CHAPTER 3

CONCEPTUAL FRAMEWORK AND METHODOLOGY
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3.1 ANALYTICAL FRAMEWORK

The previous Chapter on literature review has helped align the stray thoughts in the proper direction giving a more detailed insight into the choice of contraceptive methods. This Chapter presents the conceptual framework and methodology used in the study. This study involves data collection from primary as well as secondary sources and both quantitative and qualitative approaches. Prior studies have shown the importance of macro level supply factors such as the Family Planning Programme and factors directly and indirectly affecting contraceptive choice. Individual level socio-economic and demographic factors as well as intended choice also play an important role in choosing a contraceptive method. The importance of cultural factors and technology cannot be ruled out. The conceptual framework adopted in this study portrays the relationship among the different factors (Fig 3.1).

In the previous Chapter, the models by Palmore and Bulatao (1989) and Bulatao (1989) were discussed (Fig 2.1 and Fig 2.2). According to Bulatao (1989), contraceptive method choice is affected by four types of factors, contraceptive goals, contraceptive competence, contraceptive evaluation, and contraceptive access. The model used here is adopted from Bulato’s model and tries to incorporate some additional variables used in other studies in the Indian context. Thus, it aims at finding the factors that influence the choice of one contraceptive method over another in a population, which is characterised by a wide choice of methods. The section on socio-economic and demographic factors (3.1.2) explains a few proxy variables influencing Bulato’s four sets of variables.

3.1.1 Community factors

Social network: Social networks through communication and diffusion affect choice (Rogers, 1978; Godley, 2001). Thus, the contraceptive choice of an individual is influenced by “information from early adopters in their social network” (Kohler, 1997:370). This reveals how
interpersonal communication in social network leads to a particular contraceptive choice. Diffusion of information is another aspect how social network affects choice of a particular contraceptive method. The channels through which innovations are communicated in the social system are important in choice of a particular method. Earlier researches (Godley, 2001), have shown how interactions with "modern culture" by village kinship ties outside the village, encourage use of modern method of contraception. The impact of social network on contraceptive choice has been documented by Behrman et. al. (2002) in rural Kenya. According to the study the social networks provide information primarily through social learnings and not through exerting social influence.

**Programme factors:** The Family Planning Programme factor is also a very important programme variable operating at community level affecting choice. Accessibility and economic cost are also supply side determinants affecting individual choice. Earlier studies have also highlighted the importance of economic factors like accessibility and cost in influencing contraceptive choice (Simmons, 1978; Thomas et. al., 1996; Rosenzweig et. al., 1982).

State institutions and actors play a central role in policy formulations and implementation. State which is at the apex of the structure through its instrument of population policy tries to shape individual choice in achieving the national goal of fertility reduction. According to McIntosh and Finkle (1994), policy is divided into policy as prescription and policy as process. Policy as prescription is just that what the government/State prescribes for achieving policy objectives and goals, based on a set of assumptions that the state is inherently benevolent and knows what is right for its citizen. Policy as a process seeks to explain how different institutions and actors who are involved, or affected by the policy, take a proactive stance in challenging policy. The interaction between the prescription and process is forever dynamic, where coercion, disincentives and incentives come in to subvert efforts it perceives to be contrary to its objectives and attempts to put a brake on the process of individual self determination. It can also restrict options in the design and promotion of specific types of contraceptives.

In the studies conducted by Visaria et. al. (1995) in Gujarat, the programme factor affecting use of contraception has been addressed. Bulatao (1989) also supported the view and stated that
Promotion of a method by program personnel can add significantly to method choice" (Bulatao, 1989: 282). Programme bias on a specific method will lead to provider bias on that method. This makes the specific method readily accessible to the couples. Moreover, the couples have awareness and knowledge about the method which ultimately leads to choosing the particular method of avoiding pregnancy. Promotion of a particular method also means making it available for choice through service delivery. The integration of maternal and child health care with family planning has probably contributed to the programme bias for female methods in particular. When people come to seek maternal health care, promotion through counselling of a particular contraceptive brings knowledge about the method as well as availability leading to choosing that method. Above all “even though the Indian family planning program in principle follows a cafeteria approach to method provision, in reality it has given priority to particular methods from time to time” (Rele et al., 1989: 194).

