UNMET NEED FOR FAMILY PLANNING IN BIHAR

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DECLARATION

I, Anamika, declare that the dissertation entitled, **"UNMET NEED FOR FAMILY PLANNING IN BIHAR"**, submitted at the Jawaharlal Nehru University in partial fulfillment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY**, is my bonafide work. The dissertation has not been submitted for the award of any degree of this or any other university.

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CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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Dedicated to Mummi
& Chacha ji

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1. Introduction

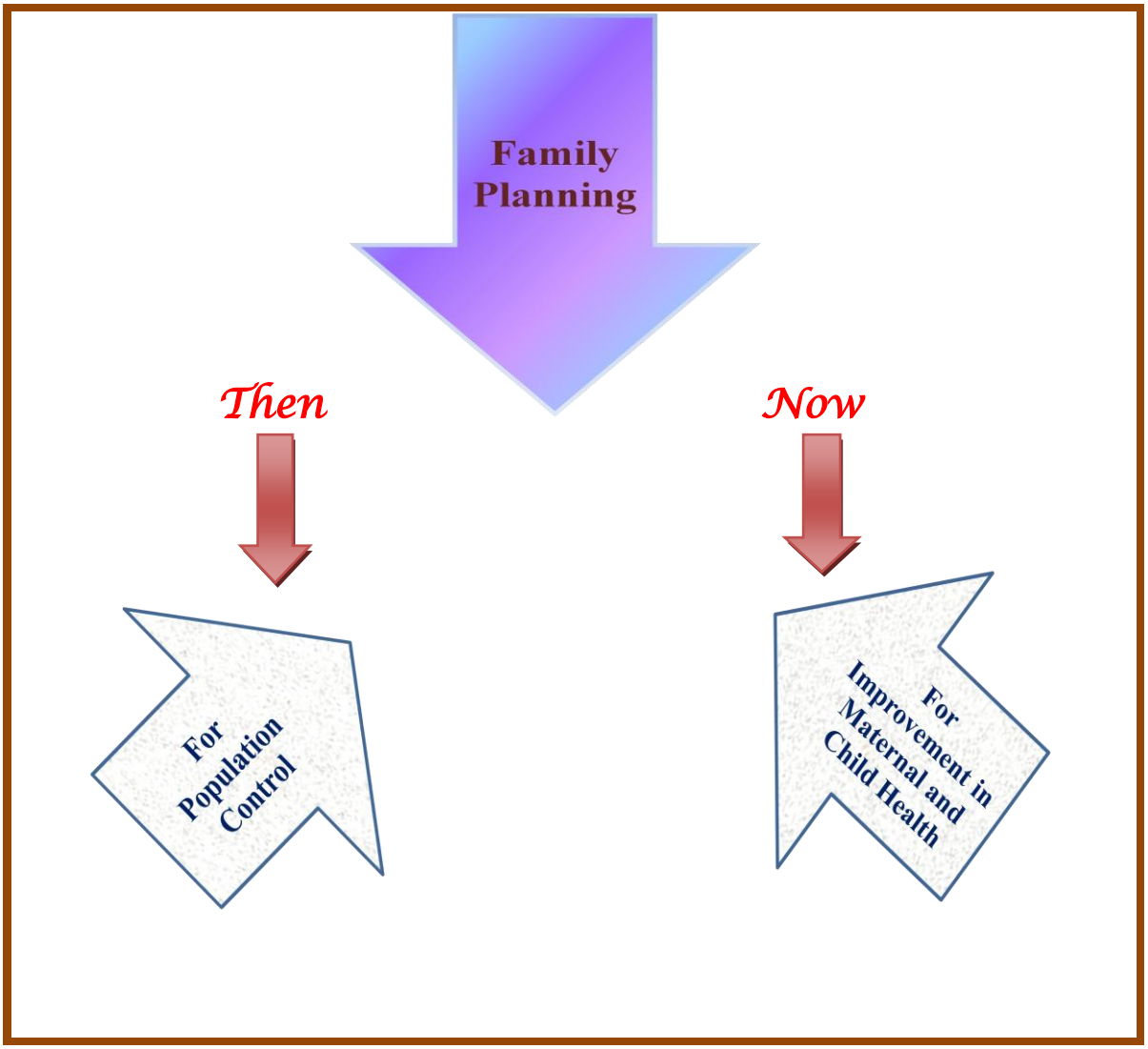
"Reproductive health is not only a state of complete physical, mental and social wellbeing but also implies that people have the capability to reproduce and freedom to decide if, when and how often to do so. In order to ensure this, access to safe, effective, affordable and acceptable methods of family planning of their choice is essential for women to go safely through pregnancy and childbirth and have a healthy infant. The reproductive rights of an individual includes planning of one's family, attainment of high standard of sexual and reproductive health and making decision related to sexual and reproductive health free of discrimination, coercion and violence. In order to improve the health indicators for women, mothers and children family planning is seen as a key strategy" (http://www.jsk.gov.in/images/unfpa.pdf)**.**

Indian family planning program was started in 1952 and the rationale of the program was to enable people to exercise control over their reproduction and to stabilize the population to reach the replacement level of fertility. The necessity to emphasize on the need for investment in family planning was accentuated in the World Population Conference in Bucharest in 1974.

In this conference member states were asked to draft population policies to curb rapid population growth. The integration of women's issues with family planning was seen in the Mexico Conference in 1984. After 10 years there was a "paradigm shift" from population control to individual well being at the International Conference on Population and Development held at Cairo in 1994 **(UNFPA,2012)**. A Programme of Action (PoA) focused on meeting the needs of individual women and men rather than on achieving demographic targets. Universal availability of and accessibility to family planning services was advocated by this. The Programme of Action (PoA) stressed on empowerment of women through education and even on the recognition of the rights of individual to have children by choice **(UNFPA, 2012)**. **S.C. Gulati (2005)** stated that "In April 1996 there was a major paradigm shifts from the "target oriented" to "target-free approach" and then to client centered and demand driven Community Needs Assessment

(CNA) approach. In 1997 Community Needs Assessment was renamed as Reproductive and Child Health (RCH)" (p.1). Promotion of contraception for both spacing and limiting children in order to prevent unwanted pregnancies was one of the essential components of RCH.

Fig 1.1 Family Planning- "*a paradigm shift*"



Source: "Overview of Family Planning Programme in India "Ministry of Health and Family Welfare, GOI.

In the year 2000, National Population Policy was formulated which is the integral component of the Reproductive Maternal Newborn and Child Health plus Adolescent Health, strategy launched under National Rural Health Mission (NRHM) in 2013 **(UNFPA,2012)**. It focuses on the efforts and initiatives required to ensure sexual and reproductive health of the individual at each stage and hence family planning forms an important component in every stage of an individual's life starting from adolescence to the reproductive life span. India, being a signatory of the Millennium Declaration universal access to family planning by 2015 is one of the Millennium Development Goals (MDG 5).

Fertility is one of the most important variables of population change. It has attained importance from the demographers since the very beginning. And controlling fertility has always been emphasized in developing countries like India. Family planning program in India made a remarkable contribution in this as family planning is not only a viable solution in limiting and spacing the number of living children but also plays an important role in improving maternal and child health. **Sengupta & Das (2012)** stated that "In the Fifth Five Year Plan (1974-79) huge emphasis was given on "sterilization" but it suffered a great setback in 1977 and the program collapsed. Then the "cafeteria approach" was started in 1980s to raise the contraceptive prevalence rate among the couples" (p.1). Despite of many such approaches adopted by the government the actual rate of acceptance of the contraception methods did not change much.

Total fertility rate is one of the most important indicators of fertility which means the average number of children a woman would bear if she experienced current fertility rate throughout her reproductive years. Currently the total fertility rate is 2.7 children per women according to National Family Health Survey III (2005-06). Earlier according to NFHS-2 (1998-99) TFR was 2.9 children per women hence a decrease by only 0.2 children between NFHS-2 and NFHS-3 is recorded. But it was 3.4 children per women according to NFHS-1 (1992-93). It means that it had decreased significantly in these years. Even the National Population Policy 2000 which emphasized on population stabilization and to achieve replacement level of fertility by 2010 has also given priority to the unmet need for contraception **(Pal A et al., 2014)**. The level of fertility in India

ranges from 3.6 in Bihar to 1.7 in West Bengal **(Annual Health Survey, 2011)**. The states where TFR is relatively high i.e. the Northern states of Bihar, Uttar Pradesh , Madhya Pradesh and Rajasthan contraceptive use has proved to be a major challenge to Family Planning program. In spite of huge investment in the family planning program there is a gap between demand and supply of contraception among women. Women who want to use contraception but are not getting it or not using it due to various reasons. Hence there is a gap between demand and supply.

According to the definition given by **World Health Organization** "Women who are fecund and sexually active but they are not using any methods of contraception and report no more children is wanted or wanting to delay the next child is said to have unmet need forcontraception"(http://www.who.int/reproductivehealth/topics/family_planning/unmet_need_fp/en/).**United Nations (2015)** states "Unmet is a gap between women's reproductive intensions and their contraceptive behavior" (para.8).This concept was developed from the knowledge, attitude and practice (KAP) studies which was conducted during 1960s and 1970s **(Kandel, 2012)** because of which investment in family planning programs by government and nongovernmental organizations (NGOs) was justified **(Sonfield, 2006).**

Unmet need is an important indicator for assessing the government policies and programs and even the effectiveness of government programmes. If there is high unmet need the program or policies effectiveness is low. But this gap in the demand and supply is not always due to the failure of the government programs. There are many factors responsible or it can be said a range of obstacles in determining the child bearing preference for women or unmet need for family planning in India, the most common being opposition from the husband and other members of the household. Religious prohibition is also one of the reasons. Women fear about the side-effects of the contraceptive methods, as they do not have the proper knowledge about the use of these methods. Sometimes women also complain about the high cost of the contraceptive methods. And sometimes they also do not have the access to these methods. Even many women also report that they are having infrequent sex and they think they would not become pregnant so they do not feel the necessity of using it. In sub-Saharan Africa based on the studies of the reasons for

unmet need among the married women in late 1980s and early 1990s it was found that lack of knowledge about contraception was one of the main reasons.

There are many problems faced by women in the reproductive age group having unmet need for family planning. Unmet need or limited use of family planning services leads to untended pregnancies, unsafe abortions and maternal mortality, hence affecting the women's health negatively **(Bradley et al., 2012).** "Over 10% of all women on global scale do not have access to or are not using the effective methods for contraception. It is estimated the number of maternal deaths can be reduced an additional 30 percent by the unmet need for family planning alone" **(World Health Organization).**

In order to meet the unmet need for contraception improved access to good quality services should be provided by offering choice of methods, by eliminating medical barriers. Secondly, unmet need can be met through improved communication about the legitimacy of family planning and by linking family planning to other services like prenatal care, post-partum care, immunization, post- abortion care and child health services **(Mosley, 2006).**

1.1 Historical Background

The concept of unmet need for family planning had its origin in the concept of KAP (Knowledge, Attitude and Practice) during 1960s. The extent of unintended fertility and unsatisfied demand for fertility regulation are very crucial in determining measures and strategies to reduce fertility. "Over the years, economists (e.g., Kelley 1988; Pritchett 1994) and demographers (e.g., Davis1967; Hauser 1969) have questioned whether sufficient unsatisfied demand for fertility control existed in high-fertility countries to warrant a family planning services—or "supply-side"— approach to reducing population growth rates."**(Bradely&Casterline, 2014)**.

Hence surveys on knowledge, attitude and practice were carried out in various parts of the countries in 1960s to determine the extent of fertility regulations. And then these surveys showed that there was mismatch between women's fertility preference and their actual behavior. This identification of KAP gap shows that many women desired to limit

fertility preferably and also desired to use family planning services. This led to the introduction of various ambitious family planning services. Three KAP surveys were carried out in Taiwan on the basis of which Freedman.et.al, in 1972 identified a group of women who have strong desire for contraception with their wanted children because they showed a desire to terminate childbearing but reported no use of contraception. After a couple of years Freedman and Coombs in 1974 estimated the size of this group. The World Fertility Survey program (1972-1984) was also carried out in 41 developing countries but none of its studies established the relationship between fertility preference and contraceptive use. Thereafter, WFS made efforts to estimate unwanted fertility and fertility preferences and contraceptive use was given more attention.

Mohaptra stated that "From the WFS surveys data, West off (1978) produced a five-country study of "unmet need for fam1ly planning", the phrase he substituted for "KAP-Gap" as an indication of refined measure of the discrepancy between fertility preference and contraceptive use" **(** as cited in **Bradley, et.al, 2014,p.125).**

Firstly, Wesoff excluded pregnant and amenorrheic women which lead to many definitional issues. Subsequently, **Westoff and Pebley (1981)** with 12 different definitions of unmet need produced the estimation of the prevalence of unmet need that varied substantially. They also recommended that the concept of unmet need should cover the desire to space births as well as to limit childbearing.

"Further enhancement in the definition was done by Nortman in the year 1982 who suggested that some pregnant, breastfeeding and amenorrheic women should be included in the definition of unmet need. In the Demographic and Health Surveys refinements of the measurement of unmet need was also done. In the DHS, women who want more children are asked how soon they want to have the next birth. The DHS also asks pregnant and post-partum amenorrheic women whether their current or most recent pregnancy was intentional, mistimed or unwanted and also whether they were using contraception at the time of conception. By the early 1990s, in the literature of family planning the concept of unmet need was firmly established" **(Mohapatra, 2010).**

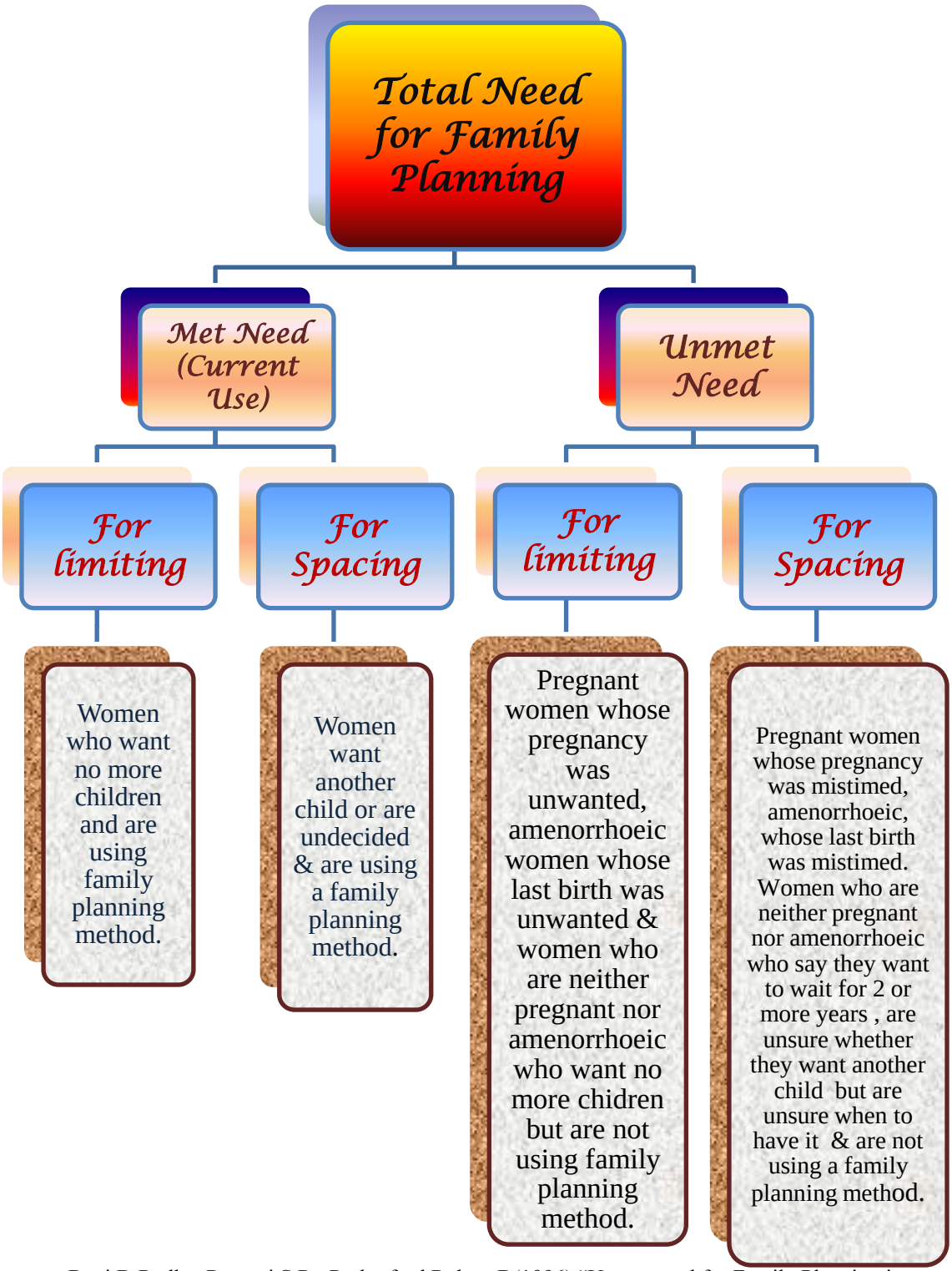
1.2 Definition of Unmet Need for Family Planning

"Unmet need for family planning is the condition in which fecund women of reproductive age group do not want to have a child soon or ever but are not using contraception" (Bhushan, 1997, p.x).

In India, NFHS- III classified unmet need of currently married women in two sub set and defined as, "Unmet need for spacing includes pregnant women whose pregnancy was mistimed; unmet need for limiting refers to pregnant women whose pregnancy was unwanted." Unmet need can be assessed from surveys (typically DHS/NFHS) by asking questions on: a) desire for additional children and b) Contraceptive use to not-sterilised fecund, non-pregnant and non-amenorrhoeic women, or c) Whether current pregnancy or last child was desired to pregnant/amenorrhoeic women. Non-fecund women are deemed not to need contraception and sterilized women (or husbands) are deemed to have met need for limiting.

"Unmet need" is a kind of negative concept in the sense that government are unable to provide Family Planning services to those who wishes to use but are not receiving facilities. The reasons may be due to many socio economic factors. "So here the concept like **KAP** *(women's knowledge of, attitudes towards, and practice of birth control)* gap came". Unmet need for family planning is also an important an important indicator for assessing the demand for family planning services in India **(Ansary & Anisujjaman 2012).**

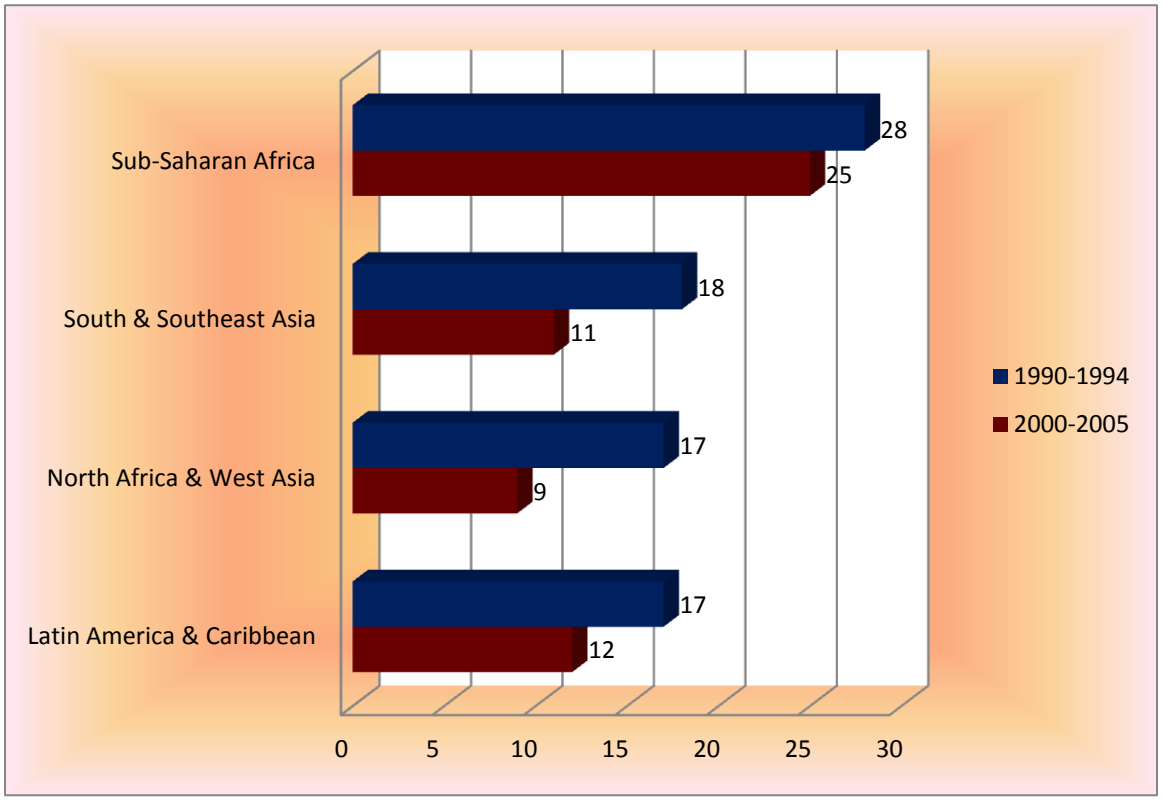
Fig 1.2 Classification of the need for family planning



Source : Devi D Radha, Rastogi S.R., Retherford Robert D(1996) "Unmet need for Family Planning in Uttar Pradesh", National Family Health Survey Subject Reports, No. 1,pp.1-27.

1.3 Unmet Need for Family Planning: International Scenario

Fig 1.3 Unmet Need for Contraception across the developing world



Source: Sonfield Adam(2006) "Working to Eliminate the World's Unmet Need for Contraception", *Guttmacher Policy Review,* Vol 9 No.1 pp 10-13.

Fig 1.3 shows the unmet need for contraception across the developing world. It can be seen from the figure that unmet need for contraception is very high in Sub-Saharan Africa followed by South and Southeast Asia. And among these, North Africa and West Asia has the lowest level of unmet need for contraception. The analysis of the trend shows that in Sub-Saharan Africa very little progress has been made. The decline in unmet need for contraception is about 10.7% in case of Sub-Saharan Africa which is very low. The decline is about 47% in case of North Africa and West Asia. Governments and NGOs can

target limited resources effectively to these countries by identifying such countries and populations **(Sonfield, 2006).**

Table 1.1 Spatial pattern of Unmet Need for Family Planning in the World.

Countries/Regions	Unmet Need for Spacing %	Unmet Need for Limiting %
Africa	15	9
Sub-Saharan Africa	16	9
Northern Africa	5	9
Western Africa	16	7
Eastern Africa	18	11
Southern Africa	5	11
Caribbean	11	12
South America	2	3
Asia (Excl China)	7	8
Western Asia	9	10
South Central Asia	7	9
South East Asia	7	6

Source: PRB Family Planning World, 2008

About 222 million women in the world have unmet need for family planning. More than half of these women belong to sub-Saharan Africa, South Central Asia and Southeast Asia **(Population Reference Bureau, 2014)**. And around 645 million women have their needs met through the use of a modern contraceptive method such as IUD, pill, injectables or sterilization (**Singh and Darroch 2012).** It is clearly evident from the above table that African countries have high unmet need for family planning as compared to the Caribbean and Asian countries. Further, it can easily be seen that Sub-Saharan

Africa is the region of highest percentage of women with unmet need (almost 25%) which portrays that one out of every four women in this region have unmet need for family planning. However, among all the developing countries, South America has the lowest percentage of only 5 percent.

1.4 Study Area

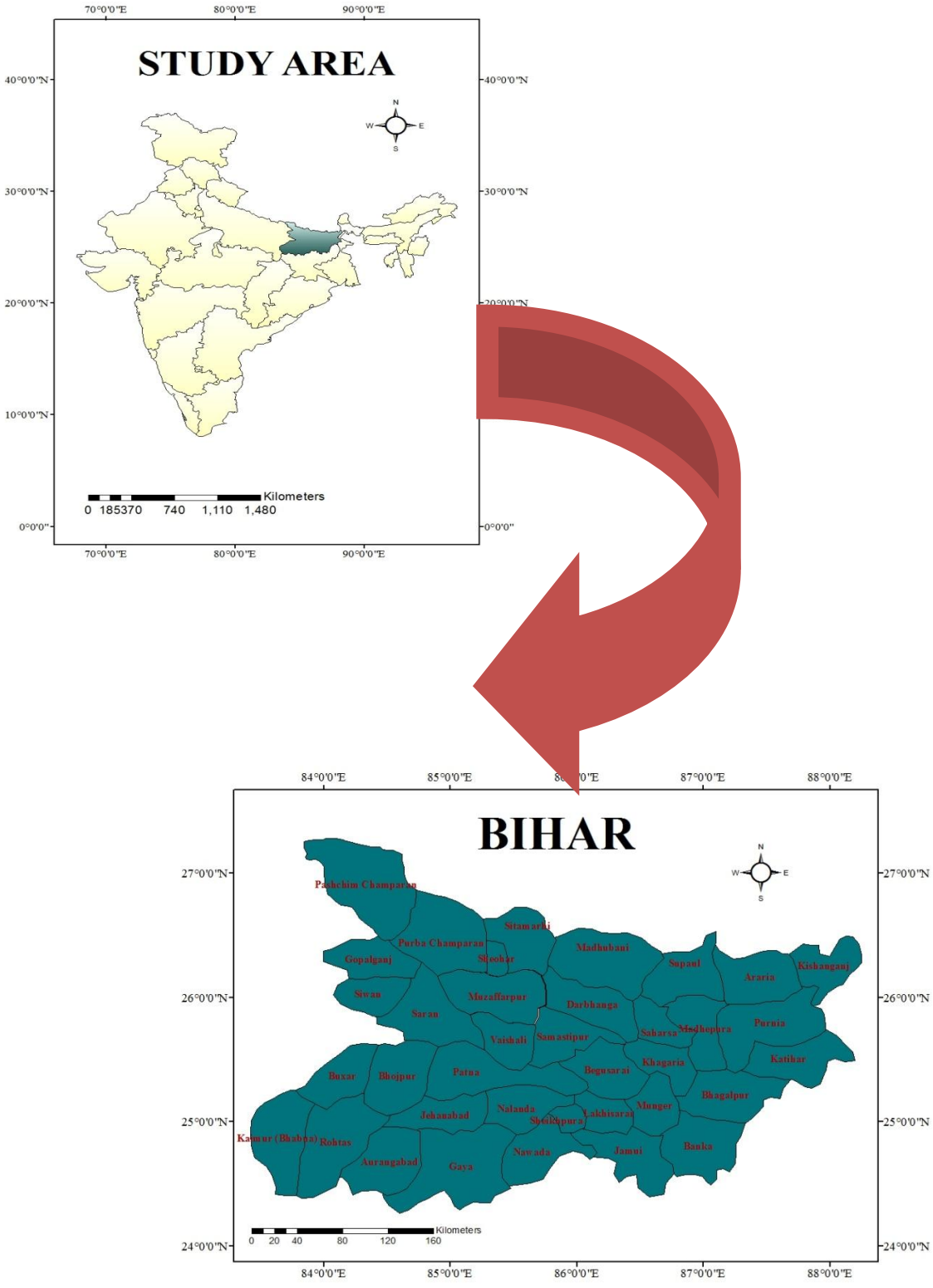
Bihar is the study area and focus of the study. It extends from 21degree 58' 10"-27 degree 31' 15" North and 82 degrees 19' 50" and 88 degrees 17' 40" East. Bihar , the third most populous state in India with 10,40,99,452 population according to Census of India, 2011 has recorded highest growth rate since nineties. Infant Mortality rate, maternal mortality ratio and total fertility rate are much higher than the national average, which reflects the poor health status of the state **(GOI, 2007)**. According to **ORGI (2012); IIPS & ORC Macro (2007)** "Bihar is the state characterized by high maternal and child mortality, low life expectancy, high fertility, high unmet need for contraception, low literacy rate, low coverage of child immunization and high child mal-nutrition" (as cited in **Kumar & Singh, 2013**, p.158)**.** The unchanging sociopolitical and economic factor is responsible to the disadvantageous conditions of Bihar **(Daniel et al., 2008).**

The economy is agrarian in nature and the caste system is widely prevalent which hinders the social progress of the region. The percent of households with access to piped water in Bihar is only 4.4 percent against the national average of 43.5 percent according to Census of India, 2011 **(UNICEF)** .The mean age at first birth in Bihar is 18.7 and contraceptive prevalence rate is still low, most of the women practice limiting method of contraception i.e. sterilization **(Daniel et al., 2008)**. About 21.9% of children in Bihar have the birth weight of less than 2.5 kg. Bihar also witnesses poor immunization coverage, early childbearing, short birth interval, high infant mortality at 42 per 1000 births **(SRS, 2013);** high maternal mortality ratio of 294 per 100,000 live births **(Annual Health Survey, 2011-12)**. In addition, these combined factors of high infant mortality, poor child health and high maternal mortality are poor health indicators that are the results of low use of contraceptive methods.

Increasing awareness about the family planning services is one of the major solutions to all the deep-rooted problem of the state. Increasing use of contraceptives will help in widening the interval between the two births and hence proves to be a very effective method in reducing infant mortality and maternal mortality rate. This will further boost women empowerment by indulging themselves in non-domestic activities (**Cleland et al., 2006)** and by enabling high women's workforce participation which lowers fertility rate **(United Nations, 1995)**. *According to NFHS-III (2005-2006), about 22.8% of currently married women in Bihar have unmet need for family planning, which is comparatively much higher than that of India as a whole* (Kumar & Singh, 2013). Thus it is necessary to study Bihar extensively in detail and analyze the effect of both the demand and supply factors on unmet need for family planning. To deal with the need for contraception, overcome the problems of unmet need and develop suitable strategies a comprehensive study of unmet need in the state is highly desirable.

The unmet need for contraception is guided by both the demand and supply factors. There is an inter dependence between the demand for the contraceptives and meeting the demand for these contraceptives i.e. supply of these contraceptives. The probable causes of unmet need for contraception in Bihar may be the nonfunctioning of health infrastructures. All the studies carried out toll date has dealt with the interrelationship of unmet need for family planning with the demand side factors. In this study, the unmet need for contraception has been looked through a wider framework. Both the demand and the supply side variables have been analyzed. To focus on this issue more prominently district wise variation of these constraints and their extent has been analyzed. Even the reason for not using contraception among women with unmet need has been analyzed, by their socio-economic background characteristics.

Map 1.1: Map of the Study Area



1.5 Objectives

The broad objectives of the study are to:

- Examine trends and spatial patterns of unmet need for family planning in India.
- Examine trends, spatial pattern of unmet need for family planning in the state of Bihar
- To study the socio-economic determinants of unmet need for family planning in Bihar.
- To study the relationship between development and unmet needs for family planning by available infrastructural and health facilities.
- To study the relationship between the quality of life and unmet need for family planning in Bihar.

1.6 Research Questions

- Whether there exists any regional variation in unmet need for contraception both in spacing and in limiting in Bihar?
- What are the main correlates for unmet need among currently married women in Bihar?
- What are the main reasons for not using contraception among the women with unmet need in Bihar?
- What will be the effect on fertility, when there is no unmet need?

1.7 Organization of the dissertation

The dissertation is divided into 6 chapters.

The chapter I is an introductory chapter; it includes objectives, research questions, data source and methodology.

Chapter II deals with the reviews of various literatures and the related findings.

Chapter III deals with the conceptual framework, data source and the methodology used in the measurement of the variables.

Chapter IV examines the trend and spatial pattern of unmet need for family planning in Bihar, reasons for not using contraception among women with unmet need for contraception and the demographic impact of unmet need for family planning in Bihar. The chapter will also examine the impact of district level variables on unmet need for family planning. The chapter also analyzes the main reasons for not using contraception among women with unmet need and the demographic impact of unmet need on Total Fertility Rate. This chapter has also analyzes the impact of reducing unmet need and increasing contraceptive prevalence on Total Fertility rate.

Chapter V examines the impact of individual level variables on unmet need. It also examines the various socio-economic determinants of unmet need for family planning in Bihar. This chapter also analyzes the effect of selected facilities in the village on unmet need for family planning.

Chapter VI summarizes the findings.

2. Review of Literature

Some of the important studies related to contraceptive use and unmet need for family planning has been reviewed in this chapter. Most of the literatures that have been reviewed deals with the developing countries as the unmet need for family planning is a phenomenon of developing countries. The unmet need for family planning is influenced by two factors of demand and supply. Demand for contraceptive practices is influenced by social, cultural, economic and individual factors i.e. education, standard of living, attitude of the society about the family size, religion of an individual, media exposure etc. Hence if the demand for contraceptives is created then it is necessary to satisfy that demand with the help of supply chain systems. Supply side factors include the health infrastructure and services that makes a wide range of affordable contraceptives available to all the clients or the users who need them. This chapter also reviews some of the research done by various scholars on the reasons of unmet need for contraception. Even the demographic significance of unmet need for family planning on total fertility rate has been well documented in some of the studies that have been reviewed. An analysis of these literatures has helped to furnish the conceptual framework for the present study.

2.1 Introduction

According to the standard DHS definition, "the unmet need group includes all fecund women who are married or living in union, and thus presumed to be sexually active, who either do not want any more children or who wish to postpone the birth of their next child for at least two more years but are not using any method of contraception." **World Health organization** defines unmet need for family planning as women aged 15-49 who are sexually active and fecund, want to postpone or limit their child bearing but they are not using any methods of contraception. There are two types of unmet need –unmet need for spacing and unmet need for limiting. **According to NFHS III (2005-06) definitions** "**Unmet need for spacing** includes fecund women who are neither pregnant nor amenorrhoeic, who are not using any method of family planning, and say they want to wait two or more years for their next birth. It also includes fecund women who are not

using any method of family planning, and say they are unsure whether they want another child or who want another child but are unsure when to have the birth**. Unmet need for limiting** includes fecund women who are neither pregnant nor amenorrhoeic, who are not using any method of family planning, and who want no more children"**. "**Unmet need for family planning is a valuable concept that is widely used for advocacy, the development of family planning policies, and the implementation and monitoring of family planning programs worldwide"(**Demographic Health Survey 2012)**.Unmet Need gained much prominence in research fields since it became a Millennium Development Goal Indicator 5.6 in 2008 (**Demographic Health Survey 2012**). The concept of unmet need gained attention or came into prominence for the first time when the concept of KAP (knowledge, attitude and practice) in 1960s came into existence**(Caterline & Sinding, 2000).** Since then the definition of this concept has been put into continuous improvement and modifications. Earlier the concept of unmet need was termed as KAP gap and this term was replaced by unmet need for contraception in 1978. Since then the concept played an important role in family planning research **(Cleland et. al, 2014)**. Even the international conference ICPD in Cairo and the fourth conference on women in Beijing had brought changes to population policies and even changed the approaches of family planning. Family planning was no longer be seen as the means to reduce fertility but to improve the reproductive health of women **(Ahmadi & Iranmahboob, 2005).**The concept of unmet need shows the gap between women's reproductive intensions and reproductive behavior **(Robey et al., 1996).** If this demand is met or if this gap is filled then it will result in increase in the use of contraception, couple protection rate will be increased which will help us in realizing our dream of a stable population **(Saini et al., 2007).** Unmet need has gained prominence in recent decades or it has become a matter of great concern for policy makers as it leads to unintended pregnancies and unwanted pregnancies which often lead to unsafe abortions which further acts as a contributing factor for high maternal mortality and infant mortality **(Ashford, 2003)**. The chapter reviews some of the important literatures and studies on the various issues of unmet need for family planning, the factors affecting unmet need for family planning and demand and supply factors associated with this concept. The review of these studies will help in

building the conceptual framework for the study and help in identifying the important determinants affecting the unmet need for family planning.

