CHAPTER II
LITERATURE REVIEW AND RESEARCH DESIGN

2.1 LITERATURE REVIEW

In this section, a systematic analysis of the studies conducted on issues of maternal and child health services has been made. An analysis of these works will not only be instrumental in providing a conceptual framework to the present study but it will also help in identifying the important variables related to research in this field. A number of scholarly works have argued that the problem of health services can be divided into two factors: demand factor and supply factor (conceptual framework). On the demand side, societal, cultural, economic and individual factors (like education, income, status of women, individual attitude and promptness to seek health services, family size, sex preference and nature of socio-cultural setting etc) influence the demand and utilization of maternal and child health services. And on the supply side, management of adequate, affordable and qualitative services are most essential to encourage people to utilize maternal and child health services. The literature on maternal and child health services has been reviewed.

In the conceptual framework it is assumed that utilization of maternal and child health services could be determined broadly by demand side and supply side. Thus, in this section the review of literature is arranged accordingly.

2.1.1 Demand Side Factors

Demand side includes the variables such as education, income, occupation, women decision-making power, women’s status, knowledge about health centre/MCH, chance of exposure, age of women, parity/order of birth, family size, ethnicity, culture/tradition, health beliefs and need etc. Identifying such factors may be important in recommending policy implications to improve maternal and child health
services. Numerous research studies in developing countries have demonstrated consistent relationships between these factors (education, income, occupation, women status, age, parity or birth order, family size, ethnicity etc) and use of maternal and child health services.

1. Education

A number of researchers have pointed out that women’s education is positively associated with the utilization level of maternal and child health services. It is argued that better educated women are more aware of health problems, know more about the availability of health care services, and use this information more effectively to maintain or achieve good health status. Mother’s education may also act as a proxy variable of a number of background variables representing women’s higher socioeconomic status, thus enabling her to seek proper medical care whenever she perceives it necessary. Chowdhury et al. (2003) found that educated women were more likely to seek treatment from doctors/nurses than women who were not educated in Bangladesh. The results of their multivariate analysis showed that women with secondary or higher education were almost 1.8 times more likely to seek treatment from doctors/nurses to treat their antepartum morbidities than the women who were not so. Caldwell (1986) and Cleland & van Ginneken (1988) also found that the utilization level of biomedical services was higher among more educated women in comparison to women who were not so in developing countries. According to them, educated women could be better able to manage economic resources in better way and they could be relatively aware too about their social and economic rights and thus, could have greater autonomy and decision-making power in their household activities. As a result, educated women would have greater control over their economic resources and could demand satisfactory services from health practitioners and have greater control over these resources.

Similarly, a study in Peru using DHS data, Elo (1992) found that mother’s education was a strong significant factor affecting the use of prenatal care and delivery
assistance. In another study, Becker et al. (1993) found that mother's education as the most consistent and important determinant of the use of child and maternal health services in Metro Cebu, Philippines. Costello et al. (1996) also found the same impact of education in another study in Philippines.

In a study using data from Ghana Demographic and Health Survey 1993 in Ghana, the result of multivariate analysis showed that women with no education and primary/junior school education were less likely to consult a doctor for prenatal care. Similarly, the odds of seeking antenatal check-ups were also lower among women with no education compared with their counterparts with secondary/higher education (Addai, 2000).

Pavalavalli and B.M. had analyzed the data of Indian National Family Health Survey (1992-93) and reached similar conclusions that point towards the positive and significant influence of mother’s schooling on maternal-care utilization. According to them, education emerges as the single most important determinant of maternal health-care utilization in India when the influence of other intervening factors was controlled. For example, educated women with at least middle schooling were nearly eight times as likely to receive antenatal care for their births as illiterate women, and literate women with less than middle schooling were more than three times as likely. The pattern was similar for utilization of the other maternal health-care services.

Mother's education was also found even a powerful, positive, and significant predictor of the utilization of child health-care services in India. Children of mothers with at least a middle-school education were 62 percent and 45 percent more likely to be taken to a health facility for treatment of ARI and diarrhoea, respectively, than children of illiterate mothers. The difference in utilization of child health-care services was not as strong when we compare children of illiterate mothers with children of mothers who were literate with less than middle-school education (Pavalavalli and B.M., 1997).
In a study from rural areas of Rajasthan in India, Mishra (2000) also found that educational level of women and husband education had positive and significant effect on the utilization of maternal and child health services. For example, the utilization level of antenatal care service increased by 121.77 percent and 35.37 percent respectively with one-unit increase in women’s and husband's level of education. The utilization of TT injection of pregnant women was increased by 27.07 percent and immunization of children by 1.63 percent when husband's education level increased by one-unit (Mishra, 2000). In a study based on data from NFHS-1 India, indicated that the utilization of maternal health services was greatly affected by women’s education in both north and south India (Govindasamy and Ramesh, 1997). Mother’s level of education has a large positive effect on the odds of institutional delivery in Andhra Pradesh in both NFHS-1 and NFHS-2. With all the other predictor variables controlled, the odds of institutional delivery are two to three times higher for mothers with middle school or higher education than for illiterate mothers (Sugathan and friends, 2001).

Other researchers found also in India that women's educational level was positively correlated with the use of safe delivery care and the effect was significant. They stated that with one-unit increase in women’s educational level, the utilization level of trained attendant was doubled (Bloom, Lippeveld, and Wypij, 1999). Sunil et al. (2005) observed the relative effect of women and their husbands’ education on use of maternal care services in rural India using data obtain from National Family Health Survey -2. They did not only find positive significant relative effect of spousal education on use of maternal care services, but also found impact of women education was higher in comparison to their husbands’ education.

As elsewhere, in Nepal, mother's education is found positively correlated with the use of maternal and child health services. This gets revealed from the fact that ninety-five percent of women with a school-leaving certificate and above received antenatal care services, compared with 39 percent of women with no education. Use of a doctor for antenatal care increases from 10 percent among uneducated women to sixty-six
percent among women who have completed their SLC. Only 57 percent of children of mothers with no education are fully immunized as compared to 91 percent of children whose mothers have completed an SLS or above (New Era, and Ministry of Health of Nepal, 2001). In an individual study, Joshi found that mothers with schooling were more active seekers of health services, such as prenatal care and hospital delivery. These women were more competent providers of child care and they spent more time on child care (Joshi, 2001). Joshi stated that though antenatal care was freely available in the village, women with some schooling used it more than women with no schooling. Educated women used hospitals for delivery, though it was found clearly more difficult than making a prenatal visit to the clinic in the village (Joshi, 1994).

In a study on utilization of health services in Nepal, World Bank also reached similar conclusions. According to this study, the utilization of health services was higher for those whose education level was higher than those who were less educated. Increase in level of education of women and their husbands showed a trend towards increase in utilization of all health services including maternal and child health services (World Bank, 2001). Similarly, Dhungel (2002) and Sharma (2004) also found that education of women had a significant positive impact on use of antenatal care in Nepal. According to Dhungel’s findings, the odds of antenatal use were about 7 times higher among literate women in comparison to illiterate women while Sharma found the same 6 times higher for women whose education level was secondary and high than the women who were uneducated. Dhungel analysed the data obtained from 1997 Nepal Multiple indicator Surveillance (NMIS) Fifth cycle whereas Sharma utilized the data obtained from the survey of ‘Between Census Household Information Monitoring and Evaluation System (BCHIMES) 2000.

2. Economic factors (Income, cost living standard)

Many researchers have pointed out that economic factors may play important role affecting maternal and child health services. As an economic factor, measures of
income and wealth form important indicators determining the women’s capability to access pregnancy care. For instance, the odds ratio of adequate antenatal care was found 4 time higher for those women whose economic status was higher than the women whose economic status was lower in a research done in Nepal based on BCHIMES – 2000 (Sharma, 2004). Mondal analyzed the data of Rajasthan based on National Family Health Survey and found that the accessibility of utilization of antenatal services varied significantly in accordance with the woman’s standard of living or income. Mishra (2000) also found that husband with higher income preferred to take their wives to the private clinic for the maternity care in Rajasthan. The result of a recent study in India based on National Family Health Survey-2 data showed the positive and significant effects of standard living index in the utilization of maternal health care services in rural India. For example, the percentage of odds of excellent utilization of maternal care services was found to be about 20 percent of women who belonged to high standard living index as compared to 10 percent for women who belonged to low standard living index (Sunil et al., 2005).

Chowdhury et al. (2003) found in rural Bangladesh that women from families with good economic condition were more likely to receive treatment from a doctor or nurse. However, the positive impact of higher economic status on health care use was not found to be statistically significant. Type of housing, like occupation, can also be considered a proxy for socioeconomic status of the household and may have a similar impact upon the utilization of health care. The results indicate that women who belong to families with houses made of cement or tin were more likely to seek treatment from qualified medical personnel. About 29 percent of women living in pacca/tin houses went to doctors/nurses, compared to 27.4 percent who lived in rudimentary houses. However, the differences were not found to be statistically significant. They also found that women’s involvement in gainful employment was one of the important factors positively affecting the use of quality medical care to treat complications. They argued that gainful employment may also empower women to take part in decision-making processes about health care in the family. Results from their study indicated that women who were involved in gainful employment
were more likely to use modern health care services to treat complications during their pregnancy. About 35.4 percent of women who worked for cash went to some qualified medical personnel for treatment, compared with only 25.3 percent of those who did not work.

