According to UNICEF's (1996b) report women's education, among other things, brings considerable change in the number of children they bear. For instance, in New Zealand, the average tertiary participation in education is 232/1000 in the age group of 16 to 24 years. The proportion of young women attending tertiary education exceeds that of young men and the total fertility rate is just 2.04 (Statistics New Zealand, 1998). The UNICEF (1996a) and Demographic Health Survey (1996) found a strong relationship between women's education and fertility rates in Nepal. Women with at least secondary education have a total fertility rate of approximately three, which

is half the rate among women with no education. Thus, women's education can contribute to fertility decline or demand for children, which contributes to maternal, infant, and child health and survival.

Women's education is also related to occupation and income. This can directly influence the women's choice in the use of health care facilities and increases access to nutritional foods during pregnancy (Mosley & Chen, 1984). Women without control over economic resources have a limited ability to make independent health-choices and may suppress health-seeking behaviour for herself and her infant (WHO, 1998a). Women who live in conditions of high poverty, high unemployment, and in communities with fewer resources are exposed to higher risks of malnutrition, infection, and stress (Roberts, 1997). These factors influence maternal health during pregnancy. Often, the income of the mother will be used for household expenditure rather than for her own and her infant's health needs, which in turn may lead to low birth-weight. For instance, Roberts (1997) found that economic hardship in the community and housing costs were positively associated with the probability of low birth-weight in the United States.

In Nepal, in low socio-economic families, women's paid outside work is important to survival and this may result in the neglect of the child in the care of a less skilled sibling. On the other hand, a wealthy family may hire a skilled and attentive nursemaid. Poor and rich mothers may gain common maternal and child health benefits from contraceptive use, but feeding techniques, such as bottle or breast may produce entirely different results in

child survival during infancy between poor and rich mothers (Mosley & Chen, 1984).

The mother's time may also be required for other economically productive activities. However, the time available to the mother is an important factor for herself during pregnancy and the upbringing of healthy infants. To assess the health condition of the foetus and the mother during pregnancy, the mother has to find the time required for frequent visits to antenatal clinics, well-baby clinics, breastfeeding, preparation of foods, house cleaning, sickness care etc.

2.2.3 Residence and income

Physical accessibility to health care services also influences the proximate determinants that may produce adverse maternal and infant health. Economically well off families can move to urban areas, where health care services are more accessible. In rural areas, trained personnel and resources are often inadequate (Mosley & Chen 1984). Even if women or families recognise the danger signs during pregnancy and delivery, they may be unable to reach medical facilities in time to save the women's life due to remoteness and lack of efficient transport systems. For example, in rural china 15 % of maternal deaths occur on the way to the hospital (Maine, 1995). In Nepal, many women live in remote villages, sometimes a day's walk or longer to get the medical services required for maternal and child health. Similarly, the health services in some areas of Nepal are simply inefficient because sometimes there are no drugs and sometimes there are no health personnel available at all (The Ministry of Health, 1996b). In rural

Nepal, the majority of families have more faith in traditional healers to cure sickness as well as to relieve pregnancy complications than in modern health care delivery systems (Poudel, 1995).

2.2.4 Ethnicity

Nepal is a multi-ethnic and multi-cultural society (Shrestha & Singh, 1992). Ethnicity and race play a considerable role in maternal and infant's health. Roberts (1997) found that if socio-economic variables are controlled, maternal race and ethnicity is still the risk factor that explains the largest amount of social inequality in the risk of low birth-weight. For instance, in a study by Roberts in the United States, Hispanic mothers were 6.25 % less likely than African-American (sic) mothers to have a low birth-weight infant. Research on socio-biological factors and birth weight in Nigeria found that, maternal education, ethnicity and babies' sex were important indicators for predicting low birth-weight (Ebomoyi, Adetoro & Wickremasinghe, 1991). Further research conducted in the USA among African-Americans, Mexican-Americans, and non-Latino whites (sic) found an association between residence and ethnicity and prenatal care utilisation (Collins, Wall, & David, 1997). The study that women who lived in the wealthiest areas were likely to receive adequate antenatal care, but in each income strata, African-Americans received comparatively less antenatal care. They also found a decline in low birth weight with a rise in prenatal care only within ethnic groups, however, African-Americans had lower birth-weights overall compared to Mexican-Americans and whites.

Another study conducted in the United States by Friedman, Cohen, Mahan, Lederman, Vezina, & Dunn (1993) among women of six ethnic groups (Black-American, Haitian, West Indian, Cape Verdean, Hispanic, and other blacks(sic) found that the American black group had lower mean birth-weights and generally higher levels of risk than other black ethnic groups. Compared to the reference group of non-Hispanic whites, Americans, other blacks and West Indians had significantly elevated relative risks of low birth-weight. These findings are similar to a recent study by Fuentes-Afflick, Hessol, & Perez-Stable (1998) in the United States among singleton infants born to US-born and non-US-born African, Asian and Latino women. This study found an association between maternal birthplace and low birth-weight that varied by ethnicity. In contrast to their expectations, foreign born Asian, Black, Latin, and White women had lower rates of low birth-weight than US-born women of the same ethnic group. However, there was no significant difference in birth weight after adjusting for maternal age, education, marital status, parity, tobacco use, use of prenatal care, and gestational age.

In another study, Hawaiian infants were more than twice as likely to be of low birth-weight than Samoan born from all age groups of mothers (Kieffer, Alexander & Mor, 1995). Nepal is a multi-ethnic society, where according to UNICEF (1992) 29% babies are born with low birth-weight. However, there has been no research conducted so far on the relationship between ethnicity and low birth-weight in Nepal.

2.2.5 Culture, tradition and religion

Culture and tradition are factors that shape and modify the economic choices and health related practices of individuals (Mosley & Chen, 1984). The power relationship within the household is the most prominent tradition such that the mother has full responsibility for childcare and herself but she has little control over the allocation of resources (food and sickness care) for herself and for her infant or child (Mosley & Chen, 1984; Maine, 1995). The right of resource allocation is reserved for her husband or mother-in-law. The value placed on sons and daughters in the family is also important for their survival. In economic terms, the family's investment in their child's health care may be subject to expected returns. Marriage expectations can be a major factor in infant or child survival. For instance, in Kenya girls are valued for the bride price; therefore, the female children's survival rate is slightly higher than the males (Mosley & Chen, 1984). In contrast in South Asian countries, the female is married off to another man along with a burdensome dowry (Okojie, 1994). Okojie (1994) stressed that the female childhood mortality rate is higher than the male child mortality rate due to unequal health care investment for male and female children. Nepal also has high female-child mortality as discussed earlier which has some roots in unequal childcare investment. Girls are brought-up and married off at very young age (before reaching 20 years), which contributes to higher fertility, low birth-weight babies, ill babies, and weak mothers (UNICEF, 1996a). Thus, culture and tradition also contribute to infant, child, and maternal health and survival

Cultures and traditions are also affected by religion. For instance, in Nepal food taboos are associated with religion. Followers of the Hindu religion can not eat meat, tomatoes, onions or garlic. However, Buddhists have little or no restriction on food items. Food restrictions are discussed later in this chapter (p. 65).

2.3 Proximate determinants: Maternal factors

In the present study proximate determinants represent maternal factors realting to pregnancy outcomes. Maternal factors included in this study are reproductive health and behaviour, general health behaviour, and present obstetric status that contribute to adverse pregnancy outcomes.

2.3.1 Reproductive health and behaviour

2.3.1.1 Maternal age

Maternal age and its effect on maternal outcome

The age of the mother when she gives birth affects her chances of dying. The World Health Organisation (1998a) defined maternal risk as the probability of dying or experiencing serious injury from pregnancy and childbirth. The World Health Organisation (1998c) found higher risks in very young or adolescent pregnancies. Further, girls aged fifteen to nineteen are twice as likely to die from childbirth as women in their twenties and those under fifteen are five times as likely. Maine (1995), points out that high maternal mortality rates are often associated with very young mothers in developing countries, and might be due in part to the pelvis not being fully matured. Skeletal growth in women is not complete until approximately the

age of eighteen and the birth canal is not mature until twenty to twenty-one years of age. Furthermore, often their bodies are not sufficiently developed to carry a pregnancy to term safely and therefore the mother is exposed to the risk of pre-eclampsia and obstructed labour due to cephalo-pelvic disproportion. However, growth rates may be different according to access to nutrition (WHO, 1998b).

Adolescent fertility rates are high in many developing countries, that is about 11% of all births in each year, and contribute to an alarming population growth of 15 million births annually (WHO, 1998b). There are direct consequences for this frequency of early pregnancies; namely, more pregnancies within the lifetime and increased pregnancy-related complications which are the main cause of death for adolescent girls. The Demographic Health Survey (1996) conducted for the period of six years (from 1990 to 1996) in Nepal, showed that 19,627 girls were exposed to pregnancy before reaching the age of twenty and a 27% maternal mortality rate was reported in women under twenty.

In many developing countries, adolescent pregnancy is due to cultural tradition. The Demographic Health Survey (1996) found that 43.3% of girls in Nepal are married before reaching the age of twenty. These girls are likely to have no knowledge of sexual health, reproductive health behaviour, contraception for the prevention of unwanted pregnancy, and the health consequences of early pregnancy (UNICEF, 1996a). Early marriage and male dominated cultural practices are more prominent in the Indo-Aryan ethnic group (UNICEF, 1996a). Other ethnic groups, whose cultures are less

gender biased, are also adopting mainstream cultural practices (UNICEF, 1996a). No studies have been done in Nepal to observe ethnic group trends in maternal survival due to pregnancy related-causes.

The other groups at risk, because of age, are women older than 35 years. Older women may be exposed to various medical problems such as hypertension and diabetes that can develop due to adverse obstetric conditions during pregnancy. In a study undertaken in the United States Besinnger (1997) showed that 38% percent of mature women (over 35 years old) delivered prematurely because of the development of hypertension. Similarly, the risk of preeclampsia is three times greater in multiparous women aged higher than 35 years (Barton, Bergauer, Debbie, Coleman, Stanziano, & Sibai, (1997). Barton et al. (1997) showed that maternal age had adverse effects on both the maternal and foetal condition. Diabetes and obesity may increase the birth-weight of the foetus, as these conditions may cause alterations in the uterine environment that promote foetal growth, obscuring the relationship between birth-weight and infant health status (Jacobson & Cousins, 1989).

Maternal age and its effect on foetal outcome

Foetal health also depends on maternal age to some extent, because the maturation of reproductive health organs is dependent on age. Similarly, health seeking behaviour may be affected by mother's age during pregnancy and childbirth (Raghupathy, 1996). Kieffer et al. (1995) conducted studies among Hawaiian and Samoan mothers and found that, unmarried status and primi-parity of mother at seventeen years of age was related to a high risk of

bearing a low birth-weight baby. A study by Ebomoyi et al. (1991) found that mean birth weight increased with an increase in maternal age, however, lowered again after the age of thirty-five. Another study (Mangold, 1982) conducted in the United States, found that adolescents had lower birth-weight babies than older women. Mangold noticed a strong association between birth-weight and prematurity, where lower birth-weight was seen among adolescents' deliveries. In fact, adolescents' pregnancies were regarded as an indicator of biological prematurity. Mangold also found strong associations between low birth-weight and neonatal mortality. In addition, babies of adolescents' under sixteen, were on average 240 grams lighter than those of other older aged mothers. Mangold stressed that this might be due to a lower number of antenatal visits, as adolescents had fewer antenatal visits than the older women. However, Kramer (1987) stressed that there is still controversy regarding whether age itself is an independent determinant of intrauterine growth or gestational duration causing low birth-weight and notes there is also a close association between low birth-weight and parity, which must be controlled first while attempting to isolate the independent impact of age.

Maternal age is also associated with higher infant mortality. Children born to adolescent mothers often experience higher risks of death during the first five years of life. A recent comparative study, the Demographic Health Survey, conducted in twenty countries by the WHO (1998a) found that the risk of children dying by the age of five was 28% higher among children born to adolescents than those born to women aged 20 to 29. High infant mortality rates were found in married teen mothers in the United States

(Bennett, 1992). However, increased maternal education and utilisation of health care services during pregnancy and childhood can contribute to a decline in infant mortality rates as found in Southern Peru (De-Meer, Bergman, & Kusner, 1993).

Young adolescents (those within one or two years of menarche) who have not completed growing, are likely to have a lower ratio of weight-for-height than older women and may have a lower calorie and other nutrient intake (Kramer, 1987). Moreover, their pregnancies are often unwanted or unplanned and they are often late in seeking antenatal care. In addition, increased smoking and alcohol consumption also puts them at risk due to the stress of an unplanned and unwanted pregnancy (Kramer, 1987). After 35 years of age women's intrauterine and gestational growth begins to be impaired and there is an increased risk of low birth-weight infants (Kramer, 1987).

2.3.1.2 Antenatal care utilisation

Maternal biological links are established between infant and mother during pregnancy and childbirth. Child development starts from conception and proceeds during the germinal period that leads to the formation of a human being (Hart, 1998). During the antenatal period, the foetus is a part of the mother and lives approximately nine months in her uterus. Within this period, the foetus obtains all building materials and oxygen from the mother's blood. A healthy mother brings forth a healthy baby, because the foetal health depends upon the mother's health. The risk of morbidity and mortality are connected with childbearing in the case of women; and growth,

development, and survival in the case of foetus, infants, and children (Park & Park, 1994).

Antenatal care is the care of women during pregnancy. Ideally, it should be started soon after conception occurs and continue throughout the remainder of the pregnancy. There is a great disparity in access to maternal health care between developed and developing countries; rich and poor; urban and rural; and educated and uneducated women (WHO, 1998b). According to WHO, approximately 35% of women in developing countries still do not have the privilege of receiving antenatal care, 50% give birth without a skilled attendant, and 70% receive no postpartum care. In contrast, maternal health care is nearly universal in developed countries (WHO, 1998b).

Figure 6 provides a comparison between Nepal and other regions of antenatal and skilled attendant coverage during pregnancy. The purpose of antenatal care is to ensure favourable pregnancy outcomes. According to Nichols and Zwelling (1997), the main objectives of antenatal care are to ensure that every pregnancy goes safely and a healthy baby is delivered without impairing the health of the mother. Antenatal care is also necessary to reduce the risk of low birth-weight, and perinatal, neonatal, infant, and maternal mortality due to pregnancy complications. Some of these factors are discussed below.

Nichols & Zwelling, (1997) suggest that, prenatal care is the necessary first step in preventing the low birth-weight of infants. Low birth-weight has

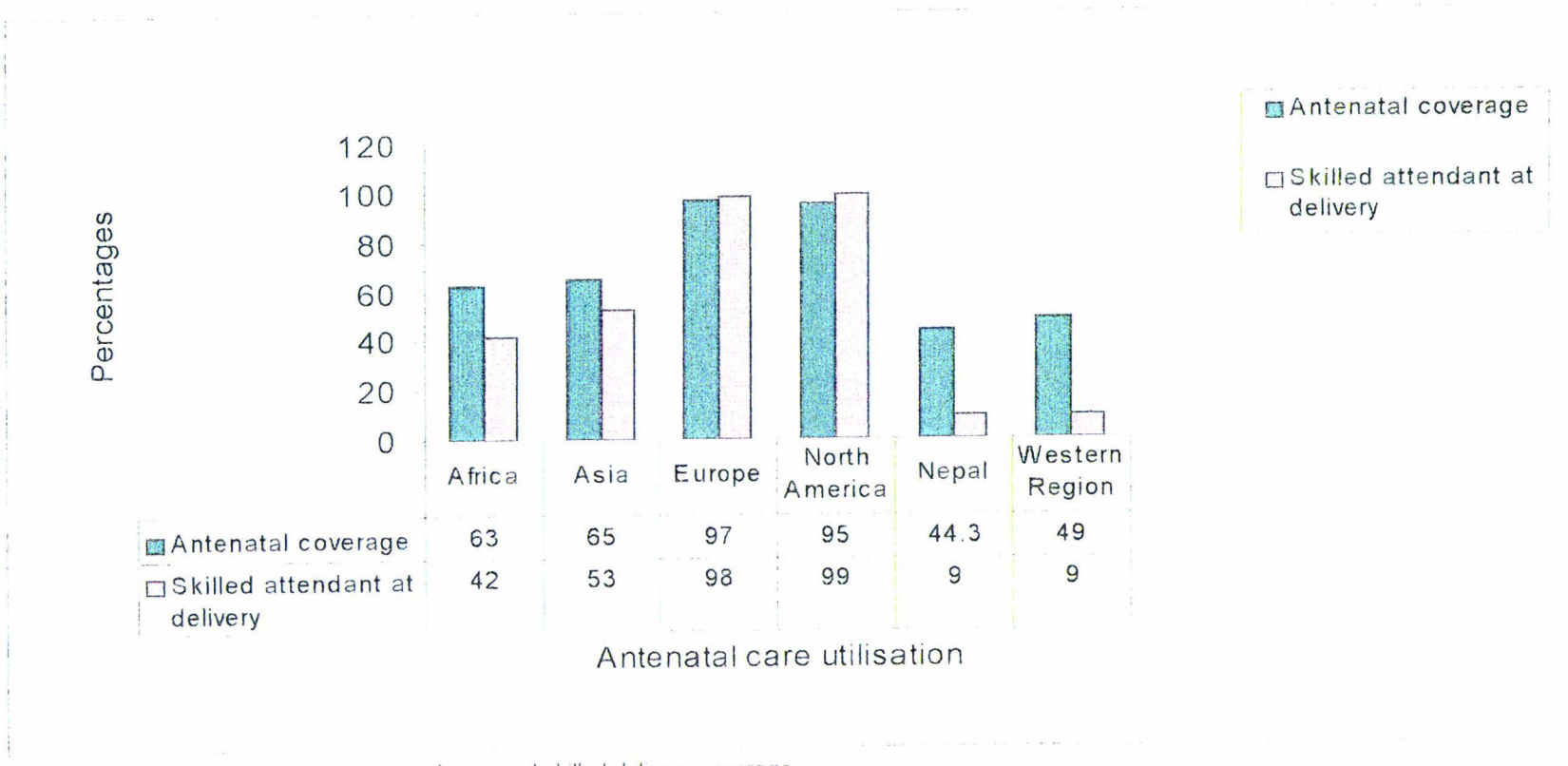


Figure: 6 Chart showing antenatal care and skilled delivery coverage
Source: WHO, 1998b; Demographic Health Survey, 1996.

its roots in the nutritional health of the mother in the pre-pregnancy stage. However, gestational weight gain can be increased through nutritional interventions such as nutritional education and counselling making women less anaemic and more resistant to infection.

Quick, Greenlick, and Roghmann, (1981) conducted studies on prenatal care and its relationship with low birth-weight among mothers from a health maintenance organisation and the general population. They categorised antenatal visits into three groups: level I (Adequate: thirteen or less visits that start within the first three months), level II (Intermediate: combination other than specified for levels I and III), and level III (Inadequate: visits start from seven months or later or no care). These categories are based on the month in which prenatal care began and the number of visits adjusted for gestational age. The authors concluded that the risk of low birth-weight was strongly related to the level of antenatal care received. The percentages of low birth-weights were 4.36, 7.25 and 11.27 at care level I, level II, and level III respectively in both the mothers from the health care maintenance organisation and the general population. The risk of high birth-weight seen among mothers who received each level of antenatal care showed that the risk could be lowered by early initiation of antenatal care. These findings are similar in developing countries. For instance, Guilkey, Popkin, and Akin, (1989) found in the Philippines, a considerable impact of prenatal care on birth-weight. Women who made four or more public, private, or traditional prenatal care visits had fewer low birth-weight and pre term births than those women who made fewer than three visits.

Prenatal care is also required for early detection and appropriate management of mothers who develop high-risk pregnancies (WHO, 1996a; Park & Park, 1994). About 75% of maternal deaths in developing countries occur due to direct obstetric causes: post-partum haemorrhage, complications of illicitly induced abortion, pregnancy-induced hypertension, pre-eclampsia, puerperal sepsis and obstetric labour including uterus rupture. Among them puerperal sepsis, pre-eclampsia, and obstructed labour including uterus rupture can be prevented by routine antenatal care (Maine, 1995). The causes of pre-eclampsia are still unknown making its prevention difficult even by good antenatal care. However, timely detection and wise management could stop complications resulting from pre-eclampsia. A well-informed mother has the knowledge and skill to seek timely antenatal help when problems arise (Benn, 1995). Therefore, well-organised health education on high-risk pregnancy may help prevent maternal and perinatal deaths.

Hall (1981) discussed the causes of perinatal death that are likely to be prevented by antenatal care. They are divided into two main categories: largely preventable and possibly preventable. Hall further stressed that birth trauma and anti-partum asphyxia will be prevented primarily by skilled care at delivery. High-risk pregnancies such as those associated with short stature are booked for confinement in appropriate settings. Most of the pre-term deaths induced by cervical incompetence can be prevented by skilled antenatal care. Placenta praevia can be detected during the antenatal period, where ultrasound scanning is available. Rhesus incompatibility can also be detected during the antenatal period by blood screening of both

parents and can be prevented by providing Anti-D immunisation (Hall, 1981). Similarly, the consequences of diabetes mellitus can also be prevented by frequent supervision during pregnancy. In this way, most high-risk pregnancies can be detected by antenatal care and preventive measures adopted to reduce the negative consequences on pregnancy outcome.

Nichols & Zwelling, (1997) also noted that, prenatal care helps to prevent neonatal and perinatal mortality. Rahabar, Momeni, Fomufod, and Westeny, (1985) in a study on prenatal care and its relationship to perinatal mortality found a higher incidence of infant mortality among black (sic) mothers who did not receive antenatal care during pregnancy. The infants' survival and non-survival rates were 72.7% and 25.2% respectively among mothers who received regular prenatal care. These figures were 23.3% and 53.2% respectively among mothers who did not receive regular antenatal care. Alexander, & Cornely, (1987) also suggested that pregnancy outcomes such as low birth-weight, prematurity, and neonatal death can be reduced by increasing the use of antenatal care. They divided mothers into high risk and low risk categories according to their health and illness status. It was found that increased utilisation of prenatal care corresponded to a decrease in prematurity and low birth-weight in each category. Similarly, low risk birth-weight mothers experienced a lower proportion of negative pregnancy outcomes than higher-risk mothers. Rishpon, Epstein, & Egoz, (1985) in a study in Haifa found that mothers who attended antenatal care regularly had a low risk of infant deaths. Thus, neonatal and perinatal deaths can be prevented by utilisation of antenatal care. In Nepal, tetanus toxoid

immunisation is also recommended for pregnant women to reduce the risk of infant mortality due to neonatal tetanus.

How many antenatal visits are required during pregnancy is based on maternal condition, quality, and the availability of antenatal services. According to Nichols & Zwelling (1997) at least thirteen visits are required in each pregnancy: each month up to twenty-eight weeks, then twice a week up to thirty-six weeks and there-after weekly until delivery. However, in developing countries, numbers of visits are lower than this standard. According to Park and Park (1994), there are about four antenatal visits during pregnancy in developing countries: the first visit before the third month, the second visit during the sixth month, the third visit during the eighth month and the fourth visit in the ninth month. However, Nepalese rural women may not perceive the necessity of antenatal care and sometimes do not receive antenatal care at all during their pregnancy (Poudel, 1995).

According to Fink, Yano, and Goya (1992) the absence or inadequacies of prenatal care are often cited as risk factors for poor pregnancy outcomes among medically high risk women including the poorly educated, those on low incomes and adolescents. Fink further stressed that some prenatal care is better than none, early prenatal care is better than late care, and adequate prenatal care is better than intermediate or inadequate care. However, the nature, value and quality of each intervention may be much more important than the number of visits or the early initiation of care says Guilkey et al. (1989). Hall (1981) stressed that antenatal care may not

achieve its maximum potential impact for several reasons. Firstly, sometimes it is often administered less to those who need it most. Secondly, doctor and midwife often miss risk factors during antenatal care. Thirdly, pregnant women may not tell of their concerns during antenatal visits because they do not want to bother the doctor or midwife who may appear very busy. Fourthly, sometimes, pregnant women do not comply with the advice of the doctor or midwife due to family circumstances. Finally, single women, those of lower socio-economic class and high parity women are more likely to appear late for antenatal care. The problems of educating and motivating high-risk women to attend regular antenatal clinic and facilitating time off work for child minding, has still not been solved (Hall, 1981). Hall also stressed that much routine antenatal care is unproductive.

There are a number of barriers that limit women's access to antenatal care. Personal factors such as age of the mother, attitudes towards pregnancy, level of education, social support, parity, ethnicity, and religion have been shown to be related to receipt of antenatal care (Benn, 1995). Second, situational factors such as road and transportation facilities, attitudes of health care providers, gender issues, and socio-cultural factors can delay decisions on health care during the antenatal period (WHO, 1998b). Gender inequality, and socio-cultural dimensions greatly limit decisions on the health care utilisation of the mother during pregnancy in developing countries including Nepal (WHO 1998b). In Nepal, the WHO (1998b) found that mothers-in-law attend most deliveries and additional care or help is sought only if the mothers-in-law or husband decides that such care is needed. Further, it was found that 75% of mothers-in-law did not

believe that an antenatal check-up was necessary during pregnancy for their daughters-in-laws.

According to Alexander and Cornely (1987) prenatal care utilisation is also based on maternal behavioural factors such as the mother's beliefs and activities relating to pregnancy and the value placed on health care. Antenatal health care has not been practised in rural parts of Nepal as a part of cultural practices (Poudel, 1995). Pregnancy is usually diagnosed symptomatically by the woman herself (UNICEF, 1996a). Nepalese women are culturally shy of discussing pregnancy with male health workers and the pregnancy becomes known to others only through visible signs (UNICEF, 1996a).

Antenatal care utilisation is also affected by financial concerns (Guilkey, et al., 1989). In rural areas, women tend to visit the public facility more often due to low cost. In contrast, urban women often visit private clinics and the number of public hospital visits is in decline. In Pokhara, Nepal, the cost per visit of a private clinic is NRs.100 compared to NRs. 5 for the public hospital, where midwives provide antenatal care and doctors are also available for antenatal examination of high-risk pregnancies. Public antenatal clinics are always busy because of the large number of rural women attending, sometimes, more than 200 women during four hours (Personal experience). Those women in Pokhara who are able to pay, prefer private clinics, because of the public perception that the quality of services in private clinics is higher (Personal experience). However, some private clinics are not well equipped and the doctors are not experienced. The choice of

private rather than public antenatal clinics may also be due to faith in doctors rather than midwives and the long waiting times in public clinics for women who are increasingly busy in the urban sector of Nepal(personal experiences).

It is clear that quality antenatal health care services are required for the survival of mother and infant. The number of antenatal visits is also important because problems may be detected in a subsequent visit if missed in a previous visit. Quality antenatal care services should be accessible, affordable and appropriate. That is, as close as possible to where women live and the lowest level facility that can provide the services safely and effectively (WHO, 1998d).