3.1.2 Socio-economic and demographic factors

It is well recognised that various socio-economic and demographic factors affect choice between contraception and no contraception; however, we try to understand their role in the choice of a specific method. The ultimate filter is the personal preference, which in turn is affected by all the above mentioned community and program factors and finally a specific method of contraception is chosen at a specified time. The important demographic and socioeconomic factors are listed here along with their plausible influence.

**Age:** Age of a woman influences contraceptive choice through her fertility goals. Fertility goals are either of spacing and limiting. When age is low, the fertility goal is to space, and non-terminal methods of contraception are used. Contrarily, at a higher age with fertility goals of limiting, a terminal method of contraception is more commonly chosen. The choice of contraceptive changes from non-permanent to permanent with increase in age. Thus, age plays a significant role in contraceptive choice. Prior studies have also supported this (Rele et al., 1989; Dang, 1995; Gulati, 1996; Chacko, 2001; Geretuya et al., 2007).

**Education of wife:** Education leads to the all round development of individuals. With education comes awareness of family planning methods which allay some fears and misconceptions.
Education eventually gives functional knowledge about how to use a method. Moreover, education increases the autonomy and decision making power of women, which further shapes choices of contraception methods (Nair, 1982; Gulati, 1996). Education also brings in the competence to use the contraceptive method (Bulatao, 1989). The ORG Survey reported that among women with less education the preferred method was sterilisation, followed by condoms, pills and IUDs, but among women with more than high school education the preferred method was condoms." (Rele et. al., 1989). Most of the studies have taken into account women's education (Bhende et. al., 1991; Verma and Baburajan, 1994; Sekhar and Reddy 1994; Barkat et. al., 1997; Mannan, 2002) in their study on urban slums of Bangladesh saw the effect of wife's education on choice.

Religion: Religion is a very important social variable as each religion has its unique set of beliefs, customs and culture. This has a strong influence on individual behaviour, since some customs and beliefs either restrict or promote a particular contraceptive method. Prior findings show that in India, Hindus go for surgical methods like sterilisation whereas Muslims prefer pills and condoms (Bhende et. al., 1991; Raju et. al., 1996; Gulati, 1996; Rajeratnam, 2000). Other studies which have used religion to evaluate contraceptive choice are that by Mannan (2002) and Hussain (2003).

Caste: As discussed earlier though family planning programme is important in choosing a contraceptive method, membership of a specific caste may influence choice of contraception. In India, caste is a well recognized factor in social stratification. Scheduled castes and scheduled tribes in India face various forms of social and economic discrimination bringing out an important socio-economic variable affecting contraceptive choice. Many castes have distinctive social identities and societal norms. Various studies conducted in India and outside shows the significance of caste on contraceptive choice (Raju and Bhat, 1996; Forste et.al., 1995 Rajaretan, 2000).

Standard of living: The standard of living brings in the income effect, which has been proven by earlier studies to be significantly related to contraceptive choice (Gulati, 1979; Rele et. al., 1989; Bhende et. al., 1991; Verma and Baburajan, 1994; Rajaretan, 2000). Income increases or
decreases the availability of a particular contraceptive method thus directly affecting choice. Indirectly income can affect choice by education, work status and inter spousal communication. Prior examination has shown that lower socio-economic groups accept sterilisation, lower middle class women accept IUDs and pills are more acceptable to middle and higher economic groups.

**Place of residence:** The place of residence, whether rural or urban, plays an important role in contraceptive choice through accessibility. This variable gives an insight directly to accessibility to information and family planning programme. National level surveys conducted by ORG and NFHS and smaller district level studies reveal sterilisation to be more common in rural areas and the use of the reversible method to be more common in urban areas (Visaria, 2000). Other studies have also highlighted place of residence’s effect on choice (Rele *et al.*, 1989; Manman, 2002).