Another research also found higher income (as measured by per capita consumption in the household) associated with a higher probability of visiting each kind of provider, but especially doctors. Unmarried respondents (who were primarily single or divorced) were much more likely than those who were married or in a consensual union to consult a pharmacist or doctor for their sick child in rural Guatemala (Goldman et al., 2002).

Study done by Gertler and Gaag (1988) in Cote d'Ivoire concluded that poorer women could not afford health services because of high fees. Similar result was found in Peru by the research done by Gertler (1988). As he concluded that fees deterred everyone from using health services, but deterred poor women most of all.

The cost of services also puts constraint on the utilization of maternal and child health services, particularly, in developing countries. As Goldman and Glei (2003) found that a large number of women in rural areas in Guatemala prefer to avail the services provided by midwives rather than going to the professional doctors. This is because the average fee charged by midwives was about ten times as low as the fee charged by doctors. Hence, lack of availability of money was a major deterrent to seeking medical help.

In Nigeria, a study found that the shift from free to fee-based services for obstetric care reduced admissions overall but significantly increased emergency cases. The number of maternal deaths rose correspondingly (Harrison (1997)).
3. Women's Decision-making Power

A number of studies pointed out that women decision making power is one of the factors that determines the utilization level of maternal and child health services in many instances. Such as World Bank found in a study of five districts in Nepal that women who discussed their health problems with their husbands were found more likely to use antenatal care, delivery and postnatal care services in Nepal (World Bank, 2001).

In a North Indian city study, women's role in household decision-making relative to their spouse and other family members may also affect their use of health services (Bloom, Wypij, & Das Gupta (2001).

In Ghana, a study of women who died of pregnancy-related complications found that 64 percent of the women had sought help from an herbalist, soothsayer or other traditional provider before going to a health facility. Families cited cost and the belief that the woman's condition would improve or that the woman was not ill enough to justify the cost involved, as the main reasons for not taking a woman to a hospital (Odoi-Agyarko et at. 1993).

In Nepal, mothers-in-law attend most deliveries, and additional care or help is sought only if the mother-in-law decides that such care is needed. One study found that 75 percent of mothers-in-law did not believe an antenatal check-up was necessary (Family Care International, New York, 1990).

A study in Nigeria found that in almost all cases, a husband's permission is required for a woman to seek health services, including life-saving care. If a husband is away from home during a delivery, those present are often unwilling to take the woman for care - no matter how pressing the need appears to be (Thaddeus and Maine, 1994).
Urassa, Massawe, Lindmark and Nystrom conducted a study in a medical centre in Tanzania, and found that women's mother or the husband were main decision-makers as to where a pregnant woman should go for care. The pregnant women have little power to decide about their own health care. If the decision maker is not at home during the time of the occurrence of illness, considerable time may be lost that may prove detrimental to the life of the pregnant women. Since women and family members often did not realize the seriousness of the illness, this led to delay at home or search for sub-optimal treatments so that valuable time was lost before the woman arrived at an appropriate health facility.

The household decision-making index (HDI), measured only for married women, was found to have a modest impact on seeking a provider in rural Guatemala. Higher levels of decision-making authority were associated with a greater probability of consulting a pharmacist and a doctor and a lower probability of consulting "other" providers, but only the last association was statistically significant. Co-residence or proximity to parents or parents-in-law was also found affecting the likelihood of seeking health providers. Women who have at least one parent or in-law nearby were considerably more likely than their counterparts to treat their children's illnesses at health posts or centers. Those who had at least two nearby, were also much more likely e.g., almost four times as likely as other women to consult a curer (Goldman, 2002).

4. Chance of Exposure

Many researchers emphasized the positive role of any kind of exposure i.e. exposure to external institutions either through direct or indirect contact or through media. They argued that any kind of exposure, particularly media may enable women to be aware about availability of health services, its benefit and even to information regarding providers, and in some cases even financial and material assistance, which increases their use of modern medicine during pregnancy. According to Goldman et al, social contacts outside their community in Guatemala (e.g., in larger urban areas
or abroad) increase the likelihood that women hold biomedical beliefs about illness causation (Goldman et al. 2001b). According to Becker (1993), women’s exposure to electronic media could be a positive factor to raise the utilization level of maternal and child health services. In Philippines, he found a significant difference in use of antenatal care among women who were exposed to radio and TV and who were not so.

Some research works done in India also indicated the same role of women’s exposure to media. Such as Sugathan et al (2001) analyzed the data of India NFHS – 2 and found that mother’s exposure to media had positive effect on the odds of institutional delivery in Rajasthan. The odds ratio of institutional delivery was two times higher for mothers with exposure to media than for without exposure to media. Another finding of Indian data based on NFHS 1992-93 also concluded the same. This finding found that exposure to mass media (watching TV and listening to radio) had significant effect in both Andhra Pradesh and Karnataka for the use of antenatal care. Women with high degree of exposure to mass media were more likely to have received antenatal care by 1.9 times in Andhra Pradesh and 1.6 times Karnataka than those with no or low degree exposure (Navaneetham et al. 2000). The recent study done by Sunil et al. (2005) by using data of National Family Health Survey -2 found that women’s mass media exposure was a positive and significant factor affecting the utilization of maternal care services in rural India. According to them, the percentage of utilization of maternal care services was about 19 percent almost a double for women who were exposed to media than the 10 percent of women who were not exposed to any medium of mass media.

Similarly, Shariff and Singh (2000) also emphasized the important role of women’s exposure to media on maternal health services. According to them, the utilization level of maternal health services was significantly higher for those women who were listening to the radio and watching TV in India even if controlling their education and their husbands.
In a comparative study done by Obermeyer (1993) it was found that the antenatal use of the pregnant women was positively associated with their exposure to media than of those who were not so in Morocco and Tunisia.

The findings of some studies carried out in Nepal also found the positive association between the utilization level of maternal health and child health service and exposure to media. Such as Gubhaju and Matsumura (2001) argued that utilization level of maternal and child health services could be higher among people who are exposed to media. Exposure to media may help to create awareness among people about availability of maternal and child health services as well as its importance. Similarly, Sharma (2004) found that the impact of listening to the reproductive health radio programme (cut your coat according to your cloth) and watching TV for antenatal care was positive and significant. According to him, the odds ratios of attendance of some and adequate antenatal care were increased by 44 percent and 28 percent for women who were supposed to listen to the reproductive health radio programme whereas the same were increased by 56 percent and 60 percent for women who were supposed to watch TV at least once a week as compared to women who did not watch TV.

5. Women's Age and the Parity of Birth

The findings of some studies revealed that women's age is negatively associated with the use of maternal and child health services. For example, Sundari believed that older mothers may ignore seeking maternity care as they may feel it is unnecessary to seek antenatal care, especially if their earlier pregnancies were problem-free. It may not only result from lack of time and money but due to lack of motivation on part of the women to seek health care services (Sundari, 1992). In Nepal too younger women were more likely to use antenatal services, to receive tetanus injections, to receive assistance from doctor during delivery than older women. For example, two-thirds of mothers below the age of 20, received one or more dose of tetanus toxoid injections as compared to one-third of mothers’ age of between 35-49 years. Dhungel (2002)
and Sharma (2004) also found in their research works that younger women were more likely to receive antenatal check-up than the older women in Nepal. Dhungel found that the proportion of antenatal check-up is 2:1 for age of women below 35 and above 35. While Sharma found that the odds ratios of antenatal check-up for women in age group 15-19, 20-24, 25-29 and 30-34 were 2.4 times, 1.7 times, 1.8 times and 1.7 times higher than the women in age group 35 and above. Their research work was based on data obtained from Nepal Multiple Indicator Surveillance (NMIS) 1997 Fifth Cycle and Between Census Household Information Monitoring and Evaluation System (BCHMES) 2000 respectively.

Similarly, in a study located in Uttar Pradesh India, Bloom, Lippeveld and Wypij found that younger age and with no previous births women were more likely to use safe delivery care. Contrary to it, Heidi et al (2006) found that women aged 18 or younger were less likely than women aged 19–23 to use either antenatal care or delivery care, or both (odds ratios, 0.5–0.9). Younger mothers in six countries were less likely than older mothers to have their infants immunized, particularly for diphtheria, pertussis and tetanus and for measles (0.5–0.8). The association of age and health care use was largely limited to Bangladesh, India, Indonesia, Nicaragua, Peru and Uganda.

But in another research in India based on NFHS-2, the effect of mother’s age was found to be a strong statistically significant positive factor (Sugathan, 2001; Sunil et al., 2005). For instance, the odds ratio of institutional delivery was 3 times higher in Andhra Pradesh among mothers who were in age group of 25-29 years than those mothers who were in age group of 15-19 years. Whereas the odds ratio was 3.4 times higher in Bihar among mothers who were in age group of 30-49 years than among those mothers who were in age group of 15-19 years (Sugathan, 2001). While Sunil et al. (2005) found that the excellent utilization of maternal care services was 15 percent for women in age group of 30 and above, in contrary to about 10 percent for women in age group less than 19 years.
The effect of higher child birth order was found negative on seeking maternal and child health services in India (Navaneetham, 2000; Sugathan et al, 2001; Sunil et al., 2005). For example, the odds ratios of institutional delivery were three to four times in Andhra Pradesh, 3 times in Gujarat, 3.8 times in Bihar and 3.4 times in Rajasthan as high for first-order births as for fourth or higher-order births (Sugathan et al. (2001). The probability of a woman receiving antenatal care was reduced by 60 percent to the order of birth 4 and above as compared to births of second order, but there was no difference in the likelihood of obtaining antenatal care between first and second order births (Navaneetham, 2000). The percentage of excellent utilization of maternal care services was decreased to 6.5 percent to the order of birth 5 and above from 21.8 percent to the birth order 1 (Sunil et al., 2005).