2.2 Unmet Need for Family Planning: A Profile

Increasing the use of contraception and reducing the unmet need for family planning are the key factors in improving the reproductive health of women. And even it tries to bridge the gap between women's reproductive intension and their actual reproductive behavior. The contraceptive prevalence rate has increased from 54.8 percent in 1990 to 63.3 percent in 2010 on global scale and the unmet need for family planning has decreased from 15.4 percent in 1990 to 12.3 percent in 2010 **(Alkema et al., 2013) .** Among the users, Female sterilization and IUD are the two most important methods used by women in both 1990s and 2010 **(United Nations 2013).** Around 222 million women aged 15-49 years worldwide who were married or in a union had unmet need for family planning according to Population Research Bureau in 2012. And about 645 million women have their demand met through the use of modern contraceptive methods **(Gribble 2012) .** If the regional variation worldwide is examined, according to **World Health Organization** African region has the highest percentage of. 24.7 percent and lowest in the Western Pacific and America with 5.7 percent and 9.3 percent of women having unmet need for family planning **.** According to study conducted from Demographic Health and Survey Data across 51 countries, Africa has the highest percentage of about 24 percent of married women having unmet meet for contraception , while it is about 15 percent in Asia and about 13 percent in Caribbean and Latin America **(Sedgh & Hussain 2014).**

According to **DLHS-3 (District and Household Survey-III, 2007-08)**, the level of unmet need in India is very high i.e. 20.5 comprising 13.3 percent for limiting and 7.2 percent for spacing. Unmet Need for family planning varies among women with different socio-economic background.

2.3 Reasons for Unmet Need for Family Planning

There are many factors responsible for unmet need for family planning. And these factors operate through various socio-economic and demographic characteristics or background of women.

Bongart and Bruce (1995) have stated on the basis of anthropological studies and survey data that geographic access to family planning services remains a problem in some areas. But lacks of knowledge, fear of side effects, opposition to use were the principal reasons for non-use of such services.

In the analysis of data from the five DHS survey conducted in Ghana it has been found that the attitudinal resistance has grown over the years whereas relative contribution to unmet need of lack of access to contraceptive methods has diminished. Neither the religion nor the opposition from houses was cited as the reason but the fear of side effects or health concerns has been reported as the main reason for non-use followed by infrequent sex. At the sub-regional level it has been found that infrequent sex or no sex is most frequently given reason in South-Central Asia. However, opposition to use is the most common reason in South Central Asia and Western Africa whereas Inconvenience to use the method is common in South Eastern Asia and Eastern Africa (**Machiyama & Cleland, 2014).**

The major reasons for unmet need for contraception among rural women of reproductive age group of Haryana were opposition from husband and family members and the reason behind this opposition was found to be the desire for more children. This reason was followed by lack of knowledge about existing contraceptive methods **(Choudhary et al., 2009).** An analysis of unmet need for contraception among married women in an urban area of Puducherry, India has shown that lack of knowledge, shyness, *etc.* followed by contraception related factors (availability, accessibility, affordability, side effects) are causes of unmet need for family planning among women with unmet need for family planning **(Sulthana et al., 2015).**

2.4 Demand and Supply Side Factors

The demand side factor includes the individual traits of an individual and socio-economic variable and demographic variables. The socio-economic variables are place of residence, caste, religion, education, standard of living etc. while the demographic variables include current age, number of living children, number of living sons etc. Recognizing demand side factors is vital for policy recommendations. Medical infrastructure (Health Institutions and health workers) plays important role in making a range of contraceptives accessible to the users or the clients. The effect of supply side variables like health infrastructure, health workers and distance to health services is important to observe. The relationship between these variables (demand and supply variables) and the unmet need for family planning has been exhibited through innumerable research studies.

2.5 Determinants of Unmet Need for Family Planning

Unmet Need for Family Panning in India is affected by many social, demographic, economic characteristics of women and even the individual and the institutional factors are also responsible for this. There are many National and International literatures addressing these issues. Most of the article has focused on the various socio-economic characteristics of women which influences the unmet need for family planning.

2.5.1 Demographic factors

2.5.1.1 Age of the women

Age of a women is very important factor affecting the unmet need for family planning. Various studies have tried to establish this relationship very efficiently. It has been well established in many literatures that the unmet need for spacing methods decreases with age and the unmet need for limiting increases with age, as in the young age women want to have more children. Whereas when the women reaches the age group of above 35 years the unmet need for limiting started increasing, as the women may have completed their family size. **Westoff & Ochoa (1991)** using DHS-1 examined the demand for

family planning with respect to age, number of children, residence and education and stated that the demand for family planning for spacing declines with age and increases with age in case of unmet need for limiting in all the 25 countries where survey was carried out using the DHS-1 data.

Radha Devi et al, (1996) on the basis of 11,438 ever-married women of reproductive age from NFHS-1 in Uttar Pradesh has stated that the unmet need for spacing decreases with age whereas the unmet need for limiting increases with age. **Ansary & Anisujjaman (2012)** analyzed the factors determining the unmet need for Family Planning in Uttar Pradesh using NFHS-3 data and found that unmet need decreases with age. Younger women have greater demand for spacing than for limiting .In the age group 30-49 years the unmet need for spacing is low as compared to unmet need for limiting. This can be explained by the fact that at this age most of the couples reach their desired family size and they do not want any more children. **Pal A et al., (2014)** analyzed the extent of unmet need in urban slums of Lucknow and tried to study various factors affecting it and found that unmet need was highest i.e.86% among women in the age group of 15-19 and it continuously decreases with age and lowest in the age group of 35-39 years.

2.5.1.2 Number of Living children

The unmet need for spacing generally rises once women have had their first and second child because women want to delay the birth of the next child. While the need for spacing declines after three children, the need for limiting increases after three children **(Westoff & Bankole, 1995).** Hence with increasing number of living children, the unmet need for spacing starts decreasing and unmet need for limiting starts increasing especially after third child. Overall the trend of spacing and limiting conceal each other and hence unmet need shows no particular pattern with the number of living children **(D Radha Devi et. al, 1996). Hailemariam & Haddis (2011)** has analyzed factors affecting unmet need for Family Planning in southern nations, nationalities and Peoples region of Ethiopia and found that Unmet need for spacing was highest (27.7% in 2005) among women with fewer than five living children but for women with five or more living children it declined to 17.1% in 2005. **Ansary & Anisujjaman (2012)** have also stated a positive

relationship between number of living children and unmet need. *Number of Living children* is also a very important demographic variable affecting unmet need for family planning. **Kumar and Singh (2013)** analyzed the trend and determinant of unmet need for family planning in Bihar using NFHS data, and found that among women with one child hardly uses contraceptive for even spacing and limiting. It has been shown that as the number of living children increases, the unmet need also increases.

2.5.1.3 Number of Living sons

In countries like India that is in the middle of the fertility transition, the effect of son preference on fertility is thought to be more pronounced **(Mutharayappa et al, 1997).**In states like Uttar Pradesh, Bihar where there is strong son preference, the number of living sons is a better indicator as compared to the number of living children. The number of living sons has a strong impact on unmet need for family planning. Sons are considered to be important for continuing family line and supporting parents in their old age. The unmet need for family planning is low among women with no living sons and then it increases when the number of living sons increases. In some countries which have strong son preference couples stop having children typically after the birth of a son and hence increases the unmet need **(Bhandari et. al, 2006).**

Harihar Sahoo (2007) studied the differentials of contraceptive use by women's background characteristics and determinants in Odisha using NFHS-3 data found that women having one son and one daughter show a higher proportion (61 per cent) in the use of contraception. Again women having two sons such percentage increases to 69.9. Therefore, it can be seen that with women having more number of sons the use of contraception increases and it can be concluded that there exists a strong son preference in Odisha.

Ranjana and Awadhesh (2012) explored the role of gender preference on contraceptive use among currently married women in states Uttar Pradesh and Bihar using National Family Health Survey (NFHS-III) and Family Welfare Year book 2001. They stated that women having no sons have desire for more children and therefore are not using contraception. Only 18 percent and 6 percent women with no living son in UP and Bihar

respectively are using any contraception indicating high preference for male child. Hence it can be stated that son preference has a great impact on the acceptance of family planning methods.

2.5.2 Social Factors

Social variables are place of residence, religion, castes, women's education, wealth index which relates to the social environment in which an individual lives. These social variables are discussed below:

2.5.2.1 Place of Residence

Urbanization has always been seen as an important factor which increases the level of contraceptive use. Studies by **Westoff and Bankole of DHS Comparative studies in 1995** stated that urban areas are characterized by lower unmet need for family planning services than the rural areas. "The explanation of these urban-rural differences no doubt includes the easier accessibility of family planning services in cities, the desire for more children in rural places, and the greater education in urban areas" **(Westoff, 2006)**. "The reason of high unmet need in rural area may be due to the gap between the demand and supply for family planning services or may be due to the gap between family planning service providers and acceptors" **(Sherin et al., 2013).** Women in rural areas do not have better educational facilities, do not avail adequate health facilities and do not have media exposure as compared to women in urban areas who are better educated, know about the varieties of contraceptives available and their sources from where they could avail which best suits them . Further, as the society is modernized in urban areas, the cost of raising children is high and hence their economic value as labor or old age security decreases resulting in small family size and increase in demand for the use of contraception (**Bongaarts, 2014).** Whereas in rural areas, the agricultural lifestyle is more conducive for childbearing as children provide a source of labor on farm (Brackett, 1980). **Aryal et al.,(2008)** in the comparative analysis of Unmet Need in Nepal using 2006 Nepal Demographic and Health Survey have stated that among the women residing in the hills the demand for family planning is highest as compared to those living in terai. It has also

been found that demand for family planning services is higher in urban areas than in rural areas, which shows people in urban areas are much more interested in postponing or limiting childbearing, but even in cities they are unable to avail these services due to lack of proper supply. However, in most of the countries unmet need for family planning is higher in case of rural areas as compared to urban areas.

2.5.2.2 Religion

Various religious groups in India are Hindus, Muslims, Sikhs, Christians, Buddhists and Jains, among which Hindus and Muslims form the major groups. As these religious groups vary considerably by their socio-economic and demographic behavior, different levels of fertility are recorded between them (Hindus 2.7 children per women and Muslims 3.1 children per women) according to **NFHS-III (2005-06).** Even marriage, beliefs of sex outside marriage, desired family size, couple's decision about contraception is affected by an individual's religious affiliation **(Gaydos et al., 2010).** Each religious group has its own peculiar attitude towards the use of contraception and the practice of family planning services. However, fertility has been always looked as one's free choice but in many poor rural areas and among some religious groups, they are not effectively free in the sense that they do not have adequate information about the type of services available and their source. Barring these factors, many a times' couples are even restrained by their religious doctrine culturally **(Berelson, 1969).**

Radha Devi et al., (1996) found that the met need for Hindus in Uttar Pradesh was almost double than Muslims. Muslims have higher unmet need as compared to other religious groups in Uttar Pradesh, as some Muslim fundamentalists assert that any form of contraception disobeys God's intentions whereas within Hinduism there is considerable flexibility in case of contraceptive use where the use of contraception is a matter of personal concern and it has nothing to do with religious directives **(Srikanthan et al., 2008).**

A women belonging to religion that is much more stringent towards the use of contraception will have high unmet need as compared to women belonging to a religious group which is less stringent **(Mohapatra, 2010**). Like in Islam, women are opposed in

many areas like work opportunities outside home, secular education and choice in reproductive behavior etc as compared to women belonging to Hinduism **(Jejeebhoy & Sathar , 2001).** It has been argued in various literatures that the higher fertility and lower contraceptive use among Muslims is owed to the lower socio-economic status of the Muslims or due to their pronatalist policy **(Mishra, 2004)** as they believe it to be their religious duty to multiply and produce more children **(Schenker, 2000).** This has also been explained by some of the authors through the minority hypothesis which asserts that in order to preserve itself a minority group is less likely to use contraception **(Mishra, 2004**). It has been also argued in this context that contraceptive use is low in case of society where women are socially excluded **(Dyson& Moore, 1983).**

2.5.2.3 Social Groups

There are innumerable castes in Indian society. High socio-economic status is enjoyed by the upper castes people and lower socio-economic is the characterized by the scheduled caste or scheduled tribe. These socio-economic differences in the status of these castes in India have played an important role on the attitudes towards contraceptive use.

Social group is interplay of various socio-economic conditions and hence it affects the unmet need for family planning services in India. There is high differential in the contraceptive prevalence among various social groups in India. Scheduled Castes, Scheduled Tribes, Other Backward Classes, General category are the major social groups. Among them Scheduled Castes are the socially and economically deprived groups with low educational level and poor socio-economic conditions **(Prusty, 2014).** Scheduled castes and scheduled tribes comprise about 16.6 percent and 8.6 percent of total population of India according to Census of India, 2011. Scheduled Castes are people who have suffered a lot due to oppression and denial of opportunities for generations and Scheduled tribes have been living in seclusion and excluded from the process of development.

Current use of family planning methods is more among women belonging to other castes than women belonging to OBC and SC&ST category **(Nagdeve, 2012)**. Among women belonging to scheduled castes category , the knowledge about the family planning

practices is low and even the contraceptive use is low **(Ramachandrappa, 2012). Prusty (2014)** has analyzed the difference of scheduled tribes from non-tribes in the states of Jharkhand**,** Madhya Pradesh, and Chhattisgarh, using District-level Household Survey-3 and found that knowledge and use of temporary contraceptive methods are considerably low among tribal women as compared to their non-tribal counterparts in Jharkhand Madhya Pradesh, and Chhattisgarh, as tribes are socio-economically deprived groups among all the social groups. It has been also found out that the castes differentials are very much prominent in the rural areas and among the people belonging to lower socio-economic status as compared to the urban areas and among people belonging to higher socio-economic status. Hence with the increase in the socio-economic status, the differentials in fertility and contraceptive use between the caste groups will disappear **(Ramesh, 2008).**

2.5.2.4 Women's Education

Unmet Need declines with increasing level of education **(Westoff & Ochoa, 1991)**. Education has long lasting repercussion on the life of a woman. It shapes attitude, values and aspirations of an individual by enhancing economic opportunities and social mobility of an individual **(Sarmad et al., 2007).** The relationship of women's education with fertility is negative and that of with contraceptive use is positive which can be explained through a number of factors. **Firstly**, more number of years in schooling leads to increased participation of women in workforce and hence the opportunity cost of raising children increases which further increases the economic values of their time and therefore has preference for smaller family size **(Bbaale & Mpuga, 2011).** Secondly, better-educated women demand higher level of schooling for their children which increases the cost of having children as in that case they would have to invest more per child and this force them to have fewer children **(Ainsworth et al., 1996).** All these factors are associated with higher motivation among better-educated women for fertility regulation and this is called the quantity-quality tradeoff developed by Gary Becker and his associates. Education also plays a very important role by providing women a forum to learn about the ways of fertility control and make efficacious use of health care system.

It has been well established in various literatures that better educated women have less unmet need as compared to women with little or no education. An educated woman has better status in the society and greater autonomy that enables her to act consciously and responsibly and participate in her reproductive decisions. Educated women are aware about the various methods of family planning services and about their availability and accessibility **(Korra A, 2002) and they** are most able to act on their reproductive intensions **(Ashford L, 2003).** Hence, in case of educated women the level of awareness about the use of contraceptives and the sources from where it can be easily available is more as compared to uneducated women thereby reducing the number of unintended and unwanted pregnancies.

Bhattacharya et al, (2006) has analyzed the "Unmet Need for Family Planning among Women of Reproductive Age Group Attending Immunization Clinic in a Medical College of Kolkata" and has found that among illiterate women prevalence of unmet need is high i.e. 46.1% as compared to those women in higher educational group. As the educational level increases the rate of use of contraception also increases. It is well documented that there is a strong desire to stop childbearing among educated women by frequent use of contraception. The possible reason for this may be cited as their higher ability to absorb information from media, health institutions and other sources in a more effective way due to their high education **(Moursund & Kravdal, 2003).**

2.5.2.5 Wealth Index

Bagle and Kour (1972) in a study of adoption of family planning in the two industrial cities of Bombay and Hyderabad found that income and adoption of contraception is positively related. As the income increases the rate of contraception also increases. **Saini et al., (2007)** have noted that women with per capita income of less than Rs 500 per month have high unmet need for family planning as compared to women per capita income of Rs.501 to 1000. The lowest is noted among women with per capita income of more than 1000. **Wiltshire et al., (2009)** has stated that women in the low income category with no insurance cover were more likely to report unmet need as compared to those with high income. As the wealth index increases the unmet need decreases

(Bradley et. al, 2012). Barman (2013) analyzed the differentials of contraceptive use in Empowered Actions Group states and South Indian states by some socio-economic and demographic variables among the currently married women aged 20-49 and found out that among women belonging to high wealth quintile, use of modern contraceptives is high and low among women belonging to low wealth quintile in all the age groups and category of states. In the EAG states, the use of traditional method follows a different pattern i.e. high in case of women belonging to low wealth quintile and low in case of women who belonged to high wealth quintile.

Vohra et al.,(2014) in the paper "*Determinants of the unmet need for family planning among women of Jaipur, Rajasthan"* has stated that the rich couples or the couples belonging to a higher social class had a low unmet need of 19.44% while the couples belonging to lower social class had an unmet need of 49.31%. Also the unmet need of couples living in kuccha house is more as compared to people living in pucca house.

2.5.2.6 Media Exposure

Media exposure has a considerable influence on unmet need. Women who are exposed to radio or television or newspapers are about four times more likely to use family planning method than the women with no media exposure **(Korra, 2002).** Other studies have also pointed out that exposure of women to information related to family planning methods and contraceptive use has found to be positively related **(Cochrane & Guilkey, 1995; Westoff & Rodriguez, 1995 Ramesh et al., 1996; Retherford & Mishra, 1997).** After controlling for the effects of residence, education and the number of living children **Retherford & Mishra (1997)** has found that contraceptive use increases by 16 percent points if women are exposed to general media. Mass media like television, newspaper, radio play an important role in the diffusion of attitude, knowledge about the limiting births and even it can change the value system and world's view which affects the fertility behavior of an individual **(Islam & Hasan, 2000).**

2.5.3 Other Factors

Choudhary et al., (2009) and Devi et al., (1996) both in their work had stated that in joint family the prevalence of unmet need is more as compared to nuclear family. The possible reason for this may be that nuclear families tend to have more privacy in discussing about using family planning methods. Hence husband are also less opposed to these contraception as husband play a crucial part in fertility taking decisions in most of the world **(Stash , 1999).**

Ndaruhuye et al., (2009) while examining demand and unmet need for means of family limitation in Rwanda using 2005 Rwanda Demographic and Health Survey has stated that women who did not approve of family planning, those who believed their partner did not approve of family planning or who did not know his attitude and those who had never discussed family planning with their partner, the unmet need for family planning was higher among those women. Hence it can be seen that partner's approval plays a very important role.

Wablembo et al., (2011) using 2006 DHS data analyzed the role of spousal communication in unmet need for family planning in Uganda and stated that unmet need for family planning are significantly higher among the young, couples who hardly or never discussed contraception with their partners.

Kisaakye (2013) examined the levels and determinants of unmet need for contraception in Uganda among various groups of currently married women and has found that women with low autonomy had higher unmet need for family planning than women with medium or high autonomy. It has also stated that richest women were less likely to have unmet need as compared to the poorest women.**Barman (2013)** has also stated that women belonging to middle, rich wealth status are less likely to have unmet need as compared to poor household and even working women are less likely to experience unmet need as compared to non-working women.

The relative effect of supply side factors on unmet need for family planning should also be analyzed vehemently. Supply side factors are physical infrastructure, manpower, distance to health services and quality of life.

2.5.4 Utilization of Maternal Child Health Service Utilization

The relationship between availability of health care system and contraceptive use is not much discussed in literatures. Hence, the studies related to utilization of maternal child health care services and contraceptive use among women is analyzed. There are many literatures, which have lamented on the relationship between utilization of maternal health care services and contraceptive use. In addition, many studies have shown that the contraceptive use is more among women who have used maternal and child health care services. There is high correlation between contraceptive use and utilization of maternal child health care services **(Ahmed & Mosley, 1997).** The association can be explained through these processes. Firstly, the use of prenatal services fosters the interaction of pregnant women with the health personnel or the family planning personnel where they get correct information regarding these services. Secondly, utilization of prenatal care may lower the cost of access to information about family planning and contraception. Hence, this is only possible if doctors, nurses and midwives give information about the various methods of contraception while providing prenatal care **(Ghosh, 2000).** In a study conducted by DHS data in Thailand, Egypt and Bolivia, it has been concluded that prior use of prenatal care has a strong effect on the use of modern contraceptives **(Zerai & Tui, 1995)**.Two studies conducted in Morocco and Tunisia using DHS data were carried on to see the influence of prenatal care on postpartum contraceptive use and in both the cases prenatal care has a positive influence on contraceptive use **(University of North Carolina, 1997).**

2.5.5 Distance and Accessibility

Accessibility of family planning refers to the extent of availability of appropriate contraceptive methods, which includes not only physical proximity but also economic, psychological and attitudinal costs, and perception of potential clients **(Minh et al.,**

2002). Fewer studies have tried to examine the role of distance and accessibility to family planning services on women's contraceptive use. Distance and accessibility or the proximity to the health services was found to be significant in rural areas but not in urban areas **(Cohen, 2000**). It has also been well documented in several literatures that increasing the number of health facilities and the number of pharmacies does not increase the use of family planning, though it is widely assumed that improving the access to family planning services will reduce the social and economic costs of contraceptive use and hence increases contraceptive use **(Ross & Hardee, 2013).** Some literatures have analyzed that the effect of geographical proximity on contraceptive use is trivial or insignificant **(Tsui & Ochoa, 1992; Mroz et al., 1999)**. This may be due to the fact that people do not have interest in family planning practice and because of their cultural constraint to any change. India, being a country with high infant deaths has little demand for contraception. Hence unless there is rapid socio-economic development and modernization, a substantial increase in the contraceptive use would not be expected (Chen et al., 1983). In a study conducted in the EAG (Empowered Action Group) states it has been found that availability and accessibility of any health facility in the village did not have impact on unmet need for family planning **(Sengupta & Das, 2012).**

2.6 Fertility Implications of Addressing Unmet Need for Family Planning

These literatures mainly deal with the effect of unmet need on fertility on fertility and what would be the effect on fertility if all the unmet need is satisfied.

In the analysis by **Sinding et al., 1994,** it has been found that if there is an increase in the contraceptive prevalence rate by 15% on the global scale, it leads to decrease of one point in the total fertility rate. Hence satisfying unmet need of 17 percent (100 million women) of reproductive women reduce the TFR by approximately 1.13 points in the developing world excluding China.

In the analysis of 27 developing countries based on Demographic and Health survey data between 1990 and 1994 it has been found that if unmet need is satisfied, fertility is

expected to decline by an average of 17 percent in 13 Sub-Saharan Africa countries and by 18 percent in the remaining 14 countries **(Westoff et al., 1996).**

The analysis from 169 DHS surveys from 70 countries has shown the effect of satisfying unmet need for limiting on fertility assuming that all unmet need for limiting is satisfied. It has been found that the predicted TFR would decline from 4.1 children per woman to 3.3, a relative decline of 20 percent for all the countries combined. Among these countries, the smallest decline in TFR is witnessed in North Africa/Middle East/Europe from 2.2 children per women to 2.0 children per women. Highest decline is witnessed in East and Southern Africa from 5 children per women to 3.7 children per women **(Bradley et al., 2014).**

Meeting the demand for family planning does not have only fertility implications but it has various social and economic effects. Access to family planning services reduces the numbers of high-risk births for women. Contraceptive use helps in birth spacing which benefits the health of mothers and children and reduces maternal and child mortality **(Cleland et al., 2010).** One of the most important effects of satisfying unmet need is fertility decline which has many positive impacts and has many social and economic effects. When there are fewer children parents can invest more on their health and overall development and their education. The reduction in fertility leads to low youth dependency ratio that further increases the income per head. As because of low fertility, women get more time and opportunity to enter into labor force and hence improve the social and economic position of women. Hence fertility decline have long-term effects on economic growth **(Canning & Schultz, 2012).**

2.7 Overview and Research Gaps

Thus, unmet need for family planning is influenced by the above discussed socio-economic, demographic factors. Unmet need is an important indicator for assessing the government policies. There are many problems such as unintended pregnancies, unsafe abortions, maternal mortality which are faced by women having unmet need for family planning, hence affecting women's health negatively.

The research carried out till now has demonstrated the relationship between unmet need for family planning and individual health seeking behavior i.e. demand side factors. The relationship of the health infrastructure available in the districts, community health infrastructure and unmet need for family planning has been shown in very few studies. Availability of community health services and access to these services also influences reproductive health to a great extent; hence it should also be examined. Very few literatures have addressed the issue of fertility implication of unmet need for family i.e. what will be the impact on fertility if there is no unmet need.

In order to demonstrate the relationship between access and availability of services and unmet need for family planning, the DLHS data has been used. The fertility implication of unmet need for family planning has also been tried to address. The next chapter discusses conceptual framework, hypotheses, data source and measurements of indicators or variables.

3. Conceptual Framework, Data base and Methodology

Based on the various literatures reviewed, this chapter provides the conceptual framework which helps in establishing casual relationship between the various socio-economic background variables, and developmental indicators affecting unmet need for family planning. It also helps in understanding the linkage and association between dependent variable and independent variables. And in order to determine the key factors that influences the unmet need for family planning or to see the linkage between the dependent and independent variables, an overview of literature is very important. The district level, village level and individual level variables have been shown which are very vital factors for determining the prevalence of unmet need for family planning. This chapter also deals with the hypotheses of the study; different sources of the data which have been used and methodology adopted for the analysis of the study.

3.1 Conceptual Framework

Some studies have suggested that the choice or decision of the women to limit and space their pregnancy and birth depends both on the demand side variables (individual level variables) and supply side variables (district level variables and village level variables) and therefore, there should be adequate services to avail in order to reduce this discrepancy between the demand and supply. The conceptual framework which has been drawn for the study is shown diagrammatically in the Figure 3.1. The dependent variable is unmet need for contraception and the independent variables have been classified into District level variables, Village level variables and Individual level variables.

3.1.1 District level variables

Sub-centers (SCs), Primary health centers (PHCs) and Community health centers (CHCs), first referral units (FRUs), and district hospitals are hierarchical system of health facilities in India. They provide services for contraceptive methods. And these facilities are linked to the women through the a set of community health workers which include Auxiliary Midwives (ANMs), Accredited Social Health Activists (ASHAs), and Anganwadi workers by facilitating the use of various health and family planning services **(UNFPA, 2010).**The number of health institutions such as sub-centres, primary health centres, community health centres is negatively correlated with the unmet need for family planning. The greater the number of these health institutions the lower will be the unmet need for family planning. These health institutions will play a key role in meeting the demand for family planning. The manpower employed also plays an important role in reducing the level of unmet need for family planning.

The socio-economic status of the districts also plays an important role. The districts with greater urban population will have lower unmet need, also the districts with higher per capita income have lower unmet need as income to a great extent helps in satisfying the demand for family planning.

Even the districts with higher female literacy have lower unmet need as education has a negative impact on unmet need for family planning. As education level increases, the unmet need for family planning decreases.

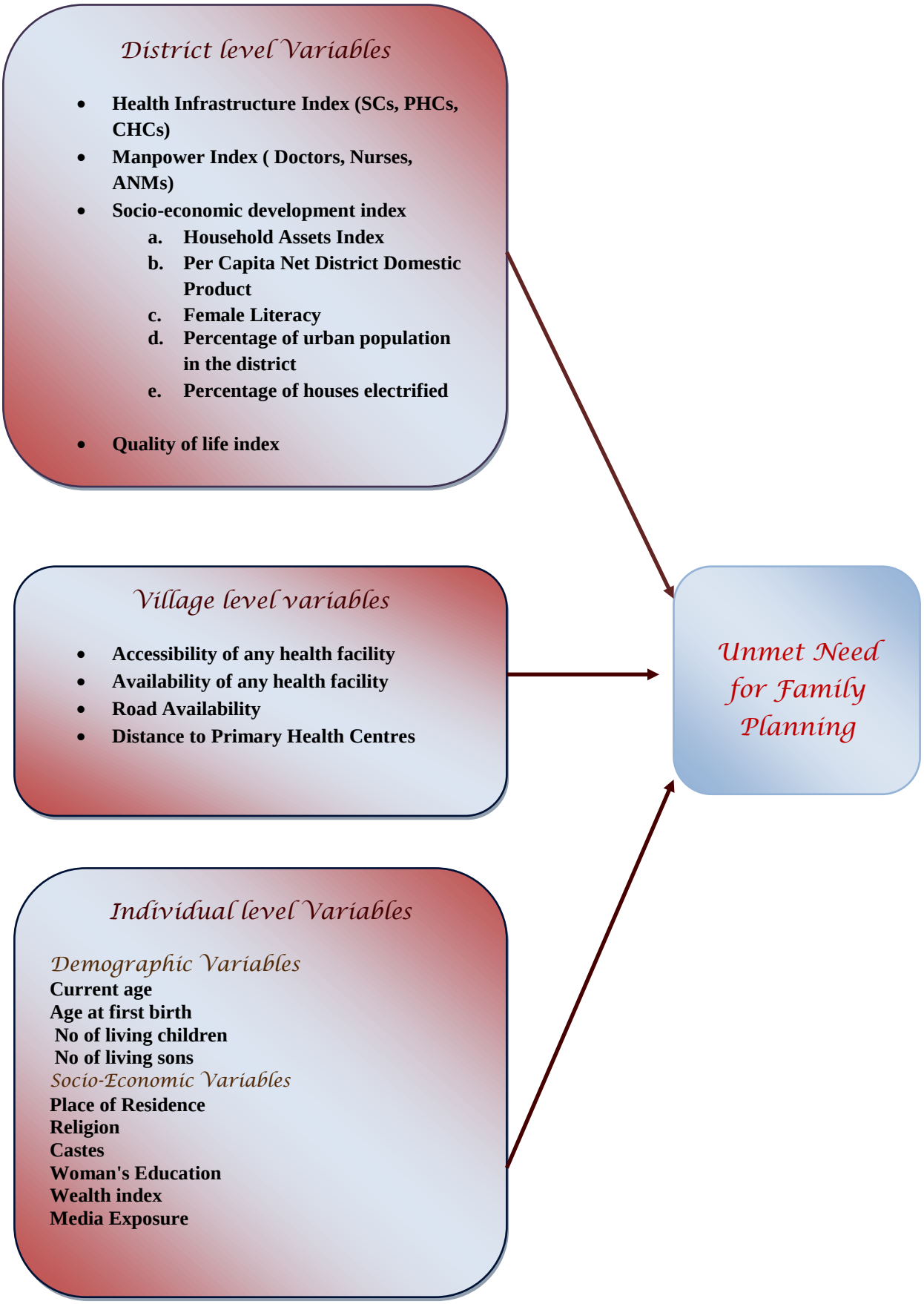
3.1.2 Village level variables

Availability of PHCS, CHCs, SCs in the village are the variables which are used and it is well known that the villages with these services have lower unmet need. Distance to these services is also a very important factor. Distance to PHCs has also been included.

3.1.3 Individual level variables

Both the socio-economic and the demographic variables have been included in the individual level variables, as demographic factors may shape a woman's desire to use the contraception or to stop child bearing. (As the elder women have higher unmet need may be because at that time they have completed their desired family size and do not want any other child). The socio-economic status of an individual and her household determines her ability to satisfy her demands for these services.

Fig. 3.1: Conceptual Framework for analyzing Unmet Need for Family Planning



3.2 Hypothesis of the study

Following hypothesis has been framed which has to be empirically tested.

1. Women belonging to urban areas, higher education level, higher standard of living has low unmet need as compared to women residing in rural areas, women with low education level and low standard of living.
2. The districts with better health infrastructure have low unmet need for contraception as compared to district with poor health infrastructure.
3. The districts which have higher level of socio-economic status witness low unmet need as compared to districts with low socio-economic status.
4. Fertility level reduces when the demand for unmet need is fulfilled.

3.3 Data Source

The present study has used the following data for the analysis.

3.3.1 District level household surveys

Data from three rounds of the **District Level Household Survey (DLHS),** a household survey at the district level carried out during carried out during 1998-99, 2002-04 and 2007-08. It is used to examine the trend of unmet need for family planning in India and Bihar. But for assessing the determinants of unmet needs and to study the prevalence of unmet needs for family planning in Bihar by background characteristics, data were drawn from the third round of the District and Household Facility Survey, conducted in 2007-08 only.

DLHS-1 (1998-99)

The first round of the survey was conducted in the 504 districts of India during 1998-99. A total of 529,817 were covered. From these surveyed households, 474,463 eligible women (currently married women in the age group 15-44 who are usual residents of the surveyed households) and 198,566 men in the age group 20-54 were interviewed. To

gather information on Ante Natal Care, Immunization services, extent of safe deliveries, contraceptive use and unmet need for family planning was the main objective of the survey. Data were also collected on Utilization of government health services and user's satisfaction.

DLHS-2 (2002-04)

"In DLHS-2 593 districts were covered during the period 2002-04. In Round II some new dimensions were added such as testing of cooking salt to assess the consumption of salt fortified with iodine, testing of blood of children (ages below 72 months), adolescents and pregnant women to assess the level of anaemia and measuring weight of children to assess the nutritional status" Ministry of Health and Family Welfare,2006).

DLHS-3 (2007-08)

In DLHS-3, 34 states 611districts are covered. Nagaland is excluded. The survey covered 7,20,320 households. From these households, 6, 43,944 ever married women aged 15-49 years and 1,66,260 unmarried women aged 15-24 years were interviewed. Earlier survey of DLHS surveyed only currently married women but in DLHS 3 ever married (15-49 years age group)and never married (15-24 years age group) were also surveyed.

"The DLHS-3 provides information on family planning, maternal and child health, reproductive health of ever married women and adolescent girls, utilization of maternal and child healthcare services at the district level for India. In addition, DLHS-3 also provides information on new-born care, post-natal care within 48 hours, role of ASHA in enhancing the reproductive and child health care and coverage of Janani Suraksha Yojana (JSY). An important component of DLHS-3 is the integration of Facility Survey of health institution (Sub centre, Primary Health Centre, Community Health Centre and District Hospital) accessible to the sampled villages. The focus of DLHS-3 is to provide health care and utilization indicators at the district level for the enhancement of the activities under National Rural Health Mission (NRHM)" ((http://www.rchiips.org/index.html).

47,137 households, 46,840 ever married women and 7,713 unmarried women were interviewed in Bihar.

It should be noted that National Family Health Survey (NFHS) rounds also give data on unmet need for contraception. But NFHS does not give district level data and the present research is based on district level indicators, variables hence DLHS data have been used. As it serves the purpose.

Household ever married, unmarried and village questionnaires are used to collect information in DLHS-3. "Information on all members of the household and socio-economic conditions of the household is collected from household questionnaire. Information on women's characteristics, maternal care, immunization and childcare, contraception and fertility preferences, reproductive health including knowledge about HIV/AIDS is collected from ever married women's questionnaire. Availability of health, education and other facilities in the village and information on their accessibility is collected from village questionnaires. The health facility questionnaires contained information on human resources, infrastructure, and services" (http://www.rchiips.org/index.html).

In the present study ever married women's file and village file are used for the analysis. Data regarding the prevalence of unmet need for family planning, socio-economic background characteristics of women with unmet need is acquired from ever married women's file. The sample size for currently married women is 44,362 currently married women.