2.3.1.3 Contraceptive use

High fertility is one of the biggest problems in the developing world. In Nepal the fertility rate is 5.6 (Census, 1996; Demographic Health Survey, 1996). High fertility is contributed to by early marriage that leads to more pregnancies. It is also due to lack of family planning information and services, personal and religious beliefs, unprotected sexual relations, high preferences for sons and limited female autonomy in fertility control in developing countries (Singh & Shrestha, 1996). Carrying an unwanted pregnancy to term may result in long-term illness and emotional distress, and can constrain education or employment (WHO, 1998e). Women around the world experience 75 million unwanted pregnancies per year which can be attributed basically to two reasons: contraception was not used or the method used failed (WHO, 1998e). Thus, use of contraceptive methods can

prevention of unwanted pregnancies and foetal survival. It is also useful for birth spacing and the prevention of high-risk pregnancies.

Contraception is widely promoted in Nepal. About 98% percentage of currently married women aged 15 to 49 know at least one method of family planning but only 29% use one of these methods, as reported by the Demographic Health Survey (1996). However, natural methods of family planning are not widely accepted by Nepalese couples.

Planned pregnancy

There is a link between planned pregnancy, improved prenatal behaviour and its impact on favourable pregnancy outcomes. Generally, those who chose to become pregnant are better prepared emotionally and financially for the demands of pregnancy and childbearing (Joyce & Grossman, 1990) and may be likely to avoid smoking and alcohol and seek out early prenatal care. Further, they are more concerned with the impact of their behaviour on foetal health than women with unwanted or unintended pregnancies (Joyce & Grossman, 1990). Young adolescents have more unplanned and often unwanted pregnancies and their often late seeking antenatal care puts them at risk of low birth-weight, prematurity and perinatal mortality (Kramer, 1987). Therefore, young adolescents are more prone to unfavourable pregnancy outcomes due to unintended or unwanted pregnancy. Measures like contraceptive use and sex education need to be encouraged to control unwanted pregnancies. There are no relevant studies conducted in Nepal relating to pregnancy planning and pregnancy outcomes.

Parity and pregnancy order

According to the WHO (1998b), women having their first baby are more likely to face complications than women having their second or third babies, and thereafter the risks rise again. As women get older and have more pregnancies, age and pregnancy order have independent relationships with maternal mortality. A study in Minnesota by Hellerstedt, Pirie & Alexander (1995) found that multipara's women were likely to have less than adequate prenatal care and were slightly more likely to have low birth-weight or pre-term infants.

A strong relationship exits between birth spacing and survival (Maine, 1995). Babies born without proper spacing often do not receive good care during foetal and infant life and this affects their later health. Arkutu (1995) noted that pregnancies too close together pose a threat to the mother's health and survival, because the mother does not have time to recover from the extra physical demands made by pregnancy and lactation. Contraceptive use can prevent pregnancies too close together.

2.3.2 General health and behaviour

2.3.2.1 Nutritional health of the mother in developing countries

Women in developing countries are prone to malnutrition as early as in their childhood (UNICEF, 1996b; Rosso, 1991). Malnutrition can continue throughout their adolescence and adulthood (UNICEF, 1996b). In addition to malnutrition suffered in the past resulting in short height and low pre-

pregnancy weight, malnutrition continuing during pregnancy increases the extent of the problem.

Rosso (1991) has classified maternal under-nutrition into four categories: the underweight mother, chronic maternal malnutrition, gestational under-nutrition and the combined form. Chronic maternal malnutrition is defined by a weight-for-height equivalent of less than 90% of the standard expected in early pregnancy. This type of malnutrition is common in the low-income group of women of developing countries. Gestational under-nutrition is expressed as a total weight gain equivalent of less than 15% of standard weight, or weekly gains of less than 350 g (Rosso, 1991). The women of developing countries suffer from the combined form of both chronic and gestational under-nutrition. Studies by Rosso, (1991) conducted in Gambia, Ethiopia, and Guatemala and in European communities showed a daily calorific intake of 2,119 Kcal for pregnant women within European communities and a calorific intake of 25 to 30% lower in developing countries. Women of developing countries are considerably shorter and lighter and dietary recommendations for pregnant women are also lower in developing countries than in countries within the European Community (Rosso, 1991).

The calorific reserve in the pre-pregnancy stage is another critical factor in meeting the basic requirement for maternal and foetal growth during pregnancy. The lean women of developed countries are likely to have adequate nutritional stores to meet the basic requirements of pregnancy,

and are therefore, less at risk of an adverse pregnancy outcome (Cnattingius, Bergstrom, Lipworth & Kramer, 1998).

Malnutrition in childhood also contributes to body size. The World Health Organisation (1995) reports that the average height of mothers is 150cm in both rural and urban Nepal. Rosso (1991) found the average height of women in Thailand and The Philippines is 149 and 151cm respectively. According to the National Centre in Health Statistics of the United States, this is a 5th percentile lower than women of 18 years of age in the United States (Krasovec, 1991). In comparison, an average height of 162 to 169cm was reported in industrialised countries (Rosso, 1991). The conclusion was that the presence of malnutrition during the childhood of Asian women is one of the factors that contribute to the big height difference, more than genetic factors. Supporting research from Dhawan (1995) found a mean birth-weight of 3,196 g in the second generation of Asian mothers in the United Kingdom compared to 2,946 g in the first generation of mothers. The birth-weight increase he says reflects the poor socio-economic status, high maternal parity, and poor maternal nutrition and health of the first generation of Asian women.

The chain of malnutrition goes back generations. Malnutrition during infancy and childhood constrains the growth and development of a woman's body and bone size, which in turn affects successful pregnancy outcomes (Rosso, 1991). If the mother is undernourished during pregnancy, any extra food she may receive during pregnancy will be used to fuel her own metabolism to correct her chronic energy deficiency rather than to nourish

the foetus in her womb (UNICEF, 1996b). Similarly, when the baby is born, the malnutrition of the mother may reduce the micronutrients in her breast milk with an ultimate combined effect on survival and growth of the next generation. According to the Demographic Health Survey (1996), 50% of female children under three are malnourished and 22% are severely malnourished in Nepal.

2.3.2.2 Pre-pregnancy weight

Pre-pregnancy weight has been shown as a determinant of birth-weight and infant mortality in various studies conducted in both industrialised and developing countries (Krasovec, 1991). Krasovec notes the combination of low pre-pregnancy weight and low weight gain during pregnancy greatly increases the risk of low birth-weight, perinatal, neonatal, and infant mortality. Further, Garn (1991) stresses that the relationship between pre-pregnancy weight and pregnancy outcomes is mediated by the amount of maternal weight that a woman gains during pregnancy. The relationship between weight gain during pregnancy and birth-weight outcome differs with the status of the mother before pregnancy or in her pre-pregnancy state. Furthermore, the use of energy supplements to increase infant birth-weight of mothers with low pre-pregnancy weights is only partially successful (Garn, 1991).

The average non-pregnant weight of women varies from country to country, and within countries. According to the WHO (1983), the average pre-pregnancy weight and height for a non-pregnant woman is 55 kg and 163.7cm respectively. WHO (1983) found in the United States that the mean

weight of women eighteen years of age was 56.6 kg with a standard deviation of 7.2 kg. However, the pre-pregnancy weight and height of mothers in many developing countries is found to be lower than that suggested by WHO (Krasovec, 1991). For instance, the mean pre-pregnancy weight for Bangladeshi women is 41 kg (Krasovec, 1991). Anderson (1989) reported that 63% of women in India had a pre-pregnancy weight of less than 40 kg, whereas less than 1% of women have that pre-pregnancy weight in the United States (Krasovec, 1991). Similarly, a median weight of approximately 44 kg was found in a sample of women in Guatemala and a mean pre-pregnancy weight of 48.6 kg was recorded for Taiwanese women (Krasovec, 1991). The average pre-pregnancy weight of woman in rural Nepal is 43 kg but it is slightly higher (44.6 kg) in Urban Nepal (WHO, 1995).

Pre-pregnancy weight and outcome

Weight gain during pregnancy depends on the pre-pregnancy weight of women. Women who have a relatively low pre-pregnancy weight should gain more weight compared to women with a relatively high pre-pregnancy weight to reduce the risk of low birth-weight babies (Cogswell, Serdula, & Hungerford, 1995). Shah and Shah (1979) found that women in India who had a pre-pregnancy weight of less than 38 kg delivered infants with an average weight of 2,467 g compared to 2,595 g for women with pre-pregnancy weights 41 kg and up. Cogswell et al. (1995) found the incidence of low birth-weight consistently decreased by increasing gestational weight gained of 11.4 to 13 kg (lower guideline of weight gain during pregnancy) and 14 to 15.9 kg (upper guideline of weight gain during pregnancy) for

average weight women (55 kg). In overweight women, the incidence of low birth-weight and high birth-weight did not differ for women who gained between 6.8 to 8.6 kg and 9 to 10.9 kg respectively. However, after controlling for other factors, women who gained between 13.6 kg and 17.7 kg were approximately half as likely to be delivered of a low birth-weight infant as women who gained 6.8 to 8.6 kg (Cogswell et al., 1995). Those women who gained 18.1 kg and more were four times more likely have a high birth-weight infant than those who gained 11.3 to 17.7 kg. In the case of very overweight women the incidence of low birth-weight did not differ from the women who gained weight between 9.0 to 18 kg during pregnancy but, high birth-weight incidence was twice as likely than for those who gained weight between 6.8 to 8.6 kg during pregnancy. Thus, women who are overweight also put infants at risk of low birth-weight.

Studies in developing countries have found that short stature, low pre-pregnancy weight, and low weight-for-height ratio are often associated with poor weight gain during pregnancy (Krasovec, 1991). Krasovec concluded that, poverty is a limiting factor for under nutrition or lower food consumption both prior and during pregnancy in developing countries. This poverty consequently puts mothers at risk of producing low birth-weight babies. The majority of people in Nepal, live below the poverty line and therefore the risk of low birth-weight babies is high (UNICEF, 1996a).

2.3.2.3 Weight-gain during pregnancy

Monitoring weight gain has been the most common means of assessing the nutritional health of the mother and growth of foetus during

pregnancy (Krasovec, 1991). An adequate weight gain during pregnancy is required for maternal health and foetal growth and development. Underweight or low weight mothers during pregnancy place their infants at higher risk of low birth-weight, prematurity, low APGAR scores, and morbidity (Burroughs, 1997). Historically, in the 1940s and 1950s, it was normal to restrict weight gain during pregnancy to less than 9 kg (20 pounds) to reduce the risk of pre eclampsia (Institute of Medicine, 1997). However, the Institute of Medicine (United States) in a review of their epidemiological data on foetal death, prematurity and low birth-weight concluded that there was evidence that poor maternal weight gain was a determinant or cause of adverse outcomes (Johnson & Yancey, 1996). Currently in the United States, the Institute of Medicine recommends the normal weight gain for a pregnant mother should be between 11.5 to 16 kg (Institute of Medicine, 1997). Burroughs (1997) also accepts a weight gain of 11.4 to 15.9 kg in pregnancy for a healthy outcome. It is recommended that the pattern of weight gain during the first trimester for women be 1.4 to 1.9 kg and thereafter about 0.5 kg a week (Burroughs 1997). Further, the weight gain during the first trimester is basically growth of maternal tissues. In the second trimester, the weight gain is still primarily due to growth of maternal tissues and partly foetal tissues. Foetal growth occurs mainly in the third trimester. Burroughs (1997) states that the weight gain during pregnancy should be as shown in Figure 7.

Organs	Weight gain during pregnancy
Breasts	0.7 to 1.4 kg
Maternal Reserves	1.8 to 4.3 kg
Uterus	1.1 kg
Foetus	3.2 to 3.4 kg
Placenta	0.5 to 0.7 kg
Amniotic Fluid	0.9 kg
Extra-cellular Fluid	1.6 to 2.3 kg
Blood Volume	1.6 to 1.8 kg
Total	11.4 to 15.9 kg

Figure 7: Weight gain during pregnancy
Source: Nichols & Zwelling (1997:1083)

Monitoring weight gain during pregnancy provides a tool for the risk assessment of mother and infant during pregnancy. However, weight change is a gross tool for detecting significant increments in weight favourable to pregnancy outcomes because it does not differentiate between the weight of the mother, and foetus or the various maternal components such as maternal reserve, extra-cellular fluid, or blood volume (Krasovec, 1991).

Average weight gain during pregnancy varies from country to country. Recommendations for weight gain have most commonly been based on the average weight gains of approximately 10.9 kg for North American and British women in the 1940s to 1960s for delivering infants with a mean birth-weight of approximately 3300 g (Krasovec, 1991). The National Health Survey in the United States in 1980 showed that, 12% of women gained less

than 7 kg, 11% women gained 7.3 to 9.1 kg, 17% gained 9.5 to 11.4 kg, and 35% gained 11.8 to 15.9 kg (Krasovec, 1991). The Institute of Medicine as stated earlier, still recommends weight gain of 11.5 to 16 kg for good health and survival for the infant. Average pregnancy weight gain in developing countries is much lower than those of industrialised countries. Durnin (1987) reported average pregnancy weight gain of 11.7 kg for women in Scotland and 10.5 kg for women in The Netherlands compared to weight gains of 8.9 kg in Thailand, 8.5 kg in The Philippines and 7.3 kg in Gambia. Lechtig (1975) found an average 7.6 kg pregnancy weight gain in Taiwan. A similar study of weight gain during pregnancy conducted in India by Agarwal (1987) revealed an average weight gain of 5.7 kg in Maharastra and 6.1 kg in Gujarat. Krasovec (1989) observed 4.8 kg average weight gain during pregnancy in Bangladesh. UNICEF (1996b) points out that most women in South-Asia gain little more than 5 kg. There is no data for average weight gain during pregnancy in Nepal.

Pregnancy weight-gain and outcome

Foetal mortality rates tend to be higher when there is less or more weight gain (Cnattingius et al., 1998). The National Health Survey in the United States in 1980 showed that when factors such as birth order, age, maternal education, race, marital status, and smoking were controlled, mothers who gained less than 9.5 kg during pregnancy were 2.3 times more likely to have low birth-weight babies and 1.5 times more likely to have foetal death compared to women gaining more weight (Taffel, 1986; Krasovec, 1991). As weight gain increased to at least 11.8 kg, the difference in the risk of low birth-weight between the lowest and highest pre-pregnancy weights

disappeared (Taffel, 1980). According to a retrospective study conducted in Kansas from 1980 to 1984 among women with average pre-pregnancy weight, the lowest perinatal mortality rate was observed with pregnancy weight gain of 13.6 to 17.8 kg (Johnson & Yancey, 1996). Likewise, the lowest perinatal mortality rates were noted among women underweight at pre-pregnancy with prenatal weight gain of more than 17.8 kg.

Weight gain during pregnancy is also affected by the mother's age. Adolescents under 15 years of age are at risk of inadequate weight gain that contributes to low birth-weight (Institute of Medicine, 1997).

Ethnicity has also been shown to be related to pregnancy weight gain. For example, in America on average, black (sic) infants are smaller and born earlier than white (sic) infants and perinatal and neonatal mortality is also higher in black (sic) infants than in white (sic) infants studied in Birmingham (Goldenberg, Cliver, Mulvihill, Hickey, Hoffman, Klerman, & Johnson, 1997). However, Goldenberg et al. (1997) further stressed that, black (sic) women had lower incomes, were less likely to be married, and lacked education. These factors can all contribute to low pregnancy weight gain and intrauterine growth retardation, which in turn results into low birth-weight and pre-term babies.

The risk of pre-eclampsia is also associated with weight gain during pregnancy. Cnattingius et al. (1998) in a study in three developed countries found pre- eclampsia more common in nulliparous women than parous women and the risk of pre-eclampsia increased with increasing maternal

weight (BMI greater/ equal 27.8) for those women. In addition, the risk was higher for black (sic) and uneducated women in the United States.

The combination of both low pre-pregnancy weight and low weight gain during pregnancy places women at the greatest risk of delivering low birth-weight babies. Ebomoyi et al. (1991) in their study in Nigeria found that maternal weight during pregnancy was closely related with the birth-weight of babies. The risk for low birth-weight decreases with increased weight gain for average-weight women. There is no lowering in the risk for low birth-weight, without weight gains of 13.6 to 15.4 kg for overweight women and 6.8 to 8.6 kg for very overweight women. Risk of high birth-weight however, increases with increasing weight gain in all three groups of women (Cnattingius et al., 1998).

2.3.2.4 Maternal height

The height of the mother is another important indicator for risk assessment because it may cause pregnancy complications as well as exert an impact on the mode of delivery. The average height of women varies in different countries. A mother with less than average height is known as short stature. In obstetrics, the height of the mother is a tool for identifying prolonged labour, cephalo-pelvic disproportion (CPD), and decision making for instrumental delivery such as caesarean section. Maternal height, especially short stature is related to maternal morbidity and pregnancy complication because it is often associated with a small pelvis (WHO, 1996a). The mean height of United States women is 163.7cm (Krasovec, 1991). In many developing countries, women's height is found to be lower

than that standard (Krasovec, 1991). Dutta (1995) noted that women below 150cm in height should be considered as high-risk pregnancies. Women less than or equal to145cm are considered short stature in India (Dutta, 1995). According to antenatal visit cards at Western Regional Hospital in Nepal, heights of pregnant women of 148cm and below indicate a high-risk pregnancy.

Maternal height and outcome

A study conducted in Scotland in 1959, found a fairly steady increase in labour related difficulties and caesarean sections for disproportion due to short maternal height (Thompson, 1959, cited in Krasovec, 1991). Similarly, Harrison (1985) reported that, the youngest and shortest Nigerian pregnant women had the highest incidence of contracted pelvis associated with the increased risk of developing cephalo-pelvic disproportion (CPD). Furthermore, they were more likely to be delivered by caesarean section. In Tanzania, Everett (1975) studied maternal height and its impact on mode of delivery in 1975 and found that 90% of nulliparous women who needed caesarean sections for cephalo-pelvic disproportion had heights less than 146cm, compared to only 30% of women who had normal vaginal deliveries.

Moller & Lindmark's (1997) study in Tanzania found 54% of caesarean sections were carried out on the 4% of women whose heights were less than 150cm. He points out that the maternal height is not strongly related with the length of labour. Similarly, Kwawukume, Ghose, & Wilson (1993) in their study in Korle-Bu, Africa, found 71.1% of woman developed cephalo-pelvic disproportion. Their study concluded that short women, with heights up to

150cm, are at risk of failing to deliver through spontaneous vaginal delivery and should be referred to hospitals where labour could be monitored and caesarean section performed if necessary. Van Roosmalen & Brand (1992) found in rural Tanzania that short stature increased the need for augmentation of labour, caesarean section or vacuum extraction in primiparae. Thus, the average height and its impact on mode of delivery varies from country to country.

The height of the mother also has a direct relationship with birth-weight and infant survival. However, it is necessary to investigate whether height or the association of height and weight affects the pregnancy outcome. According to Krasovec (1991), taller women are generally heavier and have more lean body mass than shorter woman. Therefore, the effect of height on birth-weight and infant mortality may be attributed to weight, a factor known to be associated with both. Moreover, in both developed and developing countries taller women have higher birth-weight infants than shorter women (Krasovec, 1991). Kramer (1987) points out that height produces an effect on intrauterine growth retardation but not on gestational duration. In India, women who are below 145cm and above 155cm in height have the highest incidence of low birth-weight babies in low income group women (Krasovec, 1991). Similarly, a study conducted by Ebomoyi et al. (1991) in Nigeria found that birth weight was related to maternal height, where birth weight increased with the increase in maternal height.

Maternal height is also associated with the risk of perinatal and infant mortality. Chowdhury (1982) found neonatal and post neonatal mortality

rates of 36.8 and 50/1000 live births for infants of Bangladeshi women with heights less than 147cm, compared to rates of 26.6 and 29.6/1000 live births for women with heights between 147 and 150cm. Furthermore neonatal and post neonatal mortality rates of 30.4 and 38.0/1000 live births were found in women with heights greater than 150cm. However, women less or equal to 150cm in height were found to have greater perinatal mortality than among other women in two African countries, Kenya and Mozambique (Liljestrand, 1985).

2.3.2.5 Body-mass-index

Body-mass-index (BMI) is a tool to assess thinness or obesity according to body mass. BMI is defined as the weight in kilograms divided by the square of the height in meters (Adair, 1991; Cnattingius et al., 1998). Weight-for-height is also used for this purpose.and is expressed by the percentage of reference weight at a given height (Adair, 1991). Mostly, BMI is used for monitoring weight gain during pregnancy, by reference to the pre-pregnancy weight. Therefore, thinner women should gain more weight during pregnancy than heavier or average size women. Health and Welfare Canada in 1988 established recommended BMI cut-off points as follows: BMI less than 20 at risk, BMI between 20 and 25 normal, BMI between 25 to 27 over weight and BMI greater than 27 obese (Adair, 1991). However, these cut-off points should not be considered valid for lactating mothers (Adair, 1991).

Pre-pregnancy BMI lower or higher than normal is linked to unfavourable pregnancy outcomes. In a study in three developed countries, Honor (1998) and Cnattingius et al. (1998) found that if BMI was less than

normal in the pre-pregnancy state then there might be an increase in the incidence of low birth-weight and perinatal mortality. Pre-pregnant women weighing 80 to 114 kg are half as likely to have impaired growth in their small-for-gestation at birth. These women are two or three times as likely to deliver high birth-weight infants as normal weight woman. Similarly, post partum delivery is four times higher in these women than normal weight woman. Obese mothers are also exposed to the risk of pre-eclampsia, hypertension, and gestational diabetes mellitus leading to complicated pregnancy (Honor, 1998).

2.3.2.6 Food taboos and food taking shift

Food taboos or food preferences influence maternal and infant health. Dietary intake, time of intake, and food choice are affected by the cultural traditions that exist in every society (Mosley & Chen, 1984). Maternal diet during pregnancy influences the health of the mother and the infant. Similarly, patterns of breast-feeding and supplements of food are important determinants of infant survival in later life. In Nepal, food taboos and food restrictions are quite common during pregnancy, lactation, weaning, and illness (Poudel, 1995). Pregnant women in Nepal abstain from certain foods like white pumpkin, honey, fish, and yams due to a suspicion that they cause miscarriage. According to cultural beliefs, the foetus is a gift from god and miscarriage is a sin. Green leafy vegetables, milk, curd, fish, and certain pulses are restricted during the postnatal period because they are believed to harm the foetus through breast milk. Food taboos are most common practices in the Indo-Aryan ethnic groups who are usually vegetarian. Even non-vegetarians are restricted to eating beef, buffalo and pork, which are

cheaper than chicken and goat meat. Food taboos during pregnancy also exist in minority ethnic groups. However, these ethnic groups do not have any restriction on vegetables and meats like the Indo-Aryan ethnic group except in pregnancy and the postnatal period (Poudel, 1995).

In most regions of developing countries, it is common for the men to eat first, the most and the best, leaving the women and children to eat the last and the least (UNICEF, 1996b). Then mothers also feed sons the best of what is left at the expense of her own and her daughter's nutritional well being. This is one of the main reasons for the high incidence of low birth-weight in South-Asian countries (UNICEF, 1996b). Similarly, girls and women are also less well cared for by their families, partners, and societies (UNICEF, 1996b).

In Nepal, the calorific intake is often not sufficient during pregnancy because 85% people receive energy from grain products only (UNICEF, 1992). Women's workload is 14 to 16 hours per day, which is 25% more than their male counterparts and this workload remains the same during pregnancy (UNICEF, 1996a; UNICEF, 1992). Due to the lack of nutritional food, food taboos, and high workload women often suffer from low weight gain and nutritional anaemia during pregnancy.

Food production time also has been shown to affect low birth-weight. In famine areas where caloric intake was restricted to 600 to 1500 calories per day, different negative effects were observed (Johnson & Yancey, 1996). If famine occurred during the first half of pregnancy, increased rates of

prematurity, stillbirth, and nervous system anomalies were observed. When famine was experienced only during the last half of the pregnancy, there was an increased incidence of stillbirth and low birth-weight.

2.3.2.7 Smoking and alcohol behaviour

The smoking and alcohol consumption of mothers during pregnancy also affects pregnancy outcomes. The risk of smoking and alcohol consumption is higher in young adolescents than older women leading to adverse pregnancy outcomes (Kramer, 1987). A study conducted in Nova Scotia found that women under twenty had the highest rate of smoking with a tendency for a decreasing smoking rate after increasing five year age intervals (Dodds, 1995). Dodds further noted that, unmarried women were 2.1 times as likely to smoke as married women. A study of Seven, Forman, Berendes, Barry, & Isotalo, (1993) conducted in Sweden found that older women smokers (35 or above) were at risk of small-for-gestational-age births compared to the non-smoking women. Similarly, parous smoking women were at risk of low birth-weight and pre-term delivery. A further study conducted in Sweden showed that maternal smoking induces foetal hypoxia and morphological changes of the placenta, which increase the risks of intrauterine growth retardation, low birth-weight and placental abruption, which may cause late foetal death or neonatal mortality (Cnattingus & Nordstrom, 1996). However, high haemoglobin, sometimes induced falsely by increased smoking, is also associated with the risk of growth restriction, perinatal mortality and pre-term delivery (Nichols & Zwelling, 1997).

Probably alcohol is the most widely used of all human teratogenic compounds. The teratogenic effects of alcohol include central nervous system dysfunction, cranio-facial anomalies and pathologic organ and skeletal conditions. Moreover, prenatal alcohol exposure has been associated with a range of adverse reproductive outcomes, including spontaneous abortion, and prenatal and postnatal growth retardation (Clarren & Smith, 1978). Foetal alcohol syndrome is usually seen in children of women who drink heavily, but the alcohol consumption threshold at which the syndrome occurs has not yet been established (Nulman & Koren, 1994). A study conducted in Canada showed that excessive drinking resulted in an increase in the frequency of unprotected and unplanned sexual activity which subsequently may increase the likelihood of unplanned pregnancy and expose the foetus to risk (Gladstone, Levy, Nulman, & Koren, 1997). Another study conducted by Holzman, Paneth, Little, & Pinto-Martin (1995) found that premature infants of women consuming seven or more drinks per week or three or more drinks per occasion during pregnancy were at increased risk of developing isolated brain haemorrhage and white matter damage.

Studies of the relationship between level of consumption and pregnancy outcome consistently indicate lower birth weight among children born to mothers drinking more than 140 g absolute alcohol per week or about two drinks a day (Larroque, 1992). Another study conducted in the United Kingdom found reduced weight and smaller head circumference in babies born to mothers consuming more than 100 g alcohol a week in very early pregnancy (Barrison & Wright, 1984).

2.4 Present obstetric condition

2.4.1 Anaemia

The World Health Organisation defines anaemia in pregnancy as a condition when haemoglobin concentration in the peripheral blood is 11 g/100 ml or less (Dutta, 1995). Steer (1995) suggests that, the optimal range for haemoglobin concentration should be 11 to 14 g/100 ml of blood during pregnancy. Adequate iron is essential for maternal and foetal growth. Severe anaemia with haemoglobin levels of 6 to 7 g/ 100 ml blood place women at risk of high-out-put cardiac failure due to the decreased oxygen-carrying capacity of the blood (Nichols & Zwelling, 1997). In addition, chronic iron-deficiency may cause severe haemorrhage. The risk not only affects the mothers, but also the foetus. If haemoglobin is less than 10 g/100 ml of blood, the risk of low birth-weight, pre-term delivery and perinatal death is increased (Nichols & Zwelling, 1997). Approximately 60% of women in South-Asia suffer from anaemia, which rises to 75% during their pregnancy (UNICEF, 1996b). Anaemia can be treated by haematinic and folic acid supplement throughout pregnancy, if it is detected in the early antenatal period. In Nepal, anaemic women seeking antenatal care at hospital are provided with an antenatal pack, which includes folic acid, iron and calcium to correct nutritional deficiencies during pregnancy.