The result of Demographic Health Survey 2001 of Nepal also indicates the same effect of order of birth on use of maternal health services in Nepal. It shows that mother with lower parity were more likely to use antenatal services, to receive tetanus injections, to receive assistance from doctor during delivery as compared to high parity women. For example, more than 71 percent of first and second order births were fully immunized as compared to only 54 percent for sixth and higher order births in Nepal (New Era, and MOH, 2001).

6. Family Size

Mishra observed large family size as a negative factor influencing the utilization of maternal and child health services in rural Rajasthan. According to the researcher, the probability of receiving TT Injection by pregnant women decreases by 32.78 percent when family size increases. Similarly, the effect of family size was found negative and significant on child immunization, which decreases by 22.21 percent when there is one unit increases in family size (Mishra, 2000). Like large family size, joint family was found as a negative factor on use of maternal care services in another study in rural India base on data obtained from National Family Health Survey-2. For instance, the excellent utilization of maternal care services was 11.6 percent for women
who belonged to the joint family whereas the same was 13.3 percent for women who belonged to the nuclear family (Sunil et al., 2005). World Bank also revealed that in Nepal, women from nuclear families were more likely to use antenatal care and postnatal care services than women who belonged to the joint family (World Bank, 2001).

In a research based on rural Bangladesh, the relative effect of large family was found negative on use of maternal health services. For example, women who belong to family with 3 or less than 3 members were 1.8 times more likely to receive treatment from qualified medical personnel, i.e. a doctor, nurse or FWV than the women who belong to family with 4 to 6 members. It was found that there was much higher on use of traditional and other health services between two family sizes i.e. about 8 times higher in family with 3 or less than 3 members than in family with 4 to 6 members (Chowdhury et al, 2003). In one study carried out in Philippines by Wong et al., found the same negative effect of large family size on health service utilization. They reasoned that larger family size might have resource constraints to utilize health services comfortably as compared to smaller family size (Wang et al., 1987).

7. Ethnicity, Socio-Culture and Tradition

Some researchers claimed that the health seeking behavior of people might be influenced by their ethnicity and cultural and traditional beliefs. In some communities, pregnancy is considered as a private issue and talking about it openly is considered as a taboo. In these societies the introduction of biomedical facilities to provide prenatal care is often met with indifference. They take pregnancy and birth a normal biological process and biomedical intervention is seen an unnecessary, irrelevant, or even dangerous.

Even in a developed country like America, maternal mortality widely differs due to ethnicity. In a research, it is found that the risk of maternal death for African American women is four times greater than for white women (Maine, 1997).
Formal health services can conflict with cultural norms surrounding childbirth, including preferences for privacy, modesty and female attendants. Among Saraguro Indians in Ecuador, hospital-based deliveries are perceived to violate privacy, many health providers are men, which is unacceptable culturally, and birth preparedness preferred by providers are not those preferred by women in labour. As a result, affordable and accessible maternal health services are under-utilized (Leslie, 1989).

In Papua New Guinea, and particularly among Angal Heneng, population cultural taboo is very strong that prevents women to seek maternal and child health services. According to prevailing cultural taboo, the Angal Heneng-speaking woman is expected to deliver alone (Townsend, 1985). This is due to the fact that in this community woman's blood is considered dangerous and contact with her blood is believed to result in illness or death. Other village women are not willing to assist one another in labour or delivery for fear of becoming contaminated. Also conception and pregnancy are forbidden topics of discussion between men and women and a source of embarrassment even between women themselves. Congenital defects are believed to be caused by a cultural violation by the mother, and twins are often attributed to maternal adulterity. Killing of such infants at birth is a common practice (William, 1991). Such kind of traditions or cultural taboos may have a significant negative effect on the utilization of maternal and child health services. However, in Papua New Guinea, because of the efforts of the local churches and government effort, the percentage of Angal Heneng women who attended antenatal care is found to be increased.

Even in some communities in Nepal, in some society, there is a ritual practice of untouchability period during which contact with the mother and/or infant is avoided, which may hinder people to seek postpartum services for mother and child. The majority of maternal deaths (62 percent) in Nepal occurred during the postpartum period, particularly in the seven days immediately following the birth. Twenty-eight percent maternal deaths occurred during childbirth (Safe Motherhood Newsletter/Nepal, 2003). A maternal mortality and morbidity study of Nepal found
that out of 93 direct maternal deaths more than 46 percent were due to postpartum haemorrhage with or without retained placenta. Out of 46 percent, nearly one quarter died within 2 hours of the birth of the baby (MOH of Nepal, 1998). Because of male dominant culture and lack of women empowerment in Nepal, majority women are forced to depend on their husbands or mothers-in-law consent to get treatment or utilize the health services.

Moreover, pregnancy is considered a normal part of life. Thus, most family members or pregnant woman herself do not think there is a need for antenatal care. Usually, pregnant woman labors alone at a designated birthing place.

In a community-based retrospective study of a remote area of Nepal, Jumla district, it was found that approximately 50 percent of children are born in an animal shed without an assistance of anyone. It is so because the prevailing traditional norms and beliefs of that community are such. It was believed that household deity would be angry if delivery takes place at home and it would be easier to clean the shed following the birth. Such traditional value places women in situation of high risks. Giving birth in an animal shed is even more risky both for the mother as well as the child than giving birth at home. A study revealed that children born in an animal shed were at significantly higher risk of dying than those born at home even adjusting for socio-economic status and biological variables. The association was stronger in the neonatal period (OR=2.8, 95% CI 1.9-4.1) than during the post-neonatal period (OR=1.3, 95% CI 1.02-1.6). It was obvious that the preparation of the delivery place was inadequate and thereby facilitated infection of both the newborn and the mother (Thapa, 2000).

Similar traditions and norms are found in other communities of Nepal. Thapa found in Bajura district that no one, not even family members, touches a woman during and for several weeks after delivery. According to him, a mother with her newly born baby should be confined to a cow-shed (hence the term gotha basne) and must look after all the details of birth herself, including cutting the umbilical cord. Not even the
local traditional birth attendants (TBAs) touch these women during the 'polluted
days'. They believe that "God will get angry if we touched the polluted women". He
further added that a woman with three children told him that "at the time of giving
birth and for quite some time afterwards, we are treated even by our own Jati (that is, women) worse than the dead animals; no one touches us." She expressed her
discontent by recalling that "at least the sick animals get care from their owners
(Thapa, 1996)."

It is generally believed that the demographic behaviour of members of ‘socially
backward’ communities such as scheduled caste and scheduled tribes are different
from that of other communities. But Navaneetham, (2000) found in a research that
caste was not a differentiating factor for the use of antenatal services and TT vaccine
in all three states of India. However, it was found to be an important factor for
institutional delivery: women belonging to scheduled castes and tribes were less
likely to have their babies at hospitals than other caste women, particularly in
Karnataka and Tamil Nadu. In Andhra Pradesh there was no difference between
schedule castes and other caste groups in institutional delivery of births.

Elizabeth and others found that in Bangladesh because of socio-cultural factors,
pregnant women's mobility is restricted. This clearly reflects the lack of autonomy of
women and may have important implications limiting the access of women to medical
services (Elizabeth, 1995).

Similarly, in a conference, which was held on 12 March 2002 in Jakarta about
Maternal Deaths, participants identified social, cultural, and religious factors that may
contribute to the high incidence of maternal deaths in Indonesia. For example,
traditional Islamic beliefs play a role in shaping the Indonesian perception regarding
childbirth. Many Indonesians believe that because pregnancy and childbirth are
natural processes, a mother who dies will go straight to heaven because she is a
shahid (heroine). It means, people may not perceive pregnancy as a special case and
seek for antenatal and postnatal services for safe motherhood in general.
In Benin, the government put significant pressure on women to have institutional deliveries, including fines. Still, many women continued to deliver at home, due to the honour brought to families if they were seen as "stoic" during labour and childbirth (Sargent, 1985).

Some researchers believe in cultural perspective on use of available maternal and child health services. According to them, only physical illness of individual does not determine to seek medical treatment, but it also determined by his or her cultural perception of illness. The rational behind this concept is that individuals may perceive some illness as a minimal seriousness or they may consider such conditions to be normal based on their cultural understanding and experience of that condition (Azevedo et al., 1991; Davis-Roberts, 198). According to World Bank, individual's perception of health threat, especially among pregnant women and children, tends to be culturally relative (World Bank, 1994). Sergent (1982) also pointed out the same as proposed by the World Bank. In a study based on the response of parents to childhood diseases in the Nigerian Yoruba community, Adetunji (1991) it was found that mothers used alternative sources of health care rather than hospitals (Biosocial Science Article 366 Maternal–child health services in Ghana 3 clinics and maternity centres). The study reports that parents' perception of the seriousness of a condition and the religious beliefs of mothers were important determinants in their health-seeking response.