**Number of living sons:** This variable gives an insight into son preference. Son preference is an aspect of culture in Indian society (Arnold *et al.*, 1998; Kulkarni 1999), as well as in many other societies. Dang (1995) in his study on Vietnam has found choice for traditional birth control to be related to a desire for another son. Another study on Bangladesh has shown “As the number of living male children increases, couples are significantly more likely to use permanent methods and are significantly less likely to use the pill” (Mannan, 2002: 360).

**Women’s occupation:** This variable measures women’s social status as earlier researches have shown a close correlation of social status and work status of women. It is expected that women who are working have more autonomy and equitable marital relations.

**Exposure to mass media:** Mass media exposure facilitates the family planning programme extension work. The family planning programme uses mass media to educate people about various contraceptive methods. Thus it is expected that women with mass media exposure are more aware about various methods of family planning and also about its access which in turn facilitates choice of a particular method.
Pregnancy wastage: *Outcome of Last Pregnancy* has been shown in earlier studies (Bhende *et al.*, 1991, Gulati, 1996) to be significantly affecting contraceptive choice. Child loss has been argued as a sign of unwanted birth (Walle and Knodel, 1980) and motivation to choose modern method of contraception. Miscarriage, abortion and still birth assess pregnancy wastage and can be associated with unwanted birth and thus motivation to choose more effective modern methods of contraception.

**Figure 3.1 Framework for contraceptive choice**
3.2 BACKGROUND CHARACTERISTICS OF STUDY AREA

West Bengal situated in the eastern part of India is a major state with a population of 80.2 million (Census, 2001). Though the metropolis of Kolkata is part of the state, 72.0 percent of the state’s population is rural and 53.3 percent of the workers are cultivators or agricultural labourers. Female literacy in the state is 59.6 percent which is higher than the national average (53.7 percent) and the sex ratio is 934 females per 1000 males (Registrar General of India, 2004a). Map 1 shows the administrative divisions of West Bengal (2001).

Map 3.1 District map of West Bengal 2001

Source: Primary Census Abstract 2001, West Bengal 2001. (Not to scale)
Great concentration of population is a fundamental feature of West Bengal with a population density of 904 persons per square kilometre according to the 2001 Census making it one of the most populous states with respect to geographical area. About 31.85 percent of the population lived below the poverty line in 1999-2000 (HDR 2004: 19). The most striking and unique characteristic of the population lies in the fact that, the three categories, SCs, STs and the minorities, together account for more than half the population and these are also the poorest groups in rural Bengal (HDR 2004: 20). This fact makes the state a very interesting proposition to study.

Demographically speaking the great concentration of population has resulted in severe pressure on the basic infrastructure and provisions of basic health and education services. Despite being a low-middle income state, Bengal has rapidly brought down the birth rate and death rate. Table 3.1 shows the vital rates pertaining to West Bengal and India. The birth rate is 17.5 (per thousand) for Bengal, while the national average was 22. The same is the case with the death rate and IMR (Infant Mortality Rate) being 6.2 and 35 respectively (Registrar General of India, 2009) and it is lower than the national average indicative of the supportive health care system in preventing deaths. These vital rates are directly related to the nutritional, educational and health status of the community. The TFR of West Bengal is 1.9, which is marginally lower than the replacement level fertility (TFR of 2.1) while for India the total fertility rate (TFR) was 2.68 (Registrar General of India, 2009). The Sample Registration System (SRS) reports a TFR of 1.9 for West Bengal (Registrar General of India, 2009). The state has a contraceptive prevalence rate (CPR) of 32.2 percent due to all modern methods (MOHFW, 2003). However, traditional use of family planning methods mostly in urban areas is high in West Bengal (18.5 percent, NFHS-2). West Bengal’s natural growth rate (decadal) of population is 11.2 percent compared to 15.2 percent for India (Registrar General of India, 2009).