Iron deficiency or anaemia is a widespread and neglected problem among women and girls in Nepal (UNICEF, 1996a). However, anaemia due to nutritional deficiency is more common among pregnant women. Anaemia

and malnutrition throughout lactation reduces the micronutrients in mother's breast milk, which may retard the child's growth and development. A survey conducted by the Nutrition Support Programme of Nepal found the prevalence of anaemia was 71% in the Sindhupalchowk district and 95% in the Nawalparasi district among mothers of children from 6 to 36 months, and 68% among non-pregnant mothers of the middle hills (UNICEF, 1996a). However, studies on anaemia and its effect on pregnancy outcomes in Nepal are very limited.

2.4.2 Other obstetric conditions

Other obstetric conditions include prolonged labour, mal-presentation, multiple pregnancy, eclampsia, ante-partum haemorrhage, and post partum haemorrhage. These obstetric conditions may affect the maternal and foetal survival and constitute high-risk pregnancies that should be detected during the antenatal period for appropriate treatment. These conditions are discussed later in this chapter (p. 77).

2.5 Pregnancy outcome

Pregnancy outcome is divided into two categories, namely foetal and maternal outcomes.

2.5.1 Foetal outcome

2.5.1.1 Birth-weight

Low birth-weight can indicate that the infant was malnourished in the womb or that the mother was malnourished during her own infancy, childhood, adolescence and pregnancy (UNICEF, 1996b). Therefore, a proportion of babies born with low birth-weight reflects the nutritional status of the mother not just in pregnancy but over the whole of their childhood as well as adulthood. Another problem more common in the South Asian region is the birth-weight of the growing child. According to UNICEF (1996b), birth-weight below 2,500 g and intrauterine growth retardation have been found closely associated with poor growth, not just in infancy but also throughout childhood.

The WHO (1975) Expert committee on Maternal and Child Health endorsed the international definition of low birth-weight infants as weighing 2500 g or less at birth. WHO (1992) reported a 21% average incidence of low birth-weight babies born in Asia, compared to an average incidence of low birth-weight of less than 7% in developed countries (WHO, 1992). UNICEF (1996b) findings indicate that the proportion of low birth-weight babies in India is approximately 33% of all babies born, almost 50% in Bangladesh, and in Sub-Saharan Africa, the proportion is approximately one sixth. A high proportion of low birth-weight babies are female. A study conducted by Ebomoyi et al. (1991) in Nigeria reported that female babies' birth weight is considerably lower than male babies' birth weight. The

percentage of low birth-weight is 29% in Nepal (UNICEF, 1992), but further analysis on birth-weight and its consequences is not available.

Birth weight is closely associated with gestational age (WHO, 1975). Fuentes-Affick et al. (1998) also found that very premature birth (less than 231 days gestation) and moderately premature birth (231-258 days gestation) increased the risk of low birth-weight. Late foetal death (still birth), neonatal, post-neonatal mortality or perinatal mortality and pre-term and intrauterine growth retardation (WHO, 1995) is usually associated with low birth-weight. Further, intrauterine growth retardation implies full term (greater or equal to 37 weeks gestation) infants with birth weight less or equal to 2500 g. Thus, birth-weight is not only a reliable index of intrauterine growth but also a determinant of the probability that the infant will survive and experience normal development (Ebomoyi et al., 1991). Most infant deaths occur in the first four weeks of life due to the consequences of inadequate foetal growth. Furthermore, low birth-weight infants are five times more likely to die in the first year of life than normal birth weight infants (WHO, 1992). Those low birth-weight infants who survive the first year may experience impaired growth and development (Cogswell et al., 1995). High birth-weight infants (more than 4500 g) are more than twice as likely to die within the first 28 days of life and to have the birth trauma of being delivered by caesarean section, than are normal birth-weight infants. Furthermore, high birth-weight infants are more likely to be obese during early childhood.

2.5.1.2 Infant mortality

The infant mortality rate, which is still high in developing countries, is in decline in developed countries due to social, economical and technological development (Gortmaker & Wise, 1997). Thus in developing countries, infant mortality has been regarded as a sensitive indicator for measuring the social, health and economic wellbeing of the population in the twentieth century. Infant mortality represents the full range of reproductive mortality from the 28th week of uterine presence to the end of the first year of independent life (Hart, 1998). In that time, four components are included: stillbirth, early neonatal death, late-neonatal death and post-neonatal death (Hart, 1998).

The risk of infant death depends on various characteristics of the family and community such as maternal health, age and education, birthing practices, rearing practices, weaning practices, and birth spacing (Thapa, 1996; UNICEF, 1996a). Thus, infant mortality is a compound manifestation reflecting economical, environmental, and maternal factors, social norms and practices, and the health care facilities of the entire community. Thapa (1996) describes the differences in the infant mortality patterns between developed and developing countries. In developed countries, the major proportion of infant deaths take place during the neonatal period due to immaturity, birth injury, congenital malformation and asphyxia, where the relationship between infant death and socio-economic and environmental factors might be relatively weak. In contrast, in developing countries, the major portion of infant deaths take place throughout the post-neonatal period

and up to one year due to public health factors, leading to pneumonia, gastro-intestinal disease and poor sanitation.

Estimation of the infant mortality rate (IMR) in Nepal varies according to the data sources and the estimation techniques. According to the Demographic Health Survey (1996) the infant mortality rate is 79 per 1,000 live births, and 98 per 1,000 live births as reported by the Census (1996). Neonatal mortality is the probability of dying within the first month of life. During infancy, the risk of neonatal death in Nepal is 50 per 1,000, which is nearly twice as high as the risk of post-neonatal death, 29 per 1,000 (Demographic Health Survey, 1996). Furthermore, the under-five mortality rate in Nepal is 118 deaths per 1,000, which means one in eight children born, die before the reaching the age of five (Demographic Health Survey, 1996).

Perinatal mortality includes death late in pregnancy, during birth and within the first week of life. The perinatal period represents a biological continuum during which the causes and determinants of death are substantially the same, regardless of whether the deaths take place before, during or soon after birth, since perinatal mortality includes both foetal deaths (stillbirths) and deaths of new-borns within seven days (WHO, 1996b). Perinatal mortality has recently received global attention. According to the World Health Organisation, each year approximately eight million perinatal deaths occur throughout the world, with 98% of them taking place in developing countries (Espeut & Koblinsky, 1997). In Nepal 63 perinatal

deaths per 1,000 stillbirths and live births are reported (Demographic Health Survey, 1996).

In summary, high infant, perinatal, and neonate deaths are a product of traditional birthing practices, rearing practices, low availability of quality health services and existing adverse environmental and sanitary conditions. As a member country of the World Health Organisation, Nepal has already set a goal to reduce infant mortality by 50 per 1,000 at the end of 2002 (Western Regional Health Service Directorate, 1997).

As shown in Figure 8, perinatal, neo-natal and infant mortality rates are considerably higher in the developing world and Asia compared to developed countries. Nepal, being a part of the developing world, has comparable figures in these health indicators, especially in urban areas. However, in rural Nepal these figures are higher than other developing countries as a whole. The quality of health care services in Nepal remains inadequate even in urban areas where available resources are concentrated (National Planning Commission, 1993). Very few resources are allocated for rural health development (National Planning Commission, 1993). Reassessment of public health policy is necessary especially in obstetric, neonatal, and paediatric care.

Figure 9 shows the differences in infant, neonatal, and perinatal mortality between different climatic regions in Nepal. The region served by the Western Regional Hospital, Pokhara falls into the Hilly region where infant, neonate, and perinatal mortality are 87.4, 126.9, and 45.8 per

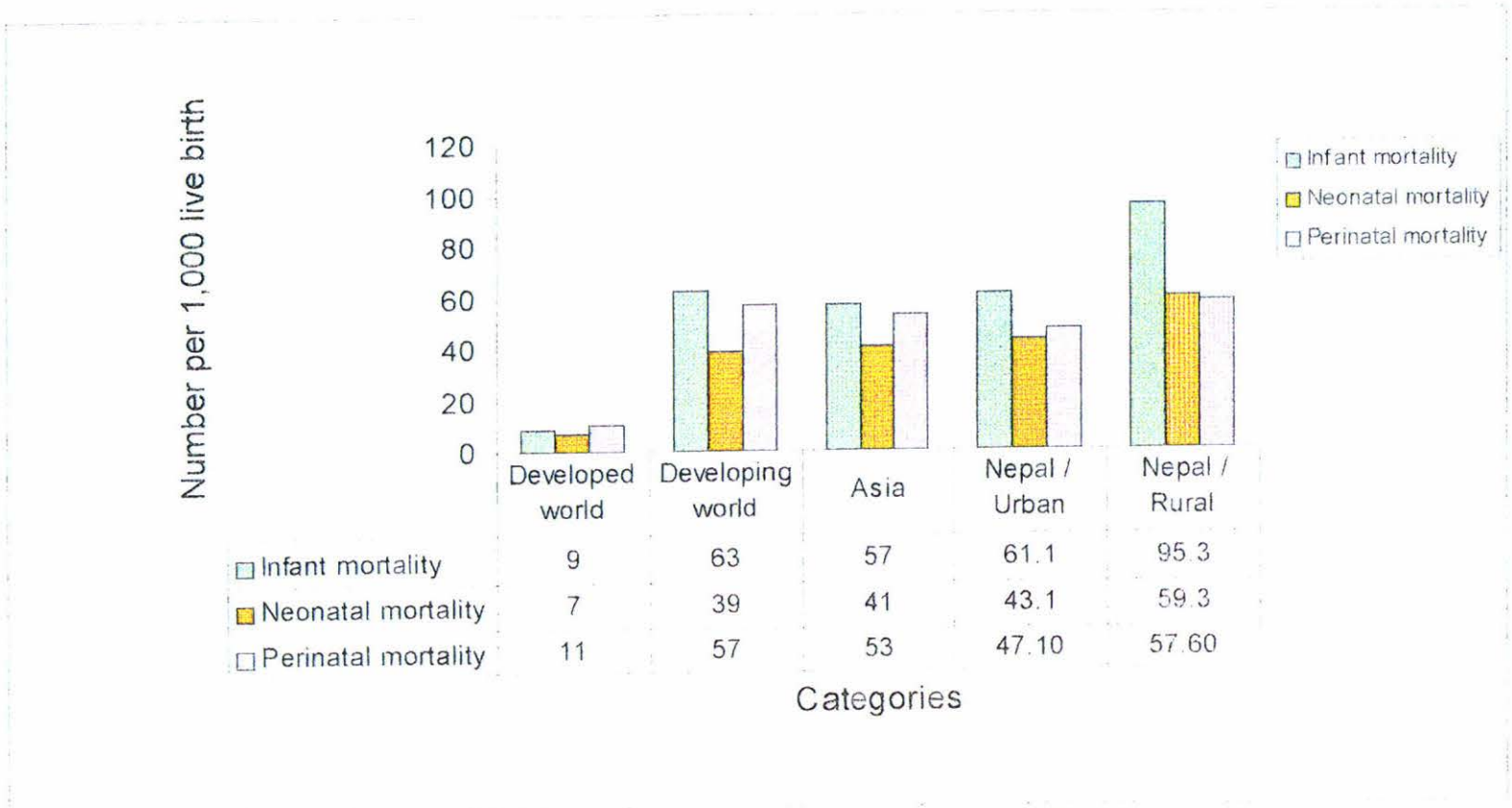


Figure: 8 Comparative chart showing infant, neonatal and perinatal mortality in 1,000 live birth
Source: WHO, 1996; Demographic Health Survey, 1996.

1,000 live births respectively. These infant and neonatal mortality rates are higher than the national average figures.

According to the above data, neonatal and infant mortality in males is higher than females. However, child mortality is higher among females than males, at 56.5 per 1,000 live births and 45.5 per 1,000 live births respectively (Demographic Health Survey, 1996). This pattern reflects some gender discrimination in child rearing practices in favour of boys, most probably in feeding and utilisation of health services.

2.5.2 Maternal outcome

2.5.2.1 Maternal mortality

In the developing world, maternal mortality accounts for the largest proportion of deaths among women of reproductive age (WHO, 1998b). Of all the health statistics monitored by the World Health Organisation, maternal mortality remains one of those with the largest discrepancy between the developed and developing countries (WHO, 1998b). The latter have maternal mortality rates eighteen times higher than the former (WHO, 1998b). The World Health Organisation, estimates that at least 1,600 women die from the complications of pregnancy and childbirth every day (Filippi, Alihonou, Mukantaganda, Graham, & Ronsmans, 1998) and a minimum of 585,000 women die every year (WHO, 1998a). According to WHO, the majority of these deaths, (almost 90%) occur in Asia and sub-Saharan Africa, around 10% in other developing regions and less than 1% in the developed region. Furthermore, between 25% and 33% of all deaths of

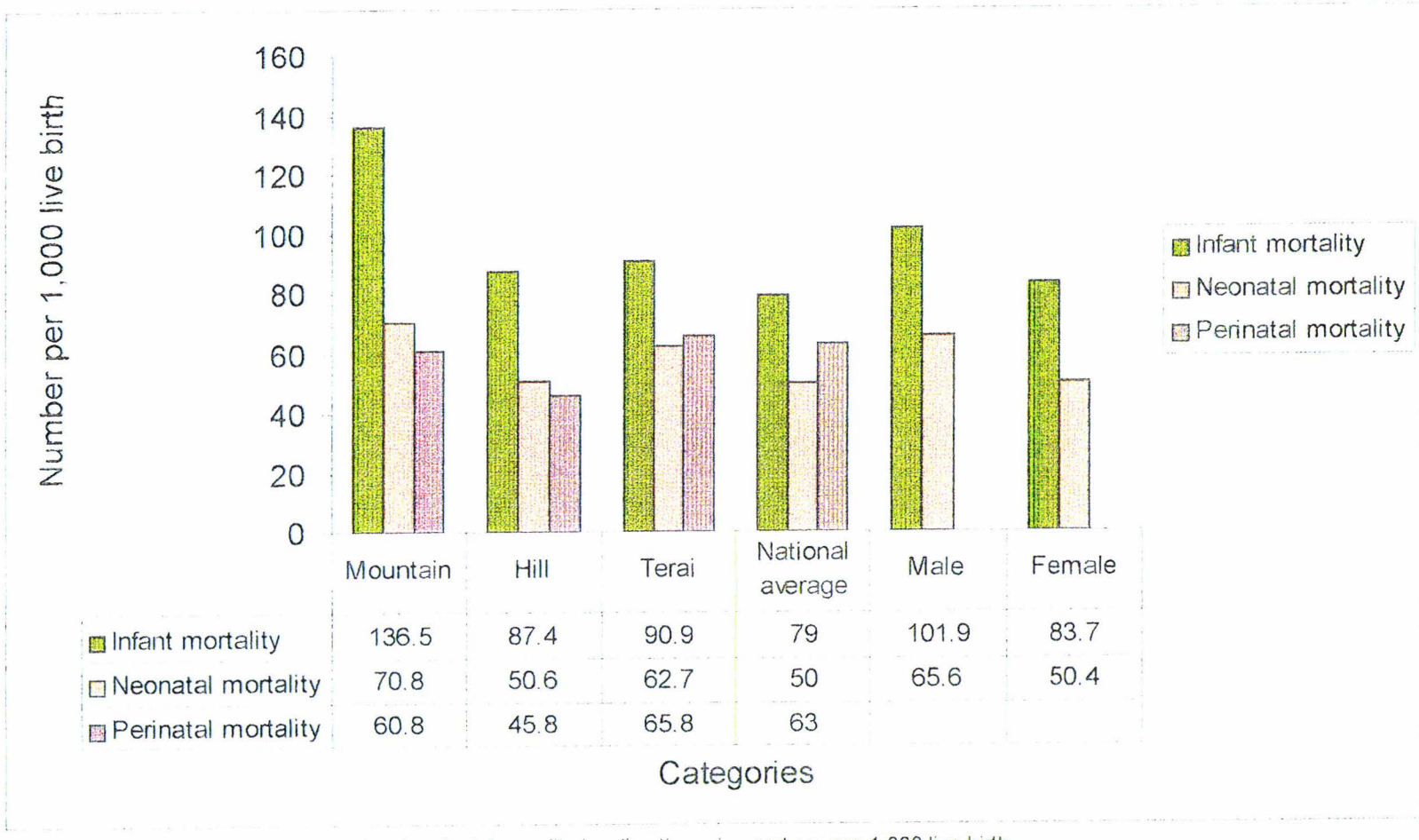


Figure: 9 Infant, neonatal and perinatal morality by climatic region and sex per 1,000 live birth.
Source: Demographic Health Survey, 1996

women of reproductive age are the result of complications of pregnancy or childbirth in developing countries. Maternal mortality ratios show the risk of dying in each pregnancy is forty times higher in developing countries than developed countries due to poor obstetric care and lack of spacing (WHO, 1998b). According to Dr. Holck (1996), maternal mortality is a sensitive indicator of inequity and offers a litmus test of the status of women, their access to healthcare and the adequacy of the health care system in responding to their needs. Thus, maternal mortality rates mirror the standards of obstetric health care provision of a country. In fact, a large percentage of maternal death and morbidity (such as uterine prolapse, urine incontinence, fistulae, and infection related to childbirth) can be prevented through appropriate obstetric and family planning services (WHO, 1989).

The high maternal mortality rate in Nepal is the product of low availability and utilisation of obstetric health services and is closely related to repeated pregnancies. In Nepal, women have a 1 in 32 chance of dying during pregnancy and childbirth (The Ministry of Health, 1996b). Each year, approximately 927,000 pregnancies takes place, of which 40% or 371,000 pregnancies are considered high risk to the mother and child (UNICEF, 1996b). The estimated maternal mortality rate is 5.15 to 13.38 per 1000 (FP & MCH Division, 1993; WHO & UNDP report, 1994; Census, 1996). According to the Family Health Survey from 1990 to 1996 the maternal mortality ratio was 539 deaths per 1000 00 · live births or 5 deaths per 1,000 live births (Demographic Health Survey, 1996). Women in Nepal are exposed to such a risk at least 5.6 times per reproductive life span on average, in contrast to less than two times for women in developed

countries (The Ministry of Health, 1996b). Maternal mortality ratios for developed and developing countries including Nepal are presented in Figure 10. Nepal's maternal mortality is considerably high 5.39/1000 compared to the average of 4.20/1000 for the developing world.

The Regional Hospital, where data collection in the present study was conducted, is situated in Pokhara. Pokhara is the Western Regional Centre of Nepal and serves a population of 4,394,950 (Western Regional Health Service Directorate, 1997) from a total population of 18.5 million in Nepal (Census, 1996). The estimated number of expected pregnancies in the Western Region is 182,386 a year, however the maternal mortality rate is only estimated, as maternal mortality figures are not currently available.

The major causes of maternal mortality are infection, hypertensive disorders of pregnancy, obstetructed labour and unsafe abortion (Christiani, 1996). About 80% of maternal deaths are caused by these conditions, which can be detected and acted upon so as to minimize the complications. The remaining 20% are caused by malaria, hepatitis tuberculosis and heart disease, which are aggravated by pregnancy (Maine, 1995; Christiani, 1996). However, the author has not found similar studies conducted in the Nepalese context so far, although high maternal mortality rates are reported. Figure 11 shows the causes of maternal mortality between developing countries and Nepal.

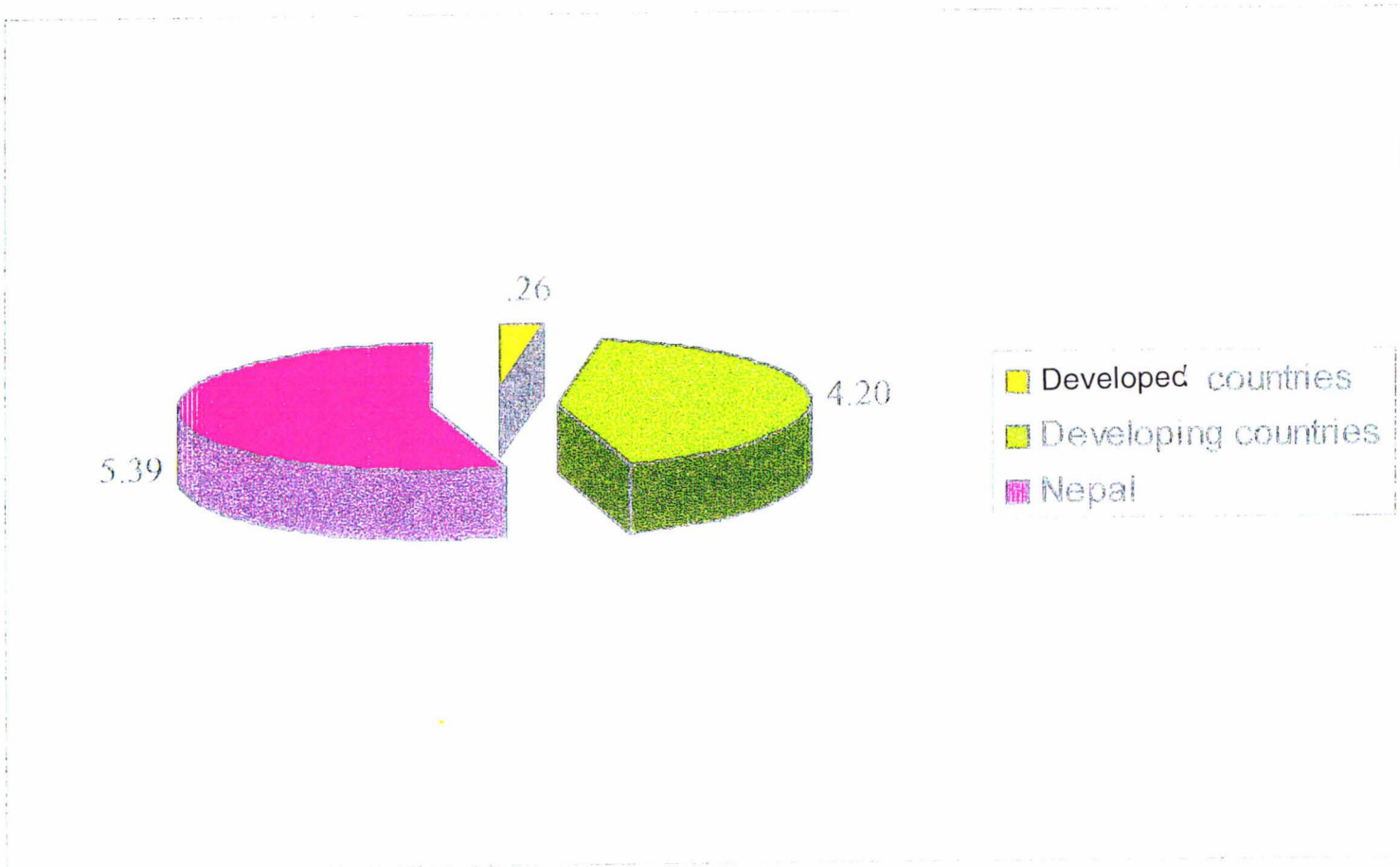


Figure: 10 Maternal mortality ratio per 1,000 live births
Source: The Ministry of Health, 1996b; Demographic Health Survey, 1996.

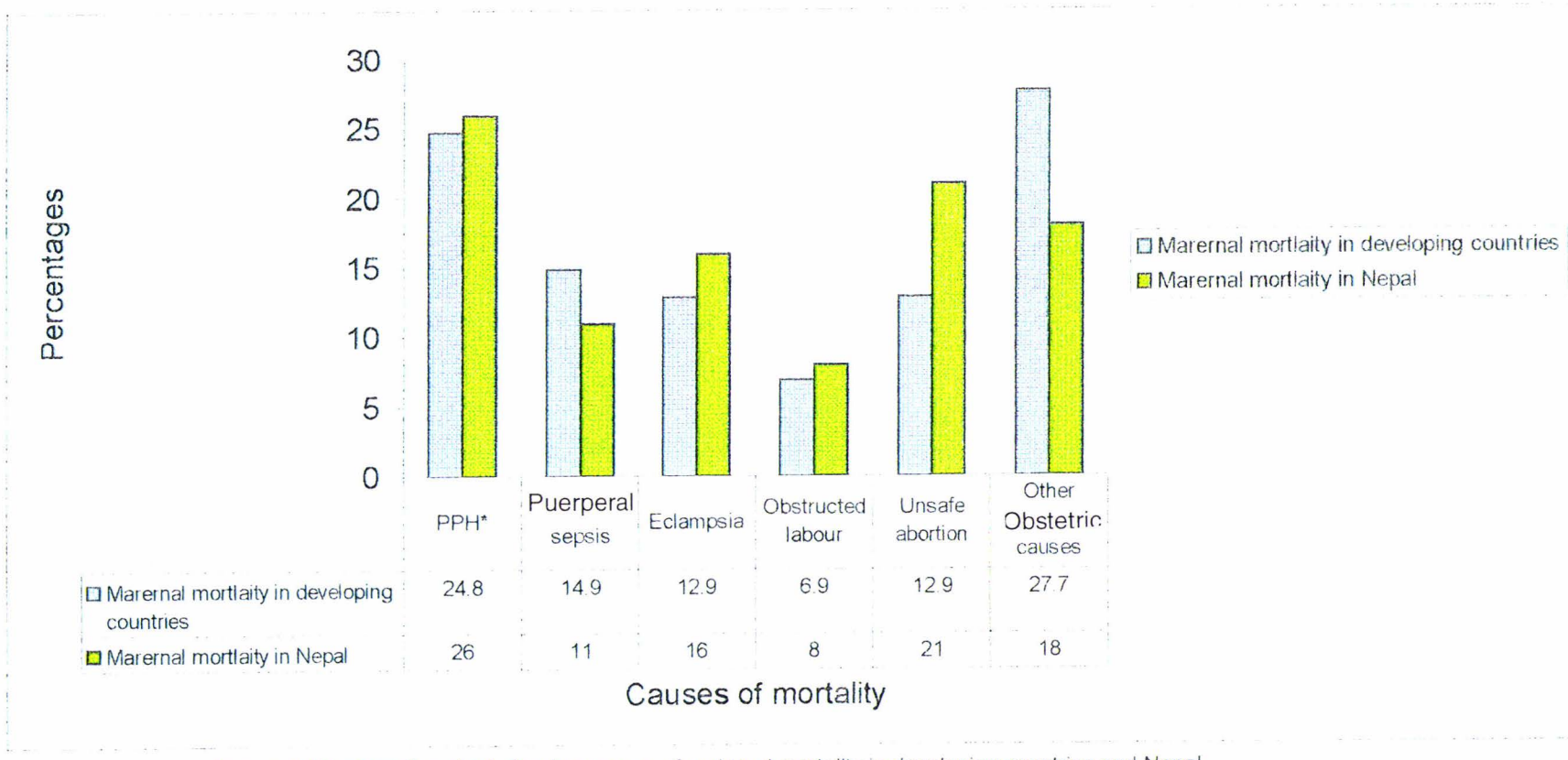


Figure: 11Comparative chart showing causes of maternal mortality in developing countries and Nepal.
Source: The Ministry of Health, 1996; Christiani, 1996.
*PPH: Post-Partum Haemorrhage

2.5.2.2 Mode of delivery

Mode of delivery includes spontaneous (naturally) or assisted deliveries (WHO, 1995). In the present study, assisted delivery includes forceps, vacuum, and caesarean section. Assisted delivery is required when labour is prolonged or obstructed.