8. Factors Associated with Need and health beliefs

Various researchers have stated that women's pregnancy status and pregnancy outcomes may also play a vital role in influencing the utilization of maternal health services. Such as Bhatia and Cleland (1995) found that a history of a higher rate of foetal loss and neonatal death rate were positively related to the utilization of maternal health services in south India. Similarly, Chowdhury et al. (2003) have also found having high risk diseases or life-threatening conditions as most important positive factors on use of maternal health services in rural Bangladesh. According to
their findings, women who had a life-threatening condition were found to be 2.2 times more likely to seek treatment for their maternal morbidities from a doctor or nurse than those women who did not have risk or less risk condition.

Mothers' health beliefs about the causes of the child's illness affect the likelihood of seeking a provider, particularly doctors and curers. Children with illnesses for which mothers' beliefs were related to hygiene were more likely to see a doctor, while children with illnesses which mothers think were due to folk causes were more likely to see a curer, as compared with their counterparts holding different beliefs. Other types of health beliefs - such as the highly prevalent beliefs related to eating or to hot–cold typologies as causes of illness - were not related to the likelihood of consulting different providers (Goldman, 2002).

9. Ecology

Wiley (2002) pointed out that high level of antenatal use in Ladakh, India was because of its ecological context and particular culture. According to him, pregnancy in Ladakh is affected by the ecology context. He stated that ecological context is important here because the hypoxia associated with Ladakh's high altitude (generally over 3000m) places unique stresses on maternal and foetal health. Such kind of evident was also found in American Mountain regions. Particularly, because of hypoxia, there use to be risk in maternal and child health due to reduced birth weight. But in contrast, the few studies in Tibet and Nepal have indicated only a slight reduction in birth weight at high altitude, and Tibetans are the heaviest of the high altitude new-borns that have been measured to date (Moore, 1990; Smith, 1997; Zamudio et al., 1993).

10. Residence of the Respondents

As access to and availability of health care services is expected to be greater in the urban areas, we would anticipate higher use among women in urban areas than among
those in rural areas. However, surprisingly we found that women in urban areas were about 50 per cent less likely to have received antenatal care than those living in rural areas in both states (Navaneetham, 2000). The analysis carried out by Govindasamy and Ramesh (1997) for south India as a whole showed that there was no significant difference between rural and urban woman in receiving antenatal check up even without controlling for other important confounding variables (eg. childhood place of residence).

11. Antenatal Service Taken

Mekonnen conducted a survey in which he stated that in the southern Ethiopia that the probability of a woman having received antenatal care was higher for women with only one birth in the last six years (0.23) as compared to women with two (0.17) and three (0.139) births during survey period. (Mekonnen, 1997).

In a study based in NFHS-1, it is found that the odds of institutional delivery were 4.5 times higher in Andhra Pradesh, 2.8 times in Gujarat, 3.5 times higher in Bihar and 4.7 times higher in Rajasthan among mothers who received antenatal check-ups than among mothers who did not, even after controlling for a number of potentially confounding variables (Sugathan and friends, 2001).

12. Knowledge about health centre/MCH

As Mishra (2000) claimed that knowledge about health centre near by residence of the respondents may also have positive and significant affect on the utilization level of maternal and child health services. He stated in his research that the utilization level of antenatal care service was increased by 265.4 percent, institutional delivery by 143.61 percent and child immunization by 17.04 percent of those women who have knowledge about primary health care in comparison to those women who have no knowledge about that (Mishra, 2000).
2.1.2 Supply Side Factor

It includes the literature related to accessibility and availability of service outlets from any sources in any types and quality services. In this present study, an attempt is made to observe the relative effect of supply side in utilization of maternal and child health services through variables like distance of health institution or service outlets and home visit of health workers.

1. Availability of Health institutions in the Community

In a study based on NFHS-2, availability of a hospital within 5 km by the residence has positive and statistically significant effect in Rajasthan for institutional delivery as the odd of that was 2 times higher for mothers who were within a distance of 5 kms from a hospital than for mothers who were not (Sugathan and friends, 2001).

The availability of health care was found significantly affecting the likelihood of consulting specific providers for child treatment in rural Guatemala. Such as parents were more much likely to take sick children to health posts and centers when there was a post or center in the community. Similarly, parents were much more likely to consult a private doctor if there was one in the community. Specifically, availability of physicians was associated with a decreased likelihood that families consult a curer. In addition, the presence of a private physician was associated with a reduced probability of visiting a health post or center, and vice versa (Goldman, 2002). Sharma (2004) also reached to the same conclusion that access to the health service is a positive factor on the use of antenatal care in Nepal. According to him, the expected odds of attending adequate antenatal care visit was increased by 89 percent in comparison to those women who had no access to health services.

But Becker et al. (1993) found in Philippines that the impact of access to health services such as physical access to care, travel time to health facilities were less important.
2. Role of a Health Worker

Health workers play a vital role in Nepal to make services available to the community in the neighbourhood. Because of such kind of provision, people need not travel to health centre for the treatment and this consequently increases utilization of health services. According to Acharya and Cleland, the effect of outreach workers on uptake of antenatal services was so pronounced in Nepal that it made pregnant women to receive four to five times more antenatal care than in their absence. But for child immunization, the relationship between outreach activities and coverage was less strong. Acharya and Cleland’s study had appreciated the contribution of village health workers for making maternal and child health services accessible particularly for women. By contrast, the influence of community health volunteers on health service use was found minimal (Acharya and Cleland, 2000).

Similarly, the chance of receiving TT Injection by pregnant women was increased by 143.6 percent and the institutional delivery by 193.1 percent when a health worker visited a pregnant woman in comparison to no visit at all. The level of child immunization was increased by 323.16 percent in rural areas of Rajasthan when a health worker visited the pregnant women in comparison to no visit at all. It shows that the role of health worker is extremely important to raise the utilization level of child immunization (Mishr, 2000). Dhungel also found that the presence of trained TBA in the society is a positive factor on use of antenatal care visit in Nepal. According to him, the proportion of antenatal check-up was increased to 23 percent from 19 percent among women who were in the community of presence of TBAs than the women who were in the community without TBAs (Dhungel, 2002).

3. Accessibility of Health Services

The accessibility of health services is often cited as a critical determinant limiting the health-care choice in the developing world (Timyan, Brechin, Measham & Ogunleye (1993). Factors such as lack of transportation, the high cost of transport, and the
difficulty of walking for hours to reach the nearest government health facility may limit the accessibility to the health services. A detailed understanding of these factors that influence the accessibility of health services would be instrumental in formulating policy implications and providing suggestions for dealing with problems related to utilization of health services.

4. Distance:

A number of research findings concluded that the association of distance of health institution with utilization of maternal and child health services is negative as distance increases the level of utilization decreases. For example, Mishra found that if the health institutions are located at distant places, there are less chances of pregnant women receiving TT injections and other health services. The probability of child immunization also decreases if health centers are at far-flung locations. The chances of receiving TT injection by pregnant women decreased by 16.10 percent and child immunization by 13.59 percent when there is one-unit increase in distance to primary health care centre in rural Rajasthan (Mishra, 2000).

Similarly, in a study of rural India, Khan and Gupta also revealed that utilization of government health services including maternal and child health (MCH) and immunization facilities was low as there is no health center in near vicinity. Most families of rural areas were found to prefer private doctors to state services mainly because primary health centre and government hospitals were distantly located (Khan and Gupta, 1984). According to Reddy, the use of services would be better when the distance between people and service delivery units is shorter (Reddy, 1980).

In a study located in Nepal, Acharya and Cleland also reached similar conclusions. They stated that the utilization of antenatal care and receipt of tetanus toxoid was nearly twice as high when there was a health post near by (Acharya and Cleland, 2000).
A team of researchers found in their research in western Nepal that pregnant women preferred to consult retailers rather than visiting health institutions and private doctors' clinics. Since most of retailers were approachable members of the same community, the patients preferred not to travel long distances to reach health centers. In addition to this, patients preferred to consult retailers also due to their no restrictive hours of service (Kafle et al. 1996). Justice had also found a negative correlation between long distance and utilization of health service in his research on cultural dimensions of primary health care in Nepal. He revealed that people chose to reach the facility because of location rather than type of medical system. If the Ayurvedic clinic was close by, the patients were found going there rather than to the health post, even though the system and medications of the two types of health facilities differed (Justice, 1998). Jahn et al. (2000) also found distance as a negative factor for antenatal visit in a study based on maternity care in rural Nepal: a health service analysis since the coverage of antenatal visit was only 10 percent when distance of health facilities was 5 km and more while the same was 32 percent when distance of health facilities was 5 km or less than that (Jahn et al., 2000).

In a research of South Africa, researchers also found a negative effect of distance on the utilization of health care services. They found a significant logarithmic relationship between distance from clinic and usage by the homesteads (r^2 = 0.774, p<0.0001). The distance usage index values ranged between 31 and 198 (mean = 110, SD =43.7) for 12 clinics and this successfully highlighted clinic usage patterns across the district (Tanser, Hosegood, Benzler and Solarsh 2001).

In rural Tanzania, 84 percent of women who gave birth at home intended to deliver at a health facility, but could not do so due to distance and the lack of transportation (G. Biego, 1995).

In Malawi, a study found that 90 percent of women wanted to deliver in a health care facility, but only 25 percent of them did. The most important reason given by 53
percent of the women, was that by the time they realized they were in labor, they did not have enough time to get to a health facility (G.S. Lule and M. Ssembataya, 1996).

Distance to Guatemala City is significantly associated with the use of care during pregnancy, especially biomedical care. Women in more remote communities are more likely to see some provider in a pregnancy month, but when they do, they are much less likely to see a biomedical one. This variable may capture the cultural and social isolation of women living in remote areas or unmeasured aspects of access to health facilities. Large differences in the likelihood of obtaining pregnancy care are also apparent across departments, perhaps due to regional variation in belief systems or unmeasured characteristics of communities and health services (Glei, 2002-01).