<table>
<thead>
<tr>
<th>Table 3.1 Vital rates (per thousand) for West Bengal and India</th>
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<td>Birth rate</td>
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<td>2008</td>
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<tr>
<td>India</td>
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<td>West Bengal</td>
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Source: Registrar General of India, 2009

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3.3 OBJECTIVES

In West Bengal, the overall contraceptive prevalence has increased since NFHS-1 (1992-93) while female sterilisation has remained stagnant since NFHS-2 (1998-99). The use of IUDs, an effective female spacing method has declined since NFHS-2 (1998-99), but the use of traditional methods shows an upward trend.

Did this gain in traditional method choice come at the expense of modern methods or is the relationship between prevalence rates of each type completely independent? Hence, it is important to study the contraceptive choice scenario in West Bengal and also the Family Planning Programme’s role in choice.

The broad objective of the proposed study is to identify individual and community factors affecting the process of contraceptive choice in West Bengal.

Specifically the study plans to address the following objectives.

a. To assess the role of socio-economic background of couples in contraceptive choice.

b. To examine whether the government’s Family Planning Programme has influenced choice.

c. To see if community factors and social network plays a role in choice.

d. To identify the difference in factors in contraceptive choice between rural and urban areas.

3.3.1 Hypotheses

The following hypotheses are being tested in the study.

a. Individual socio-economic factors have influenced the acceptance of reversible methods.

b. Those with programme contact are more likely to use modern female methods, specifically female sterilisation.

c. Community factors like social network, program factors and exposure to mass media affects individual choice decisions.

d. The relative importance of various factors influencing choice differs between urban and rural areas.
3.4 RESEARCH DESIGN

To achieve the objectives of the research both secondary and primary data sources are used. The National Family Health Survey, NFHS-3 data is analysed to see the determinants of choice. Secondary state level data is also examined to show to what extent contraceptive behaviour can be attributed to the regional effect. A combination of qualitative and quantitative approaches is explored. A household survey is carried out to capture the contraceptive behaviour whereas the process of decision making in urban and rural settings of couples is assessed by focus group discussions (FGDs) and in-depth interviews (IDI). It is known that the extension activities of the programme operate primarily in rural areas and to a smaller extent in the poor localities of urban areas. On the other hand, in urban upper class areas these would be minimal or absent. Therefore, in order to see whether the programme workers play a role in choice, samples are selected from three areas, rural, poor urban localities, and other urban localities. FGDs with women and in-depth interviews with service providers sought to bring out the programme effect on the decision making process and also help examine whether there has been provider bias. In-depth interviews of family planning service providers were carried out to understand the choice dynamics in these areas.

3.5 DATA SOURCES AND METHODOLOGY

3.5.1 National Family Health Survey-3 (2005-2006)

The NFHS-3 provides estimates of important indicators on family welfare, maternal and child health, and nutrition. Along with this, NFHS-3 provides information on several new and emerging issues, including family life education, adolescent reproductive health, high risk sexual behaviour, tuberculosis, and malaria. Information on nutritional status, including the prevalence of anaemia, is provided in NFHS-3 for women aged 15-49 years, men aged 15-54 years, and young children. The women questionnaire of NFHS-3 for West Bengal is used in this study to identify the socio-economic and demographic determinants of contraceptive choice. The survey has interviewed 5,992 households and 6,794 married and unmarried women aged 15-49 years in the state.
3.5.1.1 Measurement of variables from secondary data source

**Dependent variable:** For this study response variable was created based on current use of contraceptive method from NFHS-3 individual women data set.

Current use of contraceptive method: Categorical

- Not using
- Modern spacing methods
- Terminal method
- Traditional methods

**Explanatory variables:** In the present study, some explanatory variables are used to examine the net-effect of various socio-economic variables. The following are the variables used:

**Age of the women:** Numeric

The age of the respondents have been grouped as:

- 15-24
- 25-34
- 35-49

**Pregnancy wastage:** Number of pregnancies that resulted in still birth, spontaneous abortion or induced abortion. In this study we use the variable ever having terminated pregnancy which includes miscarriage, abortion and still birth to understand its co variation with choice of a particular contraceptive method. A dummy variable has been created indicating whether the mother has experienced pregnancy wastage or not.