The journey of the baby through the birth canal during labour is one of the most difficult times for both infant and woman. Women may become disabled during labour with severe anaemia, infertility, and vesico-vaginal fistula and the infant's health may be damaged by asphyxia or cerebral palsy (Kwast, 1996). Obstructed labour is the major cause of maternal and foetal morbidity and mortality in developing countries. About 11% of maternal deaths in developing countries are accounted for by obstructed labour (Maine, 1995). Obstructed labour is caused by mechanical failures, not by disturbance of the uterine physiology. The foetus fails to descend into the birth canal despite good uterine contractions and labour is obstructed when further progress is impossible (Lawson, 1967, cited in Kwast, 1996). Appropriate and skilled management in early pregnancy may prevent such situations occurring.

Length of labour also determines to a large extent whether women will be delivered naturally or will need assistance. The average duration of labour ranges from 8.6 hours for nullipara to 5.6 for multipara women. Length of labour exceeding twenty hours for nullipara and fourteen hours for multipara is treated as prolonged labour (Nichols et al., 1997).

According to WHO (1995) short maternal height is often associated with prolonged or obstructed labour due to CPD that requires assistance for delivery. Further, as discussed earlier, CPD is often associated with malnutrition during childhood (Kwast, 1996; UNICEF, 1996b; Rosso, 1991). However, Kwast (1996, p.6) pointed that "there is no screening tools that can predict which women will develop complications during labour and no single measurement can diagnose CPD during the antenatal period". In Nepal, women in rural areas do not attend antenatal care and therefore may be unaware of presentation and other high-risk conditions. Women may have suffered two to three days of labour pain before coming to the hospital (Personal experience). On the other hand, the hospital itself suffers from shortages or non availability of personnel, equipment, drugs, blood transfusions and functioning operating theatres to deal with emergencies (Kwast, 1992).

Young mothers may also suffer from prolonged or obstructed labour due to incomplete development of their pelvis and birth canal (WHO, 1998b; Kwast, 1996). Gestational age after 41 weeks may affect the length of labour and the necessity for assistance during delivery. Regan, Donnelly, McQuillan, and Stronge, (1998) in their study in the United States found that after forty-one weeks of gestation, risks of prolonged labour increased and the incidence of instrumental delivery was also high. In the present study, length of labour was used as a dependent measure of maternal outcome.

2.6 Summary

Good maternal reproductive health is a prerequisite for health of baby as well as a healthy family. Health of the mother is affected by the social, cultural,

economical and health care delivery systems. Socio-economic determinants: parental income, parental education, ethnicity, residence culture and tradition; and proximate determinants: reproductive health and behaviour, general health and behaviour; and present obstetric conditions affect health of mother and subsequently infants. The overall aim of the present study was investigate the relationship between socio-economic determinants and proximate determinants and pregnancy outcomes. The literature relevant to this aim has been reviewed.

Mosley and Chen (1984) and Maine (1995) identified the following socio-economic determinants: parental education, parental income, ethnicity, and residence among others. Relationships between socio-economic determinants and proximate determinants such as antenatal care utilisation, nutritional intake and contraceptive use are investigated in the first aim of the present research.

Socio-economic determinants are related to proximate determinants (maternal factors) which are in turn related to pregnancy and obstetric conditions that influence foetal and maternal health. Socio-economic determinants may also be independently related to pregnancy outcomes. The second aim of the present research is to investigate the relationships between socio-economic and proximate determinants and foetal outcome. These proximate determinants are reproductive and general health and behaviour, and present obstetric conditions. The third aim is to examine the relationships between socio-economic and proximate determinants and maternal outcomes.

CHAPTER THREE

METHOD

3.1 Design

Data was collected using cross-sectional survey method. Survey materials were derived from a number of areas, including previous safe motherhood, midwifery, community health, and demographic health survey research literature. The perinatal-record sheet of Western Regional Hospital, Pokhara, Nepal was also used.

3.2 Participants

Participants were obtained with the approval of the Western Regional Hospital authority. Participants were mothers admitted to the maternity ward of the Western Regional Hospital, Pokhara for delivery purposes. This hospital provides services for the Western region of Nepal. All pregnant women living in the Western region were potential subjects. Two hundred and fifty-five women, who had attended for delivery purposes were invited to participate in this study. Twenty women declined participation giving a response rate of 92%. Eighteen cases were deleted from analysis due to extensive missing data. Further, two cases were deleted from analysis due to lost data sheets. This resulted in a total participant pool of 215. A sample description is provided in the result's section (chapter four).

3.3 Procedure

The data were collected from Western Regional Hospital, Pokhara, Nepal. This hospital is one of five regional hospitals in Nepal, with 300 beds providing a wide-range of services including a separate maternity ward. The maternity ward provides obstetric services to women attending the ward directly. About fifteen to twenty five women per day are delivered in this maternity ward. The majority of mothers progressing with normal labour are delivered by second year staff nursing students and on duty nurses under the direct supervision of the delivery ward in-charge (senior staff nurse). In these cases, delivery ward in-charge makes the decisions regarding normal delivery, premature delivery, and episiotomy. The obstetrician on duty identifies complications and conducts assisted deliveries such as forceps, vacuum extractions, and caesarean sections during rounds.

Women coming to the hospital for delivery purposes during the third trimester were approached to participate in the study. Each woman was given a brief information sheet on the purpose of the study along with a consent form to ensure that she was aware of her rights and roles as a participant. Each woman was provided with the telephone number, and address of the researcher, so that they had the opportunity to ask further questions. Their rights to decline participation, refuse to answer any particular question, and withdraw from the study at any time were explained. The Information sheet and consent form are provided in Appendix two.

Anonymity and confidentiality were maintained by coding the names of participants with numbers. Access to the list linking names and code

numbers was limited to the researcher. In the survey session, women who agreed to participate were given instructions on the interview procedure and asked to provide the pregnancy outcome sheet.

The data collection proceeded in the following two ways.

- Interviews were undertaken with the mother to gather information regarding reproductive health information (contraceptive history, use of antenatal pack, previous pregnancy history, abortion and miscarriage history) and general health behaviour information (smoking, drinking, general health status) health behaviour information. In addition, social, economical, and demographic information was obtained. Time taken to complete the interview for each woman ranged from 45 to 50 minutes.
- Information concerning present obstetric history was taken from the mothers' most recent antenatal visit card. These were weight gain, blood pressure, urine test, blood test, and general health condition. Detailed information concerning first stage labour, second stage labour, and condition of the neonate (birth-weight, length, head circumference and APGAR Score) were obtained from the hospital's delivery and post-natal data sheets. Further information about third and fourth stages of delivery as well as twenty-fours hour after delivery, and before the mother was discharged from hospital were collected. Time taken to complete the outcome questionnaire for each woman ranged from 15 to 20 minutes.

Ethical approval was obtained from the Massey University Human Ethics Committee. Approval was also sought from the authority of Western Regional Hospital (WRH), Pokhara, where this study was to be conducted.

This research was conducted within the ethical framework given in the approval of Massey Ethics Committee. The questionnaires were administered at the Western Regional Hospital, Pokhara, Nepal between January 20 to March 26, 1998.

3.4 Measures

The main instrument for this study was a questionnaire (see Appendix 3). It was developed based on the investigator's personal knowledge and work experiences, and the midwifery, obstetrics, and sociology, literature. Some of the midwives and obstetric questionnaires were related to Benn's (1995) doctoral thesis. Some socio-economic questions were based on the New Zealand Census of Population and Dwelling (Statistics New Zealand, 1993). The culture and tradition of Nepalese women was considered while developing the questionnaires. The instrument contained closed and semi-closed questions.

The questionnaire sought two types of information: biographical information and pregnancy outcome information. The biographic questionnaire contained three sub sections. "Section A" included questions seeking social, economical, and demographic information; "Section B" sought information regarding general health status (including nutritional health); and "Section C" sought information on the reproductive health behaviour of the mother. The pregnancy outcome questionnaire contained questions regarding maternal and foetal outcome. Maternal factors were pre-pregnancy weight, pregnancy weight gain, height, vital signs of the mother during admission time, abdominal examination, maternal condition in

3.4.1 Social, economical, and demographic variables (Section A)

This section included social, economical, and demographic variables as determinants of the social status of the mother. In many patrilineal societies of developing countries, the husband's education reflects the household income and affects the health of his wife (mother) because of high illiteracy rates among females and the involvement of women in domestic (unpaid) activities (Mosley & Chen, 1984). Therefore, considering the husband's education, occupation, and income are important factors and were included in this section. Similarly, maternal education, occupation, and income are also important factors which increase autonomy in decision making regarding the mother and her infant's health during pregnancy and childbirth and questions relating to these factors were included in this section. Other variables such as ethnic origin, religion, and place of residence (urban/rural) were also included.

3.4.2 General health status of the mother (Section B)

In this section, questions were asked to assess the general health status of the mother. These items included the nutritional health of the mother, types of food eaten, number of times a day mother took food during pregnancy, food taboos and food taking shift (all together with family or last). These factors were considered to have an effect on the nutritional health status of the mother, which impacts on weight gain during pregnancy, body-mass-index, anaemia, and other nutritional deficiencies, which in turn affect foetal growth and development (Krasovec, 1991). Other questions included related to miscarriage prior to this pregnancy and smoking and alcohol

behaviour during pregnancy. These items were derived from New Zealand Census of Population and Dwelling (Statistics New Zealand, 1993).

3.4.3 Reproductive health behaviour (Section C)

These questions assessed the reproductive health behaviour of the mother. Relevant data were collected from antenatal visit cards, perinatal records, laboratory assessment sheets, treatment sheets, questionnaire, and observation sheets. The modified version of the existing observation sheet used at WRH in Nepal was adopted for data recording which was validated from the midwifery, obstetrics, literature and specialist subject matters (Kramer, 1987; Dutta, 1995; World Health Organisation, 1995; Burroughs, 1997). Three different types of variables were assessed to investigate mother's health and health behaviour during present, and previous obstetric periods.

- Reproductive health behaviours included prenatal care, contraceptive use, pre-pregnancy weight, weight gain during pregnancy, height, immunisation of Tetanus Toxiod and iron and folic-acid consumption.
- Present Obstetric status included vaginal bleeding, eclampsia, presentation of the foetus, anaemia, hours of labour, hypertension, placenta previae, and multiple pregnancy.
- Previous obstetric status included the history of prior pregnancies including spontaneous abortion/ miscarriages, number of pregnancies (parity), and birth interval.

3.4.5 Outcome of pregnancy

This section included questions on maternal and foetal outcomes.

3.4.5 Outcome of pregnancy

This section included questions on maternal and foetal outcomes.

3.4.5.1 Foetal outcome

Data concerning foetal outcome were gathered according to observation and perinatal sheets. Gestational age, birth-weight, length, birth abnormalities, APGAR scores (Appendix 4), stillbirth, and neonatal death were recorded. Some variables have no agreed scoring method for measuring data, however the researcher followed the definition of such variables according to the World Health Organisation (Kramer, 1987; WHO, 1995). These were low birth-weight, intrauterine growth retardation, prematurity, still birth, neonatal death, and birth abnormalities. APGAR scores were measured according to the Textbook of the Obstetrics (Dutta, 1995).

3.4.5.2 Maternal outcome

Data concerning maternal outcome such as weight gain during pregnancy, prolonged labour, foetal distress and mode of delivery were collected from the antenatal card sheet, perinatal records, treatment sheets, laboratory test sheets (urine and blood) and observation sheets. Outcome information was collected from hospital based records.

CHAPTER FOUR

RESULTS

4.1 Data Screening

Prior to the main analyses, data were screened for accuracy of entry, missing values and fit between variable distributions and assumptions of multivariate analysis.

Maternal age, father's income and length of time taken to get to hospital were positively skewed and logarithmic transformation improved their skewness. Logarithmic transformation also reduced skewness of gravida, gestational age, parity and weight of the mother during pregnancy. The variables relating to length of labour were negatively skewed, but their skewness was reduced by logarithmic transformation. Descriptive analyses of the personal interviews and outcome variables are presented by using non-transformed means and standard deviations due to ease of interpretation. Tests of significance were undertaken on transformed variables. Two cases had extensive missing data and were deleted from analysis. Thus, the remaining 215 participants were retained for analysis. Variables retained for multivariate analysis had less than five percent missing cases and satisfactorily met multivariate assumptions (Tabachnick & Fidell, 1989).

4.2 Sample description

Detailed socio-demographic and reproductive health and behaviour information for the participants are provided in Table 1.

Table 1: Summary of socioeconomic information for women delivered at Western Regional Hospital, Pokhara.

	Number of Respondents (N=215)	Percentage of Respondents
Age (years) (N=214)		
≤ 20 years	75	35.0
21 - 25	84	39.3
26 - 30	32	15.0
≥ 31	23	10.7
Marital Status (N=215)		
Married	215	100.0
Ethnicity (N=215)		
Indo-Aryan *	107	49.8
Newar	21	9.8
Tibeto-Burman**	65	30.2
Lower Caste***	22	10.2
Religion (N=215)		
Hindu	174	81.0
Buddhist	36	16.7
Others (Christian, Muslim)	5	2.3
Residence (N=215)		
Urban	111	51.6
Rural	104	48.4
Mother's Qualification (N=215)		
No school qualification	59	27.4
School qualification	122	56.8
University qualification	34	15.8
Mother's Source of Income (N=215)		
Employed	27	12.6
Self-employed	79	36.7
Unemployed	109	50.7
Monthly Income of Mother (NRs.)[a] (N=19)		
≤ 1000	6	31.6
1001 to 3000	8	42.1
> 3000	5	26.3
Husband's Qualification (N=214)		
No school qualification	14	6.5
School qualification	127	59.4
University qualification	73	34.1
Husband's Source of Income (N=214)		
Business	70	32.7
Professional	75	17.8
Labourer	38	35.0
Unemployed	31	14.5
Husband's Monthly Income (NRs.) (N=141)		
≤ 3000	37	26.2
3001 to 6000	62	44.0
> 6000	42	29.8

*Indo- Aryan (Brahmin and Chettri) **Tibeto-Burman (Gurung, Magar, Rai, Limbu and other Mongolian ethnic groups)
***Lower caste (Damai, Kami, Sarki etc) [a] NZ$ 1= (NRs.) 35

The total population of reproductive age (15 - 45 years) in western region is 957,665 (Western Regional Health Service Directorate, 1997). The age of women in the present study ranged from 15 to 44 years. The majority of subjects were between 21 to 25 years (39%), with 35% under 20 years. Only 15% of women were aged 26-30 years with the remaining 11% over 31 years of age. The mean age was 23 years (SD = 5.2). All subjects were married (100%). Single mother pregnancies are not acceptable in Nepalese society (Shrestha & Singh, 1992).

Fifty-percent of women were from the Indo-Aryan ethnic group (Brahmin and Chhetri), 30% identified themselves as Tibeto-Burman (Gurung, Magar, Rai, Limbu, and Tamang), 10% identified themselves as Newar and the balance (10%) as Lower caste (Kami, Damai, and Sarki). The majority (81%) of women delivered at hospital during this study were Hindu, seventeen percent of women delivered were Buddhist, and 2% from other religions (Christian and Muslim). Eighty-seven percent of the population in Nepal is Hindu (Census, 1996). Fifty-two percent of women in the present study were from urban areas compared to 48% from rural areas. Eighty-seven percent of people live in rural Nepal (Census, 1996). Among women included in the study 59% did not have school qualifications, 57% school qualification and 16% had university qualifications. In the western region of Nepal, 29% of women are literate, only half the rate of their male counterparts (Census, 1996). More than half the participants were unemployed (51%), while 37% were self-employed and only 12% employed. Of those employed who provided information regarding their income, forty-two percent of women earned NRs. up to 3,000, 26% earned NRs. less than 1,000, and 32% earned NRs. greater than 3,000, with a mean income of NRs. 2,500 (SD = 1800) per month. The women's

incomes were not sufficient for livelihood, (at least NRs. 3000 per month for food for four peoples) and the majority of husbands supplied resources for their day to day livelihood.

In developing countries, women and children's health and welfare correlate with their husband's income and education (Mosley & Chen, 1984). In the present study, 7% of husbands had no school qualification and 59%, and 34% had school and university qualifications respectively. Almost half of them (51%) were professionals or businessmen, 35% were labourers and 14% were unemployed. Forty-four percent of husbands earned NRs. up to 6,000, 30% earned NRs. greater than 6,000 and the remaining 30% earned NRs. up to 3,000 per month, although the mean income was NRs. 9,000, (SD = NRs. 15,500).

4.3 Analyses

The statistical packages SAS (SAS Institute Inc., 1989) and SPSS/PC (Norusis, 1988) were used to analyse data and relationships among variables. Analyses were undertaken in three stages according to the aims of this study. First, distance factors (socioeconomic determinants) and their relationships with proximate determinants were investigated. Second, the relationships between selected socioeconomic variables, proximate determinants and foetal outcome (birth weight) were assessed. Perinatal mortality was also calculated using an epidemiological formula (Park & Park, 1994). Third, the relationships between selected socioeconomic variables, proximate determinants and

maternal outcome were investigated.[3] Maternal mortality was also calculated using an epidemiological formula (Park & Park, 1994).

4.3.1 Aim one

Aim one investigated the socioeconomic determinants and their relationships with selected proximate determinants. A summary of the proximate determinants and foetal outcome information for the participants is provided in Tables 2 and 3.

Seventy-seven percent of the women were married before and up-to twenty years of age with only 23% married after the age of twenty. The mean age at marriage was 18.5 years (SD = 3.2). In Nepal, 43.3% women are married before reaching 20 years (Demographic Health Survey, 1996). Sixty-two percent of women gave birth to their first child before twenty years of age. Fifty-one percent of women included in the present study were primiparae and 49% were multiparae. Seven percent of women smoked during their pregnancy.

Pre-pregnancy weight, weight gain during pregnancy, maternal height and body-mass-index are major contributors to both maternal and child survival. The mean pre-pregnancy weight of the women in the present study was 48 kg (SD = 7.5). This is higher than the national average of 43 kg for rural women and 44.6 kg for urban women in Nepal (WHO, 1995).

---

[3] The researcher initially sought to investigate the relationship between socioeconomic and proximate determinants on mode of delivery as the outcome variable. However, due to the small number of assisted deliveries (20%), length of labour was chosen as the maternal outcome dependent variable.

Table 2: Summary of proximate determinants and outcomes.

	Number of Respondents (N=215)	Percentage of Respondents
Age at marriage (years) (N=212)		
≤ 20	164	77.4
21-25	37	17.4
> 25	11	5.2
Age at first baby (years) (N=215)		
≤ 20	128	61.8
> 20	79	38.2
Parity (N=215)		
Primiparae	106	49.3
Multiparae	109	50.7
Smoking Behaviour (N=215)		
Non smoker	201	93.5
Smoker	14	6.5
Pre-pregnancy weight (kg) (N=63)		
≤ 45	34	54.0
46 - 50	11	17.0
51 - 54	12	19.0
≥ 55	6	10.0
Pregnancy weight gain (kg) (N=53)		
≤ 5	13	24.5
6 - 10	25	47.2
> 10	15	28.3
Height (centimetres) (N=118)		
≤ 148	56	47.5
149 - 150	21	17.8
> 150	41	34.7
BMI (pre-pregnancy) (N=41)		
BMI< 20	12	29.2
20≤ BMI < 25	24	58.5
BMI ≥ 25	5	12.3
Birth-weight (N=208)		
Low birth-weight (≤2500 gm)	62	29.8
Normal birth-weight (>2500 gm)	146	70.2
Sex of baby (N=191)		
Male	100	52.4
Female	91	47.6

Table 3: Summary of proximate determinants .

	Number of Respondents (N=215)	Percentage of Respondents
Contraceptive use prior to this pregnancy(N=109)		
Yes	24	22
No	85	78
Choice of Health personnel for ANC*(N=213)		
Doctor	64	33
Nurse/midwife	11	6
Both	1 8	9
No answer	100	52
Reason for no antenatal care (N=52)		
No perceived need	46	88.5
Shy	6	11.5
Antenatal pack (N=196)		
Yes	76	39.0
No	120	61.0
Reason for not taking antenatal pack (N=66)		
Nausea/ vomiting	20	30.3
Fear of big baby and difficult birth	31	47.0
Health personnel did not advise	15	22.7
Immunisation (N=201)		
Yes	136	68.0
No	65	32.0

*ANC: antenatal care

However, only 10% of women met the pre-pregnancy weight criteria suggested by WHO (1983), which is 55 kg.

The average weight gain during pregnancy was 8.5 kg (SD = 3.8). Only 28% women met the weight gain (11.4 to 15.6 kg) prescribed by the Institute of Medicine (1997) and Burroughs, (1997). Forty-eight percent of women were of short stature (up to 148cm according to Nepal's antenatal visit card), 18% were 148 to 150cm in height and 35% were greater than 150cm tall with a mean height of 149cm (SD = 6.8). Women below 150cm in height should be considered as high-risk pregnancies (Dutta, 1995). Given this maternal height cut off point 65% of the women in the present study did not meet the criteria for safe delivery.

Only forty-one women supplied enough information from which BMI could be determined. Of these, 29% women had a body-mass index (BMI) of less than 20 making them of risk of low-birth weight and perinatal mortality according to guidelines developed by Adair (1991), Honor (1998), and Cnattingius et al. (1998). Fifty-nine percent had a BMI of between 20 and 25 and 12% had a BMI of 25 and greater. Thirty percent of the babies delivered to the women in the present study were low birth-weight. Fifty-two percent of babies delivered were male and 48% were female.

Twenty-two percent of multiparae women used contraception to space their pregnancies. Regarding antenatal care, 33% women preferred receiving care from a doctor, 9% from a nurse/ midwife, 8% from both and 52% of women failed to answer this question. Women said that their preference for the doctor was based on his/her skill and knowledge. Eighty-six percent of women did not perceive antenatal care as necessary during pregnancy without a visible health problem and 12% of women did not attend antenatal care during pregnancy due to shyness. Among women who attended antenatal care, 61% of women did not take an antenatal pack while 39% took the pack every day. Antenatal pack was not taken on a regular basis by women due to nausea/vomiting (12%) fear of having a big baby and a difficult birth (18%) or were not advised to do so by health personnel in rural clinics (9%). Sixty-eight percent received tetanus toxoid immunisation and 38% of women did not. Immunisation is recommended by the World Health Organisation, especially in developing countries for the prevention of neonatal tetanus to decrease infant mortality.

Distance or socioeconomic determinants included in this analysis were residence (urban, rural), parental education, maternal occupation, ethnicity, religion, and husband's income. These socioeconomic variables were examined in relation to proximate determinants. The proximate determinants were antenatal care utilisation, contraceptive use, and general (nutritional) health of mother during pregnancy. For the purpose of these analyses, a number of variables were collapsed into these three proximate determinants.

Antenatal care utilisation comprised; participants use of prenatal care, number of antenatal care visits, how long it took them to get to place of care, choice of health professional and where they received antenatal care. Women were scored on these variables and their scores were combined to produce a composite variable with scores ranging from 21 (best care received) to 3 (poorest care received). Women who receive regular antenatal care are also more likely to receive an antenatal pack, immunisation and have their condition regularly monitored. Thus these women received the best antenatal care.

Similarly, nutritional intake consisted of; average daily meal intake, food feeding shift (whether women ate last and least or together with family members) and food taboos during pregnancy. Women were scored on these variables and their scores were combined to produce a composite variable with scores ranging from 9 (best nutritional intake) to 3 (poorest nutritional intake). This variable also highlights the existing cultural preference towards

nutritional intake, food taboos, and gender related behaviour during feeding during pregnancy.

Contraceptive use consisted of contraceptive use prior to this pregnancy and opinions towards contraception after this pregnancy. Women were scored on these variables and their scores combined to produce a composite variable with scores ranging from 5 (best use of and positive opinions towards contraceptive use) to 1 (poorest use of and negative opinions towards contraceptive use).

T-tests were used to examine differences in group means on socioeconomic determinants (residence and religion) across dichotomous proximate determinants. In these analyses, an F test of sample variances was carried out. If the probability of $F > .05$, then it was assumed that sample variances were equal and pooled variance estimates were used. If the probability of $F < .05$, then it was assumed that sample variances were unequal and separate variance estimates were used (Snedecor & Cochran, 1980). Statistical significance was assessed using two-tailed tests. The levels of $p < .05$, $p < .01$ and $p < .001$ were used to indicate statistical significance for all tests.

4.3.1.1 Residence and its relation to proximate determinants

Means and standard deviations for antenatal care utilisation, nutritional intake, and contraceptive use across the residence of women are presented in Table 4.

Table 4: Means and standard deviations for proximate determinants across residence of women.

	Urban (N=111)		Rural (N= 104)		
Proximate Determinants	**M**	**SD**	**M**	**SD**	**t**
Antenatal care utilisation	13.15	3.21	13.17	2.30	***
	13.16	0.98	13.15	0.98	*
Nutritional intake	3.26	0.93	2.98	0.95	ns
Contraceptive use					

*p<.05, and ***p<.001.

Antenatal care utilisation t (189) = 3.94, p< .001 and nutritional intake t (191) = 2.44, p< .05, were significantly different across residence such that women who lived in rural areas received poorer levels of antenatal care and had a poorer nutritional intake. There were no significant differences in contraceptive use between urban and rural women t (141) = 1.78, p= .077.

4.3.1.2 Parental education and proximate determinants

One way-analysis of variances (ANOVA) was undertaken to evaluate differences in proximate determinants across parental qualifications (women and husbands). In addition, Bonferonnis' ranges tests (post hoc test) were undertaken for 'multiple comparisons' among group means to reduce Type I error (Dilorio & Hardy, 1996). This tests for all possible differences among the harmonic means and requires large differences between group means for significance. The means and standard deviations on proximate determinants across parental education are presented in Tables 5 and 6 respectively.

Table 5: Means and standard deviations for proximate determinants across women's qualifications.

Proximate Determinants	No School Qualifications (N=59)		School Qualifications (N=122)		University Qualifications (N=34)		
	M	SD	M	SD	M	SD	F
Antenatal care utilisation	8.00	2.86	10.16	2.95	12.63	2.26	***
Nutritional intake	6.18	0.78	6.33	1.03	6.53	1.19	ns
Contraceptive use	3.20	1.06	3.03	0.93	3.35	0.74	ns

***p<.001

Table 6: Means and standard deviations for proximate determinants across husband's qualifications.

Proximate Determinants	No School Qualifications (N=14)		School Qualification (N=127)		University Qualifications (N=73)		
	M	SD	M	SD	M	SD	F
Antenatal care utilisation	6.80	1.07	9.64	3.00	11.14	3.21	***
Nutritional intake	6.00	0.83	6.33	0.95	6.35	1.10	ns
Contraceptive use	3.00	1.41	3.11	0.98	3.19	0.82	ns

***p<.001.

Antenatal care utilisation was significantly different across women's qualifications, F (2, 190) = 26.02, p< .001. Ranges tests showed that the higher the women's education the better antenatal care received during pregnancy. There were no significant differences in nutritional intake, F (2, 192) = 1.23, p=. 29 and contraceptive use, F (2, 142) = 1.23, p= .30 across women's qualifications.