5. Quality of Health Services

Poor quality of health services is often cited as a critical factor limiting the health care choice in developing countries. The results of numerous researches revealed that there is a positive association between quality of services and utilization of health services. Pebley, Goldman, & Rodriguez (1996) analyzed the Demographic and Health Survey and they found that an inverse relationship between proximity of a government-sponsored clinic and use of biomedical care during pregnancy in Guatemala because of low quality of services provided over there.

In western Nepal, after adjustment for access and for socio-economic characteristics of families and communities, a very pronounced relationship between overall structural quality of the nearest health post and service uptake persisted. The adjusted odds of using some form of antenatal service were 6.6 times higher in the catchments areas of high quality posts than in areas served by low quality posts. The corresponding figure for receipt of BCG vaccination was 8.1 times higher (Acharya and Cleland, 2000). In a study of World Bank based in Nepal, it was found that a majority of women (63 percent) were dissatisfied with the health services they received. The causes for dissatisfaction with the health care received were perceived
inaccurate diagnosis of the disease, inadequate supply of medicines, absence of skilled service providers and the absence of female health service provider. Particularly, the absence of female health service providers inhibited women from visiting the maternity health service facilities. As in other countries, Nepalese women were reluctant to consult male health workers especially when a gynecological examination was required. Most of the time, assigned health service providers were absent from the health posts and only peons and clerks were available to provide services (World Bank, 2001).

A research conducted in Banke district in Nepal in 1997 by Shah and others, also found that utilization of antenatal service was low due to poor quality of health services. While most antenatal care service users had their blood pressure checked and were physically examined, but the risk of pre-eclampsia and multiple pregnancy were hardly ever detected for them. Lack of competent and individualized counselling hindered mothers and their families to take informed decisions whether antenatal care should be pursued or not. Most women in need of obstetric care either because of their risk status or because of delivery complications gave birth at home without skilled assistance. Only a minority of users received iron supplements. But use of tetanus vaccination was found at a reasonable level.

Similarly, a study of Primary Health Centres in India also revealed poor quality of primary health services available to people. The study found that women attending antenatal services were not screened either for anemia or for high blood pressure or proteinuria to detect the risk of eclampsia (Indian Council for Medical Research, 1987). Poor quality of antenatal screening and indifferent attitude of health personnel in health facilities destroy women's faith in the usefulness of antenatal care and they consequently become reluctant to go to primary health centres as they find it a futile exercise and waste of time (Sundari, 1992). Similarly, Sudari urges that even if primary health services are accessible and affordable in developing countries, the poor management and lack of know-how makes people reluctant to seek health services.
Quality of services can be affected by health personnel behavior who provide health services to the people. Many women describe providers in the formal health care system as unkind, rude, brusque, unsympathetic and uncaring. Where health workers are perceived to be hostile and unfriendly, many women rely instead on traditional healers or traditional birth attendants (TBAs) for antenatal, delivery and postpartum care. This can lead to fatal delays in seeking adequate care for pregnancy-related complications. In Tanzania, a study found that 21 percent of women delivered at home because of the rudeness of health staff - even though they thought delivering in a health facility was safer (Biego, 1995).

2.2 RESEARCH DESIGN

This is divided into two sub-sections. The first sub-section contains the conceptual framework and the second sub-section comprises the methodology of the present study.

2.2.1 Conceptual Framework

A clear-cut identification of the determinants of the utilization of maternal and child health services is not a universally accepted phenomena like other issues in the social science research. As it seems from the study of literature on the subject of utilization of maternal and child health services, the issue is complex and is multi-dimensional.

However, considering different possible determinants, numerous scholars have attempted to develop different kinds of conceptual frameworks to map out the relevant determinants that may affect the utilization level of health services of any society or country on the basis of empirical research over different time periods. According to Pokhrel and Sauerborn, the behavioral model (Anderson 1968), health belief model (Hochbaum 1958) and economic model (Grossman 1972) are the commonly accepted conceptual framework to study utilization level of health services (Pokhrel and Sauerborn, 2004).
The behavioural model suggests that people use of health services is a function of their predisposition to use services, factors which enable or impede use, and their need for care. According to this model, the use of non-use of health care services is determined by predisposing factors (Andersen, 1995).

According to this model, the use of non-use of health care services is determined by predisposing factors (e.g. demographic such as age and gender; social structure such as ethnicity, education, and occupation, health beliefs such as attitude, values, and knowledge that people have about health and health services that might influence their subsequent perceptions of need and use of health services), enabling factors (e.g. health personnel and facilities must be available where people live and work, income, insurance, a regular source of care, and travel time and waiting times or residence) and need factors (e.g. perceived health status, experience of symptoms of illness, pain, worries, and disability days).

The psychosocial model (e.g. health belief model), on the other hand, postulates that the perception of a personal health behavior threat is itself influenced by at least three factors: general health values, which include interest and concern about health; specific health beliefs about vulnerability to a particular health threat; and beliefs about the consequences of the health problem. Once an individual perceives a threat to his/her health and is simultaneously ready to action, and his/her perceived benefits outweighs his/her perceived benefits, then that individual is most likely to utilize the health services after interacting with modifying factors such as demographic, socio-psychological and structural variables (Community and Family Health).

Pokhrel and Sauerborn (2004) stated that the economic model, however assumes that factors such as price and income covariate with a set of other socio-demographic and need factors, producing the demand for health care, usually represented by health care utilization. Important in the economic model is the assumption that individuals produce a commodity called ‘health’ by combining their time and other inputs purchased from the market (one of the inputs could be medical/health care), and as
such, the demand for health care is derived from a more basic demand for health (Grossman 1972). Application of the economic model in the analysis of health care utilization in developing countries is growing (see Jack 1999).

McKinlay (1972) developed a model from analytical point of view after considering the three conceptual models (the behavioural model, the psychosocial model, and the economic model) can not be mutually exclusive in any research that rarely can all factors be collected at the same time. He identified six different approaches to analyse health-seeking behavior. According to him, socio-demographic, socio-psychological, socio-cultural, geographic, organizational and economic approaches determine the utilization of health services as they are having strengths and weaknesses. Kroeger (1983) proposed the two different models to study the health-seeking behavior i.e. the pathway model and the determinant model. The pathway model is mainly a qualitative analysis of health-seeking behavior. It focuses on different steps in decision making and in the process of illness behavior. On the other hand the determinant model focuses on a set explanatory variables or determinants which are expected to be associated with the response variable i.e. health-seeking behavior. This model follows mainly the quantitative analysis of health-seeking behavior. It helps the researcher to estimate the net effect of an explanatory variable on the utilization of health services after holding other variables constant. The objective of this research study is also to estimate the net effect of some responsible explanatory variables on the utilization of maternal and child health services. Hence, in this research, a conceptual framework has been proposed by borrowing the ideas from various scholars to map out some relevant explanatory variables that may influence the utilization level of maternal and child health services in Nepal (Figure 2.1). Moreover, this study based on determinant model that follows quantitative analysis.

According to the proposed conceptual framework (figure 2.1), the utilization of maternal and child health services could be broadly determined by the supply side and demand side. Hence, the explanatory variables to be included in the proposed model are broadly divided into supply side and demand side. The purpose is to
observe their net relative effect on the use of maternal and child health services respectively. Many researchers concluded that the supply side of services has a crucial role in raising the utilization level of health services. According to this model, increasing the availability and accessibility of the health services to the general population could be the sufficient condition to increase its utilization. (Rosenzweiz and Shultz, 1982; Rao and Richard, 1984; Elo, 1992; Sawhney, 1993; Becker et al., 1993; Rohde and Viswanathan, 1994; Develay et al. 1996; Govindasamy and Ramesh, 1997; Kumar et al., 1997; Magadi et al., 2000). On the other hand some researchers referred to the importance of accessibility of quality services in increasing the utilization of health services. The rationale behind it is that while accessibility of health services helps determine whether people make contact with the service provider, quality of service inspires people to decide whether to utilize it or not (Levine et al., 1992; Shrestha and Ittiravivongs, 1994; Bertrand et al., 1995; Shelton and Davis, 1996; Visaria, 1999).

Other researchers have found that the supply side, i.e. community access to services, is not a mere effective factor than socio-economic, socio-cultural, and demographic factors. For example, Das et al. found in a study in the rural India that utilization of maternal and child health services was driven primarily by household, and individual-level socioeconomic and demographic factors, and not by community access to services. They reasoned that the accessibility of health services is sufficient in rural India, so further improvement in it alone (e.g., decreasing the distance to a health facility) will not make much difference in the propensity to utilize services. According to them, the main factors affecting service utilization appear to be demand factors such as women’s education, women’s exposure to mass media, and preference for son (Das et al, 2001).

Some reasons for the low utilization of maternal health services are a result of the poor quality, unavailability and inaccessibility of services. While the low utilization of maternal health services in Nepal. One is partly due to the poor provision of services; the problem of non-use of health services is further exacerbated by various
other social factors. One of the major contributing factors is the general lack of awareness among people of the availability and importance of maternal health care. In Nepal, the prevailing attitude towards pregnancy is that it is not considered a condition that requires special treatment. Therefore, antenatal care and medical care during childbirth are not considered essential components of pregnancy. In addition, for cultural reasons women are reluctant to seek antenatal care, especially from a male health worker. Consequently, in some cases, even when adequate services are available, women are reluctant to use them (UNICEF, 1996).