Definition of "Unmet Need for family planning" adopted for the current study

According to DLHS-2 definitions of unmet need for family planning has been categorized into: "Unmet Need for spacing" and "Unmet need for limiting". According to DLHS-2 definition,

1. *"Unmet need for spacing includes the proportion of currently married women who are neither in menopause or had hysterectomy nor are currently pregnant and who want more children after two years or later and are currently not using any family planning method. The definition also included women who are not sure about whether and when to have next child are also included in unmet need for spacing*" **(IIPS, 2010).**

2. ***"****Unmet need for limiting includes the proportion of currently married women who are neither in menopause or had hysterectomy nor are currently pregnant and do not want any more children but are currently not using any family planning method. Total unmet need refers to unmet for limiting and spacing"* **(IIPS, 2010).**

As the objective of the current study of regional variations of unmet need for family planning in Bihar can be fulfilled only with the dataset dealing with district, hence DLHS-3 data has been used.

3.3.2 National Family Health Survey

NFHS III (2005-06)

"National family Health Survey conducted in 2005-06 interviewed men age 15-54 years and never married women age 15-49, as well as ever-married women. NFHS-3 collected information from a nationally representative sample of 124,385 women in the age group 15-49 and 74,369 men in the age group 15-54 from 109,041 sample households" .

In the present analysis in order to assess the impact of unmet need of family planning on Total fertility rate if the demand for unmet need is satisfied, NFHS-III (2005-06) is used. As DLHS III does not give data on Total Fertility Rate (TFR), NFHS-III has been used. And in order to show the reasons for not using contraception by unmet need for spacing and limiting for whole Bihar, NFHS III has been used as NFHS is best suited for the analysis which can be done at the state level.

3.3.3 Annual Health Survey

Annual Health Survey collects information on core vital and health indicators like fertility, mortality, prevalence of disabilities, injuries, acute and chronic illness and access to health care for identified morbidities; and access to maternal, child health and family planning services at the district level for 8 Empowered group states (Bihar, Jharkhand, Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, Orissa and Rajasthan) and Assam on yearly basis.

3.3.4 Ministry of Health and Family welfare, Bihar

Bihar statistical hand book, 2012 (Directorate of Economics and Statistics, Department of Planning and Development Bihar, Patna)

The district level health infrastructure data has been taken from Ministry of Health and Family Welfare, Bihar. The number of Health Institutions (Sub-centers, Primary Health Centers and Community Health Centers) in each of every 37 districts of Bihar is included.

Following data has been taken from **Bihar statistical hand book, 2012 (Directorate of Economics and Statistics, Department of Planning and Development Bihar, Patna)**

1. The number of Doctors, Nurses and ANMs in position and the number of sanctioned posts in districts of Bihar.
2. District wise Per Capita Net District Domestic Product in Rupees (PNDDP) from (Directorate of Economics and Statistics, Department of Planning and Development Bihar, Patna).

3.3.5 Census of India, 2011

- In order to show the relationship between socio-economic status of the district and unmet need for family planning, data on availability of assets has been taken from Census of India, 2011.

- Female literacy rate and percentage of urban population for each of the thirty-seven districts of Bihar has been collected from Census of India, 2011.
- Number of households electrified for each of thirty-seven districts of Bihar has been taken from Census of India, 2011.
- For calculating the asset index data on the availability of asset in the households for each of thirty-seven districts has been taken from Census of India, 2011.
- For calculating quality of life index data on the household amenities for each of thirty-seven districts has been taken from Census of India, 2011

3.4 Measurement of Variables

Identifying casual relationship among the different characteristics of a study is important in scientific investigation. A casual relationship between the two characteristics exists only when one of them may logically be considered as the cause of the other **(Mahmood & Raza,2008)** The factor which is supposed to be the cause is called "independent variable" and the variables which is supposed to be the effect is known as the "dependent variable". Thus the variation in dependent variable can be explained through the variations in independent variables (Mahmood & Raza, 2008). And hence the dependent and independent variable is used to represent the correlation between the two variables.

3.4.1 Dependent Variable

In the present study, unmet need for family planning is a binary outcome **(respondents with unmet need were coded "1" and with no unmet need were coded "0"). Binary Logistic Regression** is used to estimate influence of various socio-economic, demographic factors. It shows the linear relationship between dependent and one or more independent variables. **The dependent variable** is unmet need. According to the NFHS report, unmet need can be of two types—unmet need for spacing and unmet need for limiting.

3.4.2 Independent variables

The following variables are used are independent variables:

3.4.2.1 District level Variables

1. Health Infrastructure Index has been calculated using the following indicators:

Number of sub-centers (SC), primary health centers (PHC) and community health centers (CHC) per lakh population in each district.

2. Manpower Index has been calculated using Number of Doctors, Nurses and ANMs (Auxiliary Nurse Midwife) per lakh population in each district of Bihar.

3. Socio-Economic Status of the Districts has been calculated using the following indicators:

i) Availability of assets in the household in each district of Bihar (Radio/Transistor, Computer laptop, Telephone/ Mobile phone, Bicycle, Scooter/ Motorcycle/ Moped, Car/Jeep/Van, Households with TV, Computer/ Laptop, Telephone/mobile phone and Scooter/ Car

ii) Per capita net district domestic product in Rupees (PNDDP)

iii) Female literacy rate for each of thirty-eight district has been taken from 2011 Census.

iv) The percent of population living in urban areas for each district of Bihar has been taken.

v) The percentage of household electrified in each district= Number of households electrified/ Total number of households in the districts*100

4. Quality of Life Index

The quality of life in the districts has been shown with the help of various indicators. The indicators which represent the negative features are selected for the index. They are:

i) Houses with wall and roof made of temporary material. Wall made of Grass, Thatch, Bamboo, Plastic Polythene, Mud, Plastic or Polythene

ii) The source of drinking water away from the premise of household

iii) Source of lighting facility other than electricity (Kerosene, solar energy, other oil, any other)

iv) No drainage or Open Drainage

v) No latrine facility

vi) Does not have kitchen within the house

vii)Use of Fire wood, Crop residue, Cow dung, Coal, Lignite, Charcoal for cooking which have been considered as Polluting fuels.

viii) The number of households having no exclusive room or only one room.

3.4.2.2 Variables used from DLHS-3 and NFHS-3

Data from both datasets of DLHS 3 and NFHS 3 were used for the study. The first three objectives of analyzing the trend and spatial variations of unmet need for family planning in India and Bihar uses data from DLHS 3. To answer the research questions regarding the main reasons for not using contraception among women with unmet need, even by background characteristics and the effect on fertility when there is no unmet need, data has been used from NFHS-3. As DLHS 3 doesn't provide data on total fertility rate which is a crucial indicator to assess the impact on fertility when the need is satisfied, hence there is change in datasets. And the reasons for not using contraception are a state level analysis and for state level analysis, NFHS 3 is the most appropriate dataset to be used. And the effect on fertility when there s no unmet need is also a state level analysis.

3.4.2.2.1Variables used from DLHS-3

I. Village Level Variables

1. Village in each of the districts has been categorized according to Availability of any health facility: (1-Yes, 2-No).

2. Village in each of the districts has been categorized according to Accessibility to any health facility: (1-Yes, 2- No).

3. Villages have been categorized according to Road Availability: (1-Yes, 2-No).

4. PHCs are not available in every village and hence villages have been categorized to the distance from the PHC as: (1- In village itself, 2- Upto 5 kms, 3- 6-10 kms, 4- More than 10 kms).

II. **Individual level variables**

Demographic Variables

1. Age of the women: Age of the women has been categorized into: (1: 15-19 Years, 2: 20-24, 3: 25-29, 4: 30-34 Years, 5: 35+ Years).

2. Women age at first birth: It has been categorized into: 1: Less than 25 years, 2: 25-35 years, 3: More than 35 years).

3. Number of living children : Based on number of living children women has been categorized into (1: 0 living children , 2: 1 Living child, 3: 2 living children, 4: 3 living children, 5: 4+ living children)

4. Number of living sons: It has been categorized into: (1: 0 living sons, 2: 1 living son, and 3: 2 + living sons)

Socio-economic Variables

1. **Place of Residence**: On the basis of type of locality, place of residence has been categorized into: (1: rural, 2: urban)

2. **Religion:** It has been categorized into (1: Hindu, 2: Muslim, 3: Others.)

3. **Castes:** Social groups in DLHS has been categorized into (1: Scheduled castes and Scheduled Tribes, 2: Other Backward Classes, 3: Others)

4. **Women's Education Level**: DLHS gives information in terms of years of schooling, hence women on the basis of years of schooling has been categorized into:

1: Not literate

2: Less than 5 years of schooling,

3: 5-9 years of schooling

4: More than 10years of schooling

5. Wealth index: On the basis of household amenities, assets, durables wealth index has been formed and divides it into wealth quintiles:

1: Poor

2: Medium

3: Rich

6. Media Exposure: Women who have seen or heard or read the messages related to the family planning on the television or radio or in a newspaper/ books/ magazine/ hoarding/ pamphlets/posters or drama/song/dance performance/ street play/ puppet show are categorized as having seen/heard/read the messages related to the family planning in the media: (1: Yes; 2: No).

3.4.2.2.2 Variables used from NFHS-3

I. Main reasons for not using contraception= The analysis of main reasons for not using contraception is carried out among women with unmet need for family planning. The reasons for not using contraception were categorized into five main reasons. Infrequent sex, no sex, Menopausal, hysterectomy, sub fecund, in fecund, Wants more children has been clubbed into **"Fertility related reasons=1".** Respondent opposition, Husband Opposition, Others Opposition, Religious prohibition have been clubbed together to form **"Opposition to use=2". "Lack of knowledge=3"** about the method and source is clubbed together. The **"Method related reasons=4"** include Health concerns, Fear of side effects, costly, interference with the body etc. The last category is **"Don't know=5".**

In the analysis of main reason for not using contraception among currently married women with unmet need by selected background characteristics, the variables from NFHS-3 have been recoded as:

i. **Age group:** Based on age, women have been grouped into: 1=15 to 19 years, 2=20 to 24 years, 3= 25 to 29 years, 4=30 to 34 years, 5= 35 to 39 years, 6= 40 to 44 years, and 7= 45 to 49 years.
ii. **Place of Residence:** The women's place of residence is coded into rural and urban areas as: 1= Rural, 2= Urban.
iii. **Education Level of Women:** On the basis of educational level, women are categorized as: 0= Illiterate, 1=Primary, 2-Secondary, 3= Higher Secondary.
iv. **Religion:** Religion is coded as: 1= Hindus, 2= Muslims.
v. **Caste groups:** According to social groups, women have been classified as: 1 - General, 2- Other Backward Castes and 3- SC/ST

vi. **Wealth index:** According to wealth index, women have been categorized into: 1=Low, 2= Medium, 3= High.

vii. **Number of Living Children**: Based on the number of living children, women have been categorized into: 1= No living children i.e.0, 2= 1 living child, 2= 2 living children, 3= 3 living children, 4= More than 4 living children.

3.4.3 Fertility Implication of Addressing Unmet Need for Family Planning

1.The estimation of how reduction in the level of unmet need would affect fertility rates in Indian states and if all the demand for family planning were to be analyzed is done with the help of following method:

i) Relationship between total fertility rate and met need for spacing and limiting has been examined using multiple linear regressions. Contraceptive use for limiting births is considered to be the important predictor.

ii) Then the regression equation is calculated using TFR of all the 29 states of India and contraceptive use for limiting. With this equation, the level of TFR is predicted for a given level of contraceptive use for limiting births.

iii) In order to estimate the impact of satisfying the unmet need for limiting on the TFR, the level of contraceptive use selected is equal to the total demand for contraception for limiting. The total for limiting is estimated by summing the proportion of married women who are currently using a contraceptive method and who want no more children (i.e., current use for limiting) and the proportion of married women with an unmet need for limiting (Bradley et al., 2012).

2. The effect of reducing unmet need for family planning and increasing contraceptive use is estimated using the following methodology:

i) Based on five assumptions, total fertility rates are estimated using different scenarios of increasing unmet need for family planning and decreasing contraceptive use.

a) The first assumption is that the level of unmet need and contraceptive prevalence rate (CPR) are the same as in 2005-06. And the TFR is 4 children per women as in 2005-06.

b) The second assumption is that if there is no unmet need i.e. all unmet need is satisfied. This signifies maximum potential level of contraceptive use. If all the unmet need were satisfied then the contraceptive prevalence rate will be at the maximum level.

c) The assumption is that the unmet need declines by 50% and contraceptive prevalence rate increases to 50%.

d) The fourth assumption is that the unmet need declines by 20% and contraceptive prevalence rate increases to 20%.

e) The fifth assumption is that the unmet need declines by 10% and the contraceptive prevalence rate increases to 10%. By implying the different levels of contraceptive use and unmet need, the Total Fertility Rates (TFRs) are derived in the rest of four scenarios.

3.5 Methodology

3.5.1 Trend Analysis

In order to analyze the temporal variation in the unmet need for family planning in Bihar, trend is shown with the help of all the three rounds of DLHS which shows the trend from 1998.

3.5.2 Composite index

Composite index has been used to calculate health physical infrastructure, manpower infrastructure using Z scores of all indicators. Z score is calculated using the formula:
Z score = Observed value – Mean/ Standard Deviation

3.5.3 Principal Component Analysis

It has been used to calculate the quality of life index and socio –economic status of the districts. Principal component analysis is used for these indexes as large set of variables has been used for the computation of these indexes. And the main aim of this Principal

component analysis is to reduce a large set of variables into a smaller set of artificial variables, called "principal components", which accounts for most of the variance in the original variables.

3.5.4 Pearson Correlation Matrix

Pearson Correlation matrix has been used to find out the association between all the district level variables and unmet need for family planning in Bihar. Pearson Correlation is also used to show the association between these independent variables.

3.5.5 Multiple Linear Regressions

Multiple Linear Regression is used to show the linear relationship between a dependent variable and one or more independent variables. The association of different district level variables and unmet need for family planning has been shown with the help of multiple linear regressions.

3.5.6 Bivariate Analysis

Cross tabulation and correlations has been used to show the linkages and associations between the dependent variable i.e. unmet need and the independent variables i.e. socio-economic, demographic variables. The dependent variable i.e. unmet need for family planning by different socio-economic and demographic factors have been analyzed by bi-variate method. It is used to show the percentage distribution of factors affecting unmet need.

3.5.7 Binary Logistic Regression

As the dependent variable is dichotomous, binary logistic regression has been used to assess the effect of independent explanatory variables on dependent variable.

3.5.8 Cartographic Methods

Simple cartographic tools and techniques like **choropleth mapping** are used to analyze the spatial pattern of unmet need for family planning in India and Bihar. For the graphical representation bar Graph, line graph, pie chart etc. has been used. For mapping, ARC GIS 10 software has been used.

4. Unmet need for Family Planning in Bihar: Trend, Regional Variations and Impact of District Level Factors

This chapter provides the detailed statistical analysis of the data used. It addresses most of the objectives of the study, i.e. it analyses the spatial pattern, regional pattern of unmet need for family planning in India and Bihar. Attempt has also been made to examine the reasons for not using contraception among the currently married women of Bihar with unmet need and reasons for not using contraception by selected background characteristics. Though, DLHS-3 provides data on reasons for not using contraception, but since state level analysis is carried out, NFHS-3 is used which is the most appropriate for this analysis.

The chapter has been divided into three broad sections: The first part contains the analysis of interstate variation of unmet need for family planning in India, trend in the level of unmet need for family planning from 1998 to 2008, pattern and district level analysis of unmet need for family planning in Bihar. In the second part, main reasons for not using contraception among the currently married women of Bihar with unmet need are analyzed. Then reasons are analyzed by selected background characteristics using NFHS-3 data. The second part also analyzes how reducing level of unmet need would affect fertility rates in Indian states. Data from NFHS III (2005-06) for 29 Indian states has been used to analyze how much fertility is expected to decline if all the demand for family planning were to be satisfied. Data from NFHS III (2005-06) for 29 Indian states has also been used to analyze the effects of altering unmet need on the total fertility rates. This section also deals with the impact of reducing unmet need and increasing contraceptive use on total fertility rate. The present chapter also tries to focus on the impact of the district level factors e.g. health infrastructure, quality of life, availability of assets, female literacy, urban population, per capita income etc. on the unmet need for

family planning in Bihar. In other words, it tries to sketch the relationship between socio-economic factors and unmet need for family planning in the districts of Bihar.

4.1 Spatial and Regional Variations of Unmet Need for Family Planning in India

It is essential to analyze the prevalence of unmet need among different states of India before discussing the regional variation of unmet need for family planning in Bihar. Unmet need is prevalent vividly in developing countries and women with unmet need constitute a significant proportion of married women in reproductive age group **(Kumar & Singh, 2013)**. This concept has been a central theme in family planning policy since two decades as it reflects or indicates the unsatisfied demand for contraception **(Casterline et al., 2003)**. Further this unsatisfied demand often results in unintended pregnancies and unintended births which in turn results in unsafe abortions which subsequently results in high maternal mortality, which is a grave issue for women reproductive health. India is a country with the largest number of women with unmet need for contraception **(Sedgh et al., 2007).** The level of unmet need for family planning in the country is around 21% (**DLHS III, 2007-08)**. According to different socio-economic and cultural characteristics, the spatial variation of unmet need for family planning differs across the states. This chapter focuses on the level and pattern, regional variation of unmet need for family planning in India and Bihar, reasons for not using contraception among the currently married women with unmet need by various background characteristics. It also analyzes the impact of unmet need on total fertility rate if all the demands are satisfied. Further, focus has also been given on the impact of district level variables on unmet need for family planning in Bihar. The percentage of unmet need in all the states of India has been presented in the Table 4.1.

The maps (4.1),(4.2) and Map(4.3) showing the spatial distribution of unmet need for spacing and limiting and the total unmet need for family planning, shows that there are considerable variations among the states. These variations range from 8.1% in Andhra Pradesh to 36.1% in Bihar. On the regional basis, Eastern states which comprises of

Bihar, Jharkhand, Odisha, West Bengal has a very high prevalence of unmet need, about 28.1%. This can be attributed to backwardness of this region in terms of demographic indicators. Other region which falls in this category is the southern region comprising the states of Kerala, Andhra Pradesh, Tamil Nadu, and Karnataka. This southern region is socially and economically developed, especially Kerala is one of those which in terms of development indicators like literacy, health, and sex ratio etc is highly ranked **(Gulati, 1976).**

4.1.1 Unmet Need for Spacing and Limiting

The unmet need for spacing and limiting shows a similar picture. Meghalaya, Jharkhand, Uttar Pradesh, Chhattisgarh have high unmet need for spacing as compared to the national average i.e.7.6 percent. On the other hand, Sikkim, Punjab, Tripura, Arunachal Pradesh and Delhi records very low unmet need for spacing as compared to the national average.

The unmet need for limiting is high in the states of Bihar, Uttar Pradesh, Jharkhand, Goa, Meghalaya, Manipur, Assam, and Odisha as compared to the national average i.e. 13.4 percent. It can be seen that while the entire Northern, Eastern, North Eastern and Central States, which also comes under the category of EAG states (Empowered Action Groups States) have high unmet need for limiting and spacing, the Southern and Western states have low unmet need for spacing and limiting.

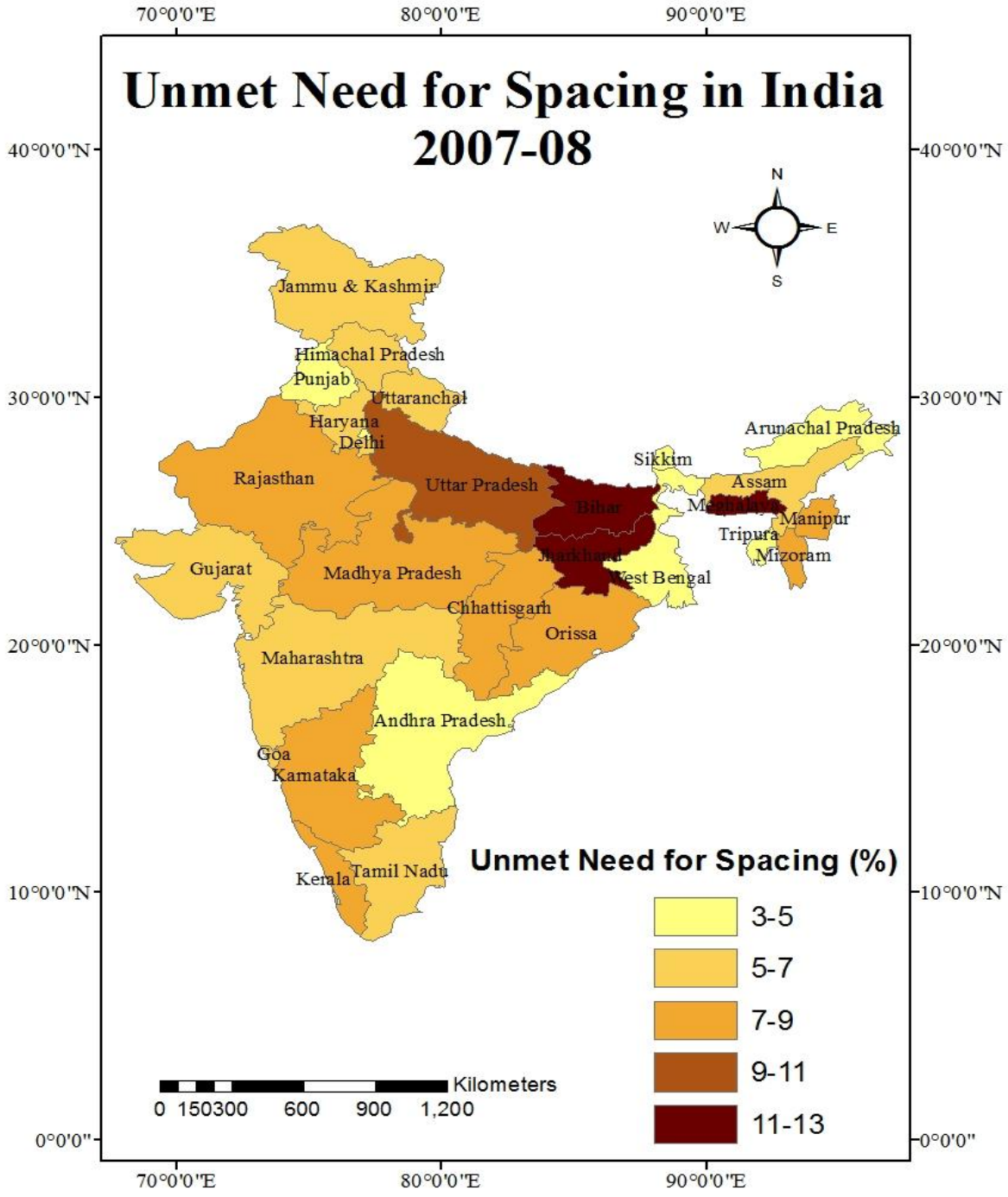
The unmet need for limiting is greater than unmet need for spacing in all the states except Karnataka where the unmet need for spacing is 7.9 percent and unmet need for limiting is 6.9 percent. In Andhra Pradesh there is no difference in the unmet need for spacing and limiting. But there is also a noticeable thing that the gap between unmet need for spacing and limiting is small. It can also be seen that the states which are socially and demographically backward have high unmet need like Bihar and Uttar Pradesh as compared to the Southern States like Kerala and Andhra Pradesh which are demographically advanced states. So here also a clear north south divide in terms of demographic and health characteristics can be seen.

Table-4.1: Spatial variation of unmet need for family planning in India

STATES	Unmet Need for Family Planning		
	To space	To Limit	Total
India	**7.4**	**13.6**	**21**
Andhra Pradesh	4.1	4	8.1
Arunachal Pradesh	3.3	9.9	13.2
Assam	5.4	18.2	23.6
Bihar	13.4	22.7	36.1
Chhattisgarh	8.4	11.5	19.9
Delhi	3.5	10.4	13.9
Goa	6.8	19.8	26.6
Gujarat	5.9	9.6	15.5
Haryana	5.2	10.2	15.4
Himachal Pradesh	4.9	9.1	14
Jammu & Kashmir	6	14.4	20.4
Jharkhand	12.7	20.8	33.5
Karnataka	7.9	6.9	14.8
Kerala	7.1	8.7	15.8
Madhya Pradesh	7.8	10.3	18.1
Maharashtra	5.8	7.7	13.5
Manipur	7.1	18.7	25.8
Meghalaya	13.4	18.9	32.3
Mizoram	7.6	6.4	14
Orissa	7.5	15.5	23
Punjab	3	8.4	11.4
Rajasthan	7	9.9	16.9
Sikkim	2.7	13.5	16.2
Tamil Nadu	5.4	12.7	18.1
Tripura	3	9.8	12.8
Uttar Pradesh	10.6	21.8	32.4
Uttaranchal	6.2	13.8	20
West Bengal	3.8	7.3	11.1

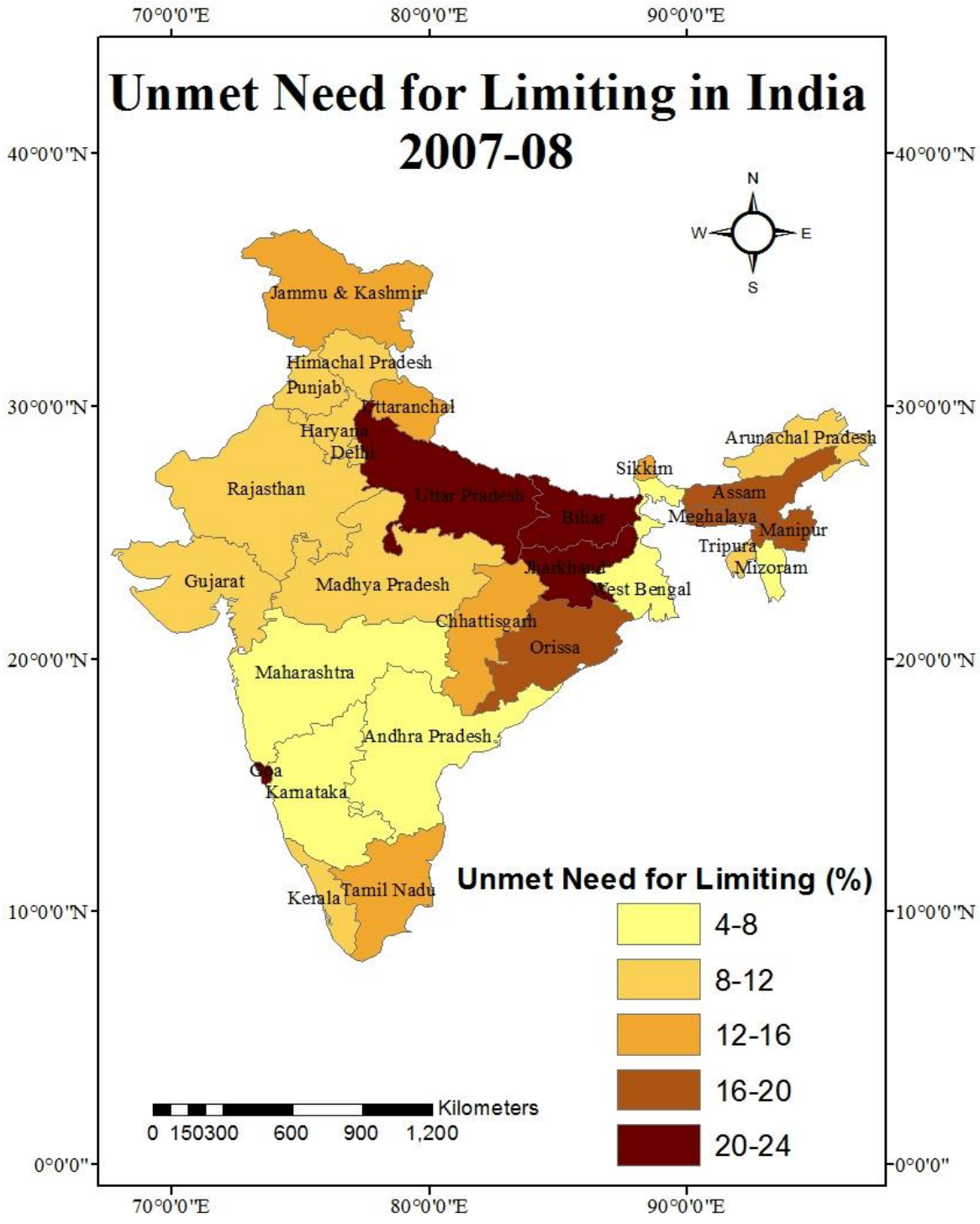
Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.1 Spatial variation of unmet need for spacing in India



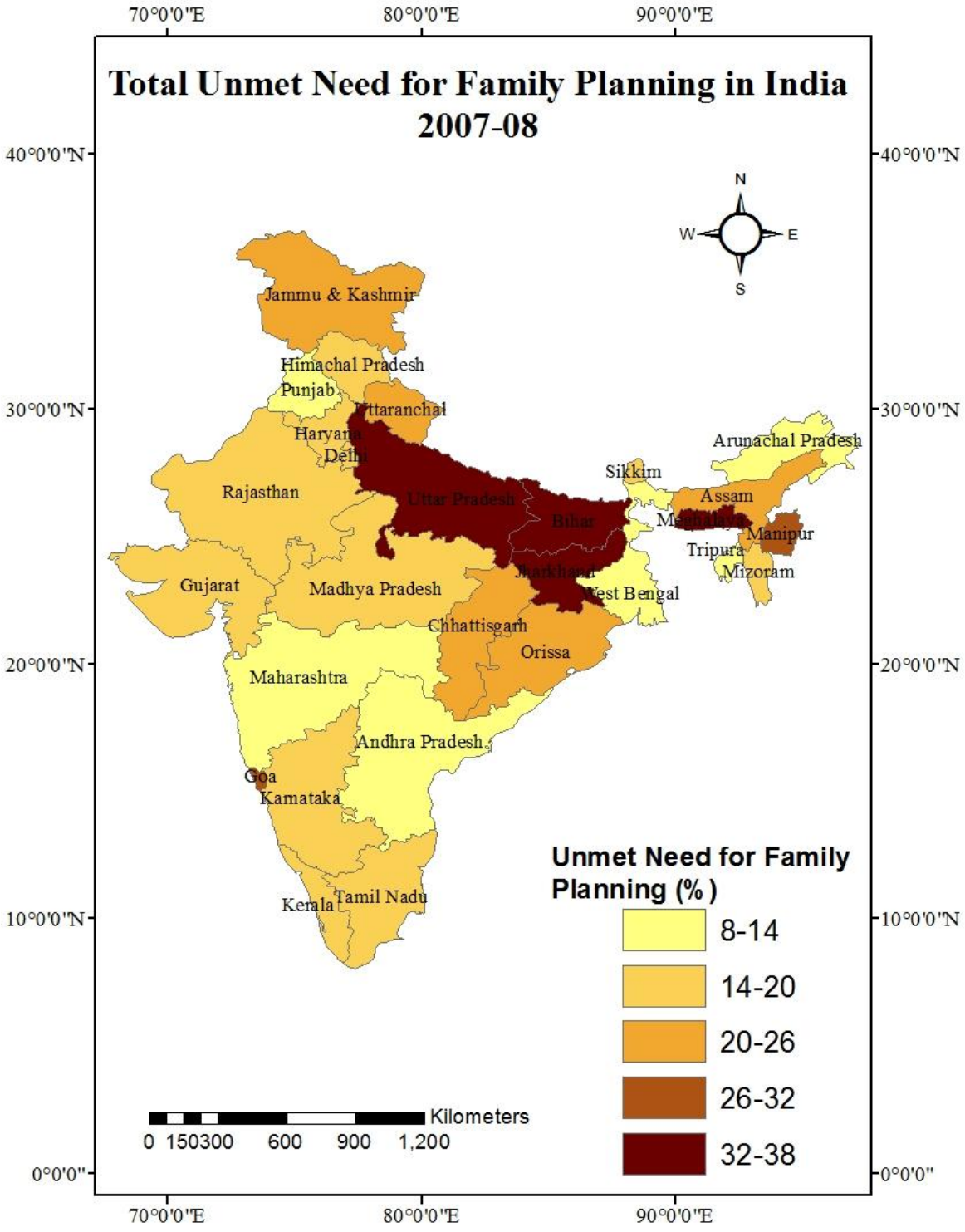
Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.2 Spatial variation of unmet need for limiting in India



Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.3 Spatial variation of Total unmet need for family planning in India



Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

4.1.2 Total Unmet Need for Family Planning

The unmet need for family planning services among currently married women in India is 21 percent according to DLHS-3. It means they are not using contraception even though they want to postpone child bearing and don't want any more children. The unmet need for spacing is 7.6 percent and the unmet need for limiting is 13.4 percent. It means that most of the people want to limit their childbearing but they are not using contraception due to various reasons.

There are great interstate variations in the unmet need for family planning in India. The states which have higher unmet need than the national average of 21% are Bihar (36.1 percent), Jharkhand (33.5 percent), Uttar Pradesh (32.4 percent), Meghalaya (32.3 percent), Goa (26.6 percent), Manipur (25.8 percent), Assam (23.6 percent), and Odisha (23 percent). The unmet need for family planning is lowest in Andhra Pradesh i.e. 8.1 percent followed by West Bengal (11.1 percent), Punjab (11.4 percent), Tripura (12.8 percent), Arunachal Pradesh (13.2 percent), Maharashtra (13.5 percent) and Delhi (13.9 percent).