Antenatal care utilisation was significantly different across husband's qualifications, F (2, 189) = 11.95, p< .001, suggesting that husbands' education was also an important indicator for wives' health care utilisation during pregnancy. The ranges test showed women whose husbands had no qualifications received significantly poorer antenatal care than women whose

husbands had school and university qualifications. Similarly, women whose husbands had university qualifications received better antenatal care during pregnancy than women with husbands with only school qualifications. However, there were no significant differences in nutritional intake, F (2, 191) = .33, p=. 72 and contraceptive use, F (2, 141) = .172, p= .84 across husband's qualifications.

Further, one-way analysis of variances (ANOVA were undertaken to assess differences in age at marriage and age at first childbirth across women's qualifications and results are presented in Table 7.

Table 7: Means and standard deviations for age at marriage and age at childbirth across women's qualifications.

	No School Qualifications (N=59)		School Qualifications (N=122)		University Qualifications (N=34)		
	M	SD	M	SD	M	SD	F
Age at marriage	19.87	4.09	18.40	2.62	21.20	3.04	**
Age at first childbirth	19.87	3.70	19.80	2.45	22.50	2.89	***

**p<.01, ***p<.001.

Age at marriage F (2, 211) = 8.45, p< .001 and age at first childbirth F (2, 206) = 7.79, p< .001 were significantly different on both variables between those women with university qualifications and the other two groups such that more poorly educated women were younger at marriage and at the birth of their first child than those with university qualifications. There were no significant differences between school qualified women and women with no school qualifications on these two variables.

One-way analyses of variance (ANOVA) were undertaken to evaluate differences in proximate determinants across parity. Means and standard deviations and results of these analyses are presented in Tables 8 and 9.

Table 8: Means and standard deviations for parity across women's qualifications.

	No School Qualifications (N=54)		School Qualification (N=107)		University Qualifications (N=32)		
	M	SD	M	SD	M	SD	F
Parity	2.57	1.54	1.47	0.94	1.38	0.70	***

***p<.001

Table 9: Means and standard deviations for parity across husband's qualifications.

	No School Qualifications (N=14)		School Qualifications (N=127)		University Qualifications (N=73)		
	M	SD	M	SD	M	SD	F
Parity	3.00	2.20	1.66	0.10	1.66	1.20	***

***p<.001

Parity was significant across women's qualifications F (2, 208) = 21.18, $p < .001$. The ranges test showed that the university educated women had fewer pregnancies. Parity was also significant across the husbands qualifications F (2, 207) = 7.99, $p < .001$. Similarly, ranges test showed that women whose husbands had either university or school qualifications had fewer pregnancies.

4.3.1.3 Women's occupation and proximate determinants

One-way analysis of variance (ANOVA) was undertaken to evaluate differences in proximate determinants across women's occupation. Means and standard deviations and results of these analyses are presented in Table 10.

Table 10: Means and standard deviations for proximate determinants across women's occupation.

Proximate Determinants	Unemployed (N=109)		Self-employed (N=79)		Employed (N=27)		
	M	SD	M	SD	M	SD	F
Antenatal care utilisation	9.23	2.97	10.42	3.39	10.51	3.19	*
Nutritional intake	6.05	1.04	6.42	1.06	6.51	0.91	*
Contraceptive use	2.94	0.10	3.15	0.96	3.17	0.94	ns

*p< .05

Antenatal care utilisation F (2, 190) = 3.729, p<. 05, and nutritional intake F (2, 192) = 4.620, p<. 05 were significantly different across occupational groups. Ranges tests showed that, self-employed and employed women were more likely to receive better antenatal care and nutritional intake than unemployed women. However, there were no significant differences in contraceptive use across women's occupation, F (2, 141) = .753, p=. 52.

Further procedures were carried out to evaluate the relationship between parity across women's occupation and means and standard deviations are presented in Table 11. Parity was not significant, F (2, 208) = .216, p= .81 across women's employment status.

Table 11: Means and standard deviations for parity across women's occupations.

Proximate Determinants	Unemployed (N=109)		Self-employed (N=79)		Employed (N=27)		
	M	SD	M	SD	M	SD	F
Parity	1.70	1.20	1.81	1.40	1.80	0.82	ns

*p<.05

4.3.1.4 Ethnicity and proximate determinants

One-way analysis of variance (ANOVA) was undertaken to evaluate differences in proximate determinants across women's ethnic group. Means and standard deviations and results of these analyses are presented in Table 12. Antenatal care utilisation, F (3, 190) = 4.53, $p < .01$ and nutritional intake F (3, 192) = 10.96, $p < .001$ were significantly different across the ethnic groups. Ranges tests showed that the Tibeto-Burman, Indo-Aryan and Lower caste women received significantly different levels of care. The Tibeto-Burman group received better care during pregnancy. There were no significant differences between Newar women and other ethnic groups on antenatal care utilisation. Ranges tests also showed that, the Newar groups had a significantly better nutritional intake than the Indo-Aryan and Lower caste groups. There were no other significant differences between groups on this variable. Contraceptive use, F (3, 142) = .753, $p = .52$, did not differ significantly across ethnic groups.

Table 12: Means and standard deviations for proximate determinants across women's ethnicity.

Proximate Determinants	Indo-Aryan (N=107)		Tibeto-Burman (N=65)		Newar (N=21)		Lower Caste (N=22)		
	M	SD	M	SD	M	SD	M	SD	F
Antenatal care utilisation	10.42	2.98	11.10	4.14	9.60	3.11	7.89	2.27	**
Nutritional intake	6.02	0.95	6.58	0.84	6.85	0.91	6.00	0.97	***
Contraceptive use	3.19	1.03	3.25	0.71	3.12	0.86	2.81	0.91	ns

**p< 0.01, ***p< 0.001

One-way analysis of variance (ANOVA) was undertaken to evaluate differences in parity across women's ethnic group. Means and standard

deviations and results of these analyses are presented in Table 13. There was no significant difference in parity across the women's ethnicity, F (3, 207) = .269, p= .85.

Table 13: Means and standard deviations for parity across women's ethnicity.

Proximate Determinants	Indo-Aryan (N=107)		Tibeto-Burman (N=65)		Newar (N=21)		Lower Caste (N=22)		
	M	SD	M	SD	M	SD	M	SD	F
Parity	1.81	1.14	1.71	1.10	1.70	1.41	1.58	1.02	ns

*p<.05

4.3.1.5 Religion and proximate determinants

T-tests were undertaken to evaluate differences in proximate determinants across religion. Means and standard deviations are presented in Table 14.

Table 14: Means and standard deviations for proximate determinants across women's religion .

Proximate Determinants	Hindu (N=174)		Buddhist (N=36)		
	M	SD	M	SD	t
Antenatal care utilisation	9.97	3.19	10.13	3.14	ns
Nutritional intake	6.22	0.98	6.74	0.99	**
Contraceptive use	3.15	0.98	3.11	0.68	ns

**p<.01

Nutritional intake was significantly different across religion, t (186) = -2.69, p< .01, such that Buddhist women had a better nutritional intake than Hindu women during pregnancy. There were no significant differences in antenatal care utilisation, t (184) = -. 259, p=.80, and contraceptive use, t (138) = .153, p=.88 between Hindu and Buddhist women.

Means and standard deviations for parity across religion are presented in Table 15. There was no significant difference in child bearing between Hindu and Buddhist women, t (2, 201) = 1.375, p= .17.

Table 15: Means and standard deviations for parity across women's religion.

Proximate Determinants	Hindu (N=174)		Buddhist (N=36)		
	M	SD	M	SD	t
Parity	1.79	1.23	1.50	0.74	ns

*p<.05

4.3.1.6 Husband's income and proximate determinants

A further procedure was carried out to assess the relationships between husband's income and the proximate determinants. Correlations between variables were examined using simple Pearson's correlations and the results are provided in Table 16.

Table 16: Inter-correlations between husband's income and proximate determinants (N=215).

Proximate determinants	1	2	3
1. Father's income			
2. Antenatal care utilisation	.19*		
3. Nutritional intake	.08	.07	
4. Contraceptive use	-.18	.05	.16

*p< .05

Husband's income was positively correlated with antenatal care utilisation, such that, women whose husband's earned more received better antenatal care. Nutritional intake and contraceptive use were not significantly related to husband's income.

4.3.1.7 Summary

Aim one explored the relationships between socioeconomic determinants (residence, education, occupation, ethnicity, religion, and income) and proximate determinants (antenatal care utilisation, nutritional intake, and contraceptive use).

Quality of antenatal care was related to residence, parental education, women's occupation, ethnicity and father's income. Nutritional intake during pregnancy was related to residence, women's occupation, ethnicity, and religion. Contraceptive use however was not related to any of the socioeconomic determinants.

Further analyses showed that age at marriage and childbirth were related to mother's education. Parity was related to women's and husband's education but not associated with women's occupation, ethnicity, and religion.

4.3.2 Aim two

Aim two examined the relationships between selected socioeconomic determinants, proximate determinants and foetal outcome.

4.3.2.1 Bivariate relationships

Bivariate relationships between the socioeconomic, proximate determinants and foetal outcome variables prior to regression analyses are presented in Tables 17 to 23.

Birth weight was positively correlated with mother's pregnancy weight, gestational age, the length of the baby and baby's head circumference. The mother's age was positively correlated with age at marriage, age at first childbirth, mother's pregnancy weight and parity, and negatively correlated with length of labour. Age at marriage was negatively correlated with parity and positively correlated with baby's length. Age at first childbirth was positively related to the pregnancy weight of the mother. Mother's height and weight were positively correlated with each other. Taller women had significantly shorter labours than shorter women. Mother's weight, gestational age, birth weight, baby's head circumference and length were all positively correlated with each other. Parity was negatively related to length of labour. Husband's income was positively correlated with baby's length.

T-tests were used to examine the difference in group means on birth weight across dichotomous independent variables. The means and standard deviations for birth weight across residence, sex of baby and religion are presented in Table 18.

Residence, t (212.8) = 2.09, $p < .05$, and religion t (208) = -2.89, $p = .01$, were significant, such that urban women gave birth to heavier babies than rural women, and Buddhist women gave birth to heavier babies than Hindu women. Sex of baby was not related to birth weight t (188) = 1.95, $p = .52$.

Table 17: Inter-correlations between socioeconomic determinants, proximate determinants and pregnancy outcomes (N=215).

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Age of mother													
2	Age at marriage	.34***												
3	Age at first childbirth	.50**	.90**											
4	Height of mother	.11	.50	.16										
5	Weight of mother at delivery	.18*	.25	.26**	.29**									
6	Gestational age	.06	-.02	-.01	.02	.20**								
7	Parity	.58***	-.13*	-.11	.12	.02	.08							
8	Husband's income	-.07	.56	.06	-.02	-.15	.08	-.13						
9	Head circumference	-.07	.04	.09	.05	.29**	.36**	-.05	.15					
10	Length of baby	.06	.46***	.04	.07	.29**	.22**	.04	.25**	.27***				
11	Frequency of ANC care	-.22**	.21**	.21**	.31***	.25**	.01	-.31***	.22**	.21***	.14			
12	Time taken to hopsital	-.02	-.01	-.01	-.05	.00	.00	-.08	-.05	-.04	-.04	-.05		
13	Length of labour	-.26***	-.07	-.01	-.03**	-.16	.50	-.25**	.11	.01	-.03	.05	.09	
14	Birth weight	.14	.03	.03	-.07	.45***	.35**	.04	.45	.46***	.46***	.05	-.02	.04

*p<.05, **p<.01, ***p<.001

Table 18: Means and standard deviations for birth weight (kg) across residence, sex of baby and religion.

	Residence					Sex of Baby					Religion				
	Urban (N=111)		Rural (N=104)			Male (N=100)		Female (N=91)			Hindu (N=174)		Buddhist (N=36)		
	M	SD	M	SD	t	M	SD	M	SD	t	M	SD	M	SD	t
Birth Weight	2879.62	485.63	2743.44	469.49	*	2864.18	494.47	2728.09	470.44	ns	2766.62	466.91	3014.21	495.91	**

The results of t-tests conducted to assess mean differences in birth weight across food taboos, availability of farmland, and whether or not the mother had anaemia are presented in Tables 19 and 20.

Table 19: Means and standard deviations for birth weight (kg) across food taboos, availability of farmland.

	Food Taboos					Availability of Farmland				
	Yes (N=79)		No (N=136)			Yes (N=77)		No (N=138)		
	M	SD	M	SD	t	M	SD	M	SD	t
Birth Weight	2773.05	443.71	2836.46	443.71	ns	2871.53	491.08	2714.28	450.77	*

*p<.05

Table 20: Means and standard deviations for birth weight (kg) across anaemia.

	Anaemia				
	Yes (N=122)		No (N=73)		
	M	SD	M	SD	t
Birth Weight	2773.05	443.71	2836.46	443.71	*

*p<.05

Availability of farmland t (174.7) = -2.386, $p < .05$ was significant, such that those with farmland had heavier babies. There were no significant differences in birth weight across food taboos, t (174) = - .096, $p = .34$. Anaemia was significantly related to birth weight, t (201) = 2.18, $p < .05$, such that the higher the anaemia the higher the risk of having low birth-weight babies.

One-way analyses of variance (ANOVA) were carried out to evaluate differences in birth weight across ethnicity and parental qualifications. Means and standard deviations are presented in Tables 21 to 23.

Table 21: Means and standard deviations for birth weight (kg) across ethnicity.

	Indo-Aryan (N=107)		Tibeto-Burman (N=65)		Newar (N=21)		Lower Caste (N=22)		
	M	SD	M	SD	M	SD	M	SD	F
Birth weight	2683.07	455.08	3041.13	469.51	2923.81	490.31	2672.44	427.86	***

***p< .001

Table 22: Means and standard deviations for birth weight (kg) across women's qualifications.

	No School Qualifications (N=59)		School Qualifications (N=122)		University Qualifications (N=34)		
	M	SD	M	SD	M	SD	F
Birth weight	2807.06	446.16	2822.05	505.32	2713.75	466.35	ns

*p< .05

Table 23: Means and standard deviations for birth weight (kg) across husband's qualifications.

	No School Qualifications (N=14)		School Qualifications (N=127)		University Qualifications (N=73)		
	M	SD	M	SD	M	SD	F
Birth weight	2807.14	498.93	2865.09	468.75	2732.00	508.75	ns

*p< .05

There was a significant difference in birth weight across ethnicity, F (3, 214) = 9.45, p< .001. Ranges tests showed that Indo-Aryan and lower caste groups had significantly lower weight babies than Tibeto-Burman and Newar groups. There were no significant differences in birth weight across women's qualifications, F (2, 214) = .053, p= .95 and husband's qualifications, F (2, 213) = .73, p= .49.

4.3.2.2 Regression analyses

Hierarchical regression analyses were used to assess the contribution of blocks of independent variables (socioeconomic variables, and proximate determinants) to the outcome variable (dependent variable) of birth weight.

The proximate determinants were divided into three groups namely reproductive health and behaviour, general health behaviour, and obstetric status. This particular type of regression analysis was used because the researcher controls the entry of blocks of variables and is thus able to assess the proportion of variance attributable to a particular block of variables after variance due to other independent variable's (IV's) or blocks of IV's is accounted for (Tabachnick & Fidell, 1989). Residence of women, antenatal care utilisation, food taboos, husband's education, and availability of land for farming were dichotomised. Binary coding provides interpretable mean differences as regression coefficients (Jaccard, Turrisi, & Wan, 1990; Dilorio & Hardy, 1996). For the purposes of regression analyses ethnicity, religion and women's education were dummy coded. This is a process of re-categorisation where a categorical variable is turned into a set of dichotomous variables i.e. Hindu vs. others; Buddhist vs. others; Indo-Aryan (Brahmin and Chettri) vs. others; Tibeto-Burman vs. others, and Newar vs. others. Similarly, the categorical variable, women's qualifications was also turned into a set of dichotomous variables. When the set of two level variables are entered in regression, the variance due to the original categorical variable is analysed and the effects of the new dichotomous components can be examined (Tabachnick & Fidell, 1989). Tabachnick & Fidell, (1989) recommend at least a 10/90% split for dichotomous variables in regression analysis therefore some of the socioeconomic determinants, reproductive health and behaviour, and general health behaviour and obstetric status variables were excluded from this regression analysis.

Birth-weight

Hierarchical regression analysis was used to evaluate the contribution of each block of variables in explaining birth-weight. The effects of reproductive health and behaviour variables were estimated after controlling for socioeconomic variables. The effects of general health behaviours were estimated after controlling for the effects of socioeconomic and reproductive health and behaviour variables. The effects of obstetric condition were estimated after controlling for the effects of socioeconomic, reproductive health and behaviour and general health behaviour variables. The results are presented in Table 24.

The standardised beta coefficients for each variable within the blocks are reported. Total variance explained by each step of the equation is provided (R^2 and adjusted R^2), along with the added variance explained by each block of variables while controlling for previous blocks (R^2 change). R was significantly different from zero at the end of each step.

At step one, socioeconomic variables alone explained 11% of variance (adjusted R^2) in birth weight, $\underline{F}$ (11,178) = 2.970, p< .001. After step two, with the addition of the five reproductive health and behaviour variables, total variance explained in birth weight was 13% (adjusted R^2), $\underline{F}$ (16, 178) = 2.651, p< .001. The reproductive health and behaviour variables accounted for 4% unique variance in birth weight when controlling for socioeconomic variables however, the R^2 change when entering the reproductive health and behaviour variables was not significant $\underline{F}$ (5, 162)= 1.795, p= .117.

Table 24: Hierarchical multiple regression of socioeconomic determinants, reproductive health and behaviour, general health behaviour, obstetric status on birth weight showing standardised regression coefficients, R, R^2, Adjusted R^2 and R^2 change for all subjects (N= 189).

	Steps			
Predictors	**1**	**2**	**3**	**4**
Socioeconomic determinants				
Income of husband	.117	.096	.064	-.007
Women's education1	-.005	-.006	.013	.032
Women's education2	.060	.068	.095	.113
Husband's Education	-.017	-.040	-.019	.008
Residence	-.107	-.097	-.081	-.067
Religion	-.027	-.038	-.012	.024
Time taken to hospital	.071	.081	.071	.062
Ethnicity1	.129	.159*	.086	.121
Ethnicity2	.333***	.384***	.315**	.253**
Ethnicity3	.042	.094	.057	.076
Farm	.101	.075	.013	-.245
Reproductive health and behaviour		.040	-.018	-.066
Age of mother		.247	.289	.332*
Age at marriage		-.249	-.274	-.347*
Age at first childbirth		-.187*	-.095	-.037
Antenatal care		.130	.142	.142
Parity				
General health behaviour				
Weight of mother			.265***	.211***
Height of mother			-.087	-.050
Gestational age			.276***	.229***
Food taboos			-.052	-.043
Obstetric condition				
Sex of baby				-.087
Head circumference of baby				.209**
Length circumference of baby				.178**
Anaemia				-.112
R	.41**	.46**	.59***	.66***
Total R^2	.17	.21	.35	.44
Adjusted R^2	.11	.13	.26	.35
R^2 change	.17***	.04	.13***	.11 ***

*p<0.05, ** p< 0.01, ***p<0.001

After step three, with the four general health variables entered total variance explained in birth weight increased to 26% (adjusted R^2), $\underline{F}$ (20, 178) = 4.153, p< .001. The general health variables accounted for 13% unique variance in birth weight when controlling for socioeconomic and reproductive health and

behaviour variables and the R^2 change was significant $\underline{F}$ (4, 158) =. 8.260, p < .001. After step four, with the addition of the four obstetric condition variables, total variance explained in birth weight increased to 35% (adjusted R^2), $\underline{F}$ (24, 178) = 5.029, p< .001. The obstetric variables accounted for 11% unique variance in birth weight when controlling for socioeconomic, reproductive health and behaviour, and general health variables. The R^2 change after entering the obstetric variables to the equation was significant, $\underline{F}$ (4, 154) = 6.511, p< .001.

By examining the beta coefficients at each step it is possible to observe the effects of individual variables on the dependent variable within each block of variables and the extent to which the addition of subsequent steps alters these effects. With all variables in the equation (step four), only ethnicity2 was significantly related to birth weight from the first block of variables. Neither husband's income, mother's education, residence, religion, time taken to hospital or availability of farmland were related to birth-weight at any of the steps of the analyses. As noted earlier in bivariate analyses there were significant differences in birth-weight across the ethnic groups. This relationship remains significant in multivariate analysis. Residence, availability of farmland, and religion were also significant in bivariate analyses. However, it appears that relationships among socioeconomic determinants may account for these significant bivariate relationships with birth weight. It may be that ethnicity is the most important variable in relation to birth weight from the socioeconomic determinants. Parental qualification and sex of the baby were not significantly related to birth weight at either bivariate or multivariate levels.

Of the reproductive health and behaviour variables, age at marriage and age of mother at birth of first child were significant at step four, however, neither were significant at steps two and three. Tabachnick and Fidell (1989) note that when IVs (independent variables) are correlated with each other, correlations and regression coefficients can be misleading. Sometimes a large regression coefficient does not directly predict the DV, (dependent variables) but it predicts the DV well after another IV suppresses irrelevant variance.

Antenatal care was significant at step one such that those who did not receive antenatal care had lower birth weight babies. However, this relationship appears to be mediated by the inclusion of the general health behaviour variables suggesting that antenatal care is not directly related to birth weight, but is related through its effects on the mother's weight and the gestational age. Age of the mother and parity were not related to birth weight at either steps of 2, 3 or four, and not significantly related to birth weight at bivariate level.

Of the general health behaviour variables at step four, weight of the mother and gestational age were both significantly related to birth-weight such that the less the mother weighed and the lower gestational age, the lower the birth-weight. The mother's height and the presence of food taboos were not related to birth weight at either steps 3 or four. Neither of these two variables were related to birth weight in bivariate analyses.

Head circumference and length of baby were positively correlated to birth weight at step four as would be expected. The sex of the baby and the anaemia status of the women were not related to birth weight. As noted earlier in bivariate analyses there were significant relationships between head circumference and length of the baby and birth weight. Maternal anaemia status was significant in bivariate analysis. The sex of baby was not related to birth-weight in bivariate analysis.

4.3.2.3 Perinatal mortality

Perinatal mortality was expressed using an epidemiological formula (Park & Park, 1994). During the period of data collection six foetal deaths (still births and early neonate deaths) were reported. Applying Park's formula, 29 foetal deaths per 1000 live births or approximately 3% were reported, with the total live birth of 209 babies within the two month period. The neonatal mortality rate (death of babies up to one week after birth per 1000 live births) was 5 per 1000 live births reported within the two-month period. Another four babies faced risk due to aspiration pneumonia and were admitted to the paediatric ward at Western Regional Hospital. National figures in Nepal for perinatal mortality are 63 per 1000 live births per year.

4.3.2.4 Summary

The second aim explored relationships between socioeconomic determinants and proximate determinants and birth weight. Ethnicity, weight of the mother, gestational age, head circumference and length of baby were significantly related to birth weight in regression analyses. Socioeconomic factors explained the greatest variance in birth weight, followed by general

health behaviours and obstetric conditions. The addition of the reproductive health and behaviour block of variables did not add significantly to the equation.

The perinatal mortality rate per 1000 births was considerably lower than the national average however data were only available from a two-month period from this study.

4.3.3 Aim three

Aim three examined the relationship between socioeconomic and proximate determinants and maternal outcomes. Detailed maternal outcomes for participants are provided in Table 25.

Fifty-seven percent of women were anaemic. Six percent of women were affected by an adverse obstetric condition (eclampsia, placenta praevia or mal-presentation) during their pregnancy and 37% did not have any health problem. Eighty-one percent of women delivered normally including normal breech delivery, 4% were delivered by vacuum or forceps and 14% women delivered by caesarean section. Among normal deliveries, intact, episiotomy and tears of the perineal area occurred 43%, 42% and 15% women respectively. Forty-one percent of women suffered from prolonged labour. Instrumental deliveries were due to cephalo-pelvic disproportion, prolonged second stage and mal-presentation.

Table 25: Summary of the maternal outcome for women delivered at Western Regional Hospital.

	Number of Respondents (N=215)	Percentage of Respondents
Obstetric conditions (N=197)		
Anaemia	112	56.8
Other*	12	6.2
Type of delivery (N=212)		
Normal	168	79.1
Breech	5	2.2
Vacuum and Forceps	9	4.1
Caesarean section	30	14.6
Perineal condition (N=180)		
Intact	78	43.3
Episiotomy	75	41.7
Tears	27	15.0
Length of labour (N=166)		
≤ 18 hours	98	59.0
> 18 hours	68	41.0
Cause of instrumental delivery (N=39)		
Cephalo-pelvic disproportion	23	59.0
Prolonged second stage	11	28.0
Mal-presentation	5	13.0
Post-partum blood loss (N=174)		
50 to 100 mls	109	62.6
300 mls to 490 mls	57	32.8
≥ 500 mls	8	4.6
Gestational age (N=213)		
≤ 34 weeks	5	2.3
35 to 36 weeks	7	3.3
> 36 weeks	201	94.4

*other: pre-eclampsia, placenta praevia or malpresentation

Five-percent of women suffered from primary post-partum haemorrhage; 33% women lost 300 to 490 mls of blood, and 62% women lost an average amount of blood during delivery. Two percent of women faced premature delivery and 94% had delivered after 36 weeks gestational age.

4.3.3.1 Bivariate analyses

Bivariate analyses were used to assess relationships between the socioeconomic determinants and proximate determinants on maternal

outcome variables. T-tests were used to examine group differences in length of labour between urban and rural women and Hindu and Buddhist women. Means and standard deviations for length of labour for these groups are presented in Table 26.

Table 26: Means and standard deviations of length of labour (hrs.) across residence and religion.

	Residence					Religion				
	Urban (N=111)		Rural (N=104)			Hindu (N=174)		Buddhist (N=36)		
	M	SD	M	SD	t	M	SD	M	SD	t
Length of labour	17.38	14.04	27.61	25.45	**	22.14	18.23	23.68	18.91	ns

**p< 0.01

Women who lived in rural areas had significantly longer labour than urban women, t (114) = -3.14, p< .01. There was no significant difference in length of labour across religious groups, t (159)=-. 475, p= .64.

Table 27 presents relationships between father's income, nutritional health and length of labour. Length of labour was not significantly related to father's income or nutritional health.

Table 27: Inter-correlations between socioeconomic determinants, proximate determinants and pregnancy outcome.

	1	2
1. Father's income		
2. Nutritional intake	-.11	
3. Length of labour	-.00	-.00

*p<.05

One-way analyses of variance were undertaken to evaluate group differences on length of labour across ethnicity, parental qualifications and

women's occupation. Means and standard deviations are presented in Tables 28 to 31.

Table 28: Means and standard deviations for length of labour (hrs.) across ethnicity.

	Indo-Aryan (N=107)		Tibeto-Burman (N=65)		Newar (N=21)		Lower Caste (N=22)		
	M	SD	M	SD	M	SD	M	SD	f
Length of labour	22.58	20.42	20.70	12.27	24.51	25.92	21.89	22.65	ns

*p< .05

Table 29: Means and standard deviations for length of labour (hrs.) across women's qualifications.

