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1.1 Significance of Maternal and Child Health

In spite of government endeavours, complications linked to maternal and child health (MCH) indeed serious health issues in the developing countries. The consequences of not utilization of services are still the prime causes of ill health and death among women of reproductive age group, predominantly in the developing countries. The emphasis on two decisive Millennium Development Goals (MDG), that is, reducing under five mortality by two-thirds and maternal mortality ratio by three quarters, between 1990 and 2015, signify the relevance of these indicators in global efforts towards human development (WHO 2004; Rosenfield et al. 2006). There are two ways to measure progress in efforts to eliminating unnecessary maternal and child deaths. First is by using impact indicators, and the second approach is by using process indicators. Impact indicators show changes in a given event (such as maternal and child death) and help us to appraise progress in reducing maternal and child deaths. However, it is hard to track the progress of impact indicators in the absence of reliable data on maternal and infant death. On the other side, it is straightforward to collect data of process indicators which show changes in the activities that lead to the events, for example evidence suggests that skilled attendance at birth and access to emergency obstetric care are important factors in reducing the risk of maternal death, in both developed and developing countries (Graham et al. 2000; WHO 2004). Moreover, study based on rural Bangladesh shows that diphtheria-tetanus-pertussis (DTP) and oral polio vaccination were independently associated with decreased risk of child death before age nine months (Breiman 2004).

Therefore, lack of reliable data on maternal and child mortality, especially in developing countries, had led to use of alternative process indicators. Proportion of institutional delivery, skilled birth attendance and child immunization are some proxy indicators
which are closely related to reducing maternal and child death. These indicators are helpful in tracking progress in maternal, newborn and child survival (Wardlow and Maine 1999; Bell et al. 2003).

Data from National Family Health Survey (NFHS)-I, II and III seem to illustrate a slow progress in the utilization of MCH care services that is, antenatal care, institutional delivery and child immunization. The NFHS-III survey found that two out of five births took place at home and more than half births were not attended to trained medical personnel. This unacceptably low utilization of MCH services has repercussions not only for women and their children but also for other family members.

The Indian Government continues its effort to search the best possible pathways so that improvement in maternal and child health could be accelerated further to meet the health related 2015 MDG. Despite an increase in the budget allocation (per capita health spending has risen from US$ 21 in 2000 to US$ 45 in 2009) for health during past decade, it is observed that the pace of decline in maternal and child mortality is considerably slower than what would be expected. Numerous programmes and policies have been implemented to eradicate the unnecessary deaths but one of the best possible pathways is to promote the utilization of MCH services.

Although, linkages between utilization of MCH services and maternal-child mortality has several methodological problems but studies have shown a strong relationship between adverse health outcomes and absence of health care during and after pregnancy (Carroli et al. 2001). Studies highlighted that most of the maternal and infant deaths could be prevented in India if all the deliveries were performed under medical attention, children were received full vaccinations and birth intervals were properly spaced. Several studies have been also carried out to explain how to improve the utilization of institutional delivery, contraceptive adoption and uptake of child
immunization (Hamid & Stephenson 2006; Williams et al. 2011; Fikre & Demissie 2012).

Number of socio-economic and demographic factors affects the utilization of MCH services and family planning methods (Babalola & Fatusi 2009). In addition, literature shows that prenatal care utilization for previous birth is also an important factor for following health care utilization. Role of prenatal care services has several advantages in elevating the utilization of MCH services as well as contraceptive adoption, but has received less attention.

There are several pathways which may describe the association between prenatal care and utilization of subsequent health care services. First, antenatal care provides a preventive service that monitors signs of pregnancy complications, detects and treats pre-existing and concurrent problems which helps pregnant women in lowering down their risk. Secondly, the antenatal care (ANC) visits during pregnancy could be considered the first entry point for women into the health care systems and there is an opportunity to encourage them to seek subsequent health care. So, it is hypothesized that received information during ANC visits may predict woman’s future contact with the health care systems. In contrast poor-quality of care and ambiguous information received during health care visits may stop women to seeking future care at facilities. It is argued that unclear communication between women and health workers and from other women in the community has led to home and unsafe delivery (Lubbock & Stephenson 2008).