Hence it can be seen that it is mostly the Eastern and North-Eastern states which have higher unmet need. These states of Uttar Pradesh, Bihar and Jharkhand with high unmet need for contraception accounts for about 40% of the population in India, Uttar Pradesh being the most populous state in India and Bihar being the most densely populated in India according to Census 2011. Even on all indicators of health, fertility and socio-economic development Bihar lies below the national average **(Daniel et al., 2008).**

4.2 Regional Variation in Unmet Need for Family Planning in India

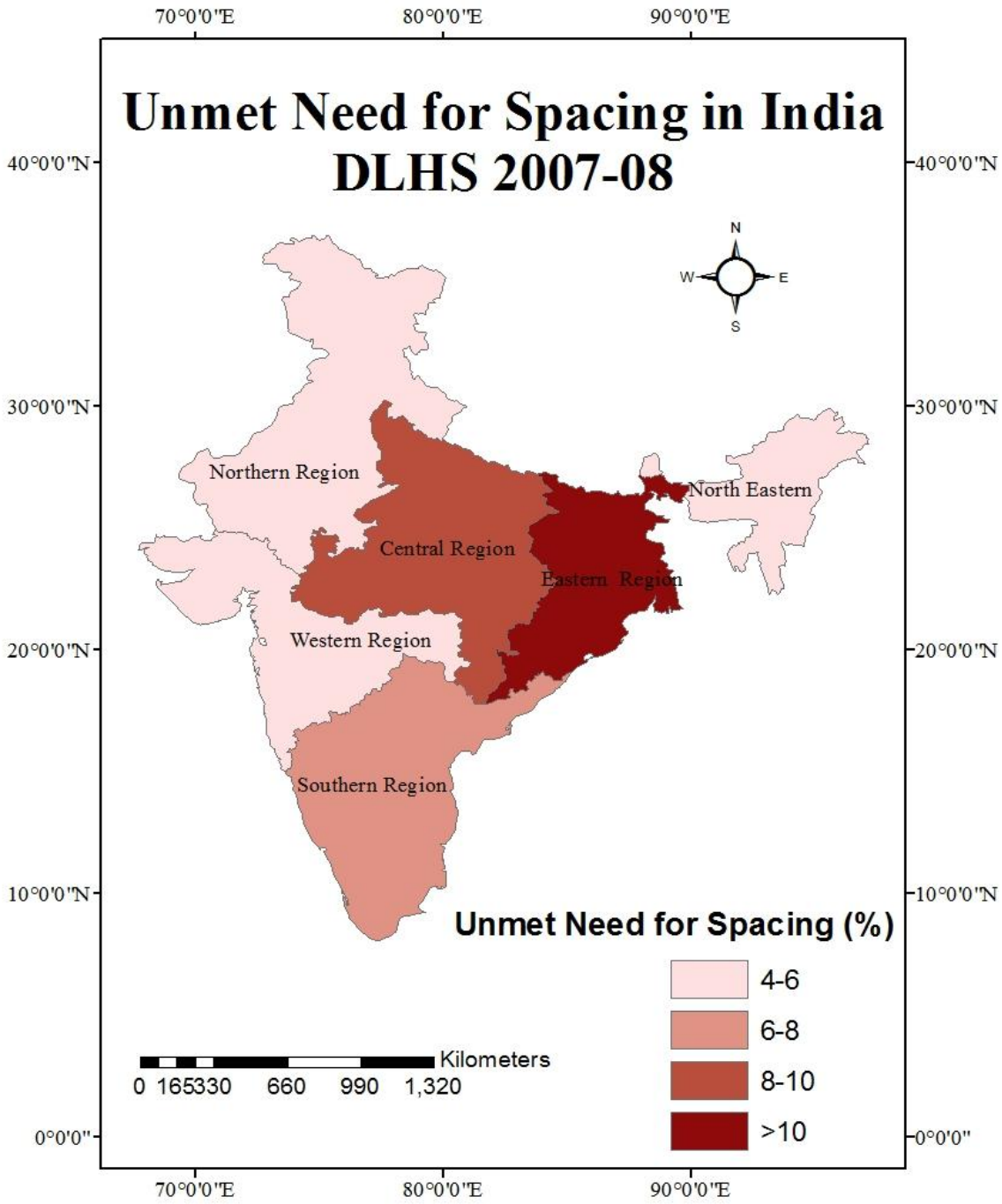
The states are clubbed together according to regions defined by NFHS for regional analysis. The six regions defined by NFHS are:

a) **Northern Region** (Delhi, Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Rajasthan and Uttarakhand)
b) **Central Region** (Chhattisgarh, Uttar Pradesh, Madhya Pradesh)
c) **Eastern Region (**Bihar, Jharkhand, Orissa, West Bengal)
d) **North Eastern Region (**Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura)
e) **Western Region** (Goa, Gujarat, Maharashtra)
f) **Southern Region (**Andhra Pradesh, Karnataka, Tamil Nadu, Kerala)

These regions have been shown in maps according to their level of unmet need for spacing, limiting and total unmet need (Map 4.4, 4.5& 4.6). As the states falling under these regions, more or less share the same socio-economic and demographic characteristics, hence variation among regions is very important to analyze. Hence, the maps showing regional variations of unmet need for spacing, limiting and total unmet need has been shown.

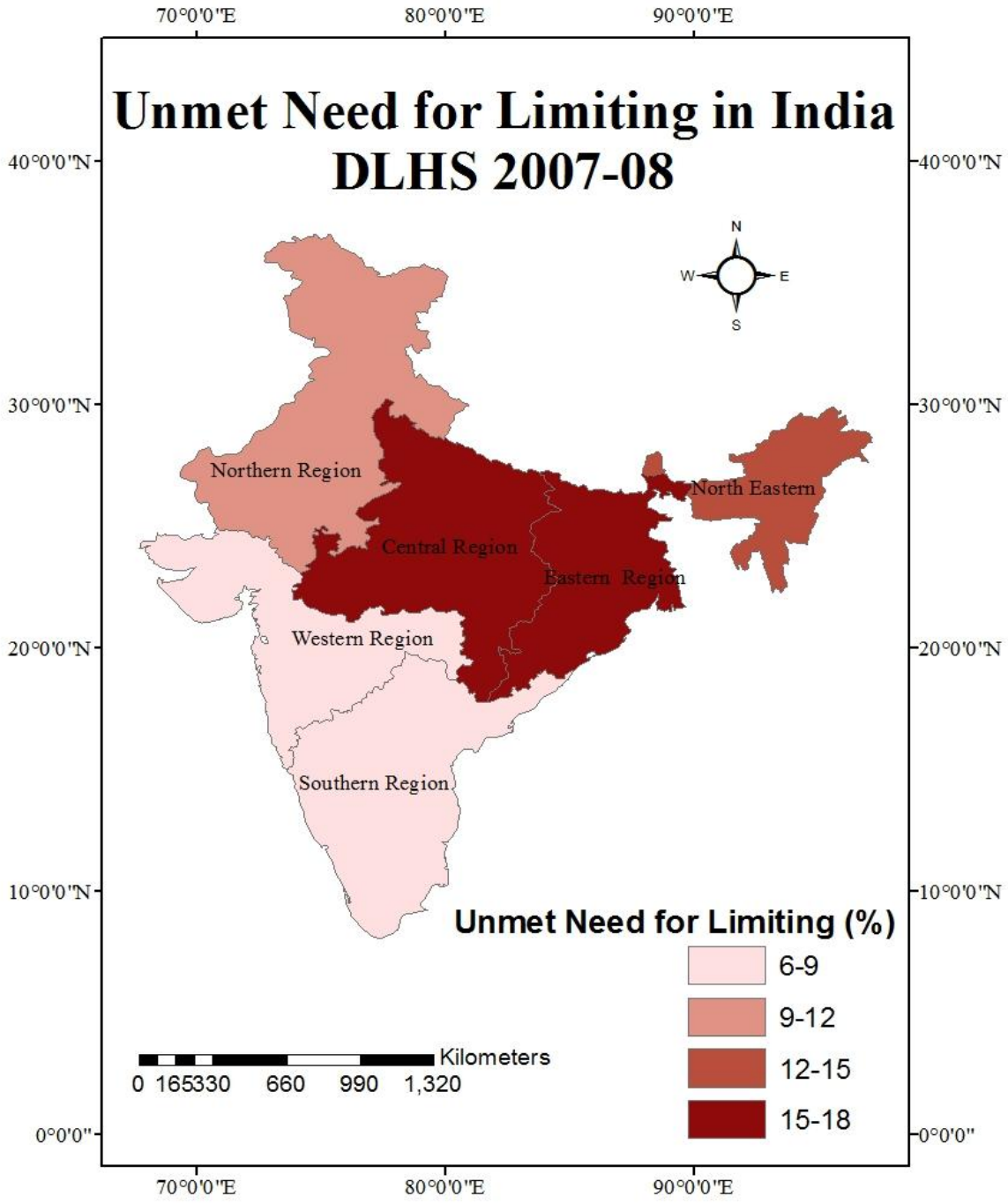
Among all the regions, the Southern region exhibits the lowest level of unmet need for family planning. This region has been identified as developed region owing to its better performance in socio-economic level. On the other hand the Eastern region shows the highest level of unmet need for family planning which is about 28.1%. Next to Southern region is the Western region exhibiting a lower percentage of unmet need for family planning as compared to other regions which can be attributed to high level of urbanization, industrialization and socio-economic development in this region. Even these states of Southern region (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) have been two decades ahead in their experience of demographic transition than the Northern and Eastern region (**Dyson, 2008)**.

Map 4.4 Regional variations of unmet need for spacing in India



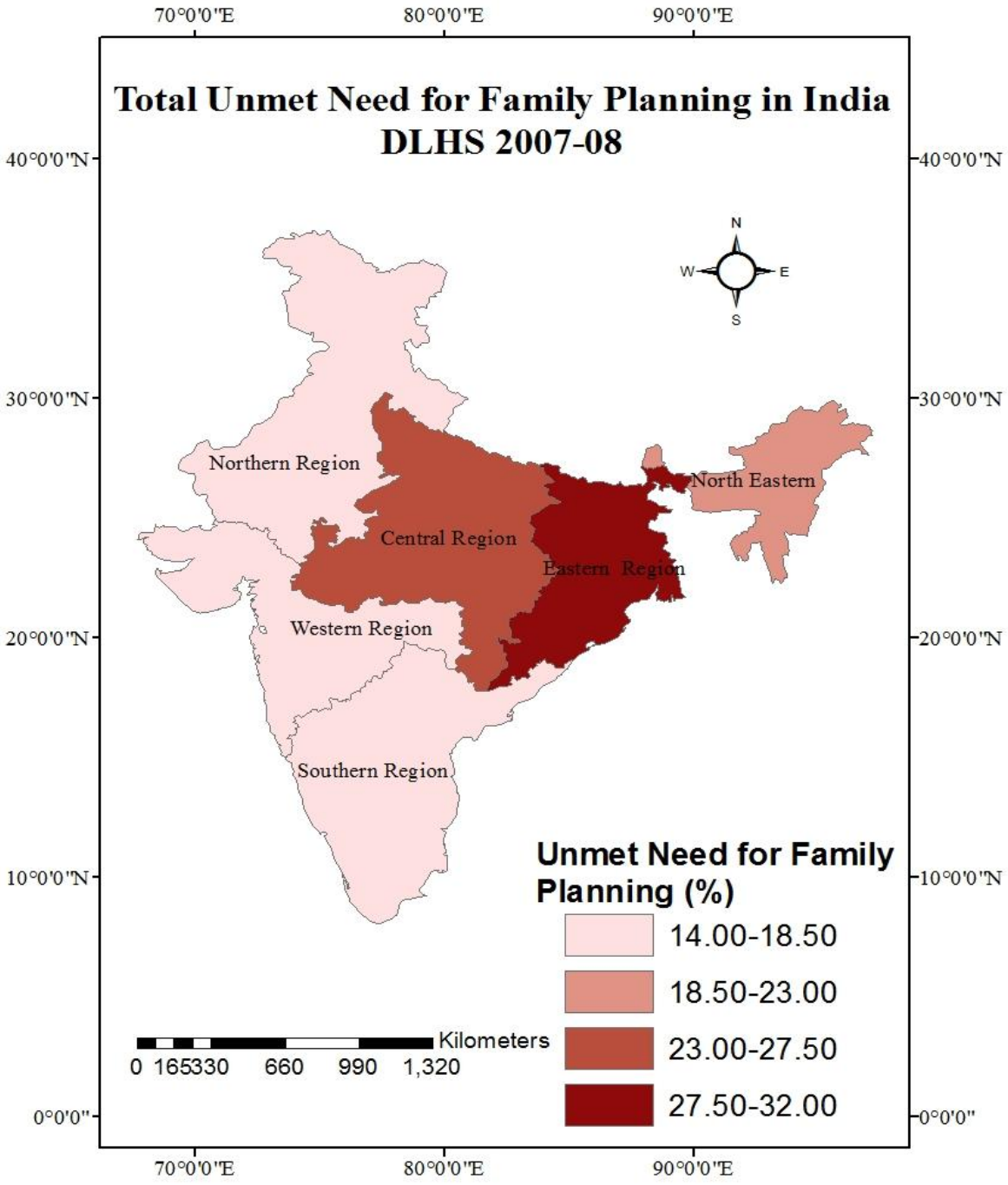
Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.5 Regional variations of unmet need for limiting in India



Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.6 Regional variations of unmet need for family planning in India

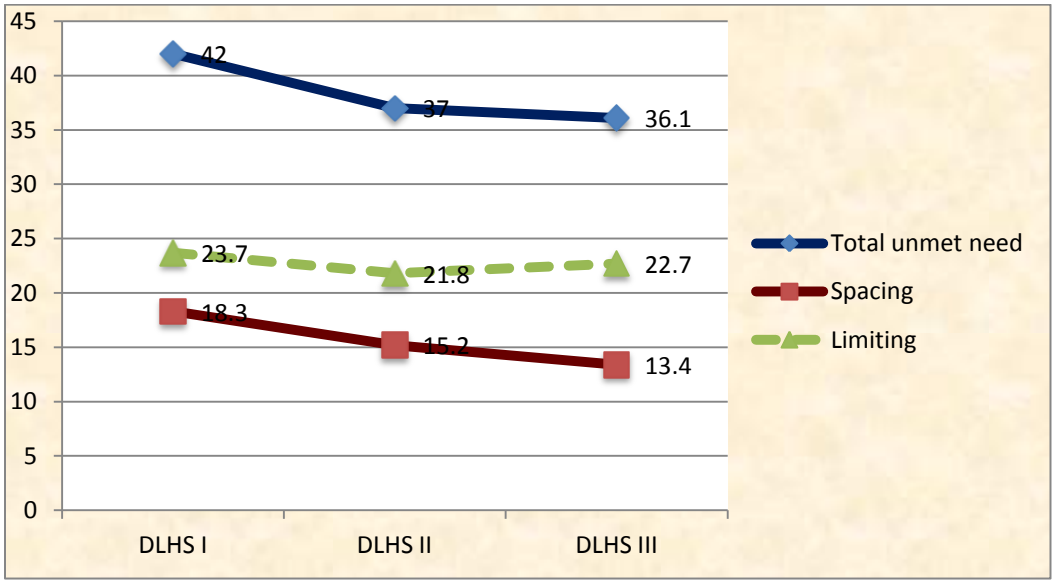


Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

4.3 Unmet need for family Planning in Bihar: Trend, Spatial Variations and Impact of District level Variables

This section shows the temporal analysis and spatial analysis of unmet need for family planning in Bihar.

Figure 4.1: Trend of Unmet Need for Family Planning in Bihar



Source: DLHS I, II, III data files

The unmet need for family planning was 42 percent, 37 percent and 36.1 percent in DLHS-1 (1998-99), DLHS II (2002-04) and DLHS III (2007-08) respectively in India. The percentage of decline is around 14 percent from DLHS I to DLHS III. Again it can be seen that the unmet demand for family planning for limiting purpose has been increasing over time i.e. it increased from 21.8% in 2002-04 to 22.7% in 2007-08.while the same for spacing has been declining steadily over the period i.e. it decreased from 18.3% in 1992-93 to 13.4% in 2007-08. This decrease in unmet need for spacing methods could be attributed to failure of the family planning programs to ensure enough choices to the people and range of contraceptive methods for spacing **(Kumar & Singh, 2013).**

Though there is decline in total unmet need for family planning from 42 percent to 36.1 percent from 1998-2008, the unmet need for limiting has increased from 2002-2008. This increase indicates that unwanted pregnancies due to lack of limiting methods has been increasing in this state **(Kumar & Singh, 2013).**

4.4 Reasons for not using contraception among women with Unmet need for Family Planning in Bihar, 2005-06.

Table 4.2: Reasons for not using contraception by unmet need for spacing and limiting in Bihar, 2005-06.

Fertility Related	**Unmet need to space**	**Unmet need to limit**
Infrequent sex, no sex	10.9	7.1
Menopausal, hysterectomy	0.0	0.0
Subfecund, infecund	0.0	0.0
Wants more children	5.5	0.0
Opposition to use		
Respondent opposed	10.9	10.1
Husband opposed	12.7	16.2
Others opposed	1.8	3.0
Religious prohibit.	38.2	26.3
Fatalistic	1.8	8.1
Lack of Knowledge		
Knows no method	7.3	0.0
Knows no source	0.0	3.0
Method Related		
Health concerns	0.0	12.1
Fears side effects	5.5	5.1
Cost too much	0.0	2.0
Interferes with body	0.0	7.1
Other	0.0	0.0
Don't Know	5.5	0.0

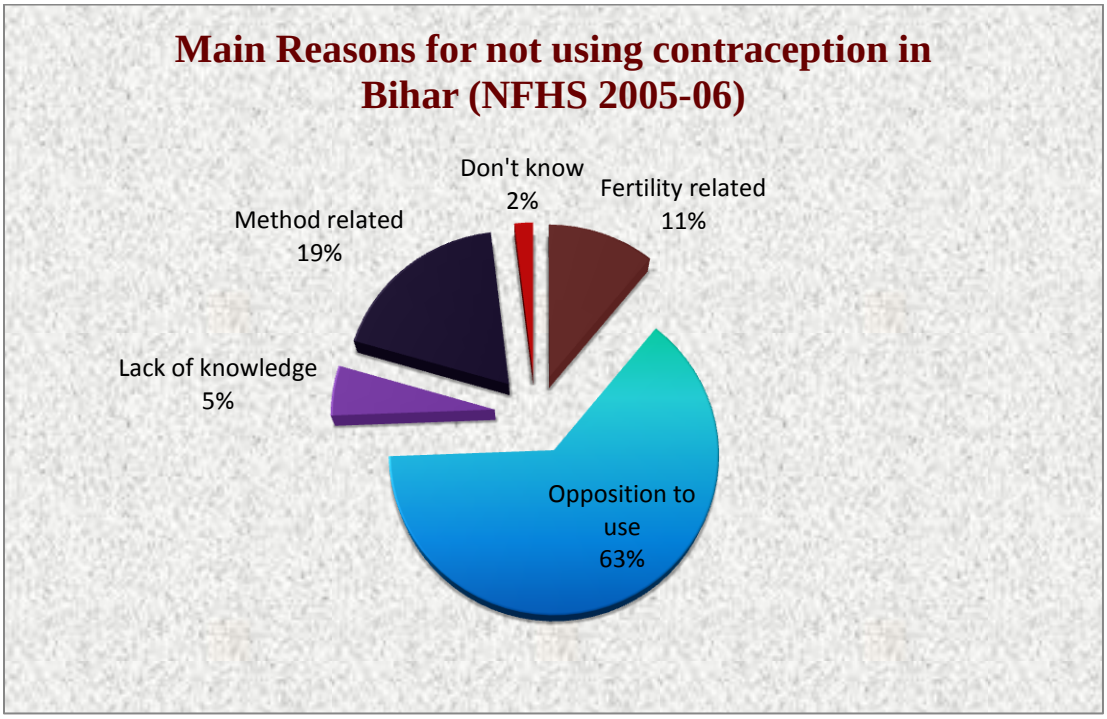
Computed from NFHS-3 (2005-06)

Table 4.2 present reasons for not using contraception by unmet need for spacing and limiting. Religious prohibition was cited as the main reason for not using contraception for both spacing and limiting. Different religions hold different views regarding their contraception which shapes one's belief and practice regarding contraception. For example, Muslims believe that any form of contraception violates God's intentions **(Srikanthan et al., 2008).** Even in Catholics the use of contraceptive methods is opposed beside natural family planning (i.e., periodic abstinence, temperature rhythm and cervical mucus tests) **(Jones & Dreweke, 2011).**

Opposition from husband was cited as the second main reason for not using contraception among the respondents of NFHS III (2005-06). Even husbands also think that usage of family planning methods poses greater health risks for women **(Zanaty et al., 1999)**. Menstrual disruption and fears of infertility are the major health risks and side effects which the women fear regarding the use of contraceptives **(Sedgh & Hussain, 2014)**.

About 10.9 % respondents cited infrequent or no sex as the reason for not using contraception for spacing and about 7.1 % cited infrequent/no sex as the reason for not using contraception for limiting. About 10% of them did not use any contraceptive method due to their own opposition and about 7.3 % of women in Bihar did not use any contraceptive method for spacing because they were not aware of any method of contraception. Only small proportion of women did not know the source of contraception that is also in case of limiting.

Figure 4.2 Main Reasons for not using contraception in Bihar (NFHS, 2005-06)



Computed from NFHS-3 (2005-06)

In Fig 4.2 reasons for not using contraception have been grouped into five main reasons. Infrequent sex, no sex, Menopausal, hysterectomy, sub fecund, in fecund, Wants more children has been clubbed into fertility related reasons. Respondent opposition, husband opposition, others opposition, religious prohibition have been clubbed together to form Opposition to use. Lack of knowledge about the method and source is clubbed together. The Method related reasons include Health concerns, Fear of side effects, costly, interference with the body etc. And on the whole "Opposition to use" has been cited by the respondents of National Family Health Survey III i.e. about 63% of them. And "Method Related" reason has been cited as the second main reason for not using contraception.

Table 4.3 shows the main reasons for not using contraception by socio-economic background characteristics. Opposition to use is cited as the main reason for not using contraception across all the socio-economic background characteristics. Most of the

women in the younger age group do not use contraception as cultural barrier always force young women from postponing childbearing and even parents expects them to become pregnant soon after marriage and cohabitation **(Daniel et al., 2008).** With increasing age group, method related reason becomes the dominant reason for not using contraception. About 12.9% of women in the age group 20-24 years do not use contraception because of method related reasons which increases to 36.4% of women in the age group 45-49 years. About 65.5% of respondents from rural areas cited opposition to use which includes husband's opposition, other's opposition, religious prohibition etc as the main reason for not using contraception but in case of urban areas it is only 46.7%. About one-third of respondents in the urban areas had issues with methods hence method related reasons were responsible for not using contraception. About 50% of women with higher secondary education cited fertility related reasons for the non-use of family planning methods.

Women with unmet need have been classified according to wealth index and it can be seen that as we move up the ladder in wealth index, the opposition to use decreases. However, the decrease is not very significant, as there is casual and structural relationship between income and health and it is positively related. **(Pritchett & Summers, 1993).** About 86.4 percent of Muslim women cited "opposition to use" as main reason for not using any contraception for spacing and limiting, while the figure was almost half, around 47% for the Hindu women. Islam does not permit family planning but among Hindus decision to use contraception is regarded as women personal matters which does not comes under religious injunction **(Iyer, 2002).** Among the social groups about 77.6% of women cited opposition to use for non-use of family planning methods but this decreases in case of Scheduled Castes group. Almost all fertility related reasons is much prevalent among women with no living children and method related reasons has increased with the number of living children from 8.7 percent among women with 1 children to 24.7 percent among women with more than 4 children.

Table 4.3: Main reason for not using contraception among currently married women of Bihar with unmet need by selected background characteristics:

Age group	Fertility related	Opposition to use	Lack of Knowledge	Method Related	Don't Know
15-19	38.9	61.1	0	0	0
20-24	6.50	54.8	16.1	12.9	9.7
25-29	6.5	83.9	3.2	6.5	0
30-34	4.50	77.3	4.5	13.6	0
35-39	4.5	50	0	45.5	0
40-44	5.00	65	0	30	0
45-49	18.2	45.5	0	36.4	0
Place of residence					
Rural	10.60	65.5	4.9	16.9	2.1
Urban	13.3	46.7	6.7	33.3	0
Respondent's Education					
Illiterate	8.60	67.2	4.7	18	1.6
Primary	8.3	58.3	8.3	16.7	8.3
Secondary	35.70	35.7	0	28.6	0
Higher Secondary	50	50	0	0	0
Religion					
Hindu	15.7	47.2	7.9	25.8	3.4
Muslim	4.5	86.4	0	9.1	0
Caste Groups					
General	4.10	77.60	0.00	18.40	0.00
OBC	12.4	59.6	6.7	19.1	2.2
SC	23.5	47.1	5.9	23.5	0
Wealth Index					
Low	10.3	65.4	6.5	15.9	1.9
Medium	12.1	63.6	0	21.2	3
High	13.3	53.3	0	33.3	0
No of living children					
0	46.2	53.8	0	0	0
1	13.00	60.9	13	8.7	4.3
2	4.3	65.2	4.3	21.7	4.3
3	22.20	61.1	0	16.7	0
4+	3.9	67.5	3.9	24.7	0

Source: Computed from NFHS III, (2005-06) file.

4.5 Demographic Impact of Unmet Need for Family Planning on Total Fertility Rate

Unmet Need for Family Planning is referred to as a common indicator to measure need for family planning services in a population. There are number of health benefits which are attached to family planning through reduction of unintended pregnancies **(Cates, 2010)**, reduction in the spread of HIV to newborns reduction in maternal mortality and morbidity, reduction in neonatal, infant and child mortality, reduction in the number of unsafe abortion and hence improves education and employment opportunities for women which enables the women to delay initiation of childbearing **(Speizer et al., 2013)**. If the unmet need for family planning were met, it will lead to reduction in the number of unplanned pregnancies which in turn would result into 22 million fewer unplanned birth each year, 15 million fewer abortions and 90,000 fewer maternal deaths **(Population Reference Bureau, 2014).** "It also reinforces people's right to determine the number and spacing of their children" **(WHO, 2013**).

The implication of unmet need for family planning to significantly reduce fertility, if need were satisfied is one of the current controversies in population policy debates. This school of thought was prominent in Cairo deliberation as there is substantial number of women with unmet need for family planning. But it did not made clear how this demand is to be satisfied as huge demand exists and key to meet this demand lies on the supply side **(Robey et al., 1992**). A second school of thought maintains that unmet need does not have effect on potential fertility because there are many women with unmet need who do not really need family planning as they can be opposed to using it, have health concerns etc **(Westoff & Bankole, 1996).**

Unmet need is important for policy implications but it is less important at the individual level because it depends on fertility desires which changes in response to the changing socio-economic situations and community influences **(Tsui et al, 2010; Monnier, 1989).** But still there are many literatures which have analyzed strong effect of unmet need on TFR. In a study by Robey, Rustein & Morris, 1992, on the relationship between contraceptive prevalence and total fertility rate and suggests that increase in contraceptive

prevalence could lower the total fertility rate in India from 3.4 children per women as per NFHS for early 1990s to 2.3 children per women **(Pathak et al., 1998).**

In a study conducted by DHS, fertility implication of completely satisfying all unmet need for limiting has been analyzed and it has been found that if total demand for limiting is satisfied the TFR for these countries would decline from 4.1 children per women to 3.3 which is a decline of 20 percent **(Bradley et al.,2012).** The increase in the use of contraceptive methods leads to 75 percent reduction in fertility in developing countries in the past six decades **(Cleland et al., 2012)**

Table 4.4: Met Need, Unmet Need, Total Demand for Spacing and Limiting of India and all the states.

States	Current use for spacing	Unmet need to space	Total demand for spacing	Current use for Limiting	Unmet need to limit	Total demand for limiting
Jammu and Kashmir	5.2	5.7	10.9	47.4	8.8	56.2
Himachal Pradesh	3.6	2.3	5.9	69.0	4.9	73.9
Punjab	4.7	2.7	7.4	58.7	4.7	63.4
Uttaranchal	5.6	4.4	10.0	53.7	6.6	60.3
Haryana	4.1	3.1	7.2	59.4	5.3	64.7
Delhi	7.8	3.2	11	59.2	4.6	63.8
Rajasthan	3.5	7.3	10.8	43.8	7.3	51.1
Uttar Pradesh	5.7	9.0	14.7	37.9	12.2	50.1
Bihar	2.2	10.3	12.5	31.9	12.6	44.5
Sikkim	5.5	5.6	11.1	51	11.4	62.4
Arunachal Pradesh	7.4	8.2	15.6	36.9	11.0	47.9
Nagaland	3.5	10	13.5	26.8	16.6	43.4
Manipur	13.1	5.0	18.1	35.6	7.5	43.1
Mizoram	12.5	12.2	24.7	47.6	5.2	52.8
Tripura	10.3	3.7	14.0	55.6	6.6	62.2
Meghalaya	7.0	23.8	30.8	18.1	12.3	30.4
Assam	10.3	3.4	13.7	46.5	7.2	53.7
West Bengal	11.8	4.0	15.8	59.4	4.1	63.5
Jharkhand	3.2	11.1	14.3	32.7	12.2	44.9
Orissa	3.4	6.8	10.2	47.4	8.1	55.5
Chhattisgarh	2.9	5.3	8.2	50.3	4.8	55.1
Madhya Pradesh	2.9	5.3	8.2	53.0	6.1	59.1
Gujarat	7.5	4.2	11.7	59.1	3.9	63
Maharashtra	4.4	5.3	9.7	62.6	4.0	66.6
Andhra Pradesh	0.9	2.8	3.7	67	1.9	68.9
Karnataka	1.9	5.7	7.6	62.2	4.0	66.2
Goa	8.4	7.3	15.7	39.5	5.9	45.4
Kerala	9.0	6.0	15.0	59.8	2.9	62.7
Tamil Nadu	2.1	4.0	6.1	59.4	4.6	64.0
India	**4.8**	**6.0**	**10.8**	**51.5**	**6.8**	**58.3**

Source: NFHS III (2005-06)

4.5.1: Impact of Unmet Need for Family Planning on Total Fertility Rate

Table 4.5: Impact of Met Need for Limiting and Spacing on Total Fertility Rate (TFR)

Variables	B	Sig
Current use for limiting	-0.043	.000
Current use for spacing	-0.035	0.126
Constant	4.924	.000

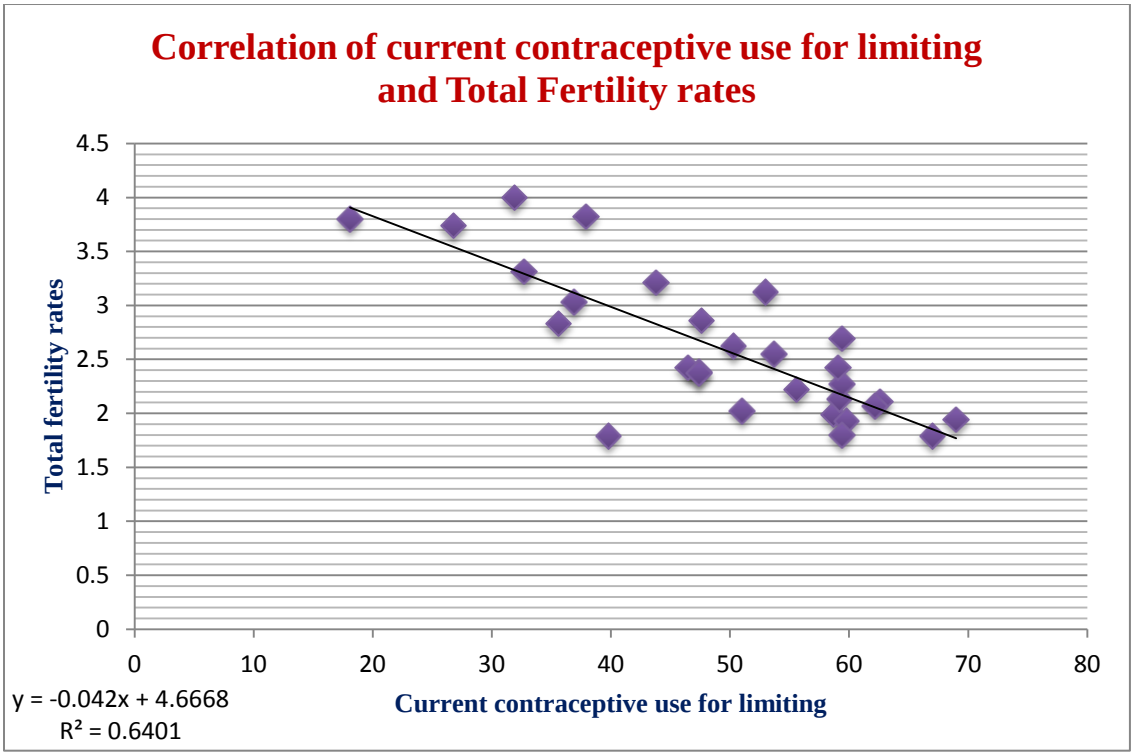
Source: Computed from NFHS III (2005-06) file.

This section analyzes how reducing level of unmet need would affect fertility rates in Indian states. Data from NFHS III (2005-06) for 29 Indian states has been used to analyze how much fertility is expected to decline if all the demand for family planning were to be satisfied.

Fertility is affected by contraception as it reduces the risk of conception **(Casterline & Zeini, 2014).** Relationship between Total fertility rate and met need for spacing and limiting has been examined using multiple linear regressions. Contraceptive use for spacing has a weaker association with total fertility rate than the contraceptive use for limiting because the contraceptive use for spacing is temporary. As the couples will discontinue the use of contraceptives when they want to have another child **(Bradley et al., 2012)**. Contraceptive use for limiting has come out as an important predictor variable of total fertility rate. The family planning scenario in India is dominated by the use of sterilization which comes under contraceptive use for limiting. In India the prevalence of female sterilization is 37 percent and 1 percent in case of male sterilization. This method of female sterilization accounts for 66 percent of all contraceptive use **(National Family Health Survey III, 2005-06).** For all the states 29 states of India, the correlation of contraceptive use for spacing and limiting with fertility is analyzed. The correlation of contraceptive use for spacing with fertility is very low (-0.07) whereas the correlation of contraceptive use for limiting with fertility is high (-0.80). But this does not mean that

spacing is irrevalent or is not significant but it has great significance for future fertility as these spacers tend to become limiters in future **(Westoff & Koffman, 2010).**

Fig 4.3: Correlation of current contraceptive use for limiting and Total Fertility Rates

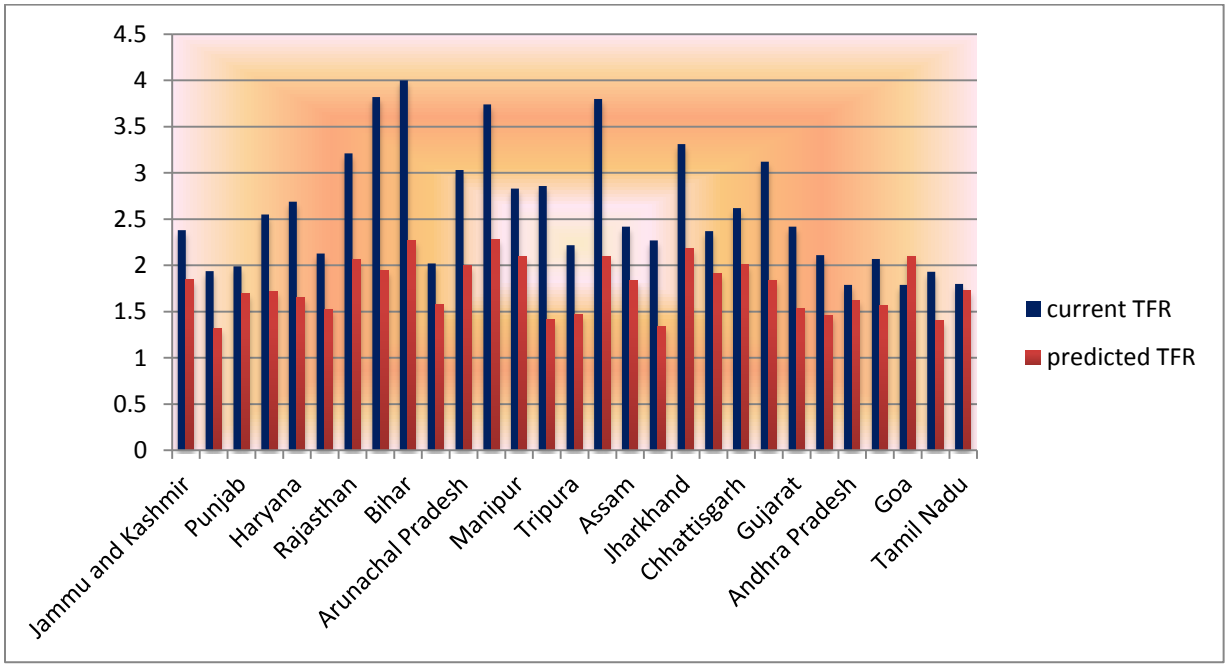


A regression equation is calculated using TFR and current contraceptive use for limiting for 29 states of India using NFHS III data. The Figure 4.3 shows Total fertility rate plotted against current contraceptive use for limiting for 29 states of India. Bradley et al, (2012) has stated "The level of contraceptive use is equal to the total demand for contraception for both limiting and spacing in order to assess the impact of satisfying the unmet need for limiting on the TFR. The total demand for family planning is estimated by summing the proportion of married women using contraceptive method and proportion of married women with an unmet need for family planning" (p.55)**.** This prediction is based on the assumption that all the unmet need for family planning (i.e.

both spacing and limiting) is to be fully satisfied. This assumption is used to demonstrate the impact of reducing unmet need not to forecast fertility.