	No School Qualifications (N=54)		School Qualifications (N=122)		University Qualifications (N=34)		
	M	SD	M	SD	M	SD	f
Length of labour	18.92	16.09	23.33	23.41	20.87	16.28	ns

*p<.05

Table 30: Means and standard deviations for length of labour (hrs.) across husband's qualifications.

	No School Qualifications (N=14)		School Qualifications (N=127)		University Qualifications (N=73)		
	M	SD	M	SD	M	SD	f
Length of labour	20.94	23.70	21.79	19.26	25.34	20.52	ns

*p<.05

Table 31: Means and standard deviations for length of labour (hrs.) across women's occupation.

	Unemployed (N=109)		Self-employed (N=79)		Employed (N=27)		
	M	SD	M	SD	M	SD	f
Length of labour	19.10	13.21	22.79	23.95	17.79	11.28	**

*p<.01

There were no significant differences in length of labour across the four ethnic groups, $\underline{F}$ (3, 165) = .27, p= .84. Additionally, neither women's qualifications or husband's qualifications were significantly related to length of labour, $\underline{F}$ (2, 155) = .35 p= .70 and $\underline{F}$ (2, 165) = .095, p= .91 respectively.

Length of labour was significantly different across women's occupations, F (2, 165) = 6.32, p< .01 such that employed women had the shortest length of labour and self-employed women the longest length of labour.

4.3.3.2 Simple regression analysis

Simple regression analysis was used to assess the contribution of independent variables (reproductive health and behaviour) to the dependent variable, length of labour. Antenatal care attendance (attended, not attended) and mode-of-delivery (natural, instrumental) were dichotomised. The results are presented in Table 32.

Table 32: Simple regression of reproductive health and behaviour, general health behaviour, on length of labour showing standardised regression coefficients, R, R^2, Adjusted R^2 and R^2 change for all subjects (N= 199).

Variables	Beta
Reproductive & general health and behaviour	
Age of mother	-.24**
Age at marriage	-.31**
Age at first childbirth	.31
Height of mother	-.10
Weight of mother	-.11
Mode of delivery	-.15*
Parity	-.02
Gestational age	.17**
Antenatal care	.12
R	.37
Total R^2	.13***
Adjusted R^2	.10

*p<0.05, ** p< 0.01, ***p<0.001

The standardised beta coefficients for the independent variables are reported. Total variance explained by the independent variables is provided by R^2 and adjusted R^2. R was significantly different from zero. The maternal factors (reproductive health and behaviour) explained 10% variance

(adjusted R^2) in length of labour $\underline{F}$ (9, 208) = 3.39, p< .001. The effect of individual variables on the dependent variable is explained by the beta coefficients of each independent variable observed. The age of the mother, age at marriage, mode of delivery (normal or instrumental) and gestational age were significantly related to the length of labour. Younger mothers experienced longer labour as did mothers who married younger. Women who had normal deliveries had shorter labours than those who had instrumental deliveries. The longer the gestational age the longer the length of labour. Age at childbirth, height and weight of mother, parity and antenatal care were not significantly related to length of labour in regression analyses. As noted earlier maternal height and parity were significantly related to length of labour bivariately (see p.113), however with the inclusion of other variables in the regression analyses effects of these factors appear to be mediated.

4.3.3.3 Maternal mortality

Maternal mortality was expressed using an epidemiological formula (total number of female deaths due to complications of childbirth or within 42 days of delivery from puerperal causes in an area during a given year per 1,000 live births) (Park & Park, 1994). During the period of data collection three maternal deaths were reported. According to this formula 14.15 deaths/1000 live births or approximately 1.4% were reported from a total of 209 live births within the two-month study period. National figures for maternal mortality are 5.15 per 1000 live births for a given year. The figures from the present study at the Western Regional Hospital are considerably

higher than the national average figures and may be due to the short time frame and the small sample size.

4.3.3.4 Summary

Aim three examined the relationships between socioeconomic determinants and proximate determinants and length of labour. Mode of delivery (natural or instrumental), gestational age, mother's age, and age at marriage were significantly related to length of labour. However, parity (fertility) and use of antenatal care, were not related to the length of labour. As noted earlier in bivariate relationships women's residence and women's occupation were significantly associated with length of the labour. However, other socioeconomic variables (parental education, ethnicity, feeding behaviour and religion) were not related to length of labour.

Maternal mortality of 14.15 per 1000 live births was found with the 209 babies born. This is a higher rate of maternal morality reported in this study at the Western Regional Hospital, than the national average.

CHAPTER FIVE

DISCUSSION

The present research examined the links between socioeconomic determinants (residence, education, occupation, ethnicity, religion and income), proximate determinants (reproductive health and behaviour, general health behaviour and obstetric status), and pregnancy outcome (foetal and maternal outcome) for women delivered at Western Regional Hospital of Nepal. Relationships between variables were investigated within the framework of maternal mortality and child survival models (Mosley & Chen, 1984; Maine, 1995). Findings are briefly summarised and then discussed in relation to previous findings and research. General limitations of the study, implications for future research and conclusions are presented.

5.1 Aim one: Summary of findings

The relationships between socioeconomic determinants and the proximate determinants were explored in aim one. For this purpose, six major socioeconomic determinant variables were investigated: residence, education, occupation, ethnicity, religion and income. The reproductive health and behaviour, and general health behaviour variables of women were collapsed into three proximate determinants: antenatal care utilisation,

nutritional intake and contraceptive use. These factors are identified in the maternal mortality and child survival models proposed by Mosley & Chen, (1984) and Maine, (1995).

The major focus of aim one was to explore the relationship between socioeconomic factors and utilisation of antenatal care, nutritional status during pregnancy, and utilisation of contraceptives for birth spacing in the Nepalese context, as these factors may influence child and maternal outcomes. Ethnicity was introduced to the modified model (see p.23) considering the multi-ethnic nature of Nepalese society, which largely determines the social class of women and the discrepancy between rich and poor. These factors reflect on low birth-weight as well as infant and maternal survival (WHO, 1998b; Gortmarker & Wise, 1997; Roberts, 1997; Krasovec, 1991). Similarly, religion was introduced to the modified model because of various food taboos and cultural practices attributed to religion that may affect the nutritional intake of women (Mosley & Chen, 1984).

The findings showed that quality antenatal care was more likely to be received by women living in urban areas, by women from Tibeto-Burman ethnic groups, by those women with higher qualifications and employment, and by those women whose husbands had higher qualifications and higher income. The findings of this study are consistent with previous research in several countries, which has found that antenatal care utilisation varies by

women's place of residence (urban vs. rural), ethnicity and income (Collins et al., 1997; Mosley & Chen, 1984; Maine, 1995; The Ministry of Health, 1996b). For instance Guilkey et al. (1989) found that financial circumstances affected women's utilisation of adequate antenatal care, choice of place of care, and the choice of health professional who provided that care. Mosley & Chen (1984) note that these financial circumstances are directly related to the husband's income.

Maternal education influences the use of relevant health services (Raghupathy, 1996). Education is shown to enhance female autonomy and decision making ability in relation to health care utilisation during pregnancy. The poorly educated are often cited as being at high risk due to the absence or inadequacies of prenatal care (Fink, et al., 1992). Poorly educated women were younger at marriage and at the birth of their first child in the present study. Young women in developing countries have little or no autonomy and usually no education on reproduction, sexual health, and contraception use, which can subsequently lead to early pregnancy and more children within their lifetime (Demographic Health Survey, 1996).

In the present study parity was related to the level of qualifications of women and their husbands. This was comparable to previous findings from the Demographic Health Survey (1996), which found a reduction (from six to three) in number of children born for women with at least secondary

school qualifications. This may be because educated people perceive the hardship of life with more children and are aware of contraceptive methods to prevent unwanted pregnancies. However, in the present study, parity was not related to women's occupation, ethnicity or religion. Parity and women's occupation may be related to each other because unwanted pregnancy can constrain employment (WHO, 1998e). The lack of significant findings relating to parity may be due to the relatively restricted range of mother's age in the present study as most were less than 30 years old. This has implications for the number of children produced. For instance, in the present study the mean number of children was 1.75 compared to the national average of 5.6. In addition, approximately 50% of the sample were urban compared to 15% in the general population and fertility rates are higher for rural women. This may also partly explain the lack of significant relationships between parity and ethnicity and religion.

In the present modified research model (see p.23), the nutritional intake of women during pregnancy was assumed to be related to residence, parental education, husband's income, ethnicity, women's occupation and religion. The results showed that better nutritional intake during pregnancy was more likely for women who lived in urban areas and for those women who were employed. This finding is consistent with Robert's (1997) findings that, high poverty, and unemployment exposed women to higher risks of malnutrition, infection and stress during pregnancy. Women from the Tibeto-

Burman ethnic group also received better nutritional intake than other ethnic groups, as did Buddhist women compared to Hindu women. Lower caste women may have poor nutritional intake due to low income and low social class level, however Indo-Aryan women may have poorer nutritional intake due to religious practices including food taboos and gender related attitudes during feeding as discussed in chapter two (UNICEF, 1996b; Poudel, 1995). Similarly, Buddhist women may have better nutritional intake because of fewer food taboos then their Hindu counterparts.

The present study found no evidence for the relationship between nutritional intake and husband's income as suggested by Mosley & Chen (1984). This may be because Nepal is largely a society based on the extended family and the husband's income generally goes to run the household. In addition the employed are significantly underpaid suggesting generally low incomes overall. Furthermore, even educated married women have limited autonomy and are influenced by cultural expectations to become housewives rather than undertake paid employment (Personal experiences). Therefore women have limited control over household resources and subsequently have limited ability to improve their nutritional intake regardless of husband's income.

Contraceptive use was not related to any of the socioeconomic determinants. This may be due to the limited number of women (22%) using

contraception before this pregnancy. This question, however, was only asked of multiparae women because contraceptive use is not common for primiparae in Nepal (Personal experiences). The Demographic Health Survey (1996), found 98% of women in Nepal were familiar with at least one contraceptive method but only 29% of women used them. This finding suggests that despite extensive knowledge, the majority still don't utilise contraceptive methods.

5.2 Aim two: Summary of findings

The second aim explored the relationships between socio-economic determinants and proximate determinants and foetal outcome (birth weight and perinatal mortality). The findings of the present study showed that ethnicity, maternal weight, gestational age, head circumference, and length of baby were related to birth weight in multivariate analysis. Socioeconomic factors explained the greatest amount of variance in birth weight, followed by general health behaviour and obstetric condition. Reproductive health and behaviour variables were not directly related to birth weight. The perinatal mortality rate per 1000 births was considerably lower than the national average, however data wereonly available from a two-month study period.

The finding that ethnicity was related to the birth weight of the baby is consistent with a number of previous studies on ethnicity and birth weight (Friedman et al., 1993; Fuentes-Afflick et al., 1998; Kieffer et al., 1995;

Roberts, 1997; Ebomoyi, et al.,1991). The women from the Tibeto-Burman ethnic group had higher birth weight babies. This ethnic group living in and around Pokhara valley is wealthier than other ethnic groups and have relatively easy access to health care facilities, which may account for the better outcome.

Weight of the mother during pregnancy was associated with the baby's birth-weight such that lower weight women had smaller babies. This finding is similar to previous research in developed and developing countries on maternal nutrition and its relation to babies' birth weight (Krasovec, 1991; Cnattingius et al., 1998; Dhawan, 1995; Cogswell et al., 1995; WHO; 1995). The majority of the women in the present study, gained less than the ideal weight during their pregnancy and their pre-pregnancy weight was also less than that prescribed by the guidelines of the Institute of Medicine (1997), Burroughs (1997), and WHO (1983). Nutritional intervention directed to women of reproductive age may lower the risk of low birth-weight in the Nepalese context.

Birth-weight increased with gestational age in the present study. This finding was consistent with previous research by WHO (1975) and Fuentes-Affick et al. (1998). Previous research has investigated the link between intrauterine growth retardation and prematurity related to birth weight (WHO, 1995), however, this relationship was not investigated in the present study.

Head circumference and length of baby were also associated with birth-weight as expected.

Income and qualifications have been shown previously to be related to birth-weight, as determinants of child survival, in previous research (Collins et al., 1998; Roberts, 1997; Raghupathy, 1996; Kalipeni, 1993; Ebomoyi, et al. 1991). The present research does not support previous findings and as stated earlier, it may be because educated employees are underpaid, reducing the overall variability of income within the population and within the present sample.

Residence and availability of farmland were related to birth weight in bivariate analysis, but not in the multiple regression model. This suggests that residence and the availability of farmland were mediated through the inclusion of ethnicity, the only significant socioeconomic determinant in the model. It may be that one's ethnicity determines where one lives and the probability of having available farmland. Time taken to visit the hospital was included as a measure of accessibility of health care services and was thought to be related to pregnancy outcomes. However, in the present study, time taken to visit the hospital was not directly related to birth weight, which may be because around two-thirds (64.2%) of the women in the present sample could visit the hospital within an hour.

In previous research antenatal care has been shown to be related to birth weight (Nichols & Zwelling, 1997; Quick et al., 1981; Guilkey et al., 1989; Alexander & Cornely, 1987). In the present study, however, antenatal care was only related to birth weight in the first step of regression analysis, and then appears to be mediated with the inclusion of the general health behaviour variables, weight of the mother and gestational age. These two variables may reflect receipt of good antenatal care. Thus, antenatal care may be related indirectly to birth weight in this sample through its relationship with general health behaviour. In addition, antenatal care is affected by a number of factors such as age, attitude of women towards pregnancy, social support, parity, ethnicity, religion, transportation facilities, gender issues, and socio-cultural factors (Benn, 1995; WHO, 1998b; Thaddeus & Maine, 1994; The Ministry of Health, 1996b; Sargent, 1985, UNICEF, 1996a). In the present study antenatal care was significantly related to a number of these variables, for example, age, age at marriage and first childbirth, parity, and husband's income. Further research is necessary in the Nepalese context on the relationships between antenatal care and birth weight and should be conducted in combination with these factors.

In contrast to previous research by Mangold (1982), Kramer (1987), and Ebomoyi et al. (1991), maternal age, age at marriage, age at first

childbirth, and level of parity were not directly related to birth weight in the present study in multivariate analysis. This may be due to the relatively restricted range of age in the present study. For instance, the mean age of mothers was 23 years. This restricted age range resulted in little variance in the other age related variables, for example, parity was 1.75, 77.4% women married within the age of twenty, and 62% gave birth to their first child within twenty years of age. Further research should include women from a wider age range to investigate these relationships.

The height of the mother was not associated with birth weight, which contradicts previous research (Krasovec, 1991; Ebomoyi et al., 1991; Kramer, 1987). This may be due to the low variability in height in the present study, which may serve to underestimate the relationship between height and birth weight.

Food taboos were also not associated with birth weight in this study. It was expected that restriction in dietary intake might hinder growth and development of the foetus. This relationship may account for the significant association between ethnicity and birth weight, as food taboos are largely a function of ethnicity in Nepal. In addition, a more detailed measurement of calorific intake of food taken during pregnancy than used in the present study is probably required to link food taboos with birth weight.

Maternal anaemia increases the risk of low birth weight (Nichols & Zwelling, 1997). In the present study, anaemia was related to birth weight in bivariate analysis, but it appears to be mediated by other variables in multiple regression analysis. This suggests that anaemia was not directly related to birth weight in the present study but may have an indirect relationship through the general health behaviour variables. Anaemia was assessed by physical examination as blood test data were available for only a limited number of women from the sample (N=25). It may be that, the use of a blood test to identify levels of haemoglobin would offer a more reliable measure of anaemia in future research.

5.3 Aim three: Summary of findings

Aim three examined the associations between socioeconomic determinants and proximate determinants and length of labour. Among socioeconomic factors, residence was significantly associated with the length of the labour. In the present study, women who lived in rural areas were more likely to suffer from prolonged labour than urban women. Obstructed labour is usually associated with prolonged labour, which increases the chance of maternal mortality and morbidity. Prolonged labour may be due to cultural practices, prominent in rural areas, such as limiting women's decision making abilities, restricting her movements, encouraging a self-possessed birth (see p. 8), and discouraging antenatal care (Thaddeus & Maine, 1994; WHO, 1998b; Sargent, 1985; Poudel, 1995).

Women's occupation was also related to length of labour in the present study such that employed women were likely to have shorter labours than the unemployed. This may be due to these women being normally engaged in additional physical activities, compared to unemployed women. The distinction between occupational groupings used in the present study was simplistic and further research is necessary to establish the association between *types* of occupation and length of labour.

Ethnicity was not related to length of labour in the present study. Given that ethnicity was significantly related to birth weight and antenatal care this finding is surprising. Collapsing at least ten different ethnic groups into the four broad groupings may have served to underestimate any relationships between ethnicity and other variables. A larger sample with adequate numbers of the different ethnic groups in Nepal would help to determine the exact nature of these relationships.

Parental qualifications and husband's income were also not related to length of labour. These variables as indices of socioeconomic determinants are thought to act on proximate determinants such as reproductive health behaviours and general health which in turn influence outcomes such as the length of labour. This relationship was partly supported by the significant relationships between parental qualifications, husbands income and

antenatal care utilisation (proximate determinant). However, this does not appear to translate into a significant relationship with outcomes. It should be remembered that the present study utilised cross-sectional data. It may be that some of the suggested "causal" relationships outlined in the research model are only detectable over time.

Maternal age, age at marriage, mode of delivery, and gestational age were associated with length of labour in regression analysis. Younger women had longer labours than older women, which is consistent with research by WHO (1998b) and Kwast (1996). This may be due to many of the participants being relatively young, which could suggest a lack of maturity of the reproductive organs including the pelvis and birth canal, resulting in prolonged and difficult labours. Length of labour increased with gestational age. Longer labours were also associated with a greater incidence of assisted deliveries. Previous research shows an increase in the length of labour and the need for assisted delivery when gestational age is above 41 weeks (Regan et al., 1998; WHO, 1995). Age at first childbirth was not related to prolonged labour. This may be due to the restricted range of ages for this variable with the majority aged between 15 to 23 at the birth of their first child, with 62% under the age of twenty.

Previous research has shown that shorter women have longer labours (Krasovec, 1991; WHO, 1995; Dutta, 1995; Kwawukume et al., 1993;

UNICEF 1996b; Rosso, 1991). In the present study, maternal height was related to the length of labour in bivariate analysis (see p.113), but not in the regression model. This may be due to the restricted range of mothers' height with 65% of women below or equal to 150cm.

Weight of the mother was also not directly related to the length of the labour in regression analysis. Although there is some evidence to suggest a relationship between weight and pregnancy outcomes (Honor, 1998; Cnattingius et al., 1998), length of labour has not previously been studied in this context.

The length of labour is shorter in multiparae women (WHO, 1995; Dutta, 1995; Kwawukume, 1993; UNICEF 1996b). In the present study parity was related to length of labour, in bivariate analysis (see p.113), but this relationship appears to be mediated in multiple regression analysis by the inclusion of other general and reproductive health and behaviour variables.

In contrast to previous research (Kwast, 1996; Nichols & Zwelling, 1997), antenatal care and maternal weight were not directly related to the length of labour. It has been noted previously in chapter two that quality is an important component of antenatal care. In the present study, questions were asked regarding aspects of quality of care, but due to the poor response rate this information could not be used for statistical analysis. A

dichotomous antenatal care variable (attended / did not attend) was used in regression analysis. In future research the relationship between antenatal care and pregnancy outcomes may be better investigated by examining both quantity and quality of care.

Maternal mortality of 14.15 per 1000 live births was found with the 209 babies born in the present study. This is a higher rate of maternal morality than the national average. This may be due to the small sample size of 215 participants and because the data were collected in two months periods.

5.4 General limitations

Limitations associated with specific findings have been discussed in previous sections. In this section, some more general limitations of the research as a whole are discussed.

The cross-sectional nature of the study limits the extent to which causal inferences may be made concerning the effects of study variables. Maternal health behaviour and nutritional health variables such as pregnancy weight gain, foetal growth retardation, and the development of maternal and foetal complications, which lead to maternal and foetal mortality and morbidity, are basically progressive in nature and require longitudinal study to investigate the whole maternal and foetal outcome process.

Although the child survival and maternal mortality models are appropriate for the present research goals, due to the nature of cross-sectional data, prediction of exact causal ordering has not been attempted. It is acknowledged that there are other possible models for such study in contemporary research, especially in a more complex form on low birth-weight and perinatal mortality, that should be tested in the future.

The present model allows examination of "main effects" between variables, it does not test interactive effects that may change the linear additive model. More recently, several researchers (Gage & Therriault, 1998, Cnattingius et al., 1998; Espeut & Koblinsky, 1997) have used a logistic model, which allows measurement of the odds ratio of causative risk factors and outcomes in population-based studies (Park & Park, 1994). For example, for the explanation of relative risks of low birth-weight or prolonged labour based on exposure to risk factors. For this type of estimation sample sizes need to be considerably larger than that used in the present study.

Some of the analyses concerning general maternal health and maternal and foetal outcome variables were undertaken on reduced sample sizes due to missing data, which raises issues of statistical power (Tabachnick & Fidell, 1989), and requires caution be exercised in their interpretation. Furthermore missing data on a number of variables (pre-pregnancy weight, BMI, weight gain in each trimester, maternal complications, mother's income,

smoking, contraceptive use and alcohol use) made it difficult to assess the association of these factors with birth weight and prolonged labour. Similarly, mortality relationships with socioeconomic determinants and proximate determinants could not be assessed because of the relatively low rates of maternal and perinatal mortality in the sample. These variables were excluded from regression analyses, because they did not meet the recommended criteria of 10/90% split for dichotomous variables (Tabachnick & Fidell, 1989).

The associations between a number of socioeconomic, proximate determinant and outcome (infant & maternal) variables could not be examined in multivariate analyses due to the increase in independent variables in the equation. Tabachnick and Fidell, (1989) note that, a minimum independent variable to cases ratio in regression analysis is five cases to every independent variable.

The sample size of a study must be large enough to reduce the influence of rounding errors or missing data (Gage & Therriault, 1998), which makes it difficult to establish relationships between variables. Missing data can also create bias, because this is likely to be non-randomly distributed with respect to birth weight and prolonged labour.

There was a poor response rate regarding attitudes and feelings

towards health professionals (obstetrician and midwife/nurse) and necessity of care during pregnancy. Similar response rates were also noted in the preference of midwife or obstetrician as a care provider throughout pregnancy, as most women did not discriminate between professions. Likewise, questions about seeking changes in place of care delivery remained unanswered by most of the participants. Furthermore, eighteen participants were excluded from analyses due to poor response rates on the majority of questions and twenty-women declined to participate after being informed about the nature of the study. Clearly, this response rate introduces bias into the sample and the extent to which findings are replicable in other contexts.

The lack of equipment in the Western Regional hospital at Pokhara made it difficult to gather some of the information for this study. For example, measurements of pregnancy weight in each trimester and blood and urine tests during the antenatal period were missed due to frequent breakdowns of equipment. Thus, weight gain during pregnancy was excluded from analyses.

Naturally, there are limitations on how findings from a sample of the western region generalise to other regions of Nepal. However, findings are not dissimilar from previous research on maternal and foetal outcomes across socioeconomic and maternal factors in developed and developing

countries (Krasovec, 1991; Ebomoyi, et al.1991; Kramer, 1987; Cnattingius et al., 1998; WHO, 1998b; WHO; 1995; AbouZahr & Royston, 1992).

There are a number of measurement issues that may have contributed to the under or over estimation of relationships among the variables in the present study. The researcher gathered outcome information from the hospital's perinatal information sheet, which had been completed by the attending midwife. There is a possibility of observational variability between midwives. Similarly, there is the possibility of measurement error from equipment, used during the study period by the midwives, such as measuring tapes and weight scales. Repeated measurement by the same observer on the same subject is necessary to ameliorate the effects of intra/inter-observer variability (Cluett, Alexander & Pickering, 1995). Each piece of equipment was calibrated with other equipment used for similar purposes to ensure reliability. However, there was still the possibility of introduced error during measurement if machines were not properly adjusted to zero before each measurement.

5.4.1 Implications for future research

The present research highlights potential future directions for research on socio-economic determinants and proximate determinants that affect maternal and foetal outcomes in the Nepalese context. There is a need for more complex multivariate models to be investigated on a longitudinal basis.

Ethnicity is one of the major factors determining birth weight in the Nepalese context as in many other countries. Ethnicity can influence people's attitudes and beliefs on health care utilisation, nutritional preferences and other aspects of their socio-cultural environment during pregnancy. In Nepal, a multi-ethnic and multi-cultural society, it is important to ascertain how these influences could affect maternal health and behaviour and their subsequent affect on pregnancy outcomes. For this purpose, alternative models such as the mixture model, which provides excellent descriptions of birth weight distribution among sexes and ethnic groups (Gage & Therriault, 1998), could be used for future research in the Nepalese context.

Maternal factors such as maternal weight were also related to birth weight in this study. However, longitudinal study of maternal factors (including height, body-mass index, pre-pregnancy weight, and weight gain in each trimester) is necessary to establish the relationship between maternal weight and birth weight. Maternal weight does not differentiate between the weight of the mother, foetus, or the various maternal components such as water, fat reserves and lean body tissues. A longitudinal study would provide the opportunity for measuring a number of aspects relating to weight gain over the entire pregnancy.

The present research suggested that, prolonged labour is affected by mode of delivery, gestational age and age of the mother. Further research is

required to investigate socio-cultural and gender related environmental factors, which may contribute to obstructed labour in Nepalese society.

The present research attempted to investigate socioeconomic determinants and proximate determinants and their relationship to foetal and maternal outcomes. This was done within the framework of child survival and maternal mortality models (Mosley & Chen, 1984; Maine, 1995). These models offer a potentially fruitful area for further research on child and maternal survival because they comprise a comprehensive set of factors related to outcomes and can also be used as a framework for longitudinal study of the health and wellbeing of the child.

5.4.2 Implications for nursing/midwifery

Women's health is central to the families' health especially for the foetus, infant and child. Midwives and community health nurses can play a central role in promoting the health and wellbeing of women in Nepal. Midwives are the driving force behind the "Safe Motherhood" programme in Nepal and midwives play an ever-increasing role in providing care and health education, and in preparing women for reproduction and birth (Thompson & Bennett, 1996).

In any efforts to target better health care for women in Nepal, midwives need to begin with themselves. Midwives are a product of the same cultural setting as the women they care for. Midwifes need to understand the

influences on various aspects of women's social environment such as status, gender, culture, nutrition, religion, politics, economics, education, and health behaviour both generally and during pregnancy. Midwives are the natural partner for women throughout their pregnancy and childbirth and therefore they must pay attention to how they view women and how they treat women who come to them for care. Midwives in Nepal need to be actively involved in programmes, which attempt to alter beliefs that are harmful to women's well being. Midwives and other health professionals who provide care to women in Nepal should be resistant to the unnecessary medicalisation of the pregnancy / birth process. The present study has shown that although there is a demonstrated need for better equipment, facilities and personnel, the greatest benefit for the majority of women would be gained from increased resourcing of primary health care initiatives.

The health of the women directly relates to foetal and child health. During foetal life the foetus gets nutrition from the mother. A healthy mother can provide good nutrition for foetal growth and development, but malnourished mothers can not provide adequate nutrition raising the risk of low birth weight and perinatal mortality. Therefore, in developing countries like Nepal, midwives need to intervene nutritionally to target women of reproductive age to reduce such risks. Similarly, midwives can monitor weight-gain, height, BMI, height-for-weight, and arm circumference and provide or suggest nutritional supplements during pregnancy to reduce risks.