The interventions to increase the utilization of maternal health services may require more than just making the services available. Social factors that influence an individual’s demand for such care also need to be considered. If women in Nepal are to be encouraged to seek prenatal care, aside from improving the quality and accessibility of services, further efforts need to be made to change people’s attitudes towards the importance of maternal health care. In order to persuade women to use maternal health care services, the benefits of using such services must be made known among the general population (Gubhaju, 2001).

Utilization of reproductive health services is in turn related to their availability and socio-economic, demographic and cultural factors such as women’s age, education, employment, caste and autonomy (Obermeyer, 1991; Elo, 1992; Obermeyer, 1993; Becker et al., 1993; Bhatia and Cleland, 1995; Pebley et al., 1996; Raghupathy, 1996; Dharmalingam et al., 1999; Addai, 2000; Acharya and Cleland, 2000).

The findings of some studies revealed that women's age is negatively associated with the use of maternal and child health services (Sundari, 1992; Dhungel, 2002; Sharma, 2004; Bloom, S. S., Lippeveld Theo & Wypij David, 1999). Contrary to it, some other researchers such as Sugathan, 2001; Sunil et al., 2005 and Heidi et al, 2006 found that women's age is positively associated with the use of maternal and child health services.
It is observed from various research findings that the relative effect of joint or large family was found negative on use of maternal and child health services (Wang et al., 1987; Mishra, 2000; World Bank, 2001; Chowdhury et al, 2003 and, Sunil et al., 2005). They reasoned that larger family size might have resource constraints to utilize health services comfortably as compared to smaller family size.

Some researchers claimed that the health seeking behavior of people might be influenced by their ethnicity and cultural and traditional beliefs (Townsend, 1985; Leslie, 1989; Maine, 1997 and, Thapa, 2000). Even in a developed country like America, maternal mortality widely differs due to ethnicity. In a research, it is found that the risk of maternal death for African American women is four times greater than for white women. It is generally believed that the demographic behaviour of members of ‘socially backward’ communities such as scheduled caste and scheduled tribes are different from that of other communities. But Navaneetham, (2000) found in a research that caste was not a differentiating factor for the use of antenatal services and TT vaccine, but be an important factor for institutional delivery.

Various researchers have stated that women’s pregnancy status and pregnancy outcomes may also play a vital role in influencing the utilization of maternal health services. Such as Bhatia and Cleland (1995) found that a history of a higher rate of foetal loss and neonatal death rate were positively related to the utilization of maternal health services in south India. Similarly, Chowdhury et al. (2003) have also found having high risk diseases or life-threatening conditions as most important positive factors on use of maternal health services in rural Bangladesh (Literature review).

However, the present research study attempts to observe the relative effect of various factors from both sides, i.e. supply (programmatic) and demand (nonprogrammatic) that are likely to play a crucial role in determining the use of maternal and child health service in rural Nepal. Thus, a conceptual framework has been prepared by including various factors from both sides for the present study. The selection of the
explanatory variables for this study is based on their theoretical and empirical importance, as borne out by the international and national literatures and health models, for the use of maternal and child health services.

The present study proposes to observe the supply side as a service channel in the given conceptual framework, which is responsible for supplying health services. According to this proposed framework, supply side means a service channel that encourages or facilitates the consumers (people) to consume or utilize the maximum available health services through the channel of realistic health policy/programmes and effective and efficient health delivery system. The government may encourage or facilitate a household and individual to use maternal and child health services by ensuring that services are sufficient and qualitative and pattern of distribution is equitable and accessible.

In this context, the present study intends to measure the relative effect of supply side in the utilization of maternal and child health services through its micro level channel i.e. availability and accessibility of services at the household and individual level. Thus, distance and time taken to reach health centre on foot and a visit of health worker at household level are taken as the proxy variables to measure the relative influence of availability and accessibility of services in the utilization of maternal and child health care services.

It is also assumed that the utilization level of health services can be said to be positive if there is a demand from the potential consumers who utilize the health services in response of supply side. Generally, consumers could be identified in the form of community, household or individual level. For this present study, household and individual are taken as the potential consumers. Thus, to measure the relative effect of demand side factors, family size, income level and ethnicity are proposed for household and individual variables; age of the respondents, education level, exposure to electronic media, problems faced in pregnancy and their knowledge about health centre/MCH, and husbands' education and occupation are also incorporated.
It is postulated that those households whose socio-economic condition are better with small family size, believe in modern health care services against the cultural taboo and feel the necessity to immunize the child, and offer any kind of modern preventive care to pregnant woman and child suffering from diarrhoea or fever will use maternal and child health care services. Similarly, in individual level, those respondents who have better knowledge about modern health institutions and maternal and child health services would be better users of health services.

Besides, those who are exposed to mass media will also use maternal and child health care services even if they may not be of a better off socio-economic condition as they perceive benefits of preventive care through media and are able to understand the benefit of child immunization and the risk of pregnancy, unsafe delivery outside any
benefit of child immunization and the risk of pregnancy, unsafe delivery outside any health institution and medically unattended postnatal case and diarrhoea and fever for child. Similarly, those respondents who have experienced the problem in pregnancy would use maternal health services than those who do not experience the same.

2.2.2 Definition and Measurement Techniques of Response Variables and Explanatory variables

2.2.2.1 Response Variables:

To observe the net relative effect of each explanatory variable on each response variable, response variables are categorized into two categories i.e. maternal health services and child health services, which are given below:

1. Maternal Health Services

To assess the utilization pattern and level of maternal health care service, only three variables are measured separately. These are as follow:

1.1 Antenatal check-up – respondent received at least one pregnancy-related check-up provided by a doctor or a health worker in a health facility or at home (yes/no; yes is coded 1 and no is coded 0).
1.2 Iron folic tablet – respondent received iron folic tablets during pregnancy (yes/no; yes is coded 1 and no is coded 0).
1.3 Tetanus toxoid vaccine – respondent received two or more tetanus toxoid injections during pregnancy (yes/no; yes is coded 1 and no is coded 0).

2. Child Health Services

To assess the utilization pattern and level of child health care service, only three variables are measured separately. These are as follow:
1.1 Full dose of immunization of child (yes/no; yes is coded 1 and no is coded 0).
1.2 Treatment of diarrhoea – among children age 0-35 months who suffered from diarrhoea during six months before the survey, taken to a health facility or provider for treatment regardless of the way of treatment (yes/no; yes is coded 1 and no is coded 0).
1.3 Treatment of fever – among children age 0-35 months who suffered from diarrhoea during six months before the survey, taken to a health facility or provider for treatment regardless of the way of treatment (yes/no; yes is coded 1 and no is coded 0).

2.2.2.2 Explanatory Variables

Twelve explanatory variables are proposed for the multivariate analysis to observe their net relative effect on selected six response variables. All explanatory variables are grouped as a dichotomous variable in order to avoid inconvenience to use logistic regression. It is evident that many explanatory variables did not have minimum value of response variables if they are to be categorized into more than two categories. These variables are categorically divided into supply side and demand side variables as depicted in the conceptual framework (figure 2.1).

1. Explanatory Variables (Demand Side)

1.1 Income of the Household

It is the gross amount, which includes cash earning of household members, cash from selling agricultural products in a year and cash from selling some others household belongings for six months preceding the survey. And no reduction of household expenses has been made in this amount. It is observed in terms of Nepalese currency (Rupees) per month and measured as a dichotomous variable on the basis of mean i.e. less than mean and mean and above mean. Less than mean is coded as ‘1’ and mean and above mean is coded as ‘2’. The reference category is less than mean.
1.2 Size of Family

It refers to the categorization of the household members made on an arbitrary basis, which is categorized into two groups: less than 6 persons and 6 persons and more and measured as a dichotomous variable. Less than 6 persons is coded as ‘1’ and 6 persons and more is coded as ‘2’. The reference category is less than 6 persons.

1.3 Education

It refers to the educational status of the respondents and their husbands only, which is categorized into two categories i.e. below primary and primary and above and measured as a dichotomous variable. Below primary is coded as ‘1’ and primary and above is coded as ‘2’. The reference group is below primary.

1.4 Occupation

It refers to the main occupation of the husbands of the respondents, which is basically collected from the respondents and main occupation refers to the sole response of the respondents as they realized it. It is categorized into two categories: agriculture and non-agriculture and measured as a dichotomous variable. Agriculture is coded as ‘1’ and non-agriculture is coded as ‘2’. The reference group is agriculture.

1.5 Ethnicity

It refers broadly to those as classified ethnic group of the respondents, which broadly divided into two categories i.e. higher caste and other caste. It is measured as a dichotomous variable. Higher caste is coded as ‘1’ and other caste is coded as ‘2’. The reference group is other caste.
1.6 Age

It refers to the age of the respondents, which is recorded in years completed by them during last childbirth. It is categorized into two categories: 15 to 19 years and 20+ years and measured as a dichotomous variable. 15 to 19 years is coded as ‘1’ and 20 years and above is coded as ‘2’. The reference group is 15-19 years.

1.7 Exposed to Electronic Media\(^3\)

It refers to the extent of listening radios and watching TV by the respondents, which is observed as "Yes" and "No" response and measured as a dichotomous variable. Yes is coded as ‘1’ and No is coded as ‘0’. The reference category is "No".