**Pregnancy wastage:** Dichotomous.

- No
- Yes

**Number of living sons:** Numeric.

This variable has been grouped into the following categories: 0, 1, 2, 3 and 3 or more.
Education of the women: Categorical.
   Illiterate
   Primary
   Middle
   Higher

Religion: Categorical.
   Hindu
   Muslim
   Others

Caste: Categorical.
   Schedule Caste (SC)
   Schedule Tribe (ST)
   Other backward Castes (OBC)
   Other Castes

Place of Residence: Dichotomous.
   Rural
   Urban

Standard of Living: Categorical.
   Low
   Medium
   High

Women’s Work: Dichotomous.
   Not Working
   Working
Exposure to Mass Media: Dichotomous
Women who listen to the radio every week or watch television every week or read newspaper once a week have been treated as those exposed to mass media.

No mass media exposure
Mass media exposure

Contact with Health Workers: Dichotomous
In the NFHS Women's questionnaire women in the reproductive age were asked about contact with health workers (Auxiliary Nurse Mid Wife- ANM or Lady Health Visitor-LHV) within the past three months.

No health contact
Some health contact

3.5.2 Primary data source
The NFHS-3 data are certainly valuable to a study of contraceptive choice as these give information of an individual or a couple's choice as well as on background socio-economic and demographic characteristics. However, information on the process of contraceptive choice and on the role of social network was not collected in the NFHS. To capture the individual and social network factors in the process of choice and contraceptive behaviour on the whole, households in rural and urban areas were surveyed by the researcher. This survey asked questions on the interaction of women with programme personnel and others relevant to the decision making process and also reasons for use of or preference for specific contraceptive methods as well as on social-economic and demographic variables (place of residence, religion, caste, educational level, age, standard of living, number of children). For the household survey, we included only women of reproductive age i.e., 15-49 years. To complement the household survey we have FGDs and in-depth interviews. The gender aspects of contraceptive choice and also the causes of the transition from male to female methods were discussed in FGDs with older (30-60 years) and younger (15-35 years) women for tracing the history. For FGDs six to eight members from selected wards/ villages, homogeneous in characteristics such as age group, income, and caste in the study area were selected.
In order to capture the programme's effect on choice of contraception from the provider's perspective, in depth interviews with family planning service providers were conducted so as to have a clearer understanding of the role of the programme from the provider's side. These interviews covered issues on guidance given to the service providers by the departments, targets, mechanisms to achieve the targets, how they give advice to women etc. Besides, this also helped assess their perception on the contraceptive preference of women.

In the household survey dependent and explanatory variables similar to those used for the NFHS-3 data have been used.

3.5.3 Study area and sample selection
The study area for primary data collection is divided into urban and rural settings. For the urban areas, four wards from Kolkata Municipal Corporation (KMC) were selected. Urban population of the state is 28.03 percentage of total population. Kolkata Municipal Area (KMA) is hosting 13.26 million population out of 22.49 million urban population accounting 59 % of state's urban population. These facts lead us to selection of wards from KMC. The urban setting is further divided into poor localities and other localities. For poor localities, two wards with the lowest literacy rates (Ward A and Ward C) and for the other, two wards above average literacy were selected (to ensure proper representation Ward D and Ward B which are at 25th and 50th percentile were selected). Other than KMC, for the rural sample two districts and have been selected. Map 2, 3 and 4 shows the location of the selected districts and all the wards. The selection is based on two factors. First the districts within 50 kilometres from KMC were dropped as these would be dependent on Kolkata for their livelihood (i.e. having routine contact with Kolkata), so these two districts were chosen for the rural study. The rural areas of these districts might have some influence of the metropolis of the remaining districts (located at least 50 kilometres from Kolkata), two were selected in the basis of the Human Development Index, one with above average and another with below average level of human development. From each of the two districts, two villages were selected for the field investigation. Details of village selection are given in Chapter 5.
Map 3.2 & 3.3 Location of Bardhaman and Bankura districts.