Midwives can also use parto-graph for the monitoring and recording of foetal and maternal indicators of well-being during labour for the feotal heart rate, maternal contractions, and blood pressure. Similarly, reproductive health care can be provided through the community-based primary health care system, such as the Safe Motherhood programme in Nepal (Family Care International, 1994).

Midwives, as those most directly involved in women's reproductive health, need to provide regular input to policy makers. By mobilising the support of women for better health, and understanding the needs and structure of health care services, midwives can suggest how to utilise the system for the advantage of women. Midwives can work in the community through community participation and multi-sectoral collaboration as a principle provider of primary health care. It is also necessary to improve women 's status and to develop strategies that may help women make decisions about their own health, which may result in timely obstetric or medical care and subsequently decrease maternal and perinatal deaths. Focusing on the health sector alone, is not likely to result in better reproductive health. Coordination between various sectors such as women's development, family planning, education, and health care services is important so that all efforts are directed to the critical areas of maternal health and child survival.

5.5 Conclusions

The results from the present study show significant discrepancies in antenatal care utilisation and nutritional intake between rich and poor, between ethnic groups, between urban and rural residents, between those who are employed or unemployed, and those who are educated or uneducated. This may have contributed to pregnancy outcomes.

Reproductive health of the mother determines the health and reproductive capacity of the next generation (WHO, 1995) and therefore, maternal care is important. Clearly, primary healthcare services for maternal and child health are inadequate in the Western Region of Nepal. There is a necessity for providing basic training for community level care providers and continuing education of other health personnel. Changes in health care education and practice are necessary to achieve an integrated service with community participation of both men and women. Similar changes are necessary to improve the family planning services by addressing joint responsibilities of men and women in reproductive health. This may help reduce unwanted pregnancies and promote child survival. Thus, health care needs to be safe and affordable to the society that have ability to improve the existing situation.

The majority of the population in Nepal lives below the poverty line. Socioeconomic factors seem to be the major contributors affecting the health

of the women and children. Women lag behind men on most indicators of social and economic status as well as in levels of health and well being in Nepal. This in turn affects birth weight, and foetal health and survival. When women's needs are neglected during the reproductive years there are extreme implications for women and future generations. Thus, policy should be directed towards improved support for women of the reproductive age and necessary health care along with education on nutrition and its impact on foetal development in the antenatal period. These measures can be part of primary health and Safe Motherhood programme in rural communities, in addition to hospital care provided in urban areas.

Women in Nepal are subordinated by the patriarchal tradition and practices, right from birth. Within this tradition, sons are considered the economic insurance against the insecurities of old age, whereas daughters are considered "things" to be given away in marriage. Similarly, more child bearing (especially male) is considered as a means of gaining status for women, which in fact, increases the risk of maternal death. A holistic approach is necessary to improve this situation including political, financial, socio-cultural factors, health systems, and education, which could positively affect integration of services, their utilisation, and health outcomes. This may include change in laws, reprioritisation and reallocation of resources in the health sector, and equal pay for equal work for males and females. Similarly, training and education is necessary to help to promote women's autonomy.

For instance freely available information on sex education, gender issues, and maternal and child health, so that women have more control over decisions regarding their health and life choices.

Regular monitoring of adolescent health, maternal health, birth weight, and child survival through research is important to prioritise and direct scarce resources to the most vulnerable areas. This will also ensure that affordable, cost-effective, and appropriate health policy is developed for maternal and child health in Nepal.

REFERENCES

AbouZahar, C. & Royston, E. (1992). Maternal mortality: A global fact book. Geneva: World Health Organisation.

Adair, L. (1991). Weight-for-height and body-mass-index in non pregnant woman. In K. Krasovec & M. A. Anderson (Eds.), Maternal nutrition and pregnancy outcomes: Anthropometric assessment (pp.186-196). Washington D. C.: Pan American Health Organisation.

Agarwal, D. K. (1987). Nutritional status in rural pregnant women in Bihar and Uttar Pradesh. Indian Paediatrics, 24, 119-125.

Alexander, G. R., & Cornely, D. A., (1987). Prenatal care utilisation: Its measurement and relationship to pregnancy outcome. American Journal of Preventive Medicine, 3 (5), 243-253.

Anderson, M. A. (1989). The relationship between maternal nutrition and growth in rural India. Ph.D. dissertation, Tufts University.

Arkutu, A. (1995). Healthy women, healthy mothers: An information guide (2nd ed.). New York: Family Care International Inc.

Bali, P. (1995). Health problems and needs of women in developing countries. Reproductive Health Reader (1994/1995), 209-217. WHO: Geneva.

Barrison, I.G., & Wright, J.T. (1984). Moderate drinking during pregnancy and fetal outcome. Alcohol & Alcoholism, 19 (2), 167-172.

Barton, J. B., Bergauer, K. N., Debbie, L., Coleman, S. K., Stanziano, G. J. & Sibai, M. B. (1997). Does advanced maternal age affect pregnancy outcome in women with mild hypertension remote from term. American Journal of Obstetrics and Gynaecology, 176 (6), 1236-1240.

Benn, C. (1995). An investigation into antenatal care utilisation and perinatal outcome in Port Elizabeth. Unpublished Ph.D. dissertation, Port Elizabeth, South Africa.

Bennett, T. (1992). Marital status and infant health outcomes. Social Science and Medicine, 9 (35), 1179-1187.

Besinnger, R. E. (1997). Does advanced maternal age affect pregnancy outcome in women with mild hypertension remote from term. American Journal of Obstetric and Gynaecology, 176 (6), 1242-1243.

Burroughs, A. (1997). Maternity nursing: An introductory text (7th ed.). Philadelphia: W. B. Saunders Company.

Census (1996). Statistical pocket book. National Planning Commission: Kathmandu.

Chowdhury A. K. (1982). Factors influencing infant survival in rural Bangladesh. Health Policy Education, 2.

Christiani, K. (1996). Women's health: Effect on morbidity and mortality in pregnancy and childbirth. Midwifery, 12, 110-119.

Clarren, S.K., & Smith, D.W. (1978). The foetal alcohol syndrome. The New England Journal of Medicine, 298, 1063-67.

Cluett, E. R., Alexander, J., & Pickering, R. M. (1995). Is measuring postnatal symphysis-fundal distance worthwhile? Midwifery, 11, 174-183.

Cnattingius, S., Bergstrom, R., Lipworth., L. & Kramer, M. S. (1998). Pregnancy weight gain and the risk of adverse pregnancy outcome. The New England Journal of Medicine, 338 (3), 147-152.

Cnattingius, S., & Nordstrom, M. L. (1996). Maternal smoking and faeto-infant mortality- biological pathway and public health significance. Acta Paediatrica, 85 (12), 1400-1402.

Cogswell, M. E., Serdula, M. K., & Hungerford, D. W. (1995). Obstetrics: Gestational weight gain among average-weight and overweight women-what is exercise. American Journal of Obstetric and Gynaecology, 172 (2), 705-712.

Collins, J.W., Wall S.N., & David, R. J. (1997). Adequacy of prenatal care utilisation, maternal ethnicity, and infant birth-weight in Chicago. Journal of National Medical Association, 89 (3), 198-203.

De-Meer, K., Bergman, R. D., & Kusner, J. S. (1993). Socio-cultural determinants of child mortality in Southern Peru: Including some methodological considerations. Social Science and Medicine, 36 (3), 317-331.

Demographic Health Survey (1996). Family health survey of Nepal. Maryland, USA: Macro International.

Dhawan, S. (1995). Births-weight of infants of first generation Asian woman in Britain compared with second generation Asian woman. The British Medical Journal, 311 (6997), 86-88.

Dilorio, F. C., & Hardy, K. A., (1996). Quick start to data analysis with SAS. Belmont: Duxbury Press.

Dodds, L. (1995). Prevalence of smoking among pregnant women in Nova Scotia from 1988 to 1992, Canadian Medical Association Journal, 152 (2), 185-190.

Durnin, J. V. (1987). Energy requirements of pregnancy: An investigation of the longitudinal data from the five country study. The Lancet, 2, 1131-1133.

Dutta, D.C. (1995). Textbook of obstetrics. Calcutta: New Central Book Agency.

Ebomoyi, E., Adetoro, O., & Wickremasinghe, A.R. (1991). Birth-weight and socio-biological factors in Ilorin, Nigeria. Journal of Bio-social Science, 23, 417- 423.

Espeut, D., Koblinsky, M. (1997). Methodological Issues in perinatal mortality research. Mother Care Matters, 6 (3), 1.

Everett, V.J. (1975). The relationship between maternal height and cephalopelvic disproprotion in Dar es Salam. East African Medical Journal, 52 (5), 251-256.

Family Care International (1994). Action for the 21st century: Reproductive health & right for all (International conference on population and development). New York.

Family Planning, and Maternal and Child Health Division (1993). Report on Nepal family planning and health survey. Ministry of Health: Kathmandu.

Feuerstein, M.T. (1993). Turning the tide: Safe Motherhood, a district action manual. Save the Children : London.

Filippi, V., Alihonou, E., Mukantaganda, S., Graham, W.J., & Ronsmans, C., (1998). Near misses: Maternal morbidity and mortality. The Lancet, 35, 145-146.

Fink, A., Yano, E. M. & Goya, D. (1992). Prenatal program: What the literature reveals (review). Obstetric and Gynaecology, 80, (5), 867-871.

Friedman, D.J., Cohen, B.B., Mahan, C.M., Lederman, R.I., Vezina, R.J. & Dunn, V.H. (1993). Maternal ethnicity and birth-weight among blacks. Ethnicity & Disease, 3 (3), 255-69.

Fuentes-Afflick, E., Hessol, N.A. & Perez-Stable, E.J. (1998). Maternal birth-place, ethnicity, and low birth-weight in California. Archives of Paediatrics & Adolescent Medicine, 152 (11), 1105-12.

Gage, T. B., & Therriault, G. (1998). Variability of birth-weight distribution by sex and ethnicity: Analysis using mixture model. Human Biology, 70 (3), 518-527.

Garn S. (1991). Pre-pregnancy weight. In K. Krasovec & M. A. Anderson (Eds.), Maternal nutrition and pregnancy outcomes: Anthropometric assessment (pp.69-85). Washington D. C.: Pan American Health Organisation.

Gladstone, J., Levy, M., Nulman, I., & Koren, G., (1997). Characteristics of pregnant women who engage in binge alcohol consumption. Canadian Medical Association Journal, 156 (6), 789-794.

Glik, D.C., Parker, K., & Hetegikamana, G.M. (1986). Integrating qualitative and quantitative survey techniques. Community Health Education, 7 (181), 87.

Goldenberg, R. L., Cliver, S. P., Mulvihill, F. X., Hickey, C. A., Hoffman, H. J., Klerman, L. V., & Johnson, M. J. (1997). Obstetrics: Medical, psychological and behavioural risk factors do not explain for low birth- weight among black women. American Journal of Obstetric and Gynaecology, 175 (5), 1317-1324.

Gortmaker, S. L., & Wise, P. H. (1997). The first injustice: Socioeconomic disparities, health services technology, and infant mortality. Annual review of Sociology, 23, 147-170.

Guilkey, D., Popkin, B. M., & Akin, S. J. (1989). Prenatal care and pregnancy outcome in Cebu, The Philippines. Journal of Development Economics, 30, 241-272.

Hall, M. (1981). Is antenatal care really necessary? Foresterhill: University of Aberdeen.

Hart, N. (1998). Beyond infant mortality: Gender and stillbirth in reproductive mortality before the twentieth century. Population Studies, 52, 215-219.

Harrison, K. (1985). Relation between maternal height, foetal birth-weight and cephalopelvic disproportion suggest that young Nigerian primigravidae grow during pregnancy. British Journal of Obstetric and Gynaecology, 9 , Suppl. 5, 40-48.

Hellerstedt, W. L., Pirie, P. L., & Alexander, G.R. (1995). Adolescents parity and infant mortality, Minnesota, 1980 through 1988. American Journal of Public Health, 85 (8), 1139-1142.

Holck, S. (1996) Maternal mortality figures substantially underestimated. Press Release, WHO/7 February 5 http://w.w.w.who.ch/press/1996/pr96-07.htm

Honor, W. (1998). High pre-pregnancy Body-Mass-Index: A maternal-foetal risk factor. The New England Journal of Medicine, 338 (3),191-192.

Holzman, C., Paneth, N., Little, R., & Pinto-Martin, J. (1995). Perinatal brain injury in premature infants born to mothers using alcohol in pregnancy. Paediatrics, 95 (1), 66-73.

Hossain, M. M. & Glass, R. (1988). Parental son preference in seeking medical care for children less than five years in a rural community in Bangladesh. American Journal of Public Health, 78, 1349-1350.

Institute of Medicine (1997). Inadequate weight gain among pregnant adolescents: Risk factor and relationship to infant birth-weight.

(Transaction of the sixty-fourth annual meeting of the Central Association of Obstetrician and Gynaecologists). American Journal of Obstetrics and Gynaecology, 6 (176), 1224-1227.

Jaccard, J., Turrisi, R., & Wan, C. (1990). Interaction effects in multiple regression. Sage Publication: Newbury Park.

Jacobson, J. D. & Cousins, L. (1989). A population-based study of maternal and perinatal outcome in patients with gestational diabetes. American Journal of Obstetric and Gynaecology, 161, 961-966.

Johnson, J.W. & Yancey, M. K. (1996). A critique of the new recommendations for weight gain in pregnancy. American Journal of Obstetric and Gynaecology, 174 (1), 254-258.

Joyce, T. J., & Grossman, M., (1990). Pregnancy wanted-ness and the early initiation of prenatal care. Demography, 27 (1), 1-16.

Kalipeni, E. (1993). Determinants of infant mortality in Malawi: A spatial perspective. Social Science and Medicine, 2 (37), 183-198.

Keiffer, E. C., Alexander, G.R., & Mor, J. M. (1995). Pregnancy outcomes of Pacific Islanders in Hawaii. American Journal of Epidemiology, 1 (141), 674-679.

Kramer, M. S. (1987). Determinants of low-birth weight: Methodological assessment and meta-analysis. World Health Organisation Bulletin, 65 (5), 663-737.

Krasovec, K. (1991). Weight gain in pregnancy. In K. Krasovec & M. A. Anderson (Eds.), Maternal nutrition and pregnancy outcomes: Anthropometric assessment (pp. 15-28). Washington D. C.: Pan American Health Organisation.

Krasovec, K. (1989). An investigation into the use of maternal arm circumference for nutritional monitoring of pregnant women. D.Sc. dissertation, John Hopkins University, School of Hygiene and Public Health.

Kwast, B. E. (1996). Prolonged and obstructed labour in developing countries: steps to reduce a neglected tragedy. In S. F. Murray (Eds.), Midwives and safer motherhood (pp. 1-22). London: Mosby.

Kwast, B. E. (1992). Obstructed labour, its contribution to maternal mortality. Midwifery, 9 , 105-123.

Kwawukume, E. Y., Ghose, T. S., & Wilson, J. B. (1993). Maternal height as a predictor of vaginal delivery. International Journal of Gynaecology and Obstetrics, 41 (1), 27-30.

Larroque, B. (1992). Alcohol and the foetus. International Journal of Epidemiology, 21 suppl., 8-16.

Lechtig, A. (1975). Effects of food supplements during pregnancy on birth-weight. Paediatrics, 4 (56), 508-520.

Liljestrand. J. (1985). Maternal height and perinatal outcome in Mozambique. Journal of Tropical Medicine, 31, 306-310.

Mahler, H. (1987). The Safe Motherhood initiative: A call to action. The Lancet, 21, 668-670.

Maine, D. (1995). Safe Motherhood programmes: Options and issues. WHO: Centre for population and family health.

Mangold, W. D. (1982). Age of mother and pregnancy outcome in the 1981 Arkansas birth cohort. Social Biology, 30 (2), 205-208.

Medical Women's International Association (1995). Women's health in a changing world: A continuous challenge, 23rd Congress of the Medical Women's International Association, The Hague, May 7-12.

Moller, B., & Lindmark, G. (1997). Short stature: An obstetric risk factor? A comparison of two villages in Tanzania. Acta Obstetrica et Gynecologica Scandinavica, 76 (5), 394-397.

Mosley, H. W., & Chen, L. C. (1984). An analytical framework for the study of child survival in developing countries. In H.W. Mosley & L. C. Chen (Eds.), Child survival: strategies for research (pp. 25-48). London: Cambridge University Press.

National Planning Commission (1993). Seventh national health plan: Estimated expenditure for health sector. Kathmandu, Nepal.

Nichols, F. H., & Zwelling, E. (1997). Maternal-newborn nursing: theory and practice. The United States: Saunders Company.

Norusis, M.J.(1988). SPSS/PC+ Advanced Statistics V2.0. Chicago: SPSS Inc.

Nulman, I., & Koren, G. (1994). Teratogenic drugs & chemicals in humans. In Koren, G.(Eds.) Maternal foetal toxicology. New York: Marcel Dekker.

Okojie, C. E. (1994). Gender inequalities of health in the third world. Social Science and Medicine, 39 (9), 1237-1247.

Paolisso, M. & Leslie, J. (1995). Meeting the changing health needs of women in developing countries. Social Science & Medicine, 40 (1), 55-65.

Park, J.E., & Park K. (1994). Textbook of preventive social medicine. Jabalpur: Banarasidas Bhanot.

Poudel, P. (1995). An utilisation of informal (traditional) and formal (modern) health care utilisation during perinatal period in rural Nepal. Unpublished baccalaureate research project. Maharajgunj, Nepal.

Quick, J. D., Greenlick, M. R. & Roghmann, K. J. (1981). Prenatal care and pregnancy outcome in an HMO and general population: Multivariate cohort analysis. American Journal of Public Health, 71 (4), 381-390.

Raghupathy, S. (1996). Education to the use of maternal care in Thailand. Journal of Social Science and Medicine, 43, 459-71.

Rahabar, F., Momeni, J., Fomufod, A., & Westeny, L. (1985). Prenatal care and perinatal mortality in a black population. Sociology/ Anthropology and Obstetric and Gynaecology, 63 (3), 327-328.

Regan, C. L., Donnelly, V., McQuillan, C., & Stronge, J. M. (1998). Does duration of pregnancy affect labour outcome? American Journal of Obstetrics and Gynaecology, 178, 97-98.

Rishpon, S., Epstein, L. M. & Egoz, N. (1985). Association of infant mortality with lack of regular prenatal care in the Haifa, sub-district, 1980. Israel Journal of Medical Sciences, 21, 123-125.

Roberts, E. M. (1997). Neighborhood social environments and the distribution of low birth-weight in Chicago. American Journal of Public Health, 4 (87), 597-603.

Rosso, P. (1991). Weight-for-height and body-mass-index in pregnant woman. In K. Krasovec & M. A. Anderson (Eds.), Maternal nutrition and pregnancy outcomes: Anthropometric assessment (pp.173-185). Washington D. C.: Pan American Health Organisation.

Royston, E. & Armstrong, S. (1989). Preventing maternal deaths. Geneva: World Health Organisation.

Sargent, C. (1985). Obstetric choice among urban women in Benin. Social Science and Medicine, 20, 287-290.

SAS Institute Inc (1989). SAS Procedures, Version 6.12. Cary, N.C.: SAS Institute Inc.

Shrestha, D. B. & Singh, C. B. (1992). Ethnic groups of Nepal and their ways of living. Kathmandu.

Seven, C., Forman, M. R., Berendes, H. W., Barry, G. & Isotalo, L. (1993). Effect of age, parity, and smoking on pregnancy outcome: A population-based study. American Journal of Obstetric and Gynaecology, 168 (1), 16-21.

Shah, K., & Shah, P. M. (1979). Relationship of weight during pregnancy and birth-weight. Indian Paediatrics, 9, 526-531.

Singh, I., & Shrestha, S. (1996). Study on the effect of socioeconomic conditions and cultural beliefs and attitudes of mothers on their awareness about child spacing and fertility. Unpublished research report, Kathmandu.

Snedecor, G., & Cochran, W. (1980). Statistical methods (7th edition). Iowa: the Iowa State University Press.

Statistics New Zealand (1998). Key statistics. Wellington: Statistics New Zealand.

Statistic New Zealand (1993). New Zealand census of population and dwelling. Wellington.

Steer, P., (1995). Maternal haemoglobin and birth-weight in different ethnic groups. The British Medical Journal, 310 (6964), 1601-1602.

Tabachnick, B. G. & Fidell, L. S. (1989). Using multivariate statistics (2nd edition). New York: Harper & Row Publishers.

Taffel, S.M. (1986). Association between maternal weight gain and outcome of pregnancy. Journal of Nurse-Midwifery, 31 (2), 78-86.

Taffel, S.M. (1980). Maternal weight gain and the outcome of pregnancy. Vital and health statistics, US Department of Health and Human Services.

Thaddeus, S., & Maine, D., (1994). Too far to walk: Maternal mortality in context. Social Science and Medicine, 38 (8), 1091-1110.

Thompson, J. E., & Bennett, R. V. (1996). Pre-congress workshops on women are dying: Midwives in an action. Oslo, Norway.

Thapa, S., (1996). Infant mortality and its correlates and determinants in Nepal: A district-level analysis. Journal of the Nepal Medical Association, 34(118 & 119), 94-109.

The Ministry of Health (1996a). Safe Motherhood policy of His Majesty's Government of Nepal, Ministry of Health. Journal of the Nepal Medical Association, 34, (118 & 119), 162-164.

The Ministry of Health (1996b). Making Safe Motherhood work in Nepal: Programmatic elements and challenges (The commentary of family health division). Journal of the Nepal Medical Association, 34 (118), 180-184.

The Ministry of Health & UNICEF (1996). National maternity care guidelines, Nepal. Kathmandu.

Tuladhar, J. (1996). Social Development in Nepal: Gender Perspective, in Maskey, B. K. (Eds.) Social Development in Nepal (pp. 60-64). United Nations of Association of Nepal: Kathmandu.

Turmen, T. (1994). Reproductive health: Making it a reality. Reproductive Health Reader (1995/1994). WHO/UNFPA.

UNDP/UNFPA/WHO/World Bank (1997). World Health Organisation's work in reproductive health: The role of the special program. Progress in Human Reproduction Research, 42, 1-8.

UNICEF (1996a). Children and women of Nepal: A situation analysis. Kathmandu: Printing Support.

UNICEF (1996b). The progress of Nations: The Nations of the world ranked according to their achievements in child health, nutrition, education, family planning, and progress for women. New York: United Nation.

UNICEF (1992). Children and women of Nepal: A situation analysis. Kathmandu: Printing Support.

Van de Walle, F., & Ouaidou, N. (1985). Status and fertility among urban women in Burkina Faso. International Family Planning Perspectives, 11 , 60.

Van Roosmalen, J., & Brand, R. (1992). Maternal height and the outcome of labour in rural Tanzania. International Journal of Gynaecology and Obstetrics, 37 (3), 169-177.

Western Regional Health Service Directorate (1997). Annual report: Regional health services (Fiscal year 1996/1997). Pokhara.

World Health Organisation (1998a). Maternal mortality: Safe Motherhood and world health day. World Health Organisation: Geneva.

World Health Organisation (1998b). Improve access to maternal health services: Safe Motherhood and world health day. World Health Organisation: Geneva

World Health Organisation (1998c). Delay child bearing : Safe Motherhood and world health day. World Health Organisation: Geneva.

World Health Organisation (1998d). Every pregnancy faces risk : Safe Motherhood and world health day. World Health Organisation: Geneva.

World Health Organisation (1998e). Prevent unwanted pregnancy: Safe Motherhood and world health day. World Health Organisation: Geneva.

World Health Organisation (1996a). An antenatal care. Geneva: World Health Organisation.

World Health Organisation, (1996b). Perinatal mortality: A listing of available information. Family and Reproductive Health: Geneva.

World Health Organisation (1995). Maternal anthropometry and pregnancy outcomes: WHO collaborative study. World Health Organisation Bulletin, 73, Suppl., 1-171.

WHO, & UNDP (1994). Report on joint programme for strengthening national capacity to reduce maternal death and disabilities. Kathmandu.

World Health Organisation, (1993). Safe Motherhood: Women's groups, NGOs and Safe Motherhood. Maternal Health and Safe Motherhood Programme Division of Family Health: Geneva.

World Health Organisation (1992). Low birth-weight: A tabulation of available information. WHO: Geneva.

World Health Organisation (1989). The prevention and treatment of obstetric fistulae.. WHO: Geneva.

World Health Organisation, (1983). Measuring change in nutritional status. WHO: Geneva.

World Health Organisation (1979). Traditional birth attendants (Report No.44). WHO: Geneva

World Health Organisation (1975). Public health aspects of low birth-weight (Report No.217). WHO: Geneva

APPENDIX ONE

A Description of the Safe Motherhood Programme in Nepal

Policy Directives

According to the Ministry of Health (1996a) maternity care services will be expanded and improved at all levels to:

- Provide preventive and promotive maternity care to all women through the existing Primary Health Care network. Further, it will emphasise the role of female health care providers with midwifery training, and ensure that emergency obstetric services are available when and where needed.
- Empower women and their families through education about Safe Motherhood practices and educate them about their role in the proper use of maternity care services, especially in rural areas.
- Ensure maternity care exists at the community level by personnel having midwifery skills and who are therefore competent to provide safe, effective care, and make timely referrals.
- Encourage active NGOs participation at the community level.

Maternity Care Components

The components of maternity care include:

- Access to antenatal care at least three times during pregnancy, including risk screening / early detection of danger signs, tetanus toxoid immunisation, health and nutrition education. Health education should be given on breast-feeding, family planning counselling, and appropriate referral.
- Delivery care should be safe and clean. Immediate care of mother and newborn should include resuscitation and thermal control, obstetric first aid and immediate feeding to baby.
- Recognition of obstetric emergencies.
- Transportation for obstetric emergencies.
- Provision of essential obstetric services at district, regional/ zonal, and central levels for effective management of obstetric emergencies.
- Arrangement of postnatal care at least once within twenty-four hours of delivery, during the first week, and thereafter as needed for prevention, early detection, and treatment of postnatal complications of mother and newborn. Advice on breast-feeding, thermal control, immunisation, nutrition, and personal hygiene.

This appendix has been reduced for formatting purposes

- Making available services, such as family planning counselling, postpartum family planning services, and appropriate methods, temporary or permanent.
- Supervision and monitoring of activities of the health care providers.

Strategies

- Strategies of the Safe Motherhood Program focus on improving the quality and coverage of maternity health care services to all women at different levels as described below (The Ministry of Health & UNICEF, 1996; The Ministry of Health, 1996b).

Primary Level Health Care Services

Family Level

The aim at this stage is to empower families with the basic knowledge necessary for independently caring for pregnant and postpartum women in their household and to educate them on nutrition, rest, and preparation for clean delivery. This should also include arrangements with trained health care providers for antenatal, delivery, and postnatal treatments and family planning so that appropriate and timely help for needy families is available. It is also important to educate families about obstetric emergencies and encourage them to register births, maternal and neonatal deaths.

Community Level

This includes the mobilisation of available resources for obstetric emergencies through community participation, registration of all births and deaths in the community. Female Health Care Volunteers such as trained birth attendants and other community groups are encouraged to work together to provide possible services.