1.8 Problem Faced During Pregnancy

It refers to the response of the respondents whether they had faced any problem during the pregnancy of the last child, which is observed as "Yes" and "No" response and measured as a dichotomous variable. Yes is coded as ‘1’ and No is coded as ‘0’. The reference category is "No".

1.9 Knowledge about the Health Centre/MCH

It refers to the knowledge of the respondents about the nearest health institution and MCH services where they are supposed to receive their maternal and child health services, which is observed as "Yes" and "No" response and measured as a dichotomous variable. Yes is coded as ‘1’ and No is coded as ‘2’. The reference category is "No".

\(^3\) It is a composite index of listen to radio daily and watch TV once a week, which is constructed as follows:
- Exposed to none: \((0,0)\)
- Exposed to any one: \([(1,0) \text{ or } (0,1)]\)
- Exposed to two: \((1,1)\)
Where ‘0’ and ‘1’ refers the status of absence and presence of listen to radio and watch TV.
2. Explanatory variables (Supply Side)

2.1 A Visit of Health Personnel

It refers to the visit of a health personnel if any, to the respondents at home when they were pregnant and their children were/are sick, which is observed as "Yes" and "No" response and measured as a dichotomous variable. Yes is coded as ‘1’ and No is coded as ‘0’. The reference category is "No".

2.2 Distance

It is the average time taken by the respondents for one-way trip from their residence to any health institution where they usually go to receive maternal and child health services on foot. It is observed in terms of ‘minutes’ and measured as a dichotomous variable on the basis of mean i.e. less than mean and mean and above mean. Less than mean is coded as ‘1’ and mean and above is coded as ‘2’. The reference category is less than mean.

2.3 Residence of the Respondents

It refers to the two districts i.e. Nuwakot district and Chitwan district where the respondents do belong. It is measured as a dichotomous variable. The reference category is "Nuwakot district".

It should be noted that not all of the explanatory variables are included in every regression model to observe their net relative effect on response variables. For example; the variable problem faced in pregnancy is included in the regression only when the response variables are to be assessed for maternal health services and residence is used only when the response variables are to be assessed for both districts in combined form.
Each variable has a rationale for inclusion in the regression model. For example, it is assumed that level of income of household and ethnicity affect access to and utilization of maternal and child health services. Ethnicity controls for cultural variation in health seeking behaviour, which is likely to be associated with a woman's access to health care facilities. Similarly, respondents' education, knowledge about health centre/MCH services and media exposure influence both access to and utilization of services.

2.2.3 Methodology

This particular sub-section of the research design consists of two major parts; these are methodology adopted for the selection of the study area and methods of data analysis.

2.2.3.1 Methodology Adopted for the Selection of the Study Area

1. Sample Size

Before deciding the sample size of survey for the research work, it is always helpful to estimate the minimum sample size on the basis of targeted population size. There are various techniques through which minimum sample size can be estimated. However, in this research, the following equation has been used to estimate the minimum sample size, which is developed by Fisher et al (1983). Such as

\[ n = \frac{Z^2 \cdot PQ}{d^2} \]

Where

- \( n \) = Sample size, if the total population under study is greater than 10000 in size.
- \( Z \) = Normal standard deviates, which is usually set at 1.96 or 2.0 following the condition of matching with 95.0 percent confidence interval.
\[ P = \text{Proportion of study population, which is the total married female population in age group 15 to 49 years to the total female population in the same age group 15 to 49 years. In this case, the total female population in age group 15 to 49 years is 201874 and the total married female population in age group 15 to 49 years is 160023.} \]

Hence, 
\[ P = \frac{160023}{201874} = 0.79 \]

\[ Q = 1 - P = 1 - 0.79 = 0.21 \]

\[ n = \frac{1.96^2 \times 0.79 \times 0.21}{0.05^2} = 255 \]

Therefore, the minimum sample is estimated to be 255 married females.

2. Site Selection

At macro level, the Central Development Region is selected for the present study among five development regions (Eastern, Central, Western, Mid-Western and Far-Western) on the basis of highest regional health profile and the lowest population-health ratio and weighted mean of antenatal care (ANC) and postnatal care (PNC) on the basis of reported cases at first stage (Appendix II and III). This region consists of 19 districts, 3 districts from the Mountain, 9 districts from the Hill and 7 districts from the Terai (map 2.1). Comparatively, this is highly developed region, particularly from socio-economic development point of view, which consists of 20 municipalities out of the total 58. The Capital City, Kathmandu is located here.

The reported utilization of maternal and child health services is found lowest among the regions. The reported utilization of antenatal care is 32.0 percent and postnatal is 11 percent (MOH, 2001/2002). It is assumed that the availability of health infrastructure in the central development region being good, the utilization level of maternal and child health services would also be higher and that may return the lower levels of mortality rates for region. On the contrary, infant mortality rate remains the third highest (77.4 live births per 1000) among the regions. According to Demographic and Health Survey 2001, this region stands in the third position from
antenatal service utilization (53 percent) and on top position from postnatal service utilization (42 percent). It can be due to higher proportion of urban population in this region where majority of mothers give birth at medical facility and are more likely to receive postnatal services as compared to other regions.

Out of 19 districts, 3 districts from the valley (Kathmandu, Lalitpur and Bhaktapur) and three districts from the Mountain Zone (Rasuwa, Sindhupalchok and Dolakha) are purposively excluded for the site selection for the present study. Out of 3 districts from the Mountain, presently 2 districts (Sindhupalchok and Dolakha) are severely affected by Maoist’s oppression and the third district is also affected to some extent (Central Bureau of Statistics, 2003). Beside that, there is no so much topographic contrast and cultural variation between the Mountain and the Hill as between the Terai and these two zones. 3 districts from valley are highly urbanized as compared to other districts and therefore excluded.

The main objective of this research is to study the level of utilization and its determinants that may affect the utilization of maternal and child health services in rural areas. Thus, Nuwakot district from the Hill and Chitwan district from the Terai, out of the remaining 13 districts have been selected purposively for the study in the first instance. The Hill and the Terai Zones have a contrast physical setting and diverse socio-economic condition and demographic parameters that may affect on the level of utilization of maternal and child health services. These districts are selected on the basis of lowest and highest index of district-wise health profile (Appendix 1). From mean weighted of antenatal and postnatal service use, Nuwakot district has the fifth rank and Chitwan district the third rank. It is further assumed that Chitwan district could be better advanced and Nuwakot district could be backward. Thus, two contrast districts; one backward and another comparatively advanced have been chosen consciously as research sites. The detailed profile of the study area regarding demographic, socio-economic and health related issues is presented in chapter III.
As stated, present study is focus on to observe the utilization pattern of maternal and child health services in rural area. Thus, 4 village development committees (VDCs) were selected from each district. The selection of VDC was done on the basis of primary health centre since the study is directly related to the village level health institutions and primary health centre is the top most that kind of institution at village level. The selection of primary health centre was made with the help of the respective district health officer. The criterion for the selection of primary health centre was set to be the best among others in the respective district. Then VDCs were selected from each primary health centre with the help of deputed doctor at the selected primary health centre. The selection of four VDCs was done on the basis of distance, which was set as such the closest VDC, short distance VDC, medium VDC and long distance VDC from the respective primary health centre.

After the selection of VDCs, selection of ward was made by lottery system selecting three from each VDC. Since the primary sample unit (PSU) is ward.

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Village Development Committee (VDC) is denoted as the lowest administrative division at district level. Each VDC is divided into 9 wards basing on the total population size and location of the settlement. Ward is a lowest local administrative unit at VDC level.
2.1 Nuwakot District

Nuwakot district, situated in the Hill Zone of Nepal in the middle part of the country, is on an elevation between 518 meters to 4,876 meters from sea level. It extends between latitude 27°55'N and longitude 85°10'E with an area of 119,650 hectares. The head quarter of the district is called Trisuli. It is 70 km away from Kathmandu, the capital city of the country and is connected by all weather roads.

Administratively, it is divided into 61 Village Development Committees (VDC) and 1 municipality. Out of the 61 VDCs, 4 VDCs, namely Belkot, Kakani, Madanpur and Okharpauwa have been selected from this district for sample study (map 2.2). These VDCs accommodate 11.04 percent of the total population (288478) and 10.72 percent of the total households (53169) of Nuwakot district. Among the selected 4 VDCs, the highest percentage of the total population and households is found in Madanpur VDC, followed by Belkot, Kakani and Okharpauwa. The VDC selection procedure is given below respective sub-section.
2.2 Chitwan District

Chitwan district is situated in the Terai Zone of Nepal in the southern part of the country (map 1.1). It is an extension of the Gangetic Plain, which is very fertile for agriculture. The altitude of this district ranges between 244 meters to 1945 meters from sea level. The district extends between latitude $27^\circ37'N$ and longitude $84^\circ25'E$ with an area of 219,454 hectares. The head quarter of the district is called Bharatpur, which is located in Bharatpur municipality. It is 139 km away from Kathmandu, the capital and is connected by road and air route from Kathmandu. Besides, it is also connected with a high known “Mahendra Rajmarga”, which runs from east to west in the country. Out of 36 VDCs, 4 VDCs, namely Birendranagar, Khairahani, Kumroj and Piple have been taken up for study (map 2.3). The selection procedure is mentioned below respective sub-section.
In case of Chitwan district, these Village Development Committees (VDCs) accommodate about 11.2 percent of the total population (472048) and 10.79 percent of the total households (92,863) of Chitwan district. Khairhani Village Development Committee consists of the highest percentage of the total population and households (about 4 percent) among the selected 4 VDCs, followed by Birendranagar, Piple and Kumroj.