Past evidences suggest that subsequent utilization of health care facilities might be increased because of learning by-doing that is, subsequent participation in the systems may be greatly influenced by the earlier experience (Lee 2005). Further, several visits to the health centre may develop a familiarity with health care systems, increasing the
likelihood that mothers will later rely on these systems for the benefit of their children. It is envisaged that ANC visits would allow a woman to have frequent contact with the health systems/workers during pregnancy, thereby enabling her to learn more about possible complications of pregnancy and the benefits that can be gained from institutional delivery and uptake of child immunization.

Extant literature suggests that maternal and child health care facilities remain much underutilised (Navaneetham & Dharmalingam 2002; Titaley et al. 2009; Titaley et al. 2010). Regarding reasons for low utilization of health services, several factors have been discussed like external environment, predisposing factors and enabling factors (Amin et al. 2010). It is observed that woman’s past experience regarding received ‘quality of care’ and ‘information of health facilities’ may influence her future behaviour in relation to utilization of reproductive and child health services. Winston and Winston & Oths (2000) argued that women with fewer children were more likely to initiate early for health care, inspite of self-referral status. However, studies shows that lack of transportation facility, difficulty in getting an appointment, patient perception of prenatal care “as being less than very important” were some important factors associated with late initiation of health care.

Apart from demographic factors, research in India consistently shows that high incurred cost is an important constraint in service utilization, particularly for the poor. Hence, income is a major determinant of health care seeking (Das et al. 2001). Analysis of the third round of National Family Health Survey (2005-06) data shows that 13 percent women from the lowest wealth quintile had accessed institutional delivery care compared to 84 percent from the highest wealth quintile (Vora et al. 2009). Also, Mohanty (2012) concluded that use of maternal care services varies significantly by level of deprivation measured by education, wealth and health indicators of household.
members. Some studies (including India) have found that geographical access has a greater effect on utilisation than socioeconomic factors (Sawhney 1993), particularly in rural areas with limited service provision.

Studies also illustrate that rural women are more likely to receive ANC even though availability and accessibility of health care services are usually low compared to urban areas (Navaneetham & Dharmalingam 2002). These findings indicate that though service utilization does not occur in a vacuum, only existence and availability of services are not enough to increase service utilization. Basu (1990) in her study on health care use revealed that mere provision of services does not lead to utilization.

A majority of women reported miscarriages or health problems during previous pregnancies as reasons to begin early care (McCaw-Binns et al. 1995; McDermott et al. 1996), while others cited spot bleeding or prior miscarriage as reasons to delay seeking care until they felt the pregnancy was viable. Studies shows that have found that multiparous, and older women were less likely to perceive the important of prenatal care (Roberts et al. 1998). Sargent and Rawlins (1991) reported that woman's experience and perceptions of pregnancy as a health state affect use of prenatal care.

According to Institute of Medicine (1985) prenatal care is linked with numerous benefits for maternal and child health. Most health practitioners are also of the opinion that prenatal visits should begin in the first trimester (Murata et al. 1992). Hitherto more than one-half women in India do not receive prenatal care during the first trimester (IIPS & Macro International 2007).

Apart from prenatal, natal and postnatal care, use of family planning methods is an important dimension of woman’s health. The Government of India has launched several programmes throughout the country related to family planning from time to time and updates its strategies. The idea behind launching these programs was that family
planning should ensure that births are properly timed, spaced and ended by choice. In India contraceptive prevalence rate has been steadily increased from 41 percent to 48 percent during the period 1992/3-1998/9 and 56 percent by 2005/6 (IIPS 1995; IIPS & Macro International 2000; IIPS & Macro International 2007), however there has not been much promotion of family planning programs in targeting the amenorrheic women who were in the crucial stage of reproductive career.