According to **Bradley et al., (2012)** "one issue associated with TFR is that it is based on all women regardless of their marital status but concept of unmet need and contraceptive use were calculated for married women only" (p.56).

Fig 4.4: Current and estimated total fertility rates (TFR) with all unmet need for both limiting and spacing satisfied



Source: NFHS III (2005-06)

Fig 4.4 section with the fertility implications of satisfying the unmet need for spacing and limiting. The TFR for India as a whole would decline from 2.7 children per women to 1.77 per women, a relative decline of 34.44%. The highest decline would be in Mizoram (from 2.86 children per women to 1.41 children per women) followed by Uttar Pradesh, Meghalaya, and Bihar where the decline is around more than 40%. The lowest decline would be experienced in Tamil Nadu (from 1.8 children per women to 1.72 children per women, a decline of 4.23%) followed by Andhra Pradesh (from 1.79 children per women

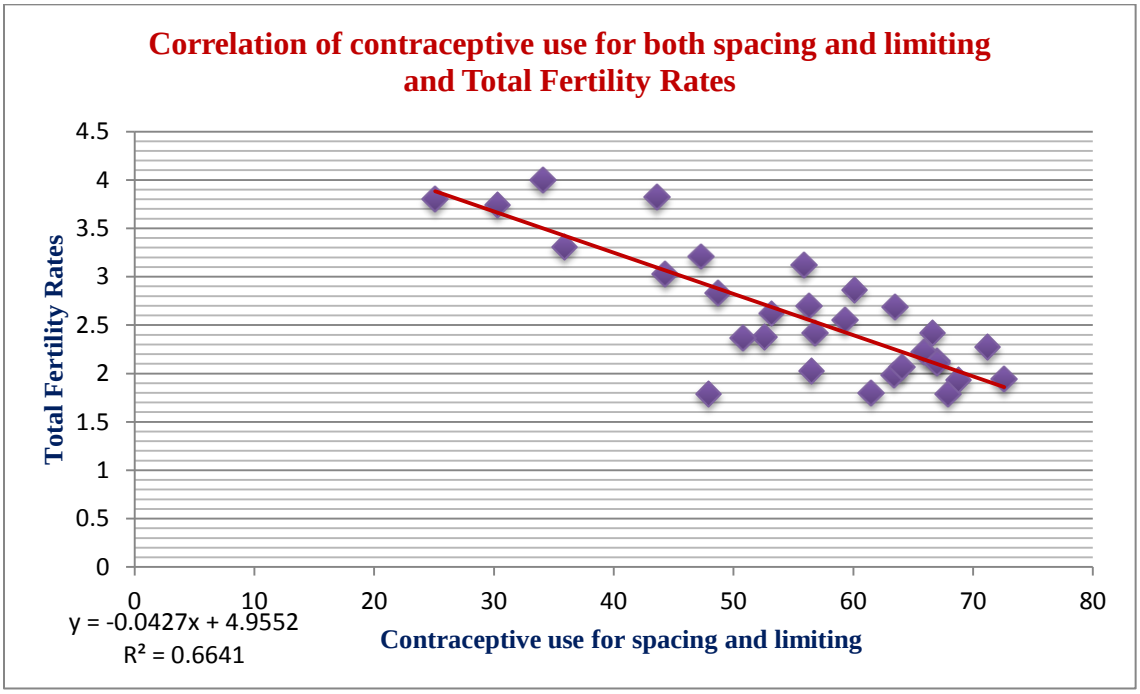
to 1.62 children per women, a decline 9.55 %). The possible reason cited for such a small decline in fertility rate is the low level of demand for contraceptive use.

4.6 Impact of Reducing Unmet Need in Bihar

The effect of reducing unmet need for family planning and increasing contraceptive use is estimated using the following methodology:

Data from NFHS III (2005-06) for 29 Indian states has been used to analyze the effects of altering unmet need on the total fertility rates. The correlation between contraceptive prevalence rate and Total Fertility rates were calculated and the correlation between them is (-0.82), showing the high correlation between contraceptive use and Total fertility rates. And hence a regression equation is estimated with the help of CPR and TFR of 29 Indian states using NFHS III data. The outcome of the regression is the TFR, with one intercept, one variable (CPR), and the beta-coefficient of the CPR variable **(Khan et al., 2008).**

Fig 4.5: Correlation of current contraceptive use for spacing and limiting and Total Fertility Rates



The equation is: **TFR(y) = 4.952 -0.0427*CPR**

Based on five assumptions, total fertility rates are estimated using different scenarios of increasing unmet need for family planning and decreasing contraceptive use.

a. The first assumption is that the level of unmet need and contraceptive prevalence rate (CPR) are the same as in 2005-06. And the TFR is 4 children per women as in 2005-06.
b. The second assumption is that if there is no unmet need i.e. all unmet need is satisfied. This signifies maximum potential level of contraceptive use. If all the unmet need were satisfied then the contraceptive prevalence rate will be at the maximum level.
c. The third assumption is that the unmet need declines by 50% and contraceptive prevalence rate increases to 50%.
d. The fourth assumption is that the unmet need declines by 20% and contraceptive prevalence rate increases to 20%.
e. The fifth assumption is that the unmet need declines by 10% and the contraceptive prevalence rate increases to 10%.

Then TFR is estimated or predicted with five different levels of Contraceptive prevalence rate with the help of this regression equation.

Table 4.6 Impact of reducing unmet need for family planning and increasing contraceptive use on fertility among currently married women in Bihar, 2005-06.

Scenario	Actual TFR	Total demand	Adjusted Unmet need	Adjusted contraceptive use	Predicted TFR from adjusted use
1.Convert no unmet to current use	4	57	22.9	34.1	**3.50**
2.Convert all unmet need to current use	4	57	0	57	**2.52**
3.Reduce the unmet need to 50% and increase the contraceptive use to 50%	4	57	11.45	45.55	**3.01**
4.Reduce the unmet need to 20% and increase the contraceptive use to 20%	4	57	18.32	38.68	**3.30**
5. Reduce the unmet need to 10% and increase the contraceptive use to 10%	4	57	20.61	36.39	**3.40**

Source: NFHS III (2005-06).

Table 4.6 shows the impact on fertility under reducing unmet need and increasing contraceptive use. In Scenario1, the level of unmet need and Contraceptive prevalence rate (CPR) are the same as in 2005-06. And the TFR is 4 children per women as in 2005-06. The Second scenario is that if there is no unmet need and all the women started using a method then what would be the effect on TFR. Then it can be seen that in Scenario 2 the TFR would fall from 4 children per women to 2.52 children per women, the TFR would get reduced by 37.05%.

In Scenario 3, if the unmet decline by 50% and contraceptive prevalence rate increases by 50%, then the TFR would decline from 4 children per women to 3.01 children per women, a decrease of about 24.82% in TFR.

In Scenario 4, if the unmet need declines by 20%, the Contraceptive prevalence rate increases approximately by 4.58 percentage points and produces a TFR of 3.30, the reduction of about 17.5%.

In Scenario 5, unmet need declines by 10% and CPR increases by 2.29 percentage points and hence the predicted TFR is 3.40, a reduction of about 15.05%.

Scenarios 3, 4, and 5 shows that moderate reductions in unmet need can reduce the TFR substantially. Hence it can be concluded that scenario, 3, 4, 5 shows that if there is moderate reduction in unmet need leads to substantial reduction in TFR.

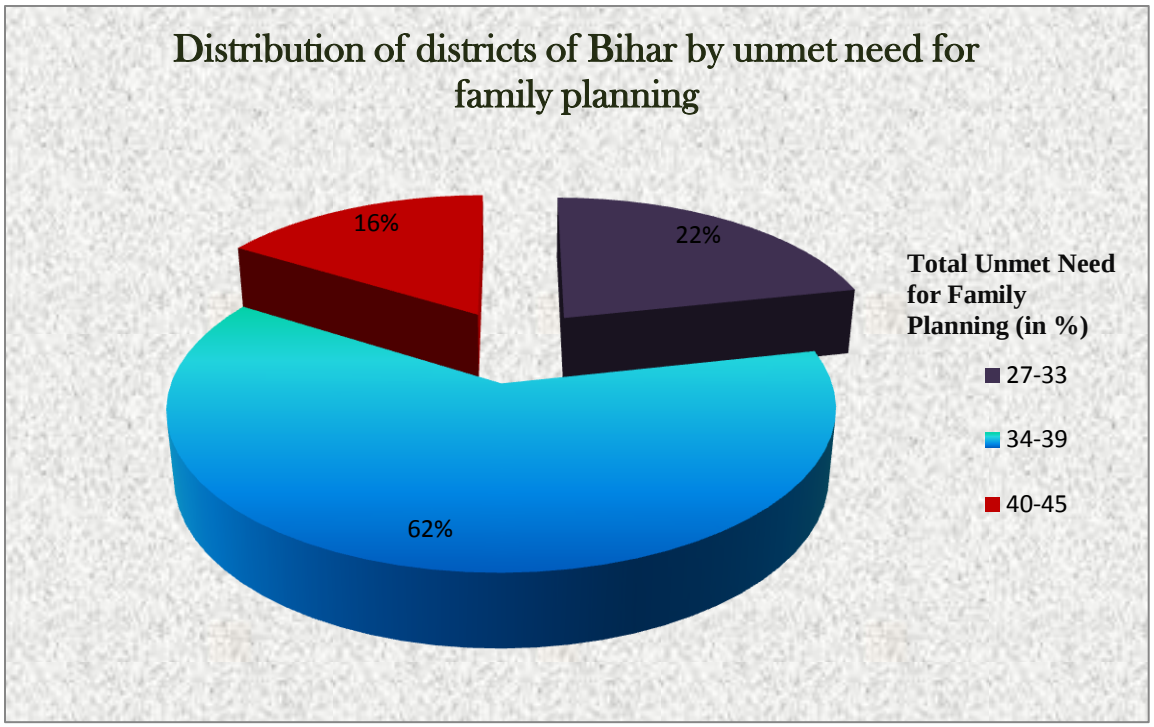
4.7 Spatial Variations of Unmet Need for family planning in Bihar

Table 4.7: Unmet Need for Spacing, Limiting, Unmet Need for Family Planning Contraceptive Prevalence rate (Met Need), and Total Demand for family planning in all the districts of Bihar.

Districts	Unmet Need for spacing	Unmet need for limiting	Unmet Need for Family planning	Contraceptive prevalence rate (met need)	Total Demand
Araria	13.3	20.8	34.1	32.9	67
Aurangabad	12.4	23.1	35.5	36.2	71.7
Banka	15.1	24.9	40	26.3	66.3
Begusarai	16.3	22.9	39.2	29.5	68.7
Bhagalpur	12.1	21.4	33.5	42.3	75.8
Bhojpur	13.1	19.7	32.8	37.5	70.3
Buxar	10.6	23.8	34.4	34	68.4
Darbhanga	14.2	21.6	35.8	32.7	68.5
Gaya	11.9	20.7	32.6	33.2	65.8
Gopalganj	8.6	30.9	39.5	23.1	62.6
Jamui	16.5	25.5	42	29.1	71.1
Jehanabad	13.7	22.7	36.4	29.6	66
Kaimur Bhabua	12.4	22.5	34.9	32.8	67.7
Katihar	17.5	25.2	42.7	27.9	70.6
Khagaria	16.7	20.3	37	32.8	69.8
Kishanganj	14.8	24.1	38.9	28.9	67.8
Lakhisarai	15	23.7	38.7	33.3	72
Madhepura	10	21.7	31.7	36.7	68.4
Madhubani	16.8	21.6	38.4	35.9	74.3
Munger	14.9	16.5	31.4	43.2	74.6
Muzaffarpur	10.4	26.1	36.5	34.2	70.7
Nalanda	13.4	22.5	35.9	32.7	68.6
Nawada	12.7	28.5	41.2	27.7	68.9
Pashchim Champaran	13.7	22.3	36	34.4	70.4
Patna	9.8	18.8	28.6	45	73.6
Purba Champaran	12.6	21.8	34.4	28.8	63.2
Purnia	17.1	23.1	40.2	28.9	69.1
Rohtas	11.9	16.3	28.2	43.4	71.6
Saharsa	14.4	21.6	36	34.9	70.9
Samastipur	13.8	22.4	36.2	36.1	72.3
Saran	12.1	28.5	40.6	30.3	70.9
Sheikhpura	15.6	23	38.6	28.9	67.5
Sheohar	14.2	25.5	39.7	28.2	67.9
Sitamarhi	11.5	25.8	37.3	26	63.3
Siwan	9.5	30.3	39.8	25.3	65.1
Supaul	12.3	16.5	28.8	45.1	73.9
Vaishali	11.2	16.7	27.9	45.3	73.2
Total	**13.4**	**22.7**	**36.1**	**33.3**	**69.4**

Source: Computed from DLHS III (2007-08) data file.

Fig 4.6 Distribution of districts of Bihar by Unmet need for Family Planning



Source: Computed from DLHS III (2007-08) data file

The table 4.7 shows the prevalence of unmet need, met need and total demand for family planning in the districts of Bihar. The number of districts at present is thirty-eight with the Arwal district which has been carved out from Jehanabad. But DLHS provides data for 37 districts at it was at the time of the survey. Hence the present study is confined to 37 districts.

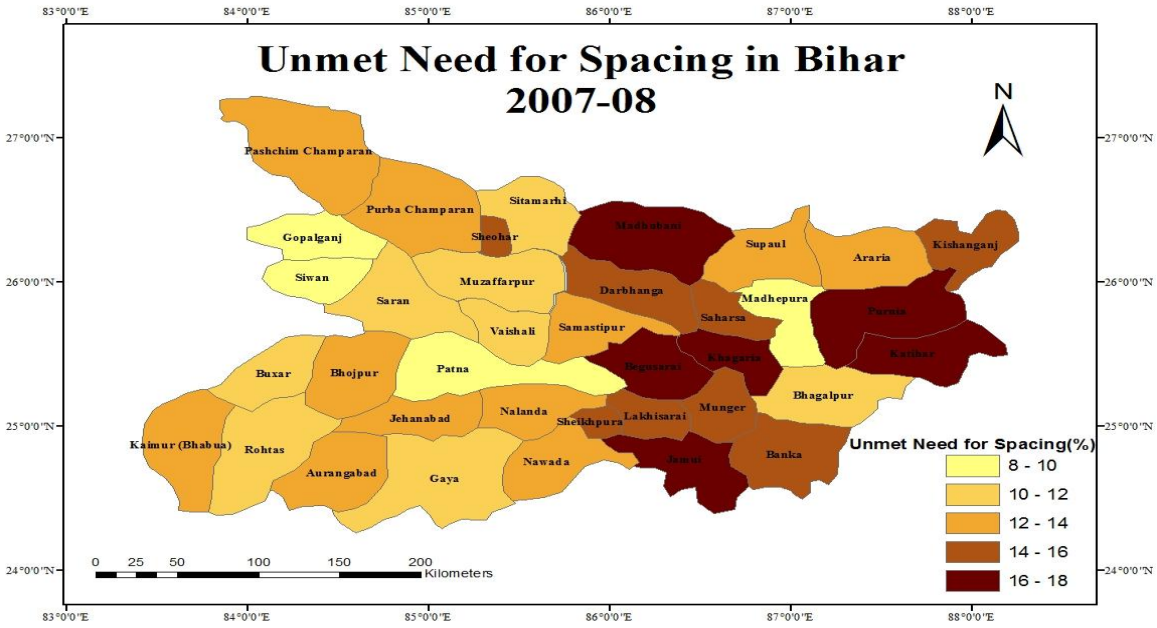
The total unmet need in Bihar is 36.1 percent whereas for spacing and limiting is 13.4 percent and 22.7 percent respectively. It ranges from 27.9 percent in Vaishali to 42.7 percent in Katihar within the state. Out of thirty-seven districts, 6 districts i.e. Banka, Purina, Saran, Nawada, Jamui, Katihar have more than forty percent of unmet need for family planning, whereas in 8 districts i.e. Vaishali, Rohtas, Patna, Supaul, Munger, Madhepura, Gaya, Bhojpur the prevalence of unmet need is between 27-33 percent.

In National Health Policy (1983) the demographic goal was to achieve Net Reproduction rate of one and even in 2000 National Population Policy, this goal was set but this was not achieved. This goal can only be achieved when the Couple protection rate exceeds 60% **(Kansal A et al., 2006).**

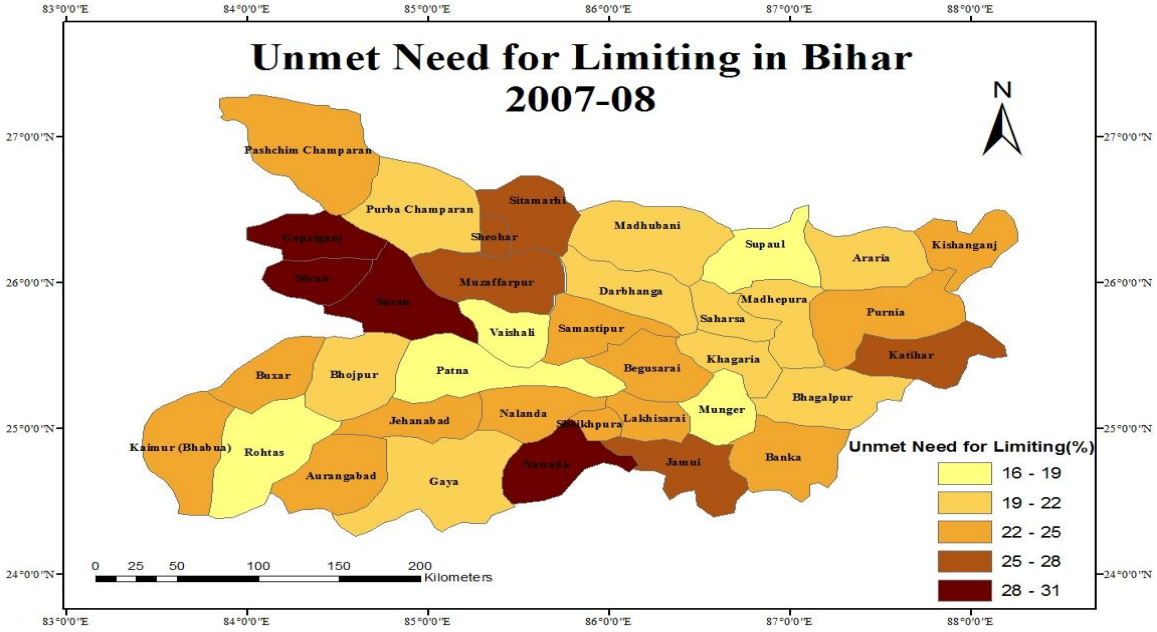
Government of India (GOI) has supported a diversified contraceptive method mix **(UNFPA, 1994)** to lower the fertility to replacement level of 2.1. There are various methods of contraception provided from GOI i.e. three spacing methods and two limiting methods to prevent pregnancy. Oral contraceptive pills, condoms, and intrauterine contraceptive devices are the three methods of spacing and female sterilization and male sterilization are the methods of limiting **(Family Health International, 2010).**

Contraceptive use through improved accessibility and awareness through incentive program is being promoted by NRHM to achieve population stabilization and promote healthy married life. There is awareness of sterilization for limiting and IUD, Pills and Condoms for spacing of children among married women in Bihar **(DLHS III, 2007-08).**The contraceptive prevalence rate is 33.3percent in Bihar. It ranges from 45.3 percent in Vaishali and 23.1 percent in Gopalganj. Contraceptive Prevalence Rate (CPR) for any method is above 40 percent in Bhagalpur, Munger, Rohtas, Patna, Supaul, and Vaishali. And these are the districts with lower unmet need. Hence it can be seen that the districts which higher level of contraception has low unmet need as compared to districts having low contraceptive prevalence rate.

Map 4.7 Unmet Need for Spacing in Bihar

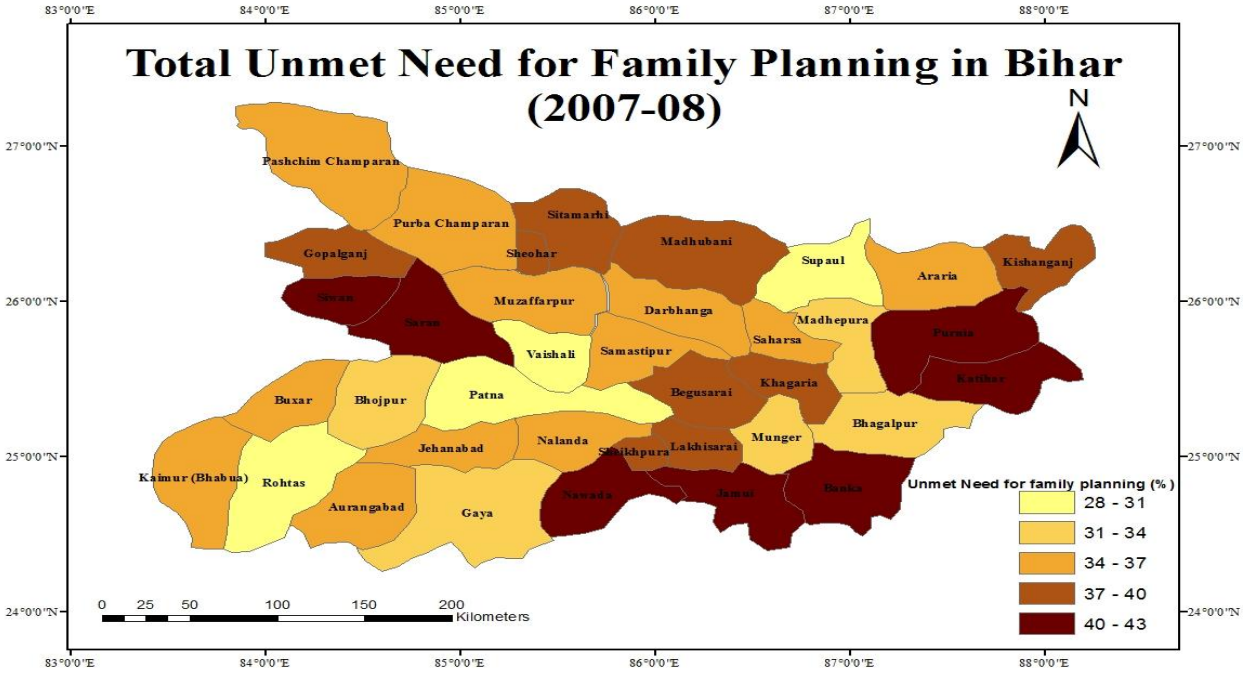


Map 4.8 Unmet Need for limiting in Bihar

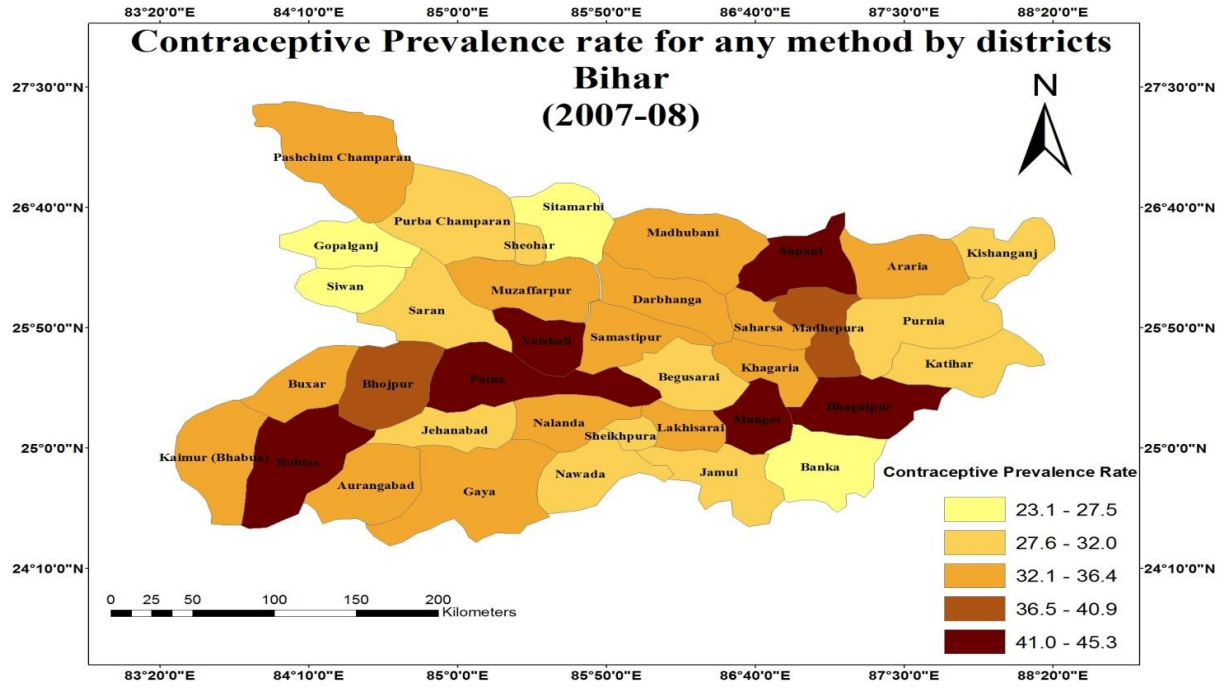


Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

Map 4.9 Unmet Need for Family Planning in Bihar



Map 4.10 Contraceptive Prevalence rate in Bihar

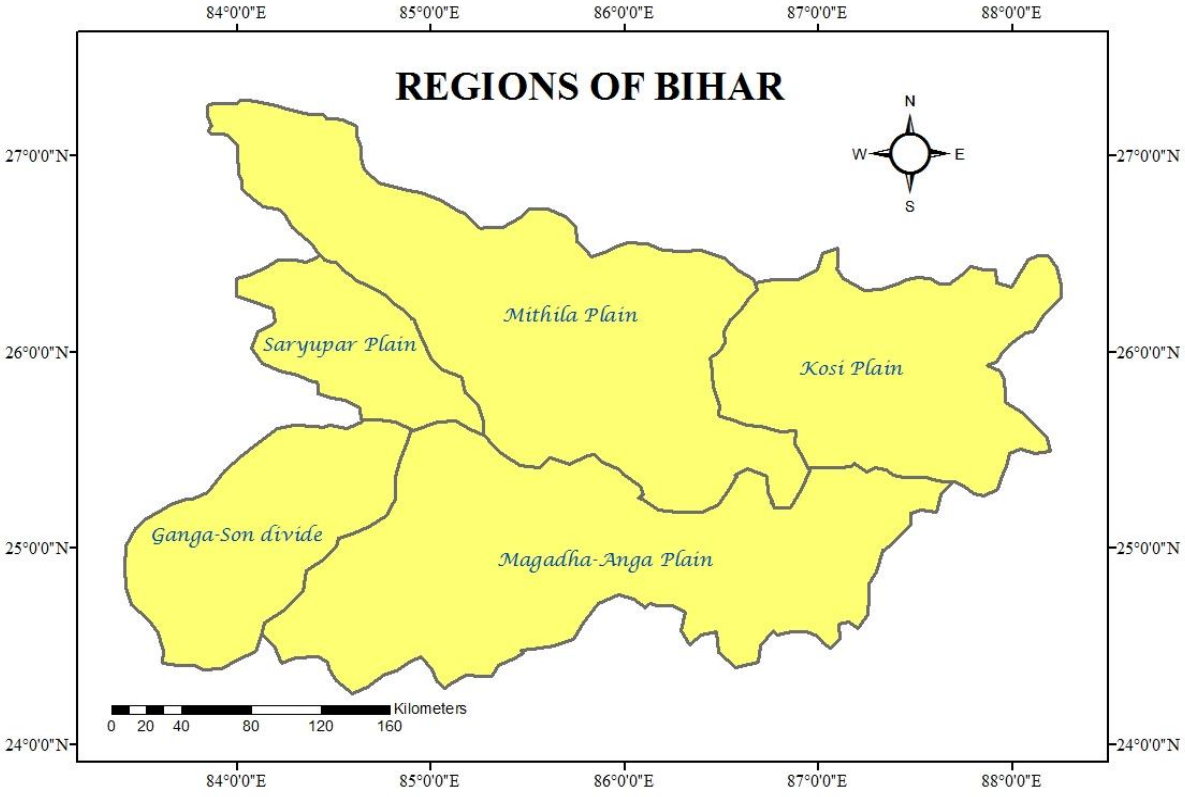


Source: DLHS-3: 2007-08 (According to DLHS-2 Definition)

4.8 Regional Variation of Unmet Need for Family Planning in Bihar

Table4.8: Physiographic Regions of Bihar

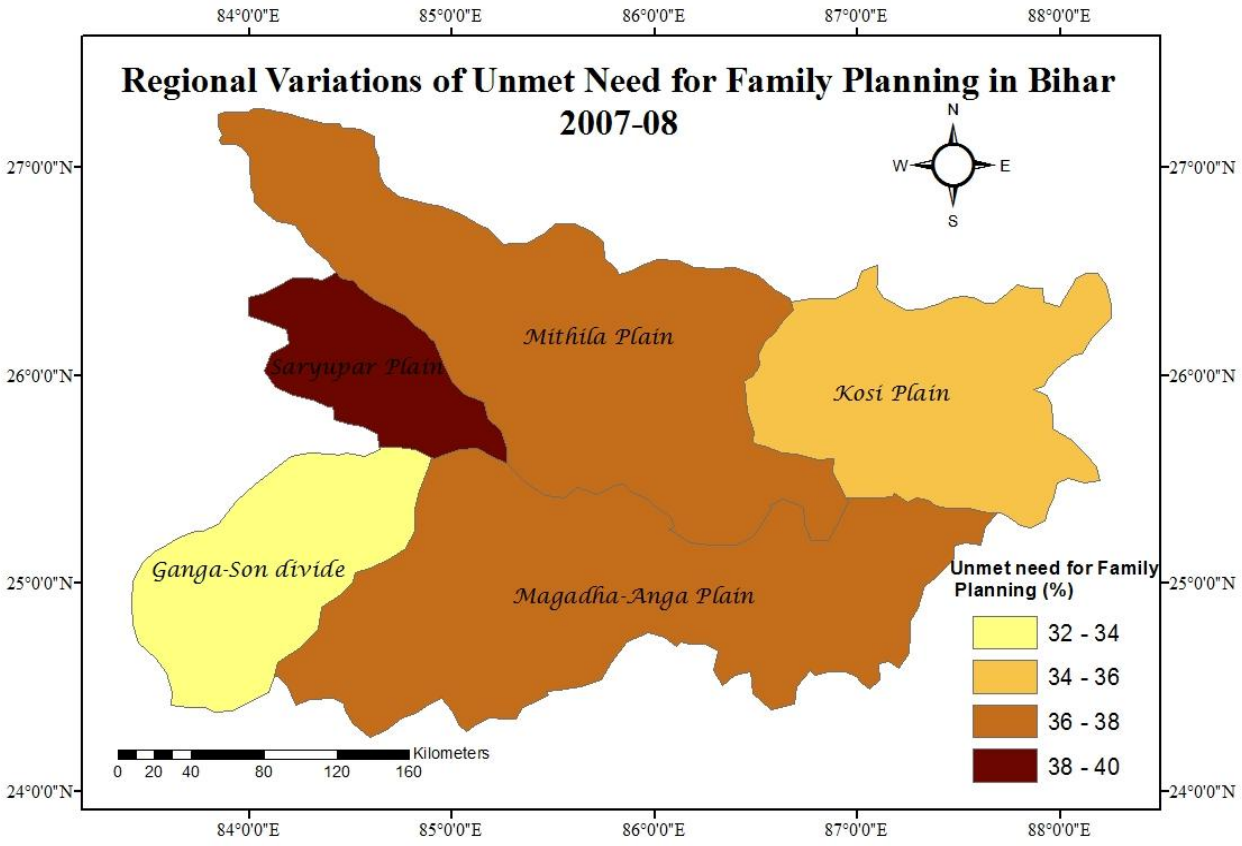
Districts of Bihar	Regions of Bihar
Gopalganj, Siwan, Saran	Saryupar Plain
Khagaria, Begusarai, Sheohar, Darbhanga, Madhubani Samastipur, Vaishali, East Champaran, West Champaran, Muzaffarpur, Sitamarhi	Mithila Plain
Saharsa, Supaul, Madhepura, Purnea, Kishanganj, Araria, Katihar	Kosi Plain
Kaimur, Rohtas, Buxar, Bhojpur	Ganga-Son divide
Patna, Nalanda, Jahanabad, Aurangabad, Gaya, Nawada, Munger, Lakhisarai, Sheikhpura, Bhagalpur, Banka, Jamui	Magadha- Anga Plain



Physiographically, Bihar is divided into five geographic regions according to the regionalization done by R.L. Singh, Professor and Head of the Department of Geography, Banaras Hindu University. Thirty-seven districts of Bihar have been clubbed into five regions. Map 4.12 shows the regional variations of unmet need for family planning in Bihar.

Map 4.12 shows the regional variations in unmet need for family planning in Bihar In this section the regional variation in unmet need for family planning in Bihar has been discussed. Bihar is the state which lags behind many other states of India in terms of Reproductive Health Indicators. This lagging behind exists because of low literacy rate of the state, constrained female autonomy and inadequate quality of health services and inaccessibility to these services. There is considerable regional diversity in the level of unmet need for family planning in Bihar despite the uniform programs designed for the state. Ganga-Son divide region has low unmet need for family planning in Bihar. According to Singh R.L. (1971) "Ganga-Son, lying between two parts functions as zone in transition both functionally and economically. This area is not only agriculturally the most prosperous zone but also witnesses' highest industrial development, having the concentration of cement industries" (p.248, 249). And Saryupar region which comprises the districts of Gopalganj, Saran and Siwan has high level of unmet need for family planning in Bihar.

Map 4.12 Unmet Need for Family Planning by Regions of Bihar (2007-08)



Source: DLHS III (2007-08)

4.9 Impact of District Level Factors on Unmet Need for Family Planning in Bihar

More than three-fourths of India's population lives in the rural areas; hence health care to the rural population should be emphasized. A vast public health infrastructure is created by Government i.e. Sub-centres, Primary Health Centres (PHCs) and Community Health Centres (CHCs). SCs, PHCs, CHCs have been established to provide health services in rural areas. "The sub-centre is the most peripheral institution and the first contact point between the primary healthcare system and the community"**(Bhandari and Dutta, 2007**). Primary health Centre comprises the second tier in the rural infrastructure and Community Health Centre forms the uppermost tier. Along with these, there are large number of health care providers (Auxiliary Nurse Midwives, Male Health workers, Female Health Visitors and Health Assistant Male).

Fig 4.7 Rural Health Infrastructure Systems in India

Source: Ministry of Health & Family Welfare GOI, 2012

The Fig 4.7 shows the three tier system of health care infrastructure in rural areas. A Sub-Centre covers a population of 3000 in hilly, tribal, difficult areas and 5000 population in plain areas. It plays a very important role in interpersonal communication in order to provide services related to maternal and child health, family welfare, nutrition, immunization, diarrhoea and control of communicable diseases **(Ministry of Health and Family Welfare, 2012).** "A Primary Health Centre covers a population of 20,000 in hilly, tribal or difficult areas and 30,000 population in plain areas with 6 indoor/observation beds. A Community Health Centre is supposed to cater to a population of 80,000 in hilly/difficult/ tribal areas and a population of 1, 20,000 in plain areas" **(IPHS,2012).**

There are many functions performed by CHCs that involves comprehensive family welfare services i.e. surgical, non-surgical, gynecological services including labour room services for tackling high risk pregnancies. Even it provides paediatric services, laboratory diagnostic services, X-ray facilities, National Health Programmes, maternal care and child health, immunisation services, etc. Provision of safe drinking water and basic sanitation, prevention and control of endemic diseases, collection of vital statistics of the area, health and nutrition, education and training of various health personnel working under the CHC area are the additional functions performed by Community Health Centre (Pal,1999). Through the multifaceted services provided by these health care infrastructures, a major role is played by these services in the improvement of reproductive and child health.