Source: Primary Census Abstract of West Bengal 2001 (Not to scale)

For the household survey it was proposed that a total of four hundred households be selected, that is, fifty households from each of the four wards of urban areas and fifty households from each of the four villages. Details of sample selection are given in Chapter V. For the qualitative study it was proposed that a total of 16 FGDs be conducted, four from the urban poor and four from the other urban localities along with it two each from the four villages. In-depth interviews were also proposed with service providers, four from urban areas and eight from rural areas. The details of qualitative study and the procedure employed to form groups for FGDs are described in Chapter 6.
Map 3.4 Ward map of Kolkata municipal corporation

Source: Census of India 2001, West Bengal.
3.6 METHODOLOGY OF ANALYSIS

We have taken up individual level analysis to capture the effect of individual characteristics on contraceptive choice for the state of West Bengal with the help of NFHS-3 data on individual women. In the analytical framework, choosing a contraceptive method is considered a one step process. Overall, women face the choice of modern spacing methods, traditional methods, terminal methods and no method. This can be modelled by multinomial logistic regression as the response variable has more than two categories (binary response variable is modelled by binary logistic regression, multinomial logistic is a generalisation of logistic regression) and not ordered. Multinomial logistic regression is designed to use a mix of continuous and categorical variables to predict a categorical outcome. It is often seen as an alternative to discriminant analysis.

3.6.1 Multinomial logistic regression

If the response variable has three categories (1, 2, 3) then the multinomial logistic model will have two equations. Let the reference category be 3 and $X_1, X_2$ and $X_3$ are predictor variables, and $P_1, P_2$ and $P_3$ be the probabilities of the response being 1, 2, 3 respectively. Then

$$\ln(P_1/P_3) = a_1 + b_1 X_1 + c_1 X_2 + d_1 X_3$$ ............................................................... (a)

$$\ln(P_2/P_3) = a_2 + b_2 X_1 + c_2 X_2 + d_2 X_3$$ ............................................................ (b)

and, $P_1 + P_2 + P_3 = 1$

Unlike logistic regression, the quantities $P_1/P_3$ and $P_2/P_3$ are not odds as the numerator and denominator do not necessarily sum up to 1.

However, solving equations for (a) and (b) the values of $P_1, P_2$ and $P_3$ are as follows.

$$P_1 = e^{a_1 + b_1 X_1 + c_1 X_2 + d_1 X_3} / \left(1 + \sum e^{a_{j1} + b_{j1} X_1 + c_{j1} X_2 + d_{j1} X_3}ight)$$ ............................................................... (c)

$$P_2 = e^{a_2 + b_2 X_1 + c_2 X_2 + d_2 X_3} / \left(1 + \sum e^{a_{j2} + b_{j2} X_1 + c_{j2} X_2 + d_{j2} X_3}ight)$$ ............................................................... (d)
3.6.2 Multilevel model:
Community factors are also important in affecting individual choice behaviour. In multilevel models, the interesting part is that characteristics from the higher level also influence or affect the lower level outcomes. We have used a multilevel model as an ordinary logistic model assuming that all observations are independent. A multilevel model allows for the hierarchical nature of the data and corrects the estimated errors to allow for clustering of observations (Goldstein, 1995). The higher level referred to here is the community and the lower level includes the individual. However, we cannot use simple regression models to see how observed community level variables along with individual level characteristics are affecting individual behaviour, because the unobserved factors at the higher level influence the lower level outcomes. This can give rise to a multilevel error structure. (Angeles et. al., 2005). In this study after clustering at PSU level (Primary Sampling Unit, villages in rural areas and census enumeration blocks in urban areas in the sample used) we want to see whether the effects of community factors are important in the choice of individual contraceptive method selection. We develop our model at two levels, individual (level1), and community (level2). The equation for basic two level models is:

\[
P_j = \frac{1}{1 + \sum e^{a_j + b_j X_{j1} + c_j X_{j2} + d_j X_{j3}}}
\]