In 1952, India became the first country in the world to launch an official family planning program and in 1956 the government started to offer modern contraceptive method like condoms and diaphragms due to high failure rates for traditional methods (Ledbetter 1984; Srinivasan 1998). After a decade male and female sterilization methods were introduced in the year 1966 (Gwatkin 1979). In India over the time period dominance of female sterilization method has been increased. In the year 2005–2006, country’s contraceptive prevalence rate was 56 percent and around 38 percent currently married women adopted sterilization method compared with 34 percent in the year 1998–1999 and 27 percent in the year 1992–1993 (IIPS & Macro International, 2007). One of the reasons could be in the year 1996 method-specific contraceptive targets were removed and implementation of the Government scheme which offered incentives both to potential users and providers. According to this scheme woman who undergone for tubectomy was eligible to receive rupees 300 and men undergoing vasectomy were eligible to get 200 rupees. The scheme was revised in the year 2006 and according to this woman eligible for 600 rupees and men eligible for rupees 1,100 (MOHFW 2005; MOHFW 2011).

The distribution of age at sterilization shows that around eight percent women underwent sterilization when they were less than 20 years old, 38 percent were aged 20-24 years and 35 percent were aged 25-29 years. Overall, four out of five women underwent
sterilization before age 30 years. In other words, India's family planning program has largely failed to encourage the use of spacing methods particularly among young women aged 15-30 years (MOHFW 1991).

A majority of women in India never use spacing methods to space births, for them sterilization is often the first and sole method of family planning to control their family size. Such limited reliance on spacing methods increase the rates of reproductive tract infections and the risk of short birth intervals, which in turn increase the risk of premature delivery, low birth weight and adverse maternal health (Miller 1989). Therefore, to insure better health of both mother and child it is necessary to increase the time gap between two births through the effective use of spacing methods.

Literatures suggest that mentioned several barriers and promoting factors affect contraceptive adoption. Many women stated that less education of their husbands and other family members (especially mother-in-law) forbade them to use any family planning methods. Preference for male child was found to be another important barrier to use contraceptive and plays a prominent role in having more children at shorter interval (Rustagi et al. 2010). Women also suggested that as per their religious and socio-cultural background, sterilization to limit family size was prohibited.

1.2 Integration and Inter-Linkages between Health Care Services

Integrated service delivery may include the delivery of services by the provider on the same day in the same health facility by incorporating effective linkages between different services. Available empirical evidence on the integration of services comes from experimental studies on the effects of integration of family planning into general health services that were conducted in the early 1980s (Faruqee 1982a; 1982b; Phillips et al. 1984).
Integration of health interventions in developing countries has been the subject of a lively debate for more than 40 years. The experience of many countries indicates that integrated services lead to better fulfillment of client needs by providing an integrated package of family planning, reproductive health and MCH services through one provider at one service delivery point. Undoubtedly, women would get benefitted tremendously if all service delivery points are fully integrated with all services offered. In the same institution, a mother delivers a child, receives postnatal care and family planning services. Offering these services together will improve care since it provides more comprehensive care to the mothers, avoids missed opportunities for key interventions and prevents loss of mother in the systems; saves money through minimize clinic visits and reduces waiting time during a visit.

However, review of trials on integrated service delivery in less developed settings found no significant clear-cut association between integration of health services and improved health-care delivery. Also, a country like India practical challenges are immense because the same number of health care workers, based in the same facilities, was expected to provide both the services with no increase in resources like medical equipment and hospitals infrastructure or training.