Geographically, Nuwakot district is situated at higher altitude with difficult terrain compared to Chitwan district. As various research studies reveal physical difficulties like hilly and mountainous terrain can be obstacles in the easy accessibility of health facilities to people. In Nepal, transportation system is very poor and costly for the majority of rural people. Taking this into consideration, we also attempt to test whether the physical barriers of the study area play any significant role in use of maternal and child health services like elsewhere. Usually, distance in kilometer to
reach the nearest health care centre from the residence is taken as a control variable to measure the impact of physical barrier in the utilization of maternal and child health services. But, in this research time taken to reach the health center on foot is taken as a measure of distance. Nuwakot district is a hilly district with poor transportation system that may force the pregnant mothers to take longer hours to travel from their residence to the nearest health care centre even if the distance is shorter in terms of kilometer.

Chitwan district is larger than Nuwakot district by 83 percent also with larger proportion of arable land. The total area under Chitwan district is 38,348.9 hectares, and 29,087.0 hectares for Nuwakot district (CBS, 2004). Comparatively land of Chitwan district is fertile that/and can produce more cereal. To give general economic conditions of both districts, it is very important to consider the size and production capacity of the arable land in a country like Nepal where more than 81 percent of the total population is engaged in agriculture and more than 60 percent GDP comes from agricultural sector (CBS, 2003). It can be a proxy source of income for the households of the present study since gross income of households has been also taken as a control variable in use of maternal and child health services.

3. Sample Selection

As stated, Nuwakot and Chitwan districts have been selected as the study area for the present study. At the final stage, 200 households were selected proportionately from each of two districts on the basis of decided 400 sample size for the present study as assuming that would be interviewed married women with at least one alive child could be available in each selected household with i\textsuperscript{th} interval, if otherwise, the very next household will be taken as the sample unit\textsuperscript{5}.

\textsuperscript{5} But, during survey, an eligible respondent was found in each household. Thus, there was no need to jump to the next household for the sake of eligible respondent. Instead of it, the jump of household was made in many instances if the eligible respondent of the selected household by i\textsuperscript{th} interval was found absent or the household itself found locked, particularly in Belkot VDC and Okharpauwa VDC in Nuwakot district and in Birendranagar VDC in Chitwan district.
The selection of household was done at first at Village Development Committee (VDC) level on the basis of proportional sampling based on 200 households, which was set to be surveyed for each district.

The interval (i^{th}) between households is found to be smaller (more than twice) in Nuwakot district compared to Chitwan district. But Nuwakot district is a hilly district. Thus, it was very time consuming and a bit difficult to visit households due to physical constrains. The route from one household to another household used to be very up and down even scary for walking freely that made every surveyor to take

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**Table 2.1: Sample Distribution of the Study Area, 2004/05**

<table>
<thead>
<tr>
<th>VDCs</th>
<th>Sample Ward</th>
<th>Total HHs</th>
<th>Sample Units</th>
<th>SH*</th>
<th>HI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kakani</td>
<td>3</td>
<td>340</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>145</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>112</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>3</td>
<td>597</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khairhani</td>
<td>1</td>
<td>329</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>928</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>344</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>3</td>
<td>1601</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birendranagar</td>
<td>2</td>
<td>368</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>144</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>402</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>3</td>
<td>914</td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kumroj</td>
<td>1</td>
<td>169</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>147</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>183</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>3</td>
<td>499</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piple</td>
<td>2</td>
<td>116</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>229</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>358</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>3</td>
<td>703</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>12</td>
<td>1895</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


*SH = Sample household and * HI = i^{th} Household interval
longer time to fill up few questionnaires per day. Besides, when survey team was supposed to move on from Madanpur VDC to Belkot VDC, there was a stream to be crossed on the way using a locally made bridge without fence side by side. I was the one who could not dare to cross the stream with using that kind of bridge. We were waiting a local man who can carry me and cross the stream that happened to be very late. Thus, we had missed our survey on that day.

The multistage sampling technique has been followed for the whole sampling selection of the study area. For example, purposive sampling was used to select the Central Development Region, two districts and Village Development Committee, for the selection of ward; simple random sampling was used, and then proportional random sampling was used for the selection of households.
2.2.4 Nature of Data and Methods of Data Collection

Secondary and primary, both kinds of data are used for this research study. Basically, secondary data have been used for the introduction and information about background of the country, study area and health status of the population, which come from various government sources, particularly, Ministry of Health and others. But the main part of the research study has been totally based on cross-section primary data.

Primary data have been collected from field survey by administrating the well structured questionnaire to the head of household and married women of that respective household who have at least one alive child aged three years or less. The original questionnaires were prepared in English and later on the pretest of the questionnaire during field survey, these were translated into Nepali. Some original questionnaires were modified based on pilot survey accordingly to what was found relevant. The duration of field study was from August 2004 to January 2005. Because of political upheavals caused by Maoist insurgency, more than four blockades were encountered during the field survey in Nuwakot. There were no any local political leaders at each Village Development Committee to be contacted at first to get to know about the village and get start survey that certainly caused inconvenient for the survey team.

2.2.5 Methods of Data Analysis

SPSS was used to process and analyze the collected primary data from field survey. Mainly, univariate analysis is used to estimate percentages and frequency distribution, bivariate is used to observe the association between utilization level of maternal and child health services and explanatory variables. Analysis of variance also is used to observe the statistical differences in mean of utilization level across two districts. Binary logistic regression is used to identify the possible determinants that would affect the utilization level of the maternal and child health services since response variables are of binary nature. Basically, logistic regression is widely used to establish the relationship between response and explanatory variables. As the unit of analysis, a
currently married woman who has at least one alive child aged three years or less at the time of survey and her youngest child is selected for sample survey.

2.2.5.1 Chi-Square Test

Chi-Square test has been used to observe whether the explanatory variables have a significant and predictable association with the response variables. It can be test by the following formula:

\[ \text{Chi-Square} = \sum \frac{(O_i - E_i)^2}{E_i} \]

Where \( O_i \) = Observed frequencies and

\( E_i \) = Expected frequencies

Null Hypothesis:

There is no any significant association between explanatory variables and responsive variables in tabular data.

Alternative Hypothesis:

There is a significant association between explanatory variables and responsive variables in tabular data.

Decision rule:

Null hypothesis should be accepted if the calculated value emerges less than to table value at given level of significance with \((c-1)(r-1)\) degrees of freedom. But, if the calculated value of chi-square is greater than the table value at given level of significance with \((c-1)(r-1)\) degrees of freedom, null hypothesis should not be accepted.
2.2.5.2 Independent T Test

\[ t = \frac{M_{xa} - M_{xb}}{\text{est.} \sigma_{M-M}} \]

Decision rule:
\[ M_0 = M_{xa} = M_{xb} \]
\[ M_1 = M_{xa} \neq M_{xb} \]

Null Hypothesis:
Chitwan and Nuwakot districts do not have different level of utilization of maternal and child health services.

Alternative Hypothesis:
Chitwan district has higher level of utilization of maternal and child health services than that of Nuwakot district.

Its immediate implication is that any difference we find between the means of the utilization level of the two samples districts should not significantly differ from zero.

2.2.5.3 Logistic Regression

A statistical test of chi-square can not rule out the cause and effect relationship between explanatory and response variables. It only tells us whether they are or are not significantly associated, without reference to any assumptions concerning the form of relationship while the literature review revealed that the level of utilization of maternal and child health services are more likely to be affected directly or indirectly by a range of variables. And the objective of this study is to find out the factors that affect the utilization level of maternal and child health services in rural area of the two districts. Thus, logistic regression is one of the suitable statistical methods to be applied to assess the net effect of each explanatory variable on response variable after controlling other variables. Binary logistic regression has been used for this study.
since all of the response variables are in binary nature i.e. like yes or not etc. The basic equation of logistic regression is:

\[ P = \frac{1}{1 + e^{-z}} \]  \hspace{1cm} (1)

Where \( p \) = an estimated probability. In this present study, \( P \) denotes the probability of utilization of various maternal and child health services in terms of specified explanatory variables; \( X_1, X_2, \ldots, X_k, b_0, b_1, \ldots, b_k \) are regression coefficients. \( Z \) is the predictor variable and \( e \) is the natural log i.e. 2.71828.

An alternative form of this equation is:

\[ P = \frac{1}{1 + e^{-z}} = \frac{\exp(z)}{1 + \exp(z)} \]  \hspace{1cm} (2)

Where \( \exp(z) \) is another way of writing \( e^z \). When \( z \) becomes infinitely negative, \( e^z \) becomes infinitely small, so that \( P \) approaches unity.

Given \( P = \frac{1}{1 + e^z} \) Then \( \frac{P}{1 + P} = e^z \)  \hspace{1cm} (3)

Taking natural logs on both sides, it can be got

\[ \log \left( \frac{P}{1 - P} \right) = z \]  \hspace{1cm} (4)

The quantity \( \frac{P}{1 - P} \) is called the "odds" and

\[ \log \left( \frac{P}{1 - P} \right) \] is called the log odds or the logit \( P \).

Thus odds \( = \frac{P}{1 - P} = \Omega \)  \hspace{1cm} (5)

It is customary to use odd ratio to compare the relative change in response variable with respect to explanatory variables.