Where
\( Y_{ij} \): Categorical outcome for individual \( i \) from community \( j \)
\( X_{ij} \): Individual level explanatory variables
\( P_{ij} \): Programme variable (could be community level)
\( Z_{ij} \): Community level variables (contact with health workers)
\( \mu_j \): Community unobserved heterogeneity
\( \varepsilon_{ij} \): Individual level unobserved heterogeneity
\( \beta, \alpha \) and \( \delta \) are coefficient vectors.
We use multinomial logistic regression to model this. There are numerous estimation procedures to treat clustering by geographic context. First, we do standard multinomial logistic regression with standard error adjusted for unobserved community effects. Then we drop the choice of permanent method (sterilisation) from our model to assess the effect of contact with service providers as average number of contacts with the health workers within the past three months does not affect the adoption of terminal methods (sterilization) which would have taken place long ago and use generalised linear latent mixed model (GLLAMM). It is a class of multilevel latent variable model for (multivariate) responses of mixed types including categorical responses. The latent variable also known as common factor or random effect can be assumed to be discrete or to have a multivariate normal distribution with mean=0. GLLAMM is estimated by the maximum likelihood method. In the simplest generalised linear mixed models, the dependence structure of clustered data is modelled by introducing a random intercept into the linear predictor. The random intercept is shared by all units in the same cluster and can be interpreted as cluster level unobserved heterogeneity (Hesketh et. al., 2002). The GLAMM gives the variance at the cluster level ($\sigma^2\mu$) and the standard error for it. The GLLAMM does not give the intraclass correlation $\rho$ and its standard error or confidence interval. However, it can be calculated by:

$$\rho = \frac{\sigma^2\mu}{(1 + \sigma^2\mu)}$$

The value of $\rho$ will be significant if it is significantly different from zero. (Chapter IV uses GLAMM).

However, due to the lack of proper community level variables we also look at the qualitative data collected from the field.

Finally, we use logistic regression to conduct more detailed choice analysis with NFHS-3 data, as well as the primary household survey data.
The Logistic function: The basic form of the logistic function is

$$P = \frac{1}{1 + e^{-z}}$$

Where $Z$ is the predictor variable and $e$ is the base of the natural logarithms and $P$ is an estimated probability (Retherford and Choe, 1993). The Logit of $P$ is derived from the logistic function which is

$$\text{Logit } P = \log \left( \frac{P}{1-P} \right)$$

The quantity $[P/(1-P)]$ is called the odds, denoted more concisely as $\Omega$ (upper case omega) and the quantity $\text{Logit } P$ is called the log odds or the logit of $P$. Thus

$$\text{Odds} = \frac{P}{1-P} = \Omega$$

and

$$\text{Logit } P = \log \left( \frac{P}{1-P} \right) = \log \Omega$$

In case an explanatory variable is categorised, the reference category is specified. In such cases, the ratio term $\exp(B_k)$ for a particular category is the odds ratio, that is, the ratio of odds for the category $K$ to the odds for the reference category.

Similar to the multinomial logistic regression, random effect logistic (xtlogit) is used to see the community effect on individual variables.

3.6.3 Presentation of results in multiple classification analysis (MCA) format

This research study presents multinomial logistic regression results in the form of a simple bivariate table (predicted values of the response variable tabulated by values of the principal predictor variable, with other predictors held constant). Adjusted values of the response variables are considered in this research study. Adjusted values are based on the complete model including all predictor variables simultaneously.
An example of presentation of the effect of predictor variables on \( P_1, P_2 \) and \( P_3 \) in the form of an MCA table is given as follows (Retherford and Choe, 1993). The estimated coefficients and their standard errors are given out by the Stata programme output after we run multinomial logistic regression. Further, the MCA Table is constructed by substituting appropriate combinations of ones, zeroes, and mean values in equations (c, d, and e).

Finally, results from the analysis of the NFHS-3 data, of the household survey, and the focus group discussions and in-depth interviews carried out by the researcher are synthesized at the end to arrive at conclusions.