The present work usage the term “Inter-linkages” as a generic description of links between one health care services to other. Thesis does not enter into the debate of ‘pros and cons of integrated services’, but takes a practical point of view by hypothesising that, counselling and motivation provided by health workers during utilization of each MCH care services improves effective adoption of subsequent service utilization and use of contraception.
1.3 Review of Previous Studies

1.3.1 Association between Antenatal Care and Institutional Delivery

Antenatal care (ANC) visits one of the important components of prenatal care and considered as a first time contact with the health workers. During the visit there is an opportunity to help women best prepare for birth, as well as inform them about pregnancy related complications, and the advantages of skilled delivery care (Lindmark et al. 1998; Campbell & Graham 2006). The World Health Organization recommends four antenatal care visits during pregnancy, with the first visit in the first trimester (before 12 weeks but not later than 16 weeks), and subsequent visits at 24-28 weeks, 32 weeks and 36 weeks. Each visit should include care that is appropriate to woman overall health condition and stage of pregnancy, and help them to prepare for birth and care of newborn. Key components of ANC include screening for risk factors, the prevention and management of complications, communication of health-related information and preparation for delivery in a safe place by skilled attendants (Villar & Bergsjo 1997; Vanneste et al. 2000; Petrou et al. 2003).

Of all components of MCH, numerous studies have assessed the effectiveness of ANC on utilization of safe delivery care and protective effect on maternal and infant death (Carroli et al. 2001). Study based on cross-sectional data report that ANC visits are associated with skilled delivery care (Bloom et al. 1999; WHO 2003, Yanagisawa et al. 2006; Mpembeni et al. 2007, Stanton et al. 2007). A study conducted within the Health and Demographic Surveillance System in Matlab, Bangladesh observed significant association between ANC visits and institutional delivery. The adjusted odds ratios to deliver in a facility among women attending three or more ANC visits in comparison to women with zero or one ANC were 3.25 (95% CI: 2.63, 3.91) and 2.74 (95% CI: 2.43, 3.09), respectively, in International Centre for Diarrhoeal Disease Research, Bangladesh.
and government Strategic Action Society (Pervin et al. 2012). In the Southern Tanzania women who were advised during ANC by health workers to deliver in a health facility had a higher proportion of delivering with a skilled attendant compared to those who had not received any advice during ANC visits (Mpembeni et al. 2007). In Bangladesh, a pregnant woman who makes ANC visits several times has high chance of deciding to use skilled attendant at birth than who had few or no ANC visits (Anwar et al. 2008). In rural Afghanistan, if woman visits more number of times for ANC, she will have high chance to deliver at a health facility (Hadi et al. 2007). Studies based on Demographic Health Survey data, suggest that women who use prenatal care services are more likely to use delivery services than those who receive no prenatal care. Studies conducted in Botswana, Tanzania and Cambodia as well as pooled data from developing countries from all the continents shows that frequency of ANC visits is a significant positive determinant of use of facility delivery (Letamo et al. 2003; Yanagisawa & Wakai 2006; Mpembeni et al. 2007; Stanton et al. 2007). Pooled data from health surveys from MDG regions in USA shows that ANC usage strongly related to health facility delivery (Stanton et al. 2007). A community based nested case-control study was conducted in the northwest Ethiopia reveals that women who had ANC during pregnancy four or more times (OR: 2.80, 95% CI: 1.56, 4.98) were more likely to deliver with the assistance of a skilled attendant. This finding is consistent with studies done in Tanzania and Cambodia (Yanagisawa & Wakai 2006; Mpembeni et al. 2007).

A community-based cross-sectional survey was conducted in the different regions of the southeast Ethiopia and result shows that women who had ANC visits during last pregnancy (OR: 4.18, 95% CI: 2.54, 6.89) were more likely to deliver at health institutions (Amano et al. 2012). ANC visits during last pregnancy were also found to be a strong predictor of institutional delivery service utilization in the Northwest of
Ethiopia. Mothers who had ANC visits during pregnancy were four times more likely to deliver in health facilities than those who did not have any ANC visits during last pregnancy (OR = 4.26, 95% CI: 1.1, 16.4) (Teferra et al. 2012).

A study done by Bloom et al. (1999) in northern part of India shows that after adjusting socio-economic and demographic factors, the level of ANC care obtained during pregnancy had a strong positive effect on likelihood of delivering in health facility (OR: 2.72, 95% CI: 1.43, 5.16). Further, study conducted in four Indian states also observed that women who received any antenatal care were significantly more likely to deliver in a medical institution (Sugathan et al. 2001). Using data from two rounds of National Family Health Surveys (NFHS-1 and NFHS-2), Mishra & Retherford (2006) estimated the effect of ANC visits on professional assistance of delivery. Results based on multinomial logistic regression shows that effect of ANC visits on professional assistance at delivery is larger in south India than in north India.