Sub-Health Post level

The Sub- Health Posts (SHPs) are established in 3199 of the 4000 Village Development Committees throughout the country (The Ministry of Health & UNICEF, 1996). Maternal & Child Health Workers (MCHW) and Village Health Workers (VHW) work at SHealth Post. MCHWs are expected to provide antenatal, natal, and post-natal care. They are supposed to assist and guide trained-birth attendants (TBAs) for conducting safe normal deliveries at home and refer high-risk cases. MCHWs are also responsible for planning and conducting out-reach clinics on a regular basis. MCHWs duties include distributing family planning devices (for example, Depo-provera, Pills, and Condoms) and counselling on

family planning methods. As well, they have to keep good records and reports of antenatal care, deliveries, still births, deaths of neonates, and mothers. SHPs provide basic maternity services, family planning services, and immunisation along with other Primary Health Care (PHC) services.

Health Post level

There are 611 Health Posts throughout the country. They provide integrated promotive, preventive, and curative Primary Health Care services including maternity (antenatal, natal and postnatal) and family planning services. The technical staff includes Health Assistants, Auxiliary Nurse Midwives, and Community Medicine Auxiliary (CMA). Auxiliary Nurse Midwives provide supportive supervision to MCHWs and TBAs at Sub-Health Post and community level. Health Post staff are responsible for arranging training to Sub-Health Post staff.

Primary Health Care Centres (PHC Centres)

PHC centres are planned to be gradually established in 205 electoral constituencies. The PHC centres will be staffed by a medical doctor, a staff nurse, a health assistant, two community medicine auxiliary, two auxiliary nurse midwives, a laboratory assistant, and VHWs. The PHC centres are to provide preventive, promotive, and curative health services including emergency health services. They will also provide maternity services, which include treatment of severe anaemia, assisted delivery (Vacuum and Forceps), management of post-partum haemorrhage, manual removal of placenta, management of hypertension during pregnancy, evacuation of uterus in case of incomplete abortion, and treatment of sepsis. The supply of extra family planning services like minilap, vasectomy, and temporary contraceptives are part of PHC's responsibility.

Secondary and Tertiary level Health Services

In Nepal, 75 district hospitals have been operating as secondary level health care providers, one in each district. Now district hospitals are to be further developed and staffed as first level referral units providing all essential obstetric facilities as per World Health guidelines. In each district hospital, one obstetrician and paediatrician are to be assigned along with other trained health workers. Hospitals are supposed to be equipped with operating-theatres to deal with obstetric emergencies. District hospitals work under the District Public Health Office, which is also responsible for the supervision and monitoring of Health Post and Sub-Health Post workers.

Zonal and Regional hospitals are functioning as secondary level referral units where necessary specialist services are available. They are supposed to be staffed with a

sufficient number of trained specialists such as obstetricians, paediatricians, anesthetists, operation-theatre staff, and blood bank technicians. In addition, they are responsible for clinical research on maternal and neonatal health.

Central level hospitals function as tertiary level centres and provide obstetric and gynaecological special services including intensive care units. Central level hospitals also arrange training for zonal /regional level health workers and conduct research on maternal and neonatal health.

APPENDIX TWO

Information Sheet and Consent Form

Date:

Theme: Relationship between reproductive health and pregnancy outcomes among mothers, delivered at Western Regional Hospital, Pokhara, Nepal.

Information Sheet

Pratima Poudel, a postgraduate student of Massey University, Department of Nursing and Midwifery, is conducting this research for the partial fulfilment of Master of Arts (Nursing degree). This research is funded by New Zealand Official Development Assistance and the Massey University Graduate Research Fund.

What is the study about?

This study will examine the effect of socio-demographic factors on reproductive health status of the mother and its effect on pregnancy outcome. The assessment will include investigation of socio-demographic factors, general health behaviours, reproductive health status, obstetric condition, modes of delivery, and child survival. This study may provide the basis for identification of areas requiring further improvement for the effective management of health care facilities in the maternal and child health sector in Nepal. Similarly, it may provide some useful guidelines to be adopted for mothers' and children's health and safety.

Eligibility

Women attending WRH for delivery are eligible for the study.

What you will be asked to do?

You will be asked some written and verbal questions relating to general socio-demographic information, present and past obstetric history, and general health behaviour. The researcher will conduct physical assessment of the participants, but does not anticipate any potential risk to the participants as well as researcher.

Your rights as a participant

All participants:

- Have the right to decline to participate,

- Have the right to discuss any aspects of the research with the researcher at any time,
- Have the right to refuse to answer any particular questions,
- Have the right to ask any questions about the study at any time during participation,
- Have the right to withdraw from the study at any time,
- Provide information on the understanding that it is fully in confidence to the researcher, information will be used only for the research purposes, and any individual will not be identified in the reports of the result, and
- Have the right to receive information about the summary of results of the study on its completion.

CONSENT FORM

Date:

Theme: Relationship between reproductive health and pregnancy outcomes among mothers, delivered at Western Regional Hospital, Pokhara, Nepal.

- I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.
- I understand I have the right to withdraw from the study at any time and to decline to answer any particular questions.
- I agree to provide information to the researchers on the understanding that my name will not be used without my permission.
- (The information will be used only for this research and publications arising from this research project).
- I agree to participate in this study under the conditions set out in the Information Sheet.

Signed:.....

Name:.....

Date:.....

Appendix Three

Research Questionnaires

REPRODUCTIVE HEALTH AND PREGNANCY OUTCOME OF WOMEN DELIVERED IN WESTERN REGIONAL HOSPITAL, POKHARA

PERSONAL INTERVIEW SCHEDULE

Code No.....
(must match outcome questionnaire)
Date of Interview.....

Firstly, I would like to ask you for some general socio-demographic information.

SECTION A. SOCIO-DEMOGRAPHIC DETAILS OF THE WOMAN

How old are you (age in years)?.....

What caste or ethnic group, do you belong to?

- Brahmin 1
- Chettri 2
- Newar3
- Gurung 4
- Magar 5
- Limbu & Rai..... 6
- Damai, Kami & Sharki 7
- Other (specify), ... 8

Which religious group, do you belong to?

- Hindu..... 1
- Buddhist 2
- Christian 3
- Muslim 4
- Other (specify)..... 5

What is your present marital status?

- Married 1
- Divorced /Separated 2
- Widowed 3
- Single..... 4
- Other (specify)..... 5

Where do you live?
Within Pokhara (Urban) 1 Outside of Pokhara (Rural) 2

This appendix has been reduced for formatting purposes

If within Pokhara, in which ward do you live?
Address .....
If outside of Pokhara, in which VDC (Village Development Committee) do you live? Address.....

What was the highest level of school you attended?

- Incomplete primary Level (1-5gr) 1
- Complete primary Level (1-5gr).....2
- Incomplete lower secondary (6-7gr).....3
- Complete lower secondary (6-7gr) 4
- Incomplete higher secondary (8-10gr) 5
- Complete higher secondary (8-10gr).....6
- Incomplete Intermediate level 7
- Complete Intermediate level.....8
- Graduate 9
- Post-graduate.....10
- Did not attend school.....11

Can you read?
Yes 1 No 2

Can you write?
Yes 1 No 2

What type of family, do you belong to?
Nuclear 1 Joint 2

How many people live in the same dwelling as you?.....

Do you have your own house?
Yes 1 No 2

What type of house do you live in?

- Stone masonry in mud mortar with thatch roof.....1
- Stone masonry in mud mortar with C.G. I. Sheet/slate roof.....2
- Stone masonry in cement mortar with C.G. I. Sheet/slate roof.....3
- RCC/PCC 4
- Other (specify)..... 5

Do you have land for farming?
Yes 1 No 2

If no, do you have your own land for a kitchen garden?
Yes 1 No 2

What type of toilet do you have?

- No toilet 1
- Outside building.....2
- Attached inside building 3

What is the source of drinking water?

- City water supply 1
- Well/spring 2
- River/stream.....3

- Other(specify).....4

Do you have any provision for filtration of drinking water?
Yes 1 No 2

What is your source(s) of income?
Specify:.....
.....
.....
.....
.....
.....

If you have livestock, which livestock do you have?

1 Hens/Chickens (Numbers:)

2 Goats (Numbers:)

3 Cow/Buffalo (Numbers:)

4 Other (specify)..... (Numbers:)

How do you get to work? Specify.....

How long does it take you to get to work?
Hrs..... Mins.....

What is your present monthly income?
Specify NRs. (approx.).....

Who decides on how **your** income is spent?

- Husband.....1
- Yourself.....2
- Other (specify).....3

I would like to ask some information about your husband.

What was the highest level of school he attended?

- Incomplete primary Level (1-5gr).....1
- Complete primary Level (1-5gr).....2
- Incomplete lower secondary (6-7gr).....3
- Complete lower secondary (6-7gr).....4
- Incomplete higher secondary (8-10gr).....5
- Complete higher secondary (8-10gr).....6
- Incomplete Intermediate level.....7
- Complete Intermediate level.....8
- Graduate.....9
- Post-graduate.....10
- Did not attend school.....11

Does your husband read?
Yes 1 No 2

Does your husband write?
Yes 1 No 2

What is your husband's source(s) of income?
Specify.....
.....
.....
.....
.....

What is his present monthly income?
Specify NRs.(approx).....

If applicable, how long would the food from the farm last?

- Less than six month 1
- Enough for six month 2
- Enough for year.....3
- Other (specify).....4
- Not Applicable 5

How long would your income resources (both husband and yourself) other than the farm last?

- Less than six month 1
- Enough for six month 2
- Enough for year.....3
- Other (specify).....4

SECTION B. GENERAL HEALTH STATUS OF THE WOMAN
I would like to ask you some questions about your general state of health.

How long does it take for you to visit Western Regional Hospital.....Hrs.....Mins

How much does it cost you to visit Western Regional Hospital (travel and food). Approx. NRs.....
How much are you charged for delivery at Western Regional Hospital. Approx. NRs.....

Do you go to hospital when you are sick?

- Never.....1
- Sometimes.....2
- Always.....3

Overall, would you say your health in this pregnancy is:

- Excellent.....1
- Very Good 2
- Good.....3
- Fair 4
- Poor 5
- Very Poor.....6
- Terrible 7

Compared to your pre-pregnancy state, how would you rate your health with the present pregnancy?

- Excellent.....1
- Very Good.....2
- Good.....3

- Fair.....4
- Poor.....5
- Very Poor.....6
- Terrible.....7

Would you describe yourself as a:

- Cigarette smoker.....1
- Cigarette ex- smoker.....2
- Non-smoker.....3
- If other specify.....4

If you smoke, how long have you been smoking?
Specify (years).....

On average, how many cigarettes do you smoke per day?
Specify.....
Were you a smoker in previous pregnancies?
Yes 1 No 2

Are you aware about the health consequences of smoking during pregnancy?
Yes 1 No 2

If yes, please specify.....

Do you usually drink alcohol?
Yes 1 No 2

Have you drunk alcohol during this pregnancy?
Never 1 Occasionally 2 Often 3

What type of alcohol do you prefer to drink?

- Home made alcoholic drink.....1
- Wine.....2
- Beer.....3
- Hard drinks (spirit).....4

On average how many days in the last seven days, would you say you drank any type of alcohol?

- Every day 1
- Five to six days.....2
- Three to four days 3
- One to two days 4
- Not at all 5
- Can't remember.....6

On average, how many standard glasses of the following alcohol did you drink per day?

- Home made alcohol .....
- Wine .....
- Beer .....
- Hard drinks (spirits) .....

Do you know the health consequences of alcoholic drinks during pregnancy?
Yes 1 No 2

If yes, please specify.....

Did you take any medicine during this pregnancy (excluding Antenatal pack)?
Yes 1 No 2

If yes, which medicines were taken and for what reasons were they taken?
1. .....

2. .....

3. .....

4. .....

5. .....

Now, I would like to ask some questions regarding your nutritional health status.

How was your appetite during this pregnancy?

- Excellent.....1
- Good.....2
- Poor.....3
- Very poor.....4

If poor or very poor, specify the reason
.....

On average, how many times during a day did you take food during pregnancy?

- One time.....1
- Two times.....2
- Three times 3
- Four times 4
- More than four times 5

Do you usually take food together with all family members?
Yes 1 No 2

If no when?.....

Do you get enough food to satisfy your needs on these occasions? Yes 1
No 2

Do you have any food taboo?
Yes 1 No 2

If yes, what are these foods and why?.....
.....
.....

Did you take any herbal preparations during your preganancy? Yes 1
No 2
If yes, specify.....

Did you take Iron and folic acid (Antenatal pack) throughout pregnancy?

- Yes 1
- No 2
- Do not know/can not remember 3

How many times a day did you take Antenatal pack?
Specify.....

Did you take Antenatal pack as advised?
Yes 1 No 2
If no, please specify reason .....
.....

Did you receive tetanus toxoid injection during pregnancy?
Yes 1 No 2
If yes how many doses? Specify .....

Do you know why you were immunised? Specify
.....

SECTION C. REPRODUCTIVE HEALTH STATUS OF WOMAN

I would like to ask you some questions about your reproductive health status.

How old you were at Menarche?
Age in years.....

How old were you when you married?
Age in years.....

How old you were at your first pregnancy?
Age in years.....

How many pregnancies have you had?
Specify.....

Have you ever had a miscarriage?
Yes 1 No 2
If yes, how many? Specify.....
.....

Have you ever had any terminations (abortions)?
Yes 1 No 2
If yes how many? Specify.....
.....

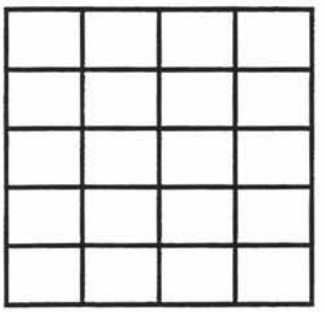
Did you have a miscarriage or termination immediately prior to this pregnancy?

- Miscarriage.....1
- Termination 2
- No.....3

How many living children do you have?
Sons..... Daughters.....

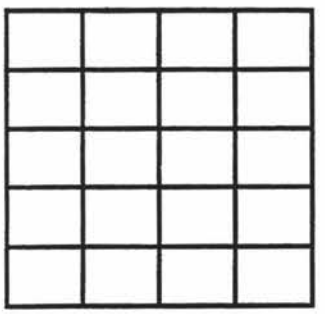
Have you lost any children post-natally (under one year of age)?
Specify

Age	Sex	Parity	Cause



For each living child please specify the vaccinations given.

Child	BCG	DPT	Polio	Measles
1				
2				
3				
4				
5				

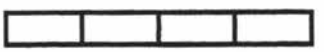


Specify reasons, if children did not receive complete doses of vaccinations?

.....

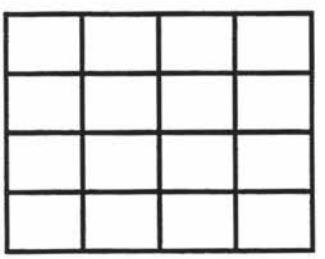
.....

.....



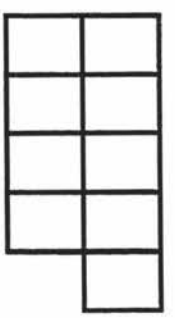
Have any children died between the ages of one and five years?
Specify.

Age	Sex	Parity	Cause



Have any babies been stillborn? Specify.

Child	Parity	Cause
1		
2		
3		
4		



Did you receive antenatal care (either, from hospital, private, doctor or midwife) during any of your previous pregnancies? [ ]

- Yes 1
- No.....2
- Can't remember.....3

Where did your previous deliveries take place? [ ][ ]
Specify place and parity .....
.....

.....

If at home, who assisted you during labour? [ ][ ]
Specify.....

If at hospital, who assisted you during labour? [ ][ ]
Specify.....

If delivered by doctor, state reasons..... [ ][ ]
.....

Did you visit Hospital or Clinic or Health post or District Hospital during your previous pregnancies? [ ]
Yes 1 No 2

If No, give reason: [ ]

- Very far from home..... 1
- Expensive for check-up 2
- Busy due to work at farm..... 3
- Did not know this was important..... 4
- Attitude of staff 5
- Had no health problem 6
- Value of services..... 7
- Other (specify)..... 8

Did you suffer from any complication during your previous pregnancies? [ ][ ][ ][ ]
Specify parity and complication:.....
.....
.....
.....

When did you first become aware of this pregnancy? [ ]

- Months1 to 3 (stopped menstruation) 1
- Months 4 to 6 (after quickening).....2
- Months 7 to 9 (after visible changes of abdomen).....3

How did you feel about this pregnancy? [ ]

- Glad.....1
- Scared.....2
- Worried.....3

If scared or worried, give reason..... [ ][ ]
.....

Did you receive antenatal care (either, from hospital, private, doctor or midwife) during this pregnancy? Yes 1 No 2

If yes, how often did you receive antenatal care (either, from hospital, private, doctor or midwife) during this pregnancy?
Specify.....
.....

How many months pregnant were you when you first saw a doctor / midwife for a prenatal check up on this pregnancy?
Specify.....
.....

If not, why did you not attend Antenatal clinic this pregnancy?

- Very far from home..... 1
- Expensive for check-up..... 2
- Busy due to work at farm..... 3
- Did not know this was important..... 4
- Attitude of staff..... 5
- Had no health problem..... 6
- Value of services..... 7
- Other (specify).....8

If you attended antenatal clinic at least once, which clinic did you attend?

- At private clinic..... 1
- At hospital clinic..... 2
- Health post (rural clinic)..... 3
- District Hospital..... 4
- Other (specify)..... 5

How long did it take you to get there?
Specify.....Hrs.....Mins.

How did you get there?
Specify.....

If you received care from a midwife, circle the answers that best describe how you feel about the care she provided.

	Disagree	Neutral	Agree
She handled me gently	1	2	3
She was patient	1	2	3
She was polite	1	2	3
She gave me some helpful information	1	2	3
She handled me roughly	1	2	3
She was impatient	1	2	3
She was rude	1	2	3
She gave me no information	1	2	3

Would you have preferred to see a doctor rather than a midwife? Yes 1
No 2

If yes, why would you have preferred to see a doctor during your pregnancy? (Circle those applicable)

- Kinder..... 1
- Gentler..... 2

- More patient 3
- More helpful..... 4
- More skilled 5
- More knowledgeable 6
- Other (specify)..... 7

Did you receive advice during this pregnancy from any of the following people? (Circle those applicable)

- Mother 1
- Grandmother 2
- Mother in law 3
- Traditional birth attendance..... 4
- Traditional healer..... 5
- Friend 6
- Other (specify)..... 7

Specify reason and purpose of advice .....
.....
.....

Did you see a doctor in this pregnancy?
Yes 1 No 2

If you received care from a Doctor, circle the answers that best describe how you feel about the care he/she provided.

	Disagree	Neutral	Agree
Handled me gently	1	2	3
Was patient	1	2	3
Was polite	1	2	3
Gave me some helpful information	1	2	3
Handled me roughly	1	2	3
Was impatient	1	2	3
Was rude	1	2	3
Gave me no information	1	2	3

Did you wait for a long time before being seen?
Yes 1 No 2

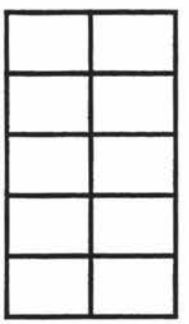
If yes, what was the length of time you had to wait for?
Specify.....Hrs.....Mins

To what extent do you agree with the following statements regarding your attitude to attending clinic during pregnancy? (Circle the best answers).

	Disagree	Neutral	Agree
It is unnecessary	1	2	3
It is a waste of time	1	2	3
It is too expensive	1	2	3
It is unhelpful	1	2	3
It is necessary	1	2	3
The time is not wasted	1	2	3
It's not too expensive	1	2	3
It is helpful	1	2	3

What changes in the clinic service would you like to see that would make you attend more regularly? (Circle the best answers).

	Disagree	Neutral	Agree
Cost	1	2	3
Waiting time	1	2	3
Location of clinic	1	2	3
Time for attendance	1	2	3
Doctor attitude	1	2	3
Midwife attitude	1	2	3
Value of service	1	2	3

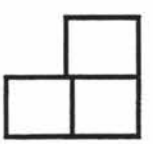


If other specify.....

Have you **ever** used a contraceptive method for birth control?
Yes 1 No 2

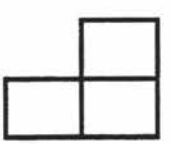
Did you use a contraceptive method prior to this pregnancy? Yes 1
No 2

If yes, what method did you use? Specify.....

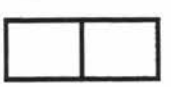


Have you used a contraceptive on mutual agreement with your husband?
Yes 1 No 2

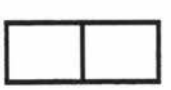
If no, specify reason.....



How often did you use this method?
Specify.....



Why did you use this method?
Specify.....



Where did you get the contraceptive device?
Specify.....

THANK YOU FOR YOUR TIME AND COOPERATION IN THIS STUDY

OUTCOME QUESTIONAIRE (INFORMATION GATHERED FROM PATIENT RECORDS)

Code No.....
(must match personal schedule)
Date completed.....

Name of field worker.....

Section A

Gravida.....

Parity.....

Gestation according to dates.....

If more than one pregnancy: birth spacing, dates of birth and pregnancy outcomes.

Year of Birth						
Normal Vaginal						
CS						
Instrumentes						
Full Term						
S.B.						
Neonate Death						
Alive						
Misc						

Present weight gain check list .

Time	Weight
Preconception state	
4 weeks	
8 weeks	
12 weeks	
16 weeks	
20 weeks	
24 weeks	
28 weeks	
30 weeks	

Time	Weight
32 weeks	
34 weeks	
36 weeks	
38 weeks	
40 weeks	

Height.....cms

Comments.....
.....
.....
.....

Present condition of mother and child.

- Born before arrival 1
- In labour..... 2
- Elective C.S. 3

This appendix has been reduced for formatting purposes

Section B
Vital signs on admission

Temperature

- Normal limits.....1
- Pyrexia (> 38 degree C or 100.4 dgree F.....2
- No data.....3

Blood Pressure
Specify.....

Haemoglobin: Specify.....

Rhesus group

- Negative 1
- Positive.....2
- No data.....3

Veneral Disease Research Laboratory

- Negative 1
- Positive.....2
- No data.....3

Abdominal Examination

Date palpation discrepancy

- Normal.....1
- Greater than dates 2
- Lesser than dates.....3
- No data.....4

Presentation

- Cephalic/ vertex.....1
- Breech.....2
- Shoulder.....3
- No data.....4

Number of foetuses
Specify.....

Previous Caesarean Section

- Yes 1
- No.....2
- No data.....3

Amount of Liquor (amniotic fluid) present

- Oligohydramnius 1
- Normal.....2
- Polyhydramnios.....3
- No data.....4

Fetal Heart Rate
Specify.....
Presence of disease affecting pregnancy.

- Cardiac disease..... 1
- Diabetes Mellitus..... 2
- Hypertention..... 3
- Renal disease..... 4
- Nil..... 5
- Jaundice..... 6
- Other (specify)..... 7

Obstetric Conditions affecting pregnancy

- Placenta Previa (APH)..... 1
- Placenta Abruptio..... 2
- Eclampsia..... 3
- Anaemia..... 4
- Nil..... 5
- Hyperemesis..... 6
- Other (specify).....7

Section C: (If elective Csection, do not fill in Section C)
Maternal and Fetal condition during active first stage and completion of second stage labour

Maternal Condition
Temperature

- Normal limits.....1
- Pyrexia (> 38 degree C or 100.4 degree F).....2
- No data.....3

Blood Pressure
Specify.....

Type of Labour

- Spontaneous..... 1
- Induction..... 2
- Caesarean section in labour..... 3
- Other (specify)..... 4

If induction:

- Oxytocin (Syntocinon)..... 1
- Artificial rupture of membrane..... 2
- Epidocin..... 3
- Other (specify)..... 4

How did labour progress?

Length of labour	Hours	Minutes
1st stage		
2nd stage		
3rd stage		
Total duration		

Duration of rupture of membrane
Specify.....Hrs.....Mins

Perineal Condition

- Intact.....1
- Laceration.....2
- Episiotomy.....3
- Tears.....4 .....degree
- No data.....5

Comments.....
.....

Blood Loss

- Average.....1
- Post partum Haemorrhage.....2
- No data.....3

Comments.....
.....

Placenta

- Incomplete.....1
- Complete.....2
- Abnormality (Specify).....3

Medication taken during labour:
Specify.....
.....
.....
.....

Fetal Condition

Sex of baby
Male 1 Female 2

Fetal heart rate
Specify.....

Liquor (amniotic fluid)

- Clear.....1
- Meconium-stained.....2
- No data.....3

Type of delivery

- Normal vaginal delivery.....1
- Vacuum extraction.....2
- Forceps.....3
- Caesarean section in labour.....4
- Caesarean section: Elective.....5
- Vaginal breech.....6

- No data..... 7

Section D
Maternal and neo-natal conditions after delivery prior to discharge or while in the post-natal ward

Maternal Condition

Temperature

- Normal limits.....1
- Pyrexia (> 38 degree C or 100.4 dgree F.....2
- No data.....3

Blood Pressure
Specify.....

Haemoglobin
Specify.....

Leg venus thrombosis or embolism

- Yes 1
- No.....2
- No data.....3

Primary Post partum haemorrhage
Yes 1 No 2

Mother alive
Yes 1 No 2

Any other complications (e.g. haematoma)?
Specify.....

Post partum tubal ligation
Yes 1 No 2 No data 3

Condition of Breasts
Well secreted 1 Not secreted 2

Condition of Nipple
Inverted 1 Normal 2 Flat 3 Bifid 4

Chosen feeding method
Breast 1 Bottle 2 Combination 3

State of Uterus
Well contracted 1 Lax 2 Tending to relax 3

Neonatal Condition

Alive at birth
Yes 1 No 2 No data 3

If not alive:

- Still birth 1
- Intra Uterine death 2

- Other (specify) 3

APGAR score at one minute
Specify.....

APGAR score after five minutes
Specify .....

Resuscitation required
Yes 1 No 2

Birth weight
Specify.....gms

Birth length
Specify.....cms

Head circumference
Specify.....cms

Comments.....
.....

Gestational age
Specify .....Wks

Birth injury present

- Yes 1
- No.....2
- No data.....3

If yes, specify.....
.....

Congenital abnormalities

- Yes 1
- No.....2
- No data.....3

If yes, specify.....
.....

Discharge with mother
Yes 1 No 2 No data 3

END

APPENDIX FOUR

APGAR SCORE

APGAR score is used to assess the condition of babies immediately after their birth, within one minute and five minutes after birth. The APGAR score determines the need for resuscitation.

APGAR Scoring

Sign	0	1	2
Heart rate	Absent	Below 100 beats	Above 100 beats
Respiratory effort	Absent	Minimal, weak cry	Good, strong cry
Muscle tone	Limp	Some flexion of extremities	Active motion of Extremities, well flexed
Reflux irritability (response to stimulation on sole of foot)	No response	Grimace	Cry
Color	Blue or pale	Body pink, extremities blue	Pink

Source: Nichols & Zwelling (1997). Maternal- newborn nursing: Theory and practice (1997, p.1083)

This appendix has been reduced for formatting purposes