4.9.1 Association of Unmet Need for Family Planning and Health Infrastructure

This section shows how availability of these infrastructures and manpower involved affects unmet need for family planning in Bihar. This section also shows the impact of socio-economic status of district and quality of life index on unmet need for family planning in Bihar. The table 4.9 shows the correlation between the district level variables and unmet need for family planning in India. There is a negative correlation between unmet need for family planning and the all the independent district level variables. It

signifies that as the available health infrastructure improves the level of unmet need decreases. These health infrastructure are places where appropriate family planning services are available as well as ANMs, doctors are recruited who play a very important role in spreading awareness among the women regarding the various contraceptive usage. The manpower available in the health centers' also helps the clients to remove their hesitation and fear about the contraceptive use. Correlation is highest between urban population percentage and the unmet need for family planning. And as the percent of urban population in the district increases, the level of unmet need decreases. Accessibility of family planning services in cities is much easier in urban areas as compared to rural areas. Being a part of modernized society, women in urban areas prefer small family norm as the cost of raising children is high in urban areas. And children economic value as age old security decreases.

Correlation is also high between the percent of houses electrified, per capita income of the district, asset index and unmet need for family planning. As the percentage of houses electrified in the district increases, the level of unmet need for family planning decreases. It can also be seen that asset index and percent of households electrified is highly positively correlated. In the asset index, availability of radio/ transistor, computer/laptops, Television etc is included and for such appliances electricity is very important. All these assets play a vital role in spreading messages regarding family planning, hence increasing client's knowledge about contraceptive use which further lowers the level of unmet need for contraception. It can be also be seen from the table that as the per capita income of the district increases, the level of unmet need decreases and it is same with the asset index.

Composite index has been constructed using Z-score to show the impact of health physical infrastructure, manpower index on the level of unmet need for family planning. Composite index has also been constructed using principal component analysis to show the impact of, Socio-economic status of the districts, quality of life index in the districts on the level of unmet need in Bihar.

Table 4.9 Correlations among the different variables of supply side and Unmet Need for Family Planning

Pearson's Correlation

	Unmet need	SCs	PHCs	CHCs	Doctors	ANMs	Nurses
Unmet need	1	-0.121	-0.218	-0.131	-.379*	-0.221	-0.211
SCs		1	.487**	0.192	-0.108	0.294	.343*
PHCs			1	.444**	.403*	.617**	.651**
CHCs				1	.339*	0.291	.415*
Doctors					1	.563**	.541**
ANMs						1	.680**
Nurses							1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

	Unmet need	Asset index	Female Literacy Rate	Urban Population%	Percapita Net District Domestic Product	% of households electrified
Unmet need	1	-.451**	-.334*	-.459**	-.342*	-.428**
Asset index		1	.661**	.905**	.924**	.929**
Female Literacy Rate			1	.522**	.429**	.601**
Urban Population%				1	.846**	.876**
Percapita Net District Domestic Product					1	.843**
% of households electrified						1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

1. Sources: ANMs, Nurses, Doctors, SC, PHC, CHC (all in per lakh population), Percentage of houses electrified, PNDDP: Ministry of Health and Family Welfare, Uttar Pradesh (2012)
2. Asset index, Female literacy rate, Percent of urban population: Census of India,2011

3. Unmet Need for Family Planning: Annual Health Survey, 2012.

Table 4.10 Variables used in the construction of Health Infrastructure Indices and socio-economic development index of the districts of Bihar

Independent Variables

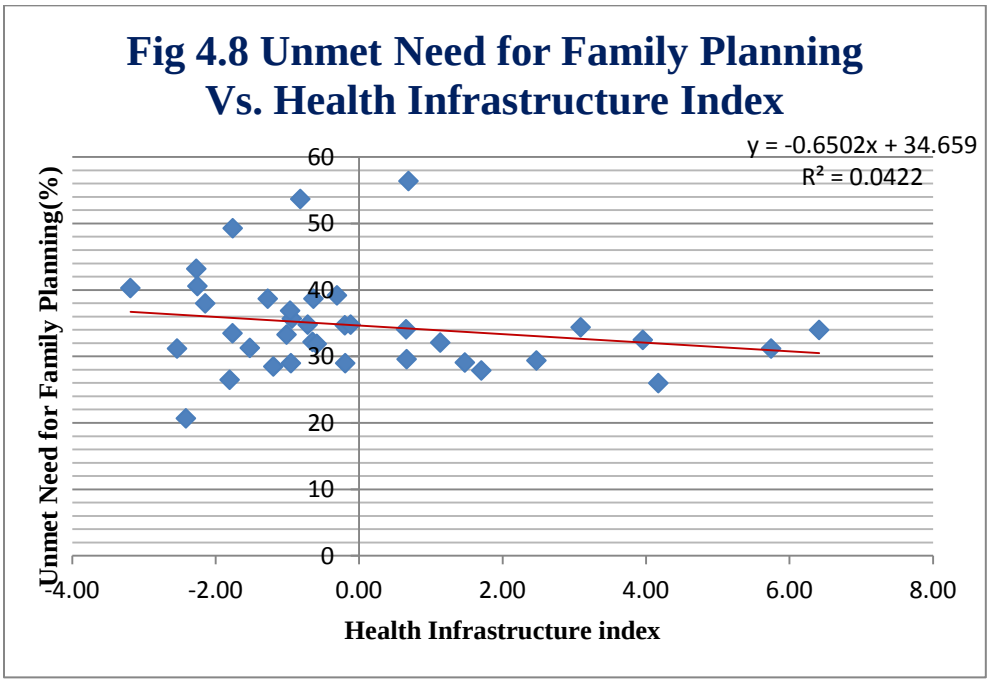
Health Infrastructure Index	· SCs (per lakh population) · PHCs (per lakh population) · CHCs (per lakh population)
Health Manpower Index	· Doctors (per lakh population) · ANMs (per lakh population) · Nurses (per lakh population)
Socio-economic development Index	· Assets index · Female Literacy rate · Percent of urban population · PNDDP (per capita net district domestic product) · Percentage of houses electrified
Quality of Life Index	· Percentage of Hoseholds to Total Households by Amenities

The first index is Physical Infrastructure index which shows the availability of health institutions in the districts. The variables used for the health institutions have been used in terms of available health institutions per lakh population. And then the Manpower index is calculated using the available manpower i.e. Doctors, Nurses and the ANMs per lakh population of the district. Socio-economic status of the districts has been analyzed with the help of these variables i.e. availability of assets in the household in each district of Bihar (Radio/Transistor, Computer laptop, Telephone/ Mobile phone, Bicycle, Scooter/ Motorcycle/ Moped, Car/Jeep/Van, Households with TV, Computer/ Laptop, Telephone/mobile phone and Scooter/ Car), Per capita net district domestic product in

Rupees (PNDDP), Female literacy rate, urban population percent, percent of households electrified.

4.9.2 Impact of Health Infrastructure and Socio-economic status of the districts on the Unmet Need for Family Planning in Bihar

To assess the effect of the health infrastructure variables, quality of life and socio-economic status of the districts simple linear Regression has been used.



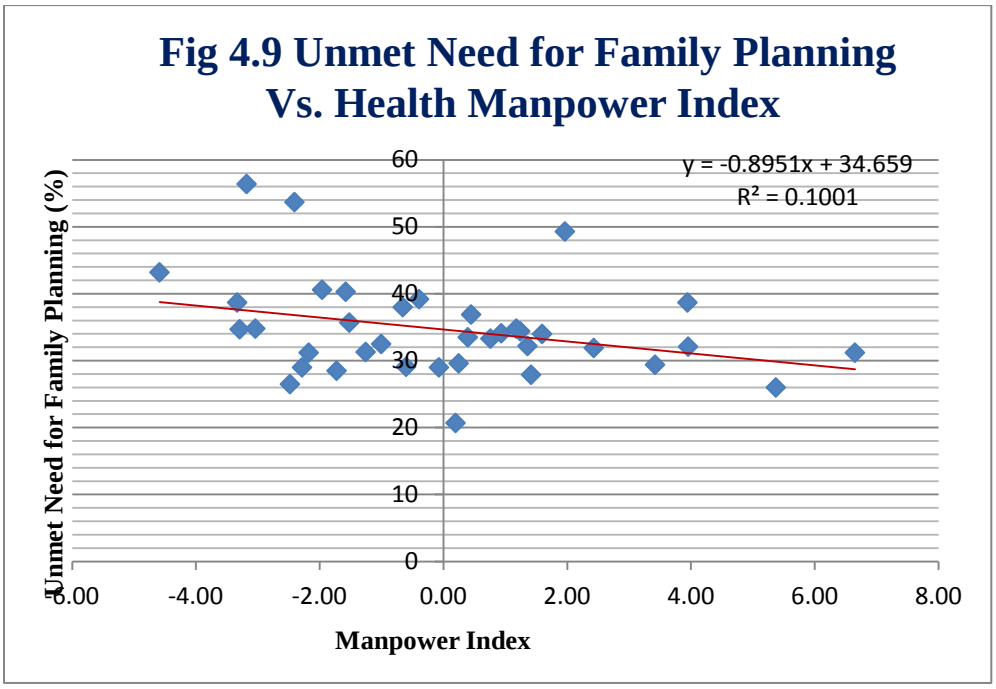
The proportion of unmet need is on Y-axis as it is the dependent variable and the Physical Infrastructure index is on X-axis which is the independent variable.

The regression equation is: **y= -0.6502x+34.659**

It shows that the available health institutions have negative impact on the Unmet Need for family planning. Greater the number of health institutions, level of unmet need for family planning decreases. But there is weak correlation between unmet need for family planning and health infrastructure. Here Patna is an outlier, distant from other observations.

In the analysis, mainly government health facilities have been taken into account. Contraceptive methods are provided by the government health services at subsidized rates, often with support from international donor agencies. But because of scarcity of funds, the cost of contraceptive methods has risen in recent years. And hence the role of private institutions has gained importance **(Nair et al., 1999).** There have been substantial increases in the use of private sector sources which may be because of rising education which in turn increases the demand for quality services and this quality is provided by private sector. The other possible reasons may be rising urbanization which makes private sector services more available or accessible and high per capita income which makes private-sector services more affordable **(Nair et al., 1999).** Moreover, nowadays there has been rise in the use of private services because government services are of poor quality or are unavailable .It is well established in many literatures also. Women in rural areas of Nepal approach the retailers and private clinics rather than approaching health institutions as they are easily approachable and people do not want to travel long distances to reach health institutions **(Mishra, 2011**).

Hence, government health infrastructure is not a good explanatory variable of unmet need for family planning. And in this analysis only government health infrastructure has been taken into account which can be a major reason for showing this weak correlation of health infrastructure and unmet need for family planning.



The manpower index is calculated using the manpower engaged in health institutions i.e. Number of Doctors, Nurses and ANMs available per lakh population. The percentage of unmet need is plotted on Y-axis which is independent variable and Manpower index is plotted on X-axis which is independent variable.

The regression equation is: **y= -0.8951x+34.659**

It shows that as manpower index increases, the level of unmet need decreases.

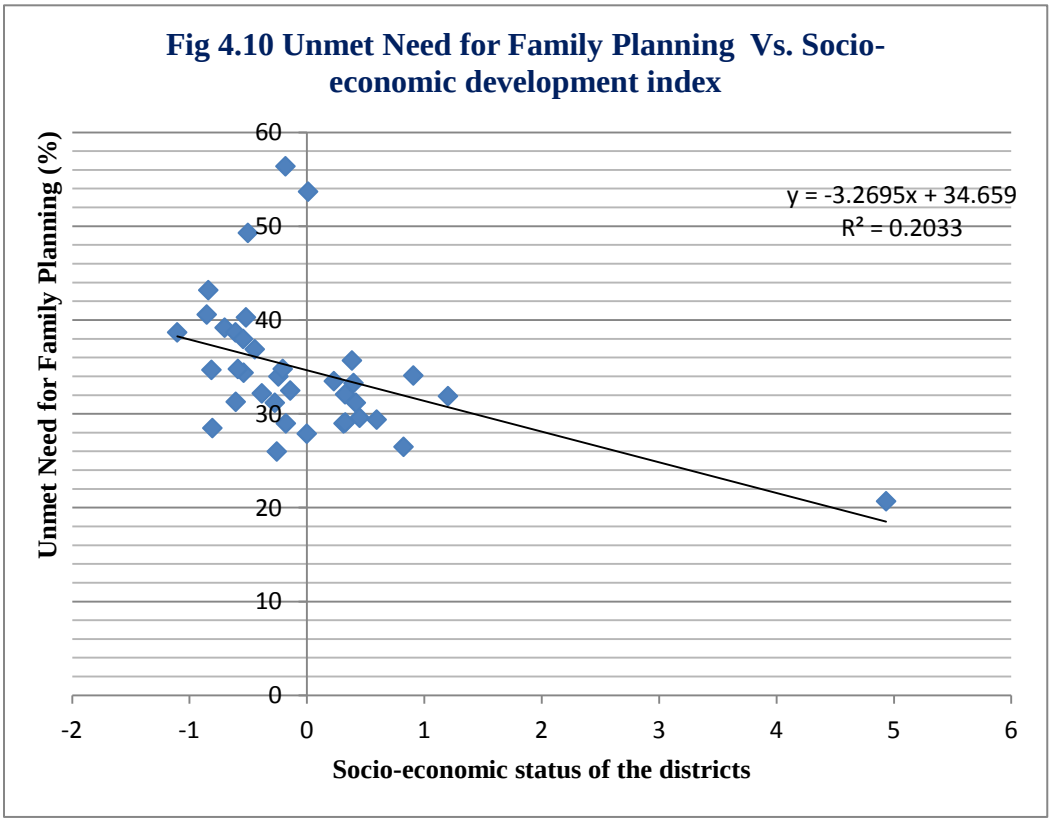
4.9.3 Impact of Socio-Economic Status of Districts on Unmet Need for Family Planning

The socio-economic status of the districts has been seen with the help of availability of assets in households (Radio/Transistor, Computer laptop, Telephone/ Mobile phone, Bicycle, Scooter/ Motorcycle/ Moped, Car/Jeep/Van, Households with TV, Computer/ Laptop, Telephone/mobile phone and Scooter/ Car), female literacy rate in each district, percent of urban population in the districts and per capita net district domestic product (PNDDP) in rupees which is indicator of per capita income of the district ,percentage of houses electrified in each districts of Bihar.

The regression equation is**: y= -3.2695x+34.659.**

It shows that as the socio-economic status of the district improves the level of unmet need decreases. It is well known that level of education has negative impact on unmet need, as when woman is educated, she is confident about her choices and is aware about the benefits of having small family. Also it can be seen that as the urban population increases then the level of unmet need decreases. Patna is also an outlier in this case, distant from other observations.

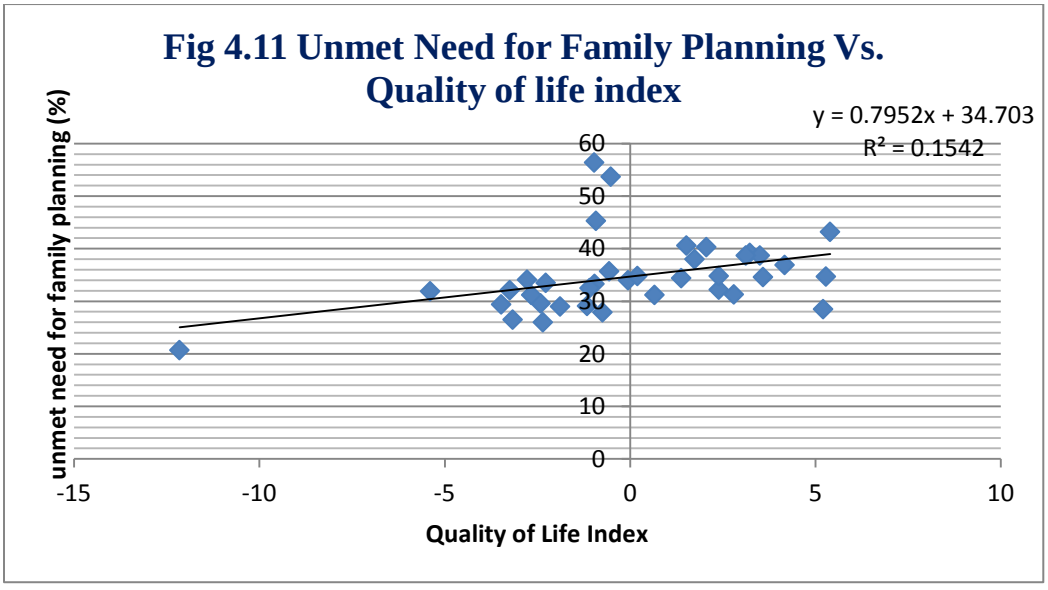
The number of households electrified is also an important indicator as people get to know about many forms of contraceptive practices and benefit of small family from the media coverage.



4.9.4 Impact of Quality of Life on Unmet Need for Family Planning

Housing and availability of household amenities is an important indicator of lifestyle and socio-economic status. Access to basic amenities like, drinking water, toilet facility, clean fuels etc are the determinants of quality of life in most of the developing countries like India (Toppo, 2014).

The quality of life index is calculated using all the indicators of household amenities and assets which represent negative features. The indicators which are unfavorable for healthy life are identified. It is constructed using the indicators like Houses with wall and roof made of temporary material. Wall made of Grass, Thatch, Bamboo, Plastic Polythene, Mud, Plastic or Polythene,the source of drinking water away from the premise of household, Source of lighting facility other than electricity (Kerosene, solar energy, other oil, any other), No drainage or Open Drainage, No latrine facility, does not have kitchen within the house, use of Fire wood, Crop residue, cowdung, Coal, Lignite, Charcoal for cooking which have been considered as Polluting fuels and the number of households having no exclusive room or only one room.



The quality of life index is plotted on X axis and the dependent variable which is unmet need is plotted on Y-axis. The regression equation is: y=0.7952x+34.703 It shows a positive correlation between the two, i.e., that as the deprivation from the household amenities increases, the level of unmet need increases.

Table 4.11 Impact of District level Factors on Unmet Need for Family Planning in Bihar

Variables	B	Sig
Health Infrastructure Index	-0.650	0.223
Health Manpower Index	-0.895	0.056
Quality of Life Index	0.953	0.005
Socio-economic status of district	-3.269	0.005
Constant	34.659	.000

To see the impact of district level factors on unmet need for family planning, a multiple linear regression is used (Table 4.11). The independent variables are Health Physical Infrastructure index, Manpower Index, Quality of Life index and the index showing socio-economic status of the district (using asset index, Per capita net district domestic product (in Rupees) as the proxy of the per capita income, percent female literacy of each district and the urban population percentage).

Quality of life index and Socio-economic status of the district are the two determining variables and shows a significant effect on unmet need for family planning. Health Physical Infrastructure Index and Health manpower index doesn't show significant effect on unmet need for family planning.

4.10 Summary

The unmet need for family planning services among currently married women in India is 21 percent according to DLHS-3. Great interstate variations in the unmet need for family planning in India have been witnessed. The states which have higher unmet need than the national average (21) % are Bihar, Jharkhand, Uttar Pradesh, Meghalaya, Manipur Assam Orissa and the North-Eastern States have high unmet need for contraception. The unmet need for family planning is lowest in Andhra Pradesh i.e. 8.1 percent followed by West

Bengal Punjab, Tripura, Arunachal Pradesh , Maharashtra, Delhi. Regional analysis shows that eastern states of Bihar, Jharkhand, West Bengal, Odisha have the highest proportion of women with unmet followed by Central Region.

An analysis of unmet need for family planning in Bihar shows that the Patna division which include Patna, Nalanda, Bhojpur, Buxar, Rohtas, Kaimur, Gaya has unmet need which is below the state average i.e. 36.1%. These are the developed districts of Bihar. On regional basis Ganga-Son divide has low unmet need whereas Saryupar Plain region has very high prevalence of unmet need in Bihar.

An analysis of reasons for not using contraception by selected socio-economic background characteristics shows that opposition to use is cited as the main reason for not using contraception across all the socio-economic background characteristics. With increasing age group, method related reason has become the dominant reason for not using contraception. About one-third of respondents in the urban areas had issues with methods hence method related reasons were responsible for not using contraception.

About 86.4 percent of Muslim women cited "opposition to use" as main reason for not using any contraception for spacing and limiting while about 47% of Hindu women cited opposition as the reason. It can be seen that moving down the wealth index from low to high, the opposition to use decreases, though not significantly. In case of number of living children, fertility related reasons for not using contraception are highly prevalent among women with no living children. This chapter also analyzes expected decline in fertility if all the demand for family planning were to be satisfied, and TFR is predicted based on the assumption that all demand for family planning was satisfied. Based on this assumption, the TFR for India as a whole would decline from 2.7 children per women to 1.77 per women, a relative decline of 34.44%.

The impact of different district level variables on unmet need has been analyzed and it has been found that Quality of life index and Socio-economic status of the district emerge as the two determining variables with mild significant effect on the dependent variable. Health Infrastructure Index and Manpower index doesn't show significant effect on unmet need for family planning. As per the impact of socio-economic status of the

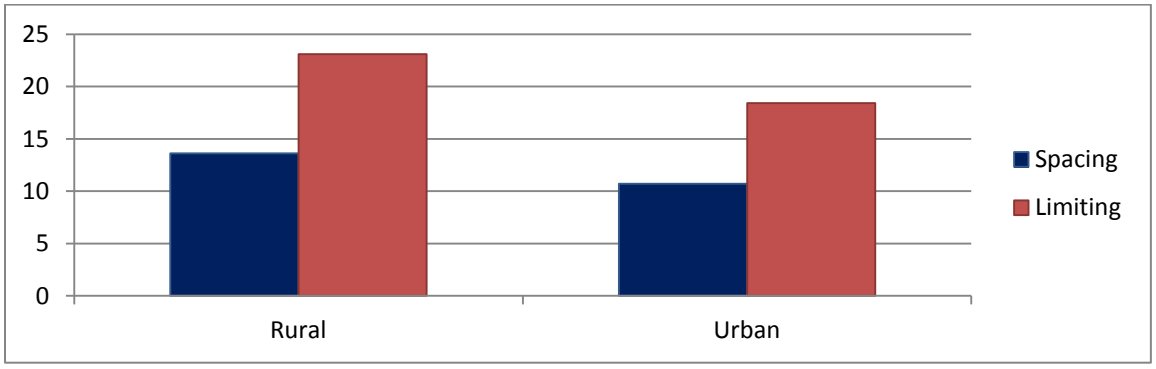
district in respect of health infrastructure is concerned, all the health indicators shows the negative correlation with the unmet need for family planning in Bihar. It means that as the socio-economic status of the districts increases, the level of unmet need decreases.

5. Determinants of Unmet Need for Family Planning in Bihar: Individual Level and Village Level Analysis

This chapter analyzes how the background characteristics of currently married women influence the unmet need for family planning in Bihar. It analyzes the effect of various socio-economic, demographic factors on the unmet need for family planning in Bihar at the individual level. Demand side factors and their influence on unmet need for family planning have been analyzed in this chapter. Firstly, the bivariate association between socio-economic, demographic factors and unmet need has been shown with the help of crosstabs in this chapter. Secondly, the binary logistic regression has been used to show the effects of these variables on unmet need. The level of unmet need for family planning varies by women's social, economic and demographic characteristics, these factors affect the unmet need for family planning to a great extent. And through such analysis policymakers can target the populations where unmet need is most concentrated and target the resources effectively.

5.1 Differentials in Unmet Need for Family Planning by Background Characteristics

Fig 5.1: Unmet Need for Family Planning by Place of Residence:

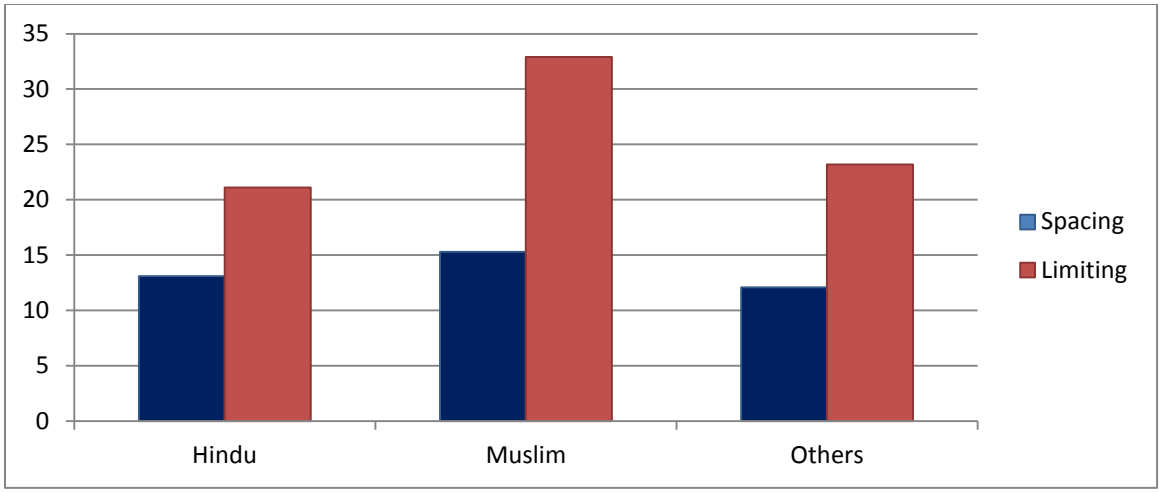


Source: DLHS III (2007-08)

In most of the developing countries place of residence is one of the determining variables in unmet need for family planning. In urban areas contraceptive use is high as compared to rural areas because urban women usually have better access to contraception and are well informed about contraceptions than the rural women (**Mishra et al., 1999).** It can be seen that there exists a great divide between the rural and urban areas for unmet need for family planning in Bihar.

Rural areas have higher unmet need than the urban areas. "The reason of high unmet need in rural area may be the gap between the demand and supply for family planning services or may be gap between family planning service providers and acceptors. We may also infer the concept of KAP gap here propounded by J. Bongaarts which is quite common in rural area as compare to the urban area" **(Ansary & Anisujjaman, 2012)**. Better education facilities and opportunities, health facilities and information about the contraceptive use in urban areas help women to get information about the various types of contraceptive methods and select the one best suitable for them. Further in the urban areas the cost of upbringing a child is high hence couples are more conscious about their reproductive choice. Hence all these factors in urban areas plays a very important role in taking decisions regarding women's reproductive behavior whereas situation is not so conducive in rural areas. In rural areas these facilities are not so easily available and therefore women are not aware of the contraceptive methods which results in higher unmet need for family planning.

Fig 5.2: Unmet need for Family Planning by Religion

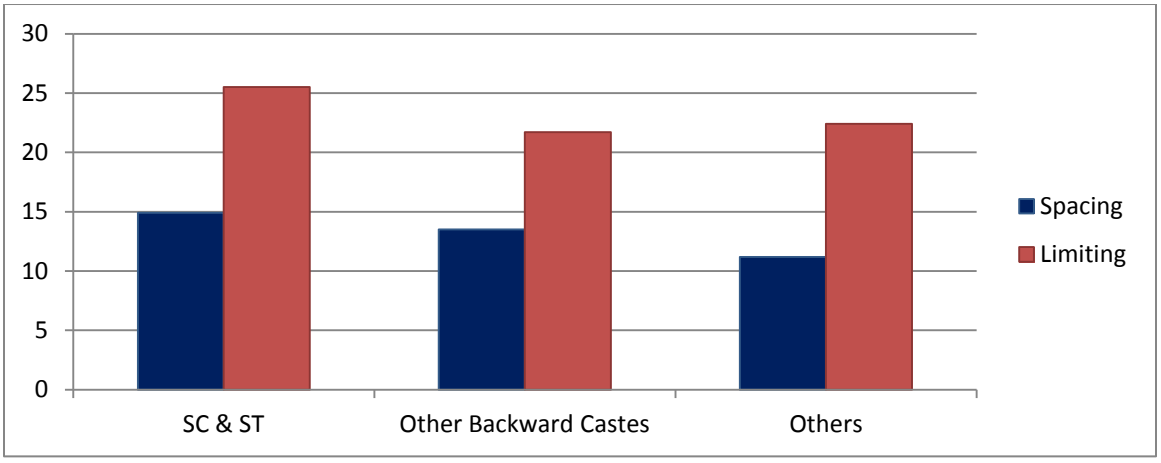


Source: DLHS III (2007-08)

There is a huge difference in the socio-economic, demographic profile among various religious groups in India and every religion is guided by their own customs and belief. It is an important variable influencing demographic behavior of an individual. Religious affiliation controls every sphere of life of an individual in terms of practices regarding marriage, norms about child bearing and family planning which in turn affects the fertility level. Religious opposition is also one of the major factors for not using contraception. There are some religions which prohibit the use of contraception. In those religions the level of unmet need for family planning is very high as compared to religions which are not so stringent towards the use of family planning services.

"In India, Islam has traditionally been portrayed as not permitting birth control or abortion in any situation whereas Hinduism regards the use of contraception as women's personal matter" **(Iyer, 2002).** In the figure 5.2 pattern of unmet need of family planning in Bihar across religion can be seen. The unmet need for family planning among Hindus (34.2%) was less than among Muslims (48.2%) during 2007-08. It portrays that Muslims have higher unmet need for family planning as compared to Hindus and the other religious groups. Also, in case of both unmet need for spacing and limiting, Muslims contribute higher than any other religion. The higher percentage of unmet need among Muslims may be due to the conservative approach to contraceptive methods.

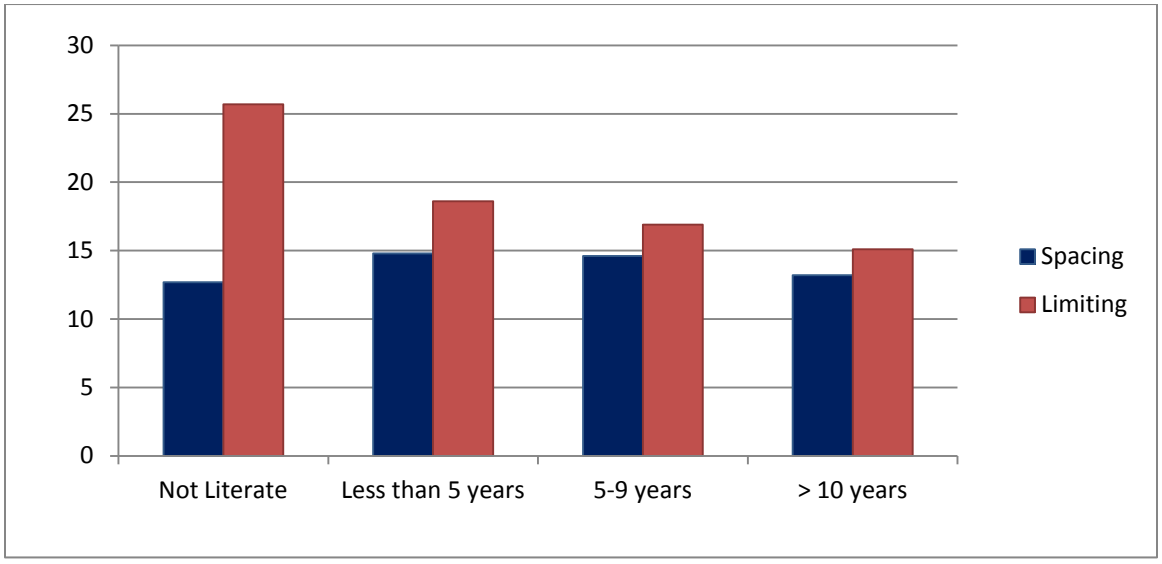
Fig 5.3: Unmet Need for Family Planning by Castes



Source: DLHS III (2007-08)

In India, caste is an important indicator affecting the social status of an individual. Several studies have shown prevalence of unmet need by different social groups in India. Across the social groups, the level of unmet need for family planning is much higher among SCs and STs than the others. Women belonging to other castes are found to have lower unmet need as compared to women belonging to SC/ST and OBC category. This may be because women belonging to other category are socially, educationally and economically more advanced as compared to women belonging to OBC, SC, ST category. Hence, they have higher social status and exposure to the health facilities and are aware about the contraceptive choices which are available according to their requirement. "In fact among the social groups the tribes are the most socioeconomically-deprived groups, with low literacy and poor economic and living conditions" **(Prusty, 2014).** Therefore, among SC&ST the level of unmet need for family planning is quite high (40.4%) followed by OBC (35.2%).

Fig 5.4: Unmet Need for Family Planning by Women's Education



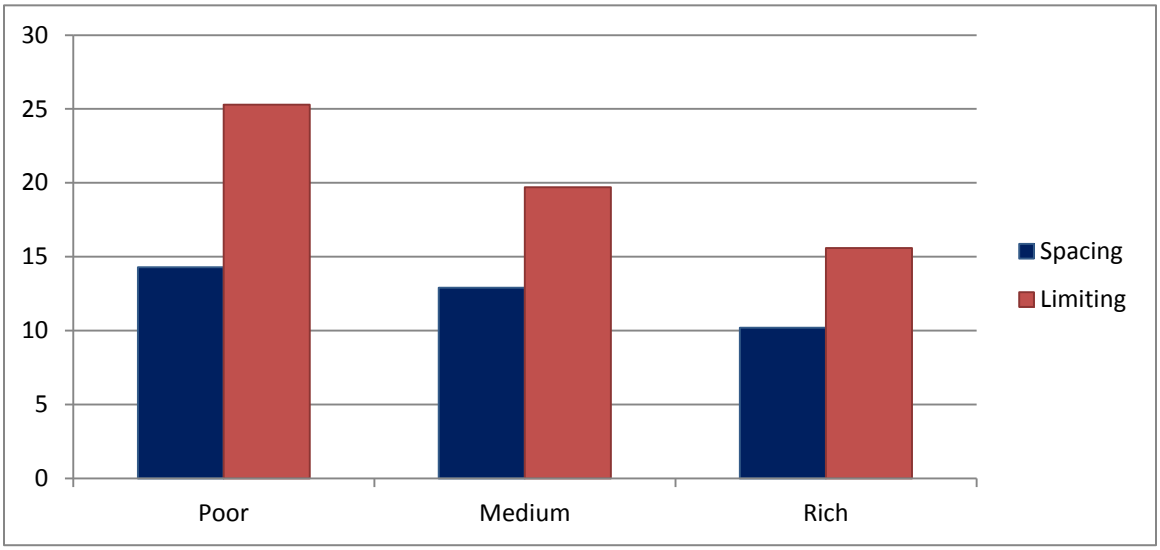
Source: DLHS III (2007-08)

Female education is one of the key determinants affecting her reproductive decisions. The relationship between education and unmet need has been widely discussed and it has been well documented about the inverse relationship between educational level of women and unmet need for family planning in many literatures. Level of education affects reproductive health of women directly and indirectly through many factors. Educated women usually make a later, healthier transition into adulthood, marry at a later stage of life, prefer smaller families, and are more likely to use contraception than their less educated counterparts **(Population Reference Bureau, 2009)**. An educated woman is more aware about the various family planning methods from the newspaper, other printed media and from other sources. She is also aware about the benefits of controlling fertility and hence this motivates her to be active in her reproductive decision which in turn lowers the unmet need for contraception.