In contrast, a study done in rural Kenya revealed that the coverage of deliveries assisted by skilled attendants was very low even among antenatal care attendees (Cotter et al. 2006). This shows that ANC care is not yet meeting its potential to serve as an entry into the healthcare system at the time of delivery in rural Kenya. Number of studies in relation to ANC and delivery care is available but findings from these studies have several limitations. Many studies rely on data collected with long recall periods based on cross sectional study and do not include important covariates for adjustment. Also, these studies lack in quantifying the actual impact of ANC visits on subsequent utilization of institutional delivery.

1.3.2 Association between Antenatal Care and Child Immunization

The immunization of children against six potentially deadly, but preventable diseases tuberculosis, diphtheria, pertussis, tetanus, polio, and measles has been an important
cornerstone of the child health care systems. Immunization status is a sign of progress towards the child health goals established under the Millennium Development.

Numerous studies have examined the empirical evidence concerning the influence of demographic and socio-economic factors influencing child immunization in the different countries of the world such as Bangladesh, Ethiopia, Nigeria and many others countries (Roy 2010; Antai 2011). These studies examine the impact of individual (child age, mother age, birth order of index child), Household (place of residence, wealth quintile, parental education, husband’s occupation, religion, caste etc.), and community (availability of health facilities and its accessibilities) characteristics. Also, a large body of literature has given special focus on gender dimension related to child immunization (Hill & Upchurch 1995; Chowdhury et al. 2002; Antai 2012). In spite of all these factors contribution of ANC visits on subsequent child immunization is remain unanswered.

Researchers have tried to establish the association between utilization of prenatal care service and child immunization (Kogan et al. 1998; Munshi & Lee 2000; Gill et al. 2002; Choi & Lee 2006; Pandey & Lee 2011). A longitudinal follow-up study based on national representative sample of infants born in 1988 United States shows that children whose mothers had less than adequate prenatal care utilization had significantly less likely to have adequate immunizations, even after income, health insurance coverage, content of prenatal care, wantedness of child, sites of prenatal and pediatric care, and maternal and pregnancy risk characteristics were taken into account (Kogan et al. 1998). Gill et al. (2002) conducted retrospective cohort study on 187 women to examine whether prenatal care improve childhood immunization, and finding shows that after controlling for age, gender, ethnicity, insurance, birth order, and language, significant association persisted between continuity in prenatal and higher completion
rates for early childhood immunization. Study based on a prospective cohort study of 608 newborns delivered at the hospital of university of Pennsylvania shows that apart from women high level of education and prior employment, prenatal care were also related with immunization status of children. Choi & Lee (2006) employed bivariate probit model on National Family Health Survey-1992-93 (NFHS-I) data in India and found that prenatal care has a much larger impact on child immunization in rural areas than urban areas.

National level data from three West African countries Chad, Mali and Niger was used to explore the independence of ANC and Expanded Program on Immunization (child vaccination) attendance amongst mothers of children under five years. Result shows that ANC and EPI attendance were strongly associated in all three countries. More specifically in Niger, mothers who attended ANC were nearly seven times more likely to attend EPI with their child than those who did not attend any ANC (OR 6.7, 95% CI: 5.5, 8.1). In Mali it is three times more likely to attend EPI (OR 3.2, 95% CI: 2.7, 3.9) and in Chad ANC attended was over six times more likely to attend EPI with their child (OR 6.3, 95% CI: 4.9, 8.1) (Carlson et al. 2011). Study based on east China shows that ANC follow up was related with full immunization coverage (Hu et al. 2013) which was consistent with the study done in Bangladesh (Mosiur & Sarker 2010). Analysis based on India data found that in four northern states of India (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) children were more likely to receive full immunization if mother received antenatal care or had delivered index child in an institution (Partha & Bhattacharya 2002). Inspite of all the existing studies no documentation available which shows the actual impact of ANC visits on subsequent child immunization in India.
1.3.3 Association between Utilization of MCH Services for First Observe Birth and Subsequent Births