It can be seen that years of schooling for women increases the level of unmet for family planning decreases, hence an inverse relationship exists between education level of women and unmet need for family planning.

The gap between unmet need for spacing and limiting is very large in cases of women who are uneducated while gap is less in cases case of women with 5-9 years of schooling or more than 10 years of schooling. Unmet need is considerably higher among women with no Education i.e. (38.4%) and among women with less than 5 years of schooling i.e. (33.4%) than among those with more than 10 years of schooling (28.3%) during 2007-08.

Fig 5.5: Unmet Need for Family Planning by Wealth Index



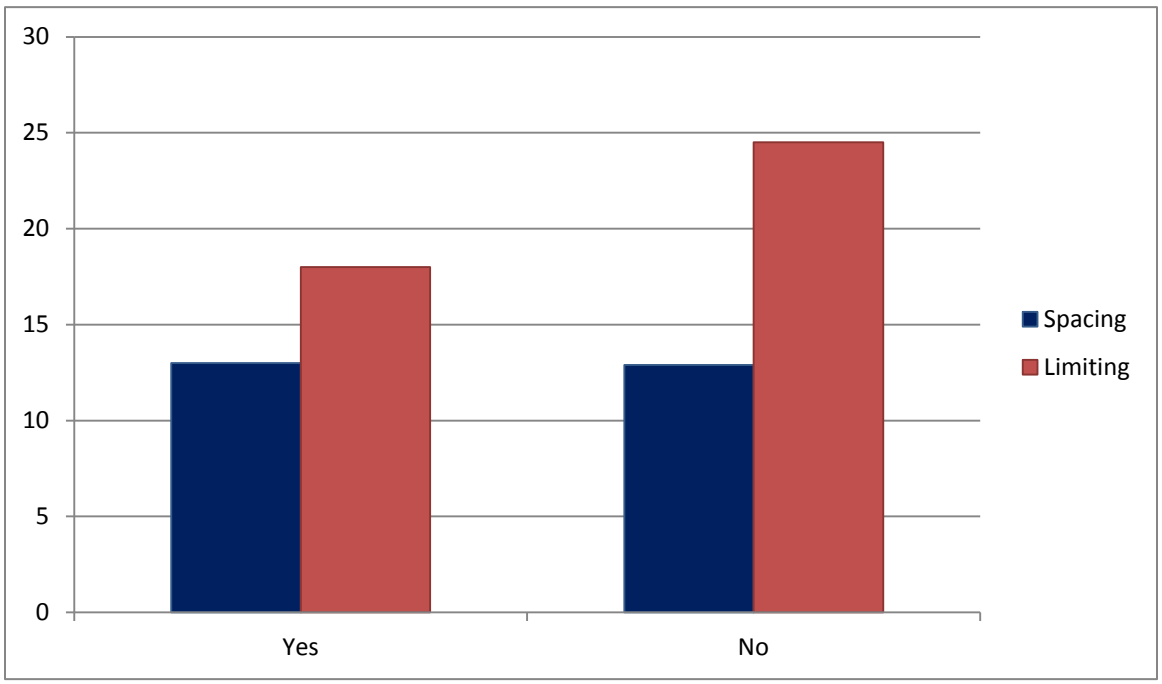
Source: DLHS III (2007-08)

DLHS computes wealth index combining household amenities, assets and durables and divides them into quintiles. Households are categorized from the poorest to the richest groups corresponding from the lowest to the highest quintiles at the national level (DLHS-3).An inverse relationship between standard of living and unmet need for family planning has been well documented in several literatures. In almost every survey unmet need is lowest among women in the wealthiest quintile (**Bradley et al., 2012).** The least users of family planning services are those with no income (**Okech et al., 2011).** Barrier to accessing contraception is a very important reason for contraceptive non-usage. The barriers are lack of insurance, high cost, and pharmacy refusal and low income which results in high level of unmet need among them.

As DLHS does not give data on standard of living, analysis has been carried out with the help of wealth index quintiles. In this figure it can be seen that wealth index and unmet need for family planning in Bihar is negatively related. Unmet need is considerably higher among women belonging to poorest category (39.6%) than among those belonging to richest category (25.8%) during 2007-2008.

If we see the gap of unmet need between poor and rich gap it is quite large and in cases of unmet need for limiting it is almost double than the rich. Further, the gap between unmet need for spacing and limiting is very large among poor, which in case of rich is quite small.

Fig 5.6: Unmet Need for Family Planning by Media Exposure

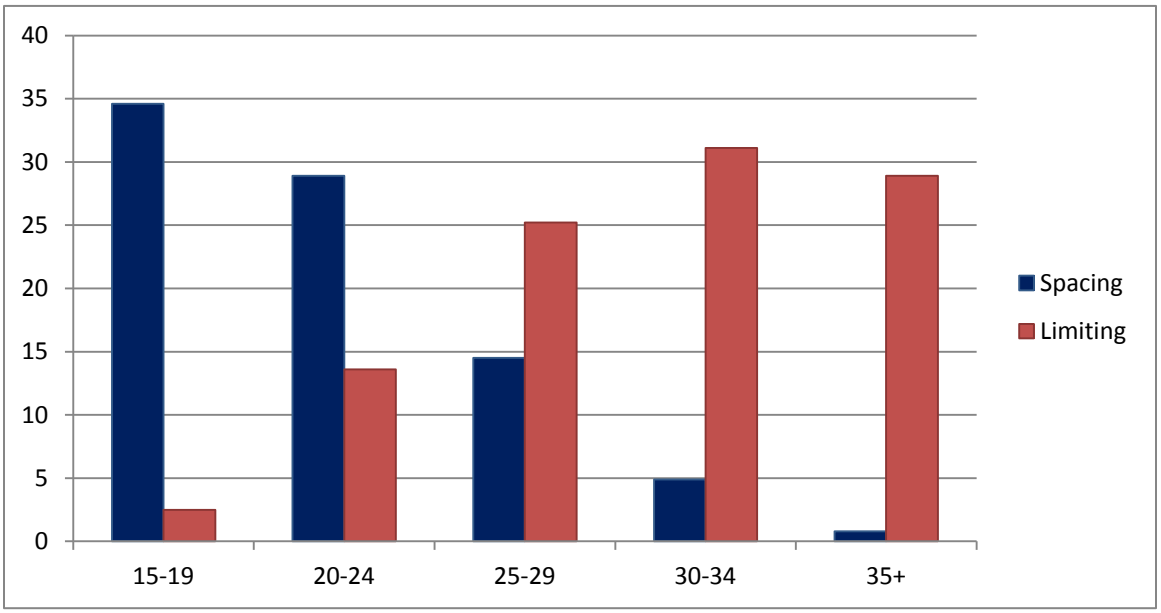


Source: DLHS III (2007-08)

Family planning messages from media has a positive effect on contraceptive use and unmet need. A major role is played by the electronic media in educating women about the benefits of small family norm and by providing them information on contraceptive use **(Mohapatra, 2010)**. Several studies have found out that exposure to media and contraceptive use is positively related **(Cochrane & Guilkey, 1995; Westoff &**

Rodriguez, 1995 Ramesh et al., 1996; Retherford & Mishra, 1997; Kulkarni, 2003). The above figure documents the findings. Women who are exposed to mass media have less chance of unmet need for contraception as compared to women who are not exposed to mass media. Though not much difference is seen in case of spacing but a wide difference is witnessed in case of limiting. It can be seen from the Fig 5.6 that women who are exposed to media messages about family planning have a lower unmet need for contraception (31 percent) than women who are not exposed to such media messages (37.4 percent).

Fig 5.7: Unmet Need for Family Planning by Age Groups

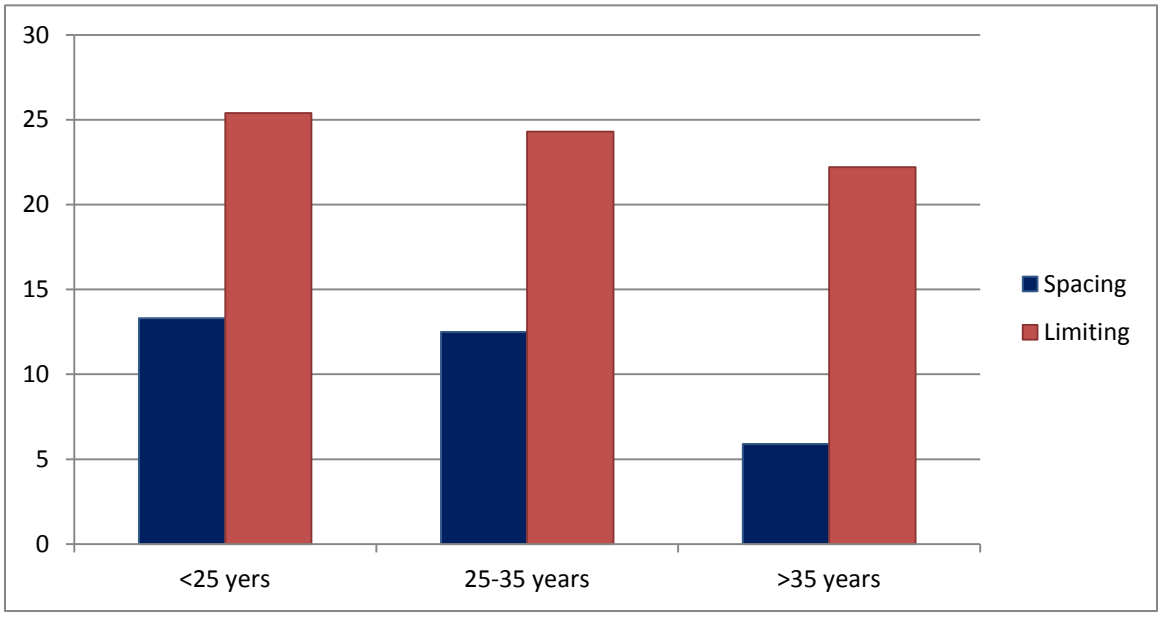


Source: DLHS III (2007-08)

The relationship between age and unmet need for family planning is well documented in various literatures. The unmet need for family planning is highest in the age group of 20-24 years i.e. 42.5% and lowest in the age group or 35 years and above with 29.7%. A negative relation is noticed between unmet need for spacing and age, as with increase in age of women the percentage of unmet need decreases. This may be due to the fact that at an early age women are not ready to bear child or become pregnant and also they want to make gap between the first and the second child. It can be seen from the pattern of unmet need among currently married women in Bihar that at the early age of child bearing

unmet need for spacing is higher than limiting, but as age increases the need for family planning shifts from spacing to limiting. The unmet need for limiting is highest in the age group 30-34 years i.e.31.1 percent. The reason may be at that age most of the women completed their family and do not want another child. Therefore at this stage the demand for limiting family services are more important than spacing. It can also be seen that there is lower levels of unmet need for family planning among women in oldest age group who have reached the last stage of fertility period and do not need family planning at all at this stage of their lives **(Bradley et al., 2012).**

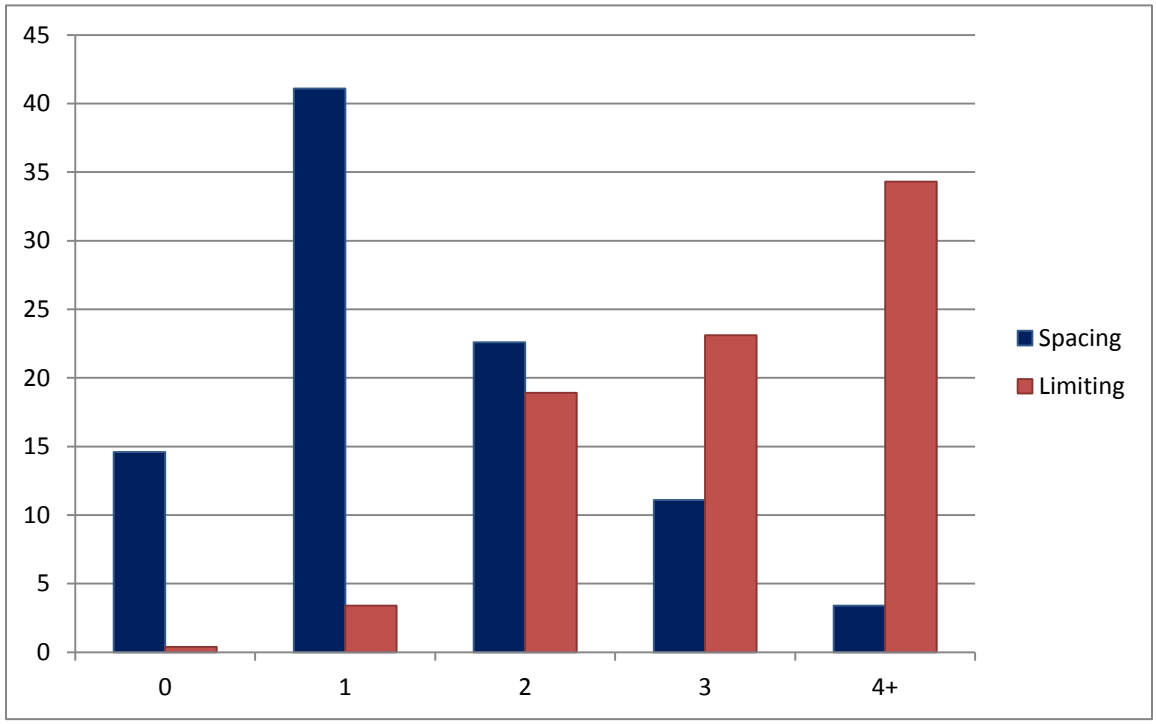
Fig 5.8: Unmet Need for Family Planning by Mother's Age at First Birth



Source: DLHS III (2007-08)

It can be seen that the unmet need for family planning is high among women whose age at first birth is less than 25 years and it decreases among women of more than 35 years of age. This is because when women's age at first birth is low, she wants to postpone the next pregnancy while the women whose age at first birth is high do not want to limit or space the childbearing process as she is already in the later part of the reproductive span which may pose difficulty in further conceiving.

Fig 5.9: Unmet Need for Family Planning by Number of living children

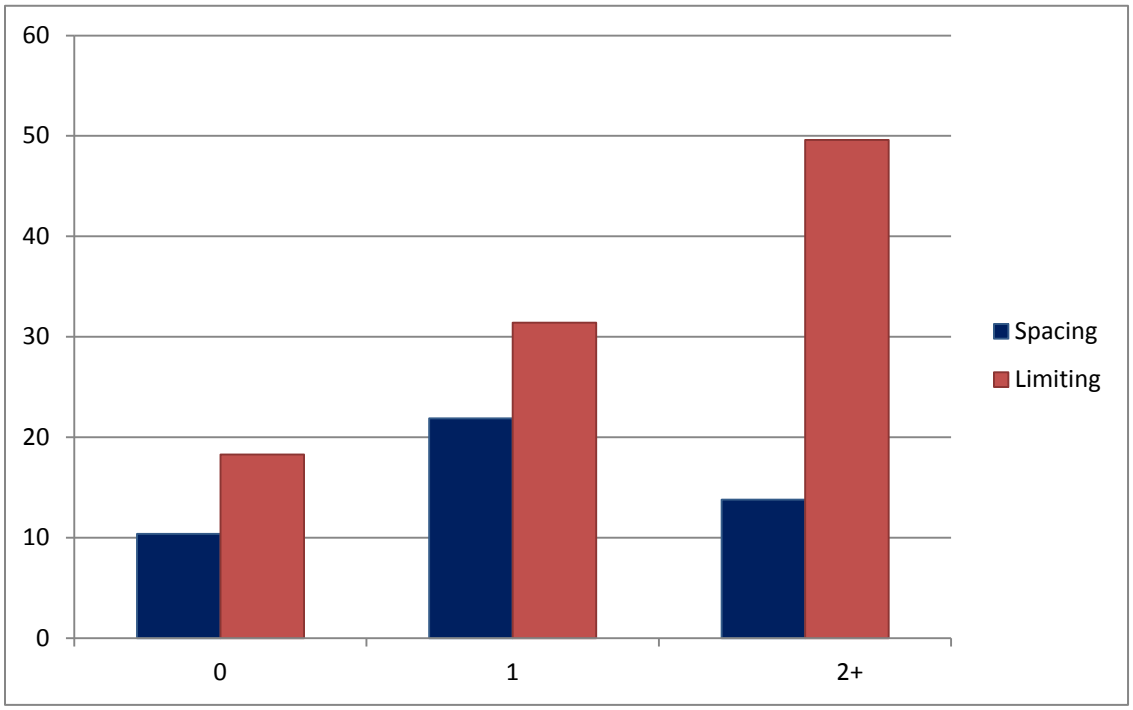


Source: DLHS III (2007-08)

The number of living children is an important factor that influences unmet need for contraception and this is well documented in various literatures. Unmet need for spacing decreases and unmet need for limiting increases as the number of living children increased **(Bhattacharya et al., 2006)**. The number of living children follows the same pattern as age. "Women who are in the early stages of childbearing are more in need of family planning for spacing purposes than women with larger families who, in turn, are more interested in limiting fertility. Again as with age, the result largely neutralizes any association between total unmet need and the number of children" **(Westoff and Ochoa, 1991).** Women want to delay the childbearing once they have first and second children hence the unmet need for spacing goes up. But after the birth of third or more than four children the unmet need for limiting increases. The reason may be the women think they have attained the desired family size and hence want to stop having children.

In Fig 5.9 it can be seen that the unmet need for spacing among women with one living children is 41.1 % which is the highest and among women with two living children declines to 22.6%. Whereas unmet need for limiting is high among women with more than four living children (34.3%), whereas in case of one living children unmet need for limiting is very low with 3.4 percent. Hence it proves the fact that unmet need for spacing decreases and unmet need for limiting increases as the number of living children increased.

Fig 5.10: Unmet Need for Family Planning by Number of living sons



Source: DLHS III (2007-08)

There are many literatures documenting strong effects of number of living sons on couple's motivation to use family planning. There is higher contraceptive use among families with more sons, hence more demand for family planning. This phenomenon is very much prevalent in areas where there is strong son preference due to various economic, social and religious reasons. Higher labor force participation of males contributing to the family income and son being seen as an old age security is one of the main economic reasons for son preference. Also in order to continue the family line or to

inherit family's wealth there is tremendous social pressure to have a son. **(Aly & Shields, 1991).** Religion also plays an important factor in this. Like in Hinduism, certain rites are performed by son on the death of parents **(Mahopatra, 2010).** Whereas in case of daughter there are factors which acts as barriers for daughter preference like economic liability, isolated from their natal home after marriage, not contributing anything to their natal home **(Chowdhury ,1994 ; Chavada & Bhagyalakshmi,2009).** In societies where strong son preference exists women would not use contraception if they do not have desired number of sons even if they have reached their desired family size which results in higher level of unmet need for family planning.

In Fig 5.10 it can be seen that the level of unmet need among women with more than 2 sons is 63.4% and it decreases to 53.4 % in case of women with one son and further to 28.7% in case of women with no living sons. It can also be noticed that unmet need for spacing decreases from 21.9% among women with one son to 13.8% in case of women with more than 2 children, whereas the unmet need for limiting increases from 31.4% in case of women with one son to 49.6% in case of women with more than two sons.

Table 5.1: Binary Logistic Regression for Unmet Need for Family Planning in Bihar

Socio-economic Background Characteristics	Frequency(N)	B	Sig	Exp(B)
Respondent's current Age**				
15-19@	1681			
20-24	3869	-1.557	0	0.211
25-29	3487	-0.876	0	0.416
30-34	2625	-0.375	0	0.687
35+	4346	-0.194	0	0.824
Mother's age at birth				
<25 yrs@	14608			
25-34 yrs	685	-0.036	0.907	0.907
>35 yrs	716	-0.317	0.306	0.306
No of living children**				
0@	715			
1	2435	2.111	0	8.26
2	2724	0.68	0	1.975
3	2552	0.472	0	1.603
4+	7582	0.466	0	1.593
No of living sons**				
0@	9110			
1	5816	0.999	0	2.953
2+	1083	0.381	0	1.429
Religion				
Hindu@	13024			
Muslim	2950	0.278	0.394	1.321
Others	35	-0.366	0.268	0.693
Caste Groups**				
SC & ST@	3949			
OBC	9298	-0.359	0	0.698
Others	2750	-0.14	0.001	0.87
Place of residence*				
Rural@	14877			
Urban	1131	-0.158	0.005	0.854

Women's education				
No education@	112			
Less than 5 yrs	1100	-0.6	0.629	1.2
5-9 yrs	2238	-0.113	0.026	0.987
>10 yrs	1326	-0.114	0.06	0.969
Wealth index**				
Poor@	11519			
Medium	2618	-0.297	0	0.743
Rich	1872	-0.25	0	0.779
Media Exposure**				
Yes@	4683			
No	6938	0.286	0	1.331
Regions of Bihar**				
Saryupar Plain(@)	1248			
Mithila Plain**	4952	0.149	0	1.161
Kosi Plain	3180	-0.012	0.644	0.988
Ganga- Son Divide	1614	-0.033	0.246	0.968
Magadha-Anga Plain**	5014	-0.165	0	0.848

Source: DLHS III, 2007-08.

Note : @- Reference category; **P<0.01; *P<0.05

Here the technique of logistic regression has been used to see the net influences of various factors. Table 5.1 shows the logistic regression analysis of unmet need for family planning in Bihar. Ten independent variables have been taken i.e. respondent's age, mother's age at first birth, number of living children, number of living sons, religion, caste groups, place of residence, women's education, wealth index, media exposure to show the net effect of unmet need for family planning in Bihar.

Respondent's age has significant effect on the unmet need for family planning. With increasing age of the respondent, the unmet need tend to decline. Women in the age group (20-24) years are found to be 0.211 times less likely to have unmet need for family planning in comparison to the reference category which is (15-19) years age group. And

women who belongs to the age group 35 and above are found to be 0.824 times less likely to have unmet need for family planning in comparison to the reference category. This decrease of unmet need for family planning after the age of 35 is may be due to the women's perception that they are no longer capable of having children at this stage of their life **(Devi et al., 1996).** The mother's age at first birth does not show any significant relation with unmet need for family planning. Number of living children also significantly impacts unmet need. Women having more than four living children have more chance of unmet need as compared to women with one or two living children, as the women with one or two living children still want to have additional child. The regression result also establishes number of living sons as strong factor affecting unmet need for family planning. Number of living sons is the closest indicator to capture prevalence of son preference in a society. Women with atleast one living son are 2.953 times more likely to have unmet need for contraception in comparison to women with no living son.

Religion of the women has less significant impact on unmet need for family planning in Bihar .Compared to Hindus, women belonging to Muslims are 1.321 times more likely to have unmet need for family planning.

Caste groups also have a strong effect on unmet need for family planning. In case of caste groups, compared to SC/ST, women belonging to OBC are 0.698 times less likely to have unmet need for family planning whereas women belonging to others are 0.87 times less likely to have unmet need for family planning.

It can also be seen that place of residence has significant impact on unmet need for family planning. In case of place of residence, women living in urban areas are 0.854 times less likely to have unmet need for contraception as compared to women living in rural areas. With increasing women's education, the level of unmet need declines. Though unmet need does not significant impact unmet need for family planning. It can be seen that women with 5-9 years of schooling are 0.987 less likely to experience unmet need for family planning in comparison to women with no education.

Wealth index has also been witnessed as a strong predictor for unmet need for family planning in many literatures. Better-off women and moderately poor women are more likely to use modern contraceptives than the extremely poor women because of socio-cultural and attitudinal factors such as considering children to be economic assets **(Schoemaker, 2005)**.Here also it can be seen that wealth index has strong effect on unmet need for family planning. Women belonging to rich category in the wealth index are 0.779 times less likely to have unmet need for family planning as compared to women belonging to poor category in the wealth index. Women who are not exposed to media are 1.331 times more likely to have unmet need for family planning as compared to women who are exposed to media messages related to family planning.

Further, after controlling for all the other factors, regions of Bihar itself plays a significant role in influencing unmet need for family planning. The reference category is Saryupar Plain which is itself the region of Bihar with highest level of unmet need for family planning. Women belonging to Mithila Plain are 1.161 times more likely to have unmet need for family planning as compared to women belonging to Saryupar Plain. Whereas the women belonging to region of Magadha-Anga Plain are 0.848 times less likely to have unmet need for family planning as compared to women of Saryupar Plain. These regions can be taken into consideration for proper programme implementation.

5.2 Impact of Village level Variables on Unmet Need for Family Planning

This section deals with the impact of village level variables on the unmet need for family planning in Bihar. DLHS 3 collect information on availability and accessibility of education, health, transport and communication facilities at village level. On the basis of these information, impact of village level variables on unmet need for family planning has been analyzed. To have a clear picture of impact of village level variables on unmet need for family planning among the currently married women of Bihar, the bivariate analysis has been carried out to show the relationship between the village level variables

i.e. availability of any health facility, accessibility to any health facility, road availability, school availability, distance to PHC and unmet need for family planning in Bihar.

Table 5.2: Percentage Distribution of Unmet Need for Family Planning by Selected Village level Variables:

Village level variables	Spacing		Limiting		Total Unmet Need	
Accessibility of any health facility	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	4072	13.4	6957	22.9	11029	36.3
No	139	15.3	223	24.6	362	39.9
Availability of Health Facility						
Yes	5037	13.5	8562	23	13599	36.5
No	486	14.9	792	24.2	1278	39.1
Road Availability						
Yes	3855	13.5	6575	23	10430	36.5
No	1669	14.1	2779	23.5	4448	37.6
Distance to PHC						
In Village itself	4	5.8	14	20	18	25.8
Upto 5 kms	1669	13.2	2965	23.4	4635	36.6
6-10 kms	1836	13.6	3149	23.3	4985	36.9
More than 10 kms	1686	14.2	2733	22.9	4418	37.1

Source: DLHS III, (2007-08).

The table 5.2 shows the percentage distribution of unmet need for family planning by village level variables. This table uses information from village questionnaire. It shows the association between each village level variables i.e. community level factors and unmet need for family planning. Widespread availability and accessibility of health facility reduces the economic costs of contraception to the users and hence contraceptive use increases and unmet need for contraception decreases. The geographical access can be treated in economic terms as the opportunity cost of travel and waiting and the travel costs **(Bhushan, 1997).**

Unmet need for family planning is lower among women who have access to any health facility i.e. (36.3 percent) and slightly higher among women who do not have access to any health facility i.e.(39.9 percent). Availability of health facility decreases the unmet need for family planning only marginally. It can be seen that unmet need for family planning is slightly higher where health facility is not available i.e. (39.1percent). The result is same in case of whether the village is connected by all weather roads. Unmet need for family planning is less among women living in community where there is availability of all weather roads. Unmet need for family planning among those women who live where PHC is located in village itself is 25.8 percent compared with 37.1 percent among women who live more than 10 kms from PHC (Primary Health Centre). But overall, it can be seen that unmet need for family planning does not differ much with the availability and accessibility of any health facility. Even it does not differ much with distance to PHC and road availability in the village. It is also evident in many studies that accessibility of health facility as measured by the distance or travel time to the nearest service center, probably has either no relationship or at most a weak relationship with unmet need for family planning (**Bongarts & Bruce, 1995).** Even studies in other countries by **Anderson & Cleland (1984); Ochoa & Tsui (1991)** on the met need and contraception have found a weak association between use of contraception and distance to a source.

5.3 Summary

The chapter analyzes the level of unmet need for family planning according to the different socio-economic and demographic variables in Bihar. The chapter also analyzes the determinants of the unmet need for family planning in Bihar. It can be seen that the women belonging to the urban area, with high education and high income level have low prevalence of unmet need as compared to the women residing in the rural areas, with low educational level and low income. In case of religion, Muslims are more likely to have unmet need for family planning as compared to other religions. As compared to the SCs & STs and OBC, unmet need for family planning is low among other caste group which is considered to be socially and economically advanced group. The unmet need forspacing declines with age and unmet need for limiting increases with age. On the whole unmet need is highest in the early years of childbearing and declines after this age and is lowest in the last part of reproductive age. The study also shows that unmet need for family planning increases with the number of living children and women with more than 2 living sons are more likely to have unmet need for family planning as compared to women with no living sons. Women who are exposed to media message have lower unmet need as compared to women who are not exposed to media messages related to family planning. The logistic regression analysis shows that most of socio-economic, demographic factors have significant relationship with the unmet need for family planning. The hypotheses framed by the present study are well supported by the results of the study. The chapter also analyzes the association of village level variables and unmet need for family planning. It can be seen that unmet need for family planning did not differ much with the selected village level variables i.e. availability, accessibility of any health facility, road availability and distance to nearest PHCs.

6. Summary & Conclusion

"Unmet need for family planning is the condition in which fecund women of reproductive age group do not want to have a child soon or ever but are not using contraception" (Bhushan, 1997, p.x).It is also an important indicator for assessing government policies and programs. There are many reasons for this gap in the demand and supply of contraceptive use in India. It is not always due to the failure of government programs. Religious prohibition and opposition from husband or other members of the household, being one of the most prominent reason. Unintended pregnancies, unsafe abortions and maternal mortality are the problems faced by women with unmet need for family planning. To avoid unintended and mistimed pregnancies and help women to achieve desired family size, greater investments in family planning is required.

The Bucharest Conference of 1974 in which member states were asked to draft population policies, for the first time emphasized on the need to invest in family planning. In the International Conference on Population and Development held at Cairo in 1994, there was "a paradigm shift" from population control to individual well being (UNFPA, 2012). Then a Programme of Action advocated the universal availability of and accessibility to family planning services. S.C. Gulati (2005) stated that "In April 1996 there was a major paradigm shifts from the "target oriented" to "target-free approach" and then to client centered and demand driven Community Needs Assessment (CNA) approach. In 1997 Community Needs Assessment was renamed as Reproductive and Child Health (RCH)" (p.1)**.** Promotion of contraception for both spacing and limiting children in order to prevent unwanted pregnancies was one of the essential components of RCH. Ensuring well being to sexual and reproductive health of the individual was also focused on National Population Policy of 2000.

The present study "Unmet Need for Family Planning in Bihar" provides an insight into the level of unmet need for family planning in India and Bihar. *According to NFHS-III (2005-2006), about 22.8% of currently married women in Bihar have unmet need for family planning, which is comparatively much higher than that of India as a whole* (Kumar & Singh, 2013). According to ORGI (2012); IIPS & ORC Macro (2007) "Bihar is the state

characterized by high maternal and child mortality, low life expectancy, high fertility, high unmet need for contraception, low literacy rate, low coverage of child immunization and high child mal-nutrition" (as cited in Kumar & Singh, 2013, p.158) Thus it is necessary to study Bihar extensively in detail and analyze the effect of both the demand and supply factors on unmet need for family planning. To deal with the need for contraception, overcome the problems of unmet need and develop suitable strategies a comprehensive study of unmet need in the state is highly desirable.

The study also analyzes the determining factors associated with the unmet need for family planning in Bihar using DLHS (District level household surveys-III, 2007-08). The study also provides a comparison of level of unmet need for family planning among the districts of Bihar according to their health infrastructure, socio-economic status and quality of life index using data from Ministry of Health and Family Welfare, 2012 and Census of India, 2011. Unmet need for family planning in India is prevalent in different socio-economic strata of the society. But satisfying the demand for contraceptives results in substantial decline in fertility and can also play a very important role in achieving replacement level of fertility **(Mohapatra, 2010).**

There are large spatial and regional variations in the unmet need for family among women in India. Spatial variation is also evident with Bihar (36.1%) recording the highest level of unmet need for family planning followed by Jharkhand (33.5%), Uttar Pradesh (32.4%), and Meghalaya (32.3%). Analysis of the data shows that the eastern region comprising of the states of Bihar, Jharkhand, West Bengal, Odisha has the highest proportion of women with unmet for family planning (28.1%) followed by Central Region (26.6%) comprising the states of Chhattisgarh, Uttar Pradesh and Madhya Pradesh. In case of unmet need for spacing and limiting, the result is same.

In order to see the significant impact of satisfying the need for family planning on fertility, relationship between total fertility rate and met need for spacing and limiting has been examined using multiple linear regressions. Contraceptive use for spacing has a weaker association with total fertility rate than the contraceptive use for limiting because the contraceptive use for spacing is temporary. Contraceptive use for limiting came out to

be predictor variable. A regression equation is calculated using TFR and current contraceptive use for limiting for 29 states of India using NFHS III data. According to Bradley et al., (2012) "The total demand for family planning is estimated by summing the proportion of married women using contraceptive method and proportion of married women with an unmet need for family planning" (p.55)**.** This prediction is based on the assumption that all the unmet need for family planning (i.e. both spacing and limiting) is to be fully satisfied. It has been analyzed that TFR for India as a whole would decline from 2.7 children per women to 1.77 per women, a relative decline of 34.44%, if the need for both spacing and limiting is satisfied (Fig 4.4). The highest decline would be in Mizoram (from 2.86 children per women to 1.41 children per women) followed by Uttar Pradesh, Meghalaya, and Bihar where the decline is around more than 40%. The interesting fact is that Bihar would be close to achieve the replacement level of fertility if unmet need is satisfied, but still it has way ahead to go for achieving replacement level of fertility. The lowest decline in fertility would be experienced in states like Tamil Nadu followed by Andhra Pradesh mostly because the level of unmet need is low.

The effect of altering unmet need and contraceptive use for family planning on the total fertility rates of Bihar is analyzed with the help of NFHS III (2005-06) data. A regression equation is estimated with the help of CPR and TFR of 29 Indian states. Five different assumptions of increasing unmet need for family planning and decreasing contraceptive use has been adopted. Based on these five assumptions, total fertility rates are estimated with the different levels of unmet need for family planning and contraceptive use. It can be seen that even if we convert all unmet need to current use, i.e. if the unmet need for family planning is 0 and the total demand for family planning is met, Bihar will not be able to reach the replacement level of fertility. In that case, TFR would not even reduce by 50% and the reduction is of 37.05% with the TFR of 2.52 children per women (Table 4.6).

Bihar has very high level of unmet need for family planning as compared to other states of India. There are large variations in the level of unmet need for family planning across the districts of Bihar. At the regional level, Saryupar plain region has the highest level of unmet need for family planning (40%) whereas the Ganga-Son divide has the lowest

level of unmet need for family planning (32.8%) followed by Kosi plain (35.7%) (Map4.12). Trend analysis has been carried out during the three phases of DLHS (1999-2008) and it has been observed that the unmet demand of family planning for limiting purpose has shown little increase over time i.e. it increased from 21.8% in 2002-04 to 22.7% in 2007-08, while same for spacing has been declining steadily over the period i.e. it decreased from 18.3% in 1992-93 to 13.4% in 2007-08. Failure of the family planning programs to ensure enough choices to the people may be the reason for the decrease in unmet need for spacing methods over the period of time. Hence the government as well as the society should emphasize on providing choices of contraceptives and reproductive health services of a high quality according to their choice, affordability and without time lag.

An analysis of reasons for not using contraception by unmet need for spacing and limiting shows that religious prohibition was cited as the main reason for not using contraception for both spacing and limiting and on the whole opposition to use was cited as the main reason for not using contraception among women with unmet need (Fig 4.2). Most of the women cited "husband's opposition" as the main reason for not using contraception. Hence, counseling should be given to men (partners) also and make them aware about the benefits of planned pregnancies and small family. "Method related" reasons are another reason cited by women for not using contraception in Bihar. "Method related reasons" are cited more by old, urban, Hindu and women belonging to high standard of living. May be women in such categories are more aware about the problems associated with the methods. Hence, women reporting "method related reasons" or "opposition to use" should be focused by the government to address this issue.