To improve coverage of MCH services, health planners and policy makers need information not only of those groups of women who never utilize services but also those who are not consistently utilizing all MCH services. For example, if women receive ANC care during their first pregnancy it is important to motivate them to return to the health center for ANC during their subsequent pregnancies.

A study based on Sewa-Rural area in Gujarat, shows that women who had previous home deliveries were 81 percent less likely to deliver in an institution during their subsequent pregnancy compared to those who had previous institutional delivery (SMNBC 2003). Study based on cross-sectional data of community and family survey of 1401 women in the southern Ethiopia shows that probability of receiving maternity care for the most recent pregnancy was very strongly related whether one received the same service immediately preceding the birth (Mekonnen 2003). A longitudinal hospital based study in New Jersey shows that among women with adequate prenatal care for the first birth, 75 percent attained adequate utilization in their second pregnancy (Denk & Kruse 2005).

Contradictory to this cross-sectional study in the northwest Ethiopia shows that previous use of institutional delivery was independently associated with a decreased likelihood of subsequent institutional delivery of 45 percent (adjusted OR 0.55, 95% CI : 0.20–0.76), which reflects low level of satisfaction with their previous experience of institutional delivery (Kebede et al. 2013). A similar study based on 630 pregnant women from Addis Ababa has documented that previous experience with ANC services did not come out as a predictor of timely booking of antenatal care for next pregnancy (Tariku et al. 2010).
Overall, research highlighted that utilization of any health services for successive births are not independent to each other. Many researchers employed number of different techniques like transition models to solve problem of dependency for their research question (Zenger 1993; Diggle et al. 2002). This allow for strong dependence between successive outcomes to the same unit. Curtis and Steele (1996) combined random effects with first order transitional model when modelling child mortality. In actuality, very few studies have assessed the relationship between previous use of health care services and subsequent utilization due to dearth of appropriate longitudinal data. Till date, no research is available which have applied advanced technique to solve dependence problem in case of health care utilization for successive births.

1.3.4 Linkages between Utilization of MCH Services and Subsequent Contraceptive Use

According to Darroch et al. (2008), use of contraceptives help to prevent an estimated 2.7 million infant deaths and the loss of 60 million years of healthy life globally. Studies suggest the positive influence of healthcare utilization on woman’s contraceptive behaviour but the existing literature provides little evidence regarding the effect of prenatal and postnatal care on contraceptive adoption. A study based on random sample of 1051 married women conducted in Pakistan have attempted to identify the influence of specialized healthcare (pre and postnatal) in regulating family planning behaviour as well as to identify the minimum level of pre and postnatal care required to influence contraceptive use. Result shows that percentage of ever use contraceptives increased by 21 percent from no prenatal care to less than five visits, and further by 13 percent when women made 5-7 visits. It finally increased by 48 percent for more than seven prenatal visits (Rehman et al. 2008). A study based on five countries provides evidence that use of particular one health intervention encourages
use of other health services, after controlling socio-demographic and economic factors and service availability (Ahmed & Mosley 2002).

Using data from Guatemala Demographic and Health Survey (DHS) Seiber et al. (2005) found that utilisation of maternal and child health services increased contraceptive use after birth by nine percent points. Using 1980s data from six demographic and health surveys, Ahmed & Mosley (2002) used structural equation models to examine the relationship between MCH service use and contraceptives adoption. A study from Morocco using household survey data also analyses to determine the relationship (Hotchkiss et al. 1999). Both studies found that women with a greater intensity of MCH service use are more likely to use family planning services.

Study based on Kenya and Zambia depicts strong association between ANC visit and use of post-partum modern family planning method (Do & Hotchkiss 2013). More recently, Akinlo et al. (2013) made use of 2008 Nigeria DHS data to determine association between MCH and postpartum contraceptive use. Finding shows that as the number of ANC visits increases, the percentage using modern methods of contraception also increases. Result also suggests that postnatal care within six weeks of childbirth is significantly related to use of modern contraception during postpartum period (p<0.01). This relationship is consistent with findings reported by other studies (Seiber et al. 2005; Barber 2007). However, Akinlo et al. (2013) found that place of delivery was not a significant predictor of use of modern contraception during postpartum period. Notably, in contrast to this analysis, Barber (2007) found that women who delivered in government or private facilities were more likely to use contraceptive method than those who delivered at home in Mexico. Study based on primary sampled data from 80 villages of Orissa clearly indicated that utilization of ANC services affected the
acceptance of family planning methods even after controlling for literacy status (Sinha 1997).

1.4 Rationale of the Study

Literature suggests that in addition to several socio-economic and demographic factors, prenatal care emerge as an imperative factor for subsequent utilization of health care services. Studies illustrate that prenatal care increases the chance of mother using subsequent health care services for her child (Sugathan et al. 2001; Mishra & Retherford 2006; 2008 Ram & Singh 2006). It may be that women, who participate in antenatal health care programs, receive counselling regarding the significance of subsequent health care utilization, such as delivery care and child immunization.

On the contrary, Lee (2005) argued that it is more likely that a mother who uses prenatal care may also utilize subsequent health care services due to utilization of past health services in her reproductive carrier rather than her beliefs and motivations. It is not clearly understood whether it is a causal effect or simply a correlation. Also, evidence to support that frequency of woman’s contact with the health worker during pregnancy is effective in rising further delivery care and child immunization has been missing till date because of presence of selection bias. The present study attempts to fill this gap.

Among all factors, studies show that birth order play a crucial role in utilization of health care services (Kesterton et al. 2010). Some of the studies point out that a primiparous mother may not be quite familiar and conscious with the services, while a multiparous mother becomes more accustomed to it and having visited the health facilities more frequently (Banerjee 2003). However, on the other hand, several studies have also found that for all indicators of maternal and child health care services the likelihood of utilization of these services decreased for higher order births (Elo 1992;
Bhatia & Cleland 1995). Moreover, according to Hazemba & Siziya (2008), having had last childbirth at home was negatively associated with current delivery at a health facility. In this scenario, it would be puzzling to find out whether birth order is positively or negatively related to institutional delivery. At the same time, it is essential to make out whether there is any dependency between utilization of an institution for the lower order births, and that of subsequent births. The improvement in the coverage of these services policy makers and health planners need information not only about those groups of women who never utilize services but also those who are not consistent in utilization of delivery care services.

Family planning programmes continued to be closely interlinked with maternal and child health activities in the several countries. Researchers have tried to link contraceptive use and utilization of MCH services (Sinha 1997; Seiber et al. 2005). Most of the researchers have tried to show the impact of utilization of antenatal care services on ever-use of family planning methods. Nevertheless, research investigating the nature of this relationship is not well understood, in the sense that ever use of contraceptive is a weak indicator to capture this aspect. Nevertheless, the conceptual case for a relationship between MCH service and contraceptive use is compelling, the relationship has still been somewhat murky. In the present study, with the help of a reproductive calendar, concerted attempt has been made to examine whether utilization of maternal and child health care services is one of the major networks for contraceptive adoption. We have examined types and initiation of specific contraceptive use, after utilization of MCH services. It is crucial to know because probability of conception after childbirth is a vital question for those who do not hurry to conceive a new baby just after birth. Overall, the present research sets out to
investigate the broad nature of inter-linkages between utilization of different MCH and family planning services in India.

1.5 Research Questions: Some of the important questions that emerge are

1. Is the relationship between utilization of antenatal care and institutional delivery and further antenatal care and child immunization services not strong enough after removing the selection bias?