To assess the effect of the district level variables i.e. health infrastructures, socio-economic status of the districts and quality of life index simple linear regression has been used. It has been analyzed that the Quality of life in the district and socio-economic status of the districts plays an important role in determining the level of unmet need for family planning (Table 4.11). The districts with worse quality of life have high level of unmet need for family planning. As the negative factors have been taken into consideration, the quality of life index and unmet need for family planning shows a positive relationship.

The districts which rank high in the socio-economic development index have low level of unmet need for family planning. However, the health infrastructure and manpower index do not show significant effect on determining the level of unmet need for family planning in the districts, as government facilities are distributed in a normative manner.

Differences in the prevalence of unmet need for family planning may be due to socio-economic differences among women. In order to analyze the association of various socio-economic, demographic factors on the unmet need for family planning in Bihar at the individual level, bivariate analysis has been carried out using DLHS III (2007-08) data. Secondly, the binary logistic regression has been used to show the effects of these variables on unmet need. It can be seen that the women belonging to the urban area have low level of unmet need as compared to the women residing in the rural areas. This is may be due to fact that women living in urban areas have appropriate knowledge about the availability of spacing and limiting methods and its usage. In case of religion, Muslims are more likely to have unmet need for family planning as compared to other religions (Fig 5.2). "Opposition to use" is cited as the main reason for not using contraception among Muslims mentioned above. Even the lower status and low position of Muslim women in terms of socio-economic status explains their vulnerability to have high unmet need. As compared to the SCs & STs and OBC, unmet need for family planning is low among other caste group which is considered to be socially and economically advanced group (Fig 5.3). Women who are exposed to media message have lower unmet need as compared to women who are not exposed to media messages related to family planning (Fig 5.6).

Demographic characteristics of women have prominent impact on unmet need for family planning. The unmet need for spacing declines with age and unmet need for limiting increases with age. This is due to the fact that at an early age women are not ready to bear child or become pregnant and also they want to maintain gap between the children. But as the age increases, the need for family planning services shifts from spacing to limiting. With increase in age most of the women already complete their fertility and do not want another child. On the whole unmet need is high in the early years of childbearing and declines after this age and is minimum in the last part of reproductive age groups (Fig

5.7). The study also shows that once women have first and second children, they want to delay the childbearing which increases their unmet need for spacing. But the unmet need for limiting increases after the birth of third or more than four children (Fig 5.9). And even women with more than 2 living sons are more likely to have unmet need for family planning as compared to women with no living sons (Table 5.1). This is very much prevalent in societies with strong son preference. In such societies, if desired number of sons is not reached even if desired family size is achieved, women would not use contraception, this result in higher level of unmet need for family planning.

Further, after controlling for all the other factors, regions of Bihar itself plays a significant role in influencing unmet need for family planning. Regions of Bihar itself play a significant role in influencing unmet need for family planning. It can be seen that women belonging to Mithila Plain are 1.161 times more likely to have unmet need for family planning as compared to women belonging to Saryupar Plain. Whereas the women belonging to region of Magadha-Anga Plain are 0.848 times less likely to have unmet need for family planning as compared to women of Saryupar Plain. These regions can be taken into consideration for proper programme implementation.

The analysis of association of village level variables and unmet need for family planning shows that supply side factors and community factors do not have effect on unmet need for family planning in Bihar. It can be seen that unmet need for family planning did not differ much with the selected village level variables i.e. availability, accessibility of any health facility, road availability and distance to nearest PHCs (Table 5.2). In Bihar, the individual socioeconomic variables are the determining factors of unmet need for family planning. . Hence unless there is rapid socio-economic development and modernization in Bihar, a substantial increase in the contraceptive would not be achieved.

From the above discussion it is clear that basically the marginalized or the disadvantageous sections of the society have high level of unmet need for family planning. Some of the hypotheses regarding the relationship of the demographic and socio-economic variables with unmet need for family planning i.e. women belonging to urban areas, higher education level, higher standard of living has low unmet need as

compared to women residing in rural areas, women with low education level and low standard of living etc. are supported by the analysis of DLHS III data.

The findings suggest that greater emphasis should be made on imparting information and education to young rural women belonging to low standard of living, illiterate women, belonging to the marginalized section of the society. Even the role of media is very important in dispelling misconceptions and misinformation about the methods and its usage. And contraceptive choices should be enlarged to meet women's unmet need. It is recommended to address the root causes and reasons for this unmet need. The socio-economic status and position of women in the society should be improved as it is not the family or the society but the women who takes the pain and risk of child birth and even its upbringing. Hence then only a women can exercise her reproductive right whether to have a child or not or whether to use family planning methods or not. The level of unmet need for family planning is high in young, poor, illiterate, SC/ST, Muslim women who belongs to marginalized section of the society and hence, government should target such women to encourage contraceptive use among them. As access to family planning services play a very vital role in improving the reproductive health of women which indirectly benefits the economy. Access to family planning services has many implications. Firstly, it reduces total fertility rate and it is well evident in the study. Secondly, it reduces the rate of unintended pregnancies, maternal mortality and high risk births. Thirdly, it improves birth spacing and reduces child mortality (Canning & Schultz, 2012). India, being a country a country with high infant deaths has little demand for contraception.

Bibliography

- Ahmed, S., & Mosley, W. H. (1997), Simultaneity in maternal-child health care utilization and contraceptive use: Evidence from developing countries. *Johns Hopkins Population Center.*

- Ainsworth, M., Beegle, K., & Nyamete, A. (1996). The impact of women's schooling on fertility and contraceptive use: A study of fourteen sub-Saharan African countries. *The World Bank Economic Review*, 10(1), 85-122.

- Alkema, L., Kantorova, V., Menozzi, C., & Biddlecom, A. (2013). National, regional, and global rates and trends in contraceptive prevalence and unmet need for family planning between 1990 and 2015: a systematic and comprehensive analysis. *The Lancet*, 381(9878), 1642-1652.

- Aly, H. Y., & Shields, M. P. (1991). Son preference and contraception in Egypt. *Economic Development and Cultural Change*, 39(2), 353-370.

- Anderson, J. E., & Cleland, J. G. (1984). The world fertility survey and contraceptive prevalence surveys: A comparison of substantive results. *Studies in Family Planning*, 15(1), 1-13.

- *Annual Health Survey Bihar 2011-12.* New Delhi: Vital Statistics Division Office of the Registrar General & Census Commissioner, India.

- Ansary, R., & Anisujjaman, M. (2012). Factors Determining Pattern of Unmet Need for Family Planning in Uttar Pradesh, India. *International Research Journal of Social Sciences,* 1(4), 16-23.

- Aryal, R. H., Pathak, R. S., Dottel, B. R., & Pant, P. D. (2008). A comparative analysis of unmet need in Nepal: Further analysis of the 2006 Nepal Demographic and Health Survey.

- Ashford, L. (2003). Unmet need for family planning: Recent trends and their implications for programs. *Population Reference Bureau*,1-7.

- Bagle, S &S. Kaur. 1972. Adoption of family planning in two industrial settings: A Comparative Study, Council of Social Development, New Delhi.

- Barman, S. (2013). Socio-economic and Demographic Determinants of Unmet Need for Family Planning in India and its Consequences. *Research on Humanities and Social Sciences*, 3(3), 62-75.

- Barman, S. (2013). Socio-economic and Demographic Differentials of Contraceptive Usage in Indian States: A Study Based on NFHS Data. *J Hum Ecol*, 42(1), 53-68.

- Barman, S. (2013). Socio-economic and Demographic Differentials of Contraceptive Usage in Indian States: A Study Based on NFHS Data. *J Hum Ecol*, 42(1), 53-68.

- Bbaale, E., & Mpuga, P. (2011). Female education, contraceptive use, and fertility: Evidence from Uganda. Consilience: *The Journal of Sustainable Development*, 6(1), 20-47.

- Berelson, B. (1969). Beyond family planning. *Studies in family Planning*, 1(38), 1-16.

- Bhandari, G. P., Premarajan, K. C., Jha, N., Yadav, B. K., Paudel, I. S., & Nagesh, S. (2006). Prevalence and determinants of unmet need for family planning in a district of eastern region of Nepal. *Kathmandu University Medical Journal*. 4(2): 203-10

- Bhandari, L., & Dutta, S. (2007). Health infrastructure in rural India. India infrastructure report.

- Bhattacharya, S. K., Ram, R., Goswami, D. N., Gupta, U. D., Bhattacharya, K., & Ray, S. (2006). Study of unmet need for family planning among women of reproductive age group attending immunization clinic in a medical college of Kolkata. *Indian Journal of Community Medicine*, 31(2), 4-6.

- Bhushan, I. (1997). Understanding unmet need. Working Paper Number 4. Baltimore, *Johns Hopkins University School of Public Health*, Center for Communication Programs.

- Bongaarts, J. (1991), "The KAP-gap and the unmet need for contraception" *Population and Development Review*, 17(2), pp. 293-313.

- Bongaarts, J. (2014). The impact of family planning programs on unmet need and demand for contraception. *Studies in family planning*, 45(2), 247-262.

- Bongaarts, J., & Bruce, J. (1995). The causes of unmet need for contraception and the social content of services, *Studies in family planning*, 26(2), 57-75.

- Bradley, S. E., & Casterline, J. B. (2014). Understanding unmet need: History, theory, and measurement. *Studies in family planning*, 45(2), 123-150.

- Bradley, S. E., Croft, T. N., Fishel, J. D., & Westoff, C. F. (2012). Revising unmet need for family planning.

- Canning, D., & Schultz, T. P. (2012). The economic consequences of reproductive health and family planning. *The Lancet*, 380(9837), 165-171.

- Casterline, J. B., & El-Zeini, L. O. (2014). Unmet need and fertility decline: a comparative perspective on prospects in sub-Saharan Africa. *Studies in family planning*, 45(2), 227-245.

- Casterline, J. B., & Sinding, S. W. (2000). Unmet need for family planning in developing countries and implications for population policy. *Population and development review*, 26(4), 691-723.

- Casterline, J. B., El-Zanaty, F., & El-Zeini, L. O. (2003). Unmet need and unintended fertility: longitudinal evidence from Upper Egypt. *International family planning perspectives*, 29(4), 158-166.

- Chaudhury, R. H. (2001). Unmet need for contraception in South Asia: levels, trends and determinants. *Asia Pacific Population Journal*, 16(3), 3-22.

- Chavada, M., & Bhagyalaxmi, A. (2009). Effect of socio-cultural factors on the preference for the sex of children by women in Ahmedabad district. *Health and population: Perspectives*, 32(4), 184-89.

- Chen, C. H., Santiso, R., & Morris, L. (1983). Impact of accessibility of contraceptives on contraceptive prevalence in Guatemala. *Studies in family planning*, 14(11), 275-283.

- Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., & Innis, J. (2006). Family planning: the unfinished agenda. *The Lancet*, 368(9549), 1810-1827.

- Cleland, J., Conde-Agudelo, A., Peterson, H., Ross, J., & Tsui, A. (2012). Contraception and health. *The Lancet*, 380(9837), 149-156.

- Cleland, J., Harbison, S., & Shah, I. H. (2014). Unmet need for contraception: issues and challenges. *Studies in family planning*, 45(2), 105-122.

- Cleland, J., Harbison, S., & Shah, I. H. (2014). Unmet need for contraception: issues and

challenges. *Studies in family planning*, 45(2), 105-122.

- Cochrane, S. H., & Guilkey, D. K. (1995). The effects of fertility intentions and access to services on contraceptive use in Tunisia. *Economic Development and Cultural Change*, 43(4), 779-804.

- Cohen, B. (2000). Family planning programs, socioeconomic characteristics, and contraceptive use in Malawi. *World Development*, 28(5), 843-860.

- Daniel, E. E., Masilamani, R., & Rahman, M. (2008). The effect of community-based reproductive health communication interventions on contraceptive use among young married couples in Bihar, India. *International family planning perspectives*, 34(4), 189-197.

- Devi, D. R., Rastogi, S. R., & Retherford, R. D. (1996)."Unmet Need for Family Planning in Uttar Pradesh", National Family Health Survey Subject Reports, No.11, IIPS, Mumbai and East-West Centre Program on Population, Honolulu, Hawaii, USA.

- Dyson, T. (2008). India's Demographic Transition and its consequences for Development. Academic Foundation.

- Dyson, T., & Moore, M. (1983). On kinship structure, female autonomy, and demographic behavior in India. *Population and development review*, 9(1) 35-60.

- El-Zanaty, F., Way, A., Kishor, S., & Casterline, J. B. (1999). Egypt in depth study on the reasons for non-use of family planning: results of a panel survey in Upper Egypt, National Population Council, Cairo, Egypt.

- Gaydos, L. M., Smith, A., Hogue, C. J., & Blevins, J. (2010). An emerging field in religion and reproductive health. *Journal of religion and health*, 49(4), 473-484.

- Ghosh, D. (2006). Effect of Mothers' Exposure to Electronic Mass Media on Knowledge and Use of Prenatal Care Services: A Comparative Analysis of Indian States*. *The Professional Geographer*, 58(3), 278-293.

- Gribble, J. N. (2012). Fact sheet: Unmet need for family planning. Washington, D.C., Population Reference Bureau [PRB [3] p

- Gulati, L. (1976), "Age of marriage of women and population growth: the Kerala experience", *Economic and Political Weekly*, 11(31/33), pp. 1225-1234.

- Gulati, S. C. (2005). Population Policies and Programs Since ICPD, 1994: Issues and Challenges Ahead. *Demography India*, *34*(1), 1.

- Hailemariam, A., & Haddis, F. (2011). Factors affecting unmet need for family planning in southern nations, nationalities and peoples region, Ethiopia.*Ethiopian journal of health sciences*, 21(2), 77-90.

- International Institute of Population Sciences (IIPS). 2001. District level Household Survey (1998-99). Bombay: IIPS.

- International Institute of Population Sciences (IIPS). 2006. District level Household Survey (2002-04). Bombay: IIPS.

- International Institute of Population Sciences (IIPS). 2007. National Family Health Survey (2005-06). Bombay: IIPS.

- International Institute of Population Sciences (IIPS). 2008. District level Household Survey (2007-08). Bombay: IIPS.

- Iyer, S. (2002). Religion and the decision to use contraception in India. *Journal for the Scientific Study of Religion*, 41(4), 711-722.

- Jejeebhoy, S. J., & Sathar, Z. A. (2001). Women's autonomy in India and Pakistan: the influence of religion and region. *Population and development review*, 27(4), 687-712.

- Jones, R. K., & Dreweke, J. (2011). Countering conventional wisdom: New evidence on religion and contraceptive use. Alan *Guttmacher Institute*,3-8.

- Kandel, N. R. (2013). Unmet Need for Contraception and its Associated Factors among Married Women of Reproductive Age in Simichaur VDC of Gulmi District. *Health Prospect*, 11, 11-14.

- Kansal, A., Kandpal, S. D., & Mishra, P. (2006). Reasons for not practicing contraception in a rural population of Dehradun District. *Journal of Communicable Diseases*, 38(1), 97.

- Khan, S., Bradley, S. E., Fishel, J., & Mishra, V. (2008). Unmet need and the demand for family planning in Uganda. Further analysis of the Uganda Demographic and Health Surveys 1995-2006.

- Khan, S., Bradley, S. E., Fishel, J., & Mishra, V. (2008). Unmet need and the demand for family planning in Uganda. Further Analysis of the Uganda Demographic and Health Surveys, 1995-2006. Calverton, Maryland, USA: Macro International Inc.

- Kisaakye, P. (2013). Determinants of Unmet Need for Contraception to Space and Limit Births among Various Groups of Currently Married Women in Uganda. *European Scientific Journal*, 9(19), 822-831.

- Korra, A. (2002). Attitudes toward family planning and reasons for nonuse among women with unmet need for family planning in Ethiopia. Calverton: ORC Macro.

- Kumar, A., & Singh, A. (2013). Trends and determinants of unmet need for family planning in Bihar (India): evidence from National Family Health Surveys.*Advances in Applied Sociology*, 3(02), 157.

- Machiyama, K., & Cleland, J. (2014). Unmet need for family planning in Ghana: The shifting contributions of lack of access and attitudinal resistance. *Studies in family planning*, 45(2), 203-226.

- Mahmood & Raza, (2008) *Statistical Methods in Geographical Studies* (New Delhi: Rajesh Publications,)

- Mazharul Islam, M., & Saidul Hasan, A. H. M. (2000). Mass media exposure and its impact on family planning in Bangladesh. *Journal of biosocial science*, 32(04), 513-526.

- Mishra, P.K. (2011). Intra- State Variations in Institutional Delivery in Uttar Pradesh, M.Phil Dissertation Submitted to Jawaharlal Nehru University, New Delhi (Unpublished).

- Mishra, V. K. (2004). Muslim/non-Muslim differentials in fertility and family planning in India.

- Mishra, V. K., Retherford, R. D., Nair, P. S., & Feeney, G. (1999). Reasons for discontinuing and not intending to use contraception in India. National Family Health Survey Subject Reports Number 13; Mumbai: International Institute of Population Sciences; and Population and Health Studies, Honolulu: East-West Center.

- Mohapatra, M. (2010). Fertility Implications of Addressing Unmet Need for Family Planning in India, M.Phil Dissertation Submitted to Jawaharlal Nehru University, New Delhi (Unpublished).

- Monnier, A. (1989). Fertility intentions and actual behaviour. A longitudinal study: 1974, 1976, 1979. *Population English Selection* No.44 (1), 237-259.

- Moursund, A., & Kravdal, Ø. (2003). Individual and community effects of women's education and autonomy on contraceptive use in India. *Population Studies*, 57(3), 285-301.

- Mroz, T. A., Bollen, K. A., Speizer, I. S., & Mancini, D. J. (1999). Quality, accessibility, and contraceptive use in rural Tanzania. *Demography*, 36(1), 23-40.

- Mutharayappa, R. (1997). Son preference and its effect on fertility in India. National Family Health Survey Subject Reports Number 3 Mumbai : International Institute of Population Sciences; and Honolulu : East-West Center.

- Nagdeve, D. A. (2012). Fertility and family planning differentials among caste groups in Rajasthan. *Journal of Family Welfare*, 58(2), 40-50.

- Nair, P. S. (1999). Factors affecting source of family planning services in India. National Family Health Survey Subject Reports Number 12, Mumbai: International Institute of Population Sciences; and Population and Health Studies,Honolulu: East-West Center.

- Ndaruhuye, D. M., Broekhuis, A., & Hooimeijer, P. (2009). Demand and unmet need for means of family limitation in Rwanda. *International perspectives on sexual and reproductive health*, 35(3), 122-130.

- Okech, T. C., Wawire, N. W., & Mburu, T. K. (2011). Contraceptive use among women of reproductive age in Kenya's City Slums. *Int J Bus Soc Sci*, 2(1), 22-43.

- Pritchett, L., & Summers, L. H. (1996). Wealthier is healthier. *Journal of Human resources*, 31(4), 841-868.

- Prusty, R. K. (2014). Use of Contraceptives and Unmet Need for Family Planning among Tribal Women in India and Selected Hilly States. *Journal of health, population, and nutrition*, 32(2), 342.

- Ramachandrappa, S. (2012) Schedule Caste Women and Family Planning In Karnataka-A Critical Analysis.International *Journal of Humanities and Social Science Invention* 1(1)?.45-49

- Ramesh, B. M., S.C. Gulati and R. D. Retherford (1996) "Contraceptive Use in India, 1992-93" NFHS Subject Reports No.2, International Institute of Population Sciences, Mumbai.

- Ramesh, B. M., S.C. Gulati and R. D. Retherford. 1996. "Contraceptive use in India, 1992-93." National Family Health Survey Subject Reports, No. 2 Mumbai : International Institute of Population Sciences; and Honolulu : East-West Center.

- Ramesh, P. (2008). Are social group differentials in fertility narrowing with rising level of living in Andhra Pradesh?.

- Ranjana, K., & Awdhesh, Y. (2012). Role of gender in contraceptive use among currently married women in Uttar Pradesh and Bihar. Research on Humanities and Social Sciences, 2(2), 34-45.

- Retherford, R. D., & Mishra, V. K. (1997). Media exposure increases contraceptive use. National Family Health Survey Bulletin, No.7 Mumbai : International Institute of Population Sciences; and Honolulu : East-West Center.

- Robey, B, J. Ross and o. Bhusan, 1996, "Meeting Unmet Need: New Strategies", Population Reports Series J, No.43. Baltimore, John Hopkins School of Public Health/Centre for Cornrnunication Programs.

- Robey, B., Ross, J., & Bhushan, I. (1996). Meeting unmet need: new strategies. Population Reports. Series J*: Family Planning Programs*, (43), 1-35.

- Ross, J., & Hardee, K. (2013). Access to contraceptive methods and prevalence of use. *Journal of biosocial science*, 45(06), 761-778.

- Sahoo, H. (2007). Determinants of contraceptive use in Orissa: An analysis from National Family Health Survey III. *Health and population-Perspectives and issues*, 30(3), 208-21.

- Saini, N. K., Bhasin, S. K., Sharma, R., & Yadav, G. (2007). Study of unmet need for family planning in a resettlement colony of east Delhi. *Health and Population-Perspectives and Issues*, 30(2), 124-133.

- Sarmad R, Akhtar, S., & Manzoor, S. (2007). Relationship of female literacy to contraceptive use in urban slums of Khushab (Punjab). *Biomedica*, 23, 21-23.

- Schenker, J. G. (2000). Women's reproductive health: monotheistic religious perspectives. *International journal of gynecology & obstetrics*, 70(1), 77-86.

- Schoemaker, J. (2005). Contraceptive use among the poor in Indonesia.International *Family Planning Perspectives*, 31(3), 106-114.

- Sedgh, G., & Hussain, R. (2014). Reasons for contraceptive nonuse among women having unmet need for contraception in developing countries. *Studies in Family Planning*, 45(2), 151-169.

- Sedgh, G., & Hussain, R. (2014). Reasons for contraceptive nonuse among women having unmet need for contraception in developing countries. *Studies in Family Planning*, 45(2), 151-169.

- Sengupta, R., & Das, A. (2012). Contraceptive practices and unmet need among young currently married rural women in empowered action group (EAG) states of India. *J Fam Welf*, 58(1), 1-14.

- Shah, N. M., Shah, M. A., & Radovanovic, Z. (1998). Patterns of desired fertility and contraceptive use in Kuwait. *International Family Planning Perspectives*, 24(3), 133-138.

- Sherin Raj, T., Tiwari, V. K., & Singh, J. V. (2013) REGIONAL VARIATIONS IN UNMET NEED OF FAMILY PLANNING IN RAJASTHAN. *Health and Population - Perspectives and Issues* 36 (1 & 2), 26-44.

- Sinding, S. W., Ross, J. A., & Rosenfield, A. G. (1994). Seeking common ground: Unmet need and demographic goals. *International Family Planning Perspectives*, 20(1), 23-32.

- Singh, R. (2012). Middle Ganga Plain. In R. Singh, & R. Singh (Ed.), *India A Regional Geography* (pp. 183-251). Varanasi: National Geographical Society of India.

- Singh, S., Darroch, J. E., Ashford, L. S., & Vlassoff, M. (2009). Adding It Up: The costs and Benefits of Investing in family Planning and maternal and new born health. *Guttmacher Institute*,1-40.

- Sonfield, A. (2006). Working to eliminate the world's unmet need for contraception. *Guttmacher Policy Review*, 9(1), 10-13.

- Sonfield, A., Hasstedt, K., & Gold, R. B. (2014). Moving forward: Family planning in the era of health reform. New York, *Guttmacher Institute*, 1-56.

- Speizer, I. S., Calhoun, L. M., Hoke, T., & Sengupta, R. (2013). Measurement of unmet

need for family planning: longitudinal analysis of the impact of fertility desires on subsequent childbearing behaviors among urban women from Uttar Pradesh, India. *Contraception*, 88(4), 553-560.

- Srikanthan, A., & Reid, R. L. (2008). Religious and cultural influences on contraception. *J Obstet Gynaecol Can*, 30(2), 129-137.

- Stash, S. (1999). Explanations of unmet need for contraception in Chitwan, Nepal. *Studies in family planning*, 30(4), 267-287.

- Sulthana, B., Shewade, H. D., Sunderamurthy, B., Manoharan, K., & Subramanian, M. (2015). Unmet need for contraception among married women in an urban area of Puducherry, India. *The Indian journal of medical research,*141(1), 115.

- Thang, N. M., & Anh, D. N. (2002). Accessibility and use of contraceptives in Vietnam. *International Family Planning Perspectives*, 28(4), 214-219.

- Toppo, L. V. (2014). Spatial distribution of housing and household amenities: A district level analysis, Odisha(doctoral dissertation, national institute of technology rourkela).

- Tsui, A. O., & Ochoa, L. H. (1992). Service proximity as a determinant of contraceptive behaviour: evidence from cross-national studies of survey data. *Family planning programmes and fertility*, 222-56.

- Tsui, A. O., McDonald-Mosley, R., & Burke, A. E. (2010). Family planning and the burden of unintended pregnancies. *Epidemiologic reviews*, 32(1), 152-174.

- United Nations (2015), Department of Economic and Social Affairs, Population Division World Contraceptive Use 2015 (POP/DB/CP/Rev2015).

- University of North Carolina, Carolina Population Center. 1997. "Do integrated MCH/ family planning programs increase contraceptive use? Findings from two North African studies." Evaluation Project, Chapel Hill, North Carolina.

- Vohra, R., Vohra, A., Sharma, S., Rathore, M. S., Sharma, B. N., & Sharma, M. P. (2014). Determinants of the unmet need for family planning among women of Jaipur, Rajasthan. *International Journal of Advanced Medical and Health Research*, 1(1), 20-25.

- Wablembo Mukisa Sarah, Ntozi James & Kwagala Betty "Does couple discussion influence unmet need for family planning in Uganda? ", uaps2011.princeton.edu/papers/110381

- West off C. F., and A. Bankole., (1995). Unmet need: 1990-1994. Demographic and Health Surveys comparative studies. No.16. Calverton, Maryland: macro international, Inc.

- Westoff Charles F., (2006). New estimates of unmet need and the demand for family planning. DHS Comparative Reports No. 14. Calverton, MD: Macro International.

- Westoff, C. F. (2006). New estimates of unmet need and the demand for family planning. Calverton, Maryland, Macro International, MEASURE DHS, 2006 Dec. [75] p. DHS Comparative Reports No. 14; USAID

- Westoff, C. F., & Bankole, A. (1995). The potential demographic significance of unmet need. *International Family Planning Perspectives*, 22(1), 16-20.

- Westoff, C. F., & Koffman, D. (2010). Birth spacing and limiting connections DHS Analytical Studies No. 21. Calverton, Maryland, USA: ICF Macro.

- Westoff, C. F., & Ochoa, L. (1991). Unmet Need and the Demand for Family Planning. DHS Comparative Studies No. 5. Institute for Resource Development, Columbia., USA.

- Westoff, C. F., & Pebley, A. R. (1981). Alternative measures of unmet need for family planning in developing countries. *International Family Planning Perspectives*, 7(4), 126-36.

- Westoff, C. F., & Rodriguez, G. (1995). The mass media and family planning in Kenya. *International Family Planning Perspectives*, 26-36.

- Wiltshire, J. C., Person, S. D., Kiefe, C. I., & Allison, J. J. (2009). Disentangling the influence of socioeconomic status on differences between African American and White women in unmet medical needs. *American journal of public health*, 99(9), 1659-1665.

- Zerai, A., & Tsui, A. O. (2001). The relationship between prenatal care and subsequent modern contraceptive use in Bolivia, Egypt and Thailand. *African journal of reproductive health*, 5(2), 68-82.

- http://www.jsk.gov.in/images/unfpa.pdf).

- http://www.who.int/reproductivehealth/topics/family_planning/unmet_need_fp/en/

- http://www.rchiips.org/index.html

Appendix 4.1: Unmet Need for family planning in Bihar, 2012.

Districts	Total Unmet need (%)
Araria	43.2
Aurangabad	27.9
Banka	34.4
Begusarai	33.3
Bhagalpur	34.1
Bhojpur	29.6
Buxar	33.5
Darbhanga	31.2
Gaya	29
Gopalganj	53.7
Jamui	34
Jehanabad	26
Kaimur (Bhabua)	29.1
Katihar	39.2
Khagaria	32.2
Kishanganj	38.7
Lakhisarai	32.1
Madhepura	34.7
Madhubani	34.8
Munger	31.9
Muzaffarpur	35.7
Nalanda	29.4
Nawada	32.5
Pashchim Champaran	31.3
Patna	20.7
Purba Champaran	40.3
Purnia	36.9
Rohtas	26.5
Saharsa	49.3
Samastipur	38
Saran	29
Sheikhpura	31.2
Sheohar	38.7
Sitamarhi	40.6
Siwan	56.4
Supaul	28.5
Vaishali	34.8

Source: Annual Health Survey, 2012.

Appendix 4.2: Sub centres in the Districts of Bihar, 2012.

Districts	SCs	Population	SCs per lakh population
Araria	199	2811569	7.08
Aurangabad	216	2540073	8.50
Banka	265	2034763	13.02
Begusarai	287	2970541	9.66
Bhagalpur	258	3037766	8.49
Bhojpur	302	2728407	11.07
Buxar	147	1706352	8.61
Darbhanga	259	3937385	6.58
Gaya	440	4391418	10.02
Gopalganj	195	2562012	7.61
Jamui	279	1760405	15.85
Jehanabad	64	1125313	5.69
Kaimur (Bhabua)	183	1626384	11.25
Katihar	330	3071029	10.75
Khagaria	171	1666886	10.26
Kishanganj	136	1690400	8.05
Lakhisarai	102	1000912	10.19
Madhepura	272	2001762	13.59
Madhubani	434	4487379	9.67
Munger	151	1367765	11.04
Muzaffarpur	480	4801062	10.00
Nalanda	374	2877653	13.00
Nawada	325	2219146	14.65
Pashchim Champaran	368	3935042	9.35
Patna	387	5838465	6.63
Purba Champaran	327	5099371	6.41
Purnia	334	3264619	10.23
Rohtas	186	2959918	6.28
Saharsa	152	1900661	8.00
Samastipur	362	4261566	8.49
Saran	413	3951862	10.45
Sheikhpura	85	636342	13.36
Sheohar	29	656246	4.42
Sitamarhi	212	3423574	6.19
Siwan	367	3330464	11.02
Supaul	178	2229076	7.99
Vaishali	335	3495021	9.59
Total	**9604**	**104099452**	**9.23**

Appendix 4.3: Primary Health centres in the Districts of Bihar, 2012.

Districts	PHCs	Population	PHC per lakh population
Araria	33	2811569	1.17
Aurangabad	70	2540073	2.76
Banka	43	2034763	2.11
Begusarai	41	2970541	1.38
Bhagalpur	71	3037766	2.34
Bhojpur	42	2728407	1.54
Buxar	35	1706352	2.05
Darbhanga	55	3937385	1.40
Gaya	71	4391418	1.62
Gopalganj	35	2562012	1.37
Jamui	57	1760405	3.24
Jehanabad	69	1125313	6.13
Kaimur (Bhabua)	30	1626384	1.84
Katihar	62	3071029	2.02
Khagaria	26	1666886	1.56
Kishanganj	16	1690400	0.95
Lakhisarai	22	1000912	2.20
Madhepura	36	2001762	1.80
Madhubani	88	4487379	1.96
Munger	30	1367765	2.19
Muzaffarpur	94	4801062	1.96
Nalanda	66	2877653	2.29
Nawada	67	2219146	3.02
Pashchim Champaran	53	3935042	1.35
Patna	85	5838465	1.46
Purba Champaran	73	5099371	1.43
Purnia	44	3264619	1.35
Rohtas	51	2959918	1.72
Saharsa	42	1900661	2.21
Samastipur	65	4261566	1.53
Saran	63	3951862	1.59
Sheikhpura	23	636342	3.61
Sheohar	12	656246	1.83
Sitamarhi	54	3423574	1.58
Siwan	61	3330464	1.83
Supaul	31	2229076	1.39
Vaishali	47	3495021	1.34
Total	**1863**	**104099452**	**1.79**

Appendix 4.4: Community Health centres in the Districts of Bihar, 2012.

Districts	CHCs	Population	CHCs per lakh population
Araria	2	2811569	0.07
Aurangabad	3	2540073	0.12
Banka	3	2034763	0.15
Begusarai	2	2970541	0.07
Bhagalpur	3	3037766	0.10
Bhojpur	3	2728407	0.11
Buxar	0	1706352	0.00
Darbhanga	2	3937385	0.05
Gaya	2	4391418	0.05
Gopalganj	3	2562012	0.12
Jamui	3	1760405	0.17
Jehanabad	2	1125313	0.18
Kaimur (Bhabua)	2	1626384	0.12
Katihar	1	3071029	0.03
Khagaria	1	1666886	0.06
Kishanganj	2	1690400	0.12
Lakhisarai	1	1000912	0.10
Madhepura	0	2001762	0.00
Madhubani	3	4487379	0.07
Munger	0	1367765	0.00
Muzaffarpur	1	4801062	0.02
Nalanda	3	2877653	0.10
Nawada	2	2219146	0.09
Pashchim Champaran	2	3935042	0.05
Patna	3	5838465	0.05
Purba Champaran	1	5099371	0.02
Purnia	2	3264619	0.06
Rohtas	2	2959918	0.07
Saharsa	0	1900661	0.00
Samastipur	1	4261566	0.02
Saran	3	3951862	0.08
Sheikhpura	1	636342	0.16
Sheohar	1	656246	0.15
Sitamarhi	2	3423574	0.06
Siwan	3	3330464	0.09
Supaul	2	2229076	0.09
Vaishali	3	3495021	0.09
Total	**70**	**104099452**	**0.07**

Appendix 4.5: Number of Doctors working in the Districts of Bihar, 2012.

Districts	No of Doctors working	Population	Doctors per lakh population
Araria	56	2811569	1.99
Aurangabad	99	2540073	3.90
Banka	74	2034763	3.64
Begusarai	118	2970541	3.97
Bhagalpur	116	3037766	3.82
Bhojpur	136	2728407	4.98
Buxar	91	1706352	5.33
Darbhanga	139	3937385	3.53
Gaya	152	4391418	3.46
Gopalganj	95	2562012	3.71
Jamui	57	1760405	3.24
Jehanabad	84	1125313	7.46
Kaimur (Bhabua)	65	1626384	4.00
Katihar	104	3071029	3.39
Khagaria	64	1666886	3.84
Kishanganj	40	1690400	2.37
Lakhisarai	56	1000912	5.59
Madhepura	61	2001762	3.05
Madhubani	127	4487379	2.83
Munger	73	1367765	5.34
Muzaffarpur	157	4801062	3.27
Nalanda	157	2877653	5.46
Nawada	67	2219146	3.02
Pashchim Champaran	128	3935042	3.25
Patna	351	5838465	6.01
Purba Champaran	184	5099371	3.61
Purnia	137	3264619	4.20
Rohtas	93	2959918	3.14
Saharsa	68	1900661	3.58
Samastipur	161	4261566	3.78
Saran	142	3951862	3.59
Sheikhpura	43	636342	6.76
Sheohar	49	656246	7.47
Sitamarhi	123	3423574	3.59
Siwan	91	3330464	2.73
Supaul	98	2229076	4.40
Vaishali	174	3495021	4.98

Appendix 4.6: Number of ANMs working in the Districts of Bihar, 2012.

Districts	No of ANMs working	Population	ANMs per lakh population
Araria	170	2811569	6.05
Aurangabad	553	2540073	21.77
Banka	463	2034763	22.75
Begusarai	579	2970541	19.49
Bhagalpur	687	