2. Is there any dependency between utilization of delivery care services for the lower order births and that of the subsequent births?

3. Do women who receive maternal care services have improved contraceptive adoption, in terms of initiation and types of method?

1.6 Objectives of the Study

The broad objective of the proposed study is to examine in the Indian context, how utilization of maternal, child health care services and contraceptive dynamics are intertwined together. However, the specific objectives of the study are

1. To examine the level, trends and differentials in consistent utilization of maternal and child health care services of most recent birth and across successive births.

2. To understand the influence of woman’s frequency of contact with the health workers during pregnancy on institutional delivery and child immunization.

3. To investigate the behavioral consistency in use of delivery care services, across successive births.

4. To explore the impact of prenatal, delivery and postnatal care utilization on initiation and types of contraceptive use.

1.7 Research Hypotheses: The following research hypotheses are framed

1. After removing the selection bias, the relationship between utilization of preceding and subsequent health care services becomes weaker.
2. The behaviour of women in utilizing the institutional delivery across successive births is consistent.

3. Women who receive postnatal care services adopt contraceptive early than those women who receive antenatal care services.

1.8 Conceptual Framework

Many researchers have examined the determinants of MCH and contraceptive use, from both the providers’ and clients’ perspectives. The customized conceptual framework builds on existing knowledge to analyze the association between utilization of MCH services and contraceptive use and socio-economic and demographic factors associated with them. Demographic factors such as age of respondent, parity and experienced of child loss represent biological urge that people need health services. Social structure is measured by a broad array of factors like education of women and their husband, religion and caste, etc. that determine the status of person in the community and his or her ability to utilize health care utilization. When women utilize a particular MCH service, health workers motivates women and give information about other MCH services. The motivation and information about other health care services change the beliefs, attitudes, and knowledge among women and consequently might influence their use of subsequent MCH services as well as same health care services for higher order birth. The conceptual framework is presented in Figure 1.
1.9 Organization of the Thesis

The present thesis entitled “Inter-linkages between Maternal, Child Health Care and Contraceptive Dynamics in India” consists of six chapters.

Chapter-I provides an overview of research problem and review of the relevant prior research work. It illustrates the importance of utilization of MCH services and contraceptive use and rational of the present study accordingly. The chapter also discusses about the research questions, broad objectives and hypotheses of the study. After a detailed discussion of the available studies, an attempt has been made to explain about the proposed framework of the study in order to understand the linkages between use of MCH services and contraceptive methods and underlying mechanism.

Chapter-II discusses the levels, trends and differentials in consistent utilization of maternal and child health care services according to different socio-economic and
demographic factors. Consistent utilization of MCH services has been examined in two different sections, in the first section, the results of the levels, trends and determinants of consistent utilization of four subsequent maternal and child health care services have been discussed. In the second section, the results of the levels, trends and determinants of consistent utilization of a specific MCH service across successive births of a woman are presented.

Chapter-III presents the results of linkages between utilization of two different health care services in India. The chapter has been divided into two sections. Using propensity score matching analysis, first section discusses the net impact of ANC visits on subsequent utilization of institutional delivery. In the second section of this chapter an attempt has been made to examine the net impact of ANC visits on child immunization. Lastly, sensitivity analysis using Mantel-Haenszel bounds has been employed to validate the obtained estimates and results have been discussed.

Chapter-IV explores the consistent utilization of delivery care services across successive births. Research attempts to highlight the factors affecting consistent utilization of institutional delivery. The assumptions of the applied conventional method have been verified and advantages of multivariate multilevel model over multilevel model has been discussed and applied.

Chapter-V makes an effort to understand the impact of use of MCH services on time to initiate subsequent contraceptive adoption. Simultaneously, the chapter tries also to look into the impact of use of different MCH services on type of contraceptive (traditional, modern) adoption after birth.

Chapter-VI provides the summary of finding, conclusions, policy implications, limitations and proposes future directions for research on this subject. Major findings emerged from each chapter are presented. Finally, policy issues, limitations of the study and future directions for research have been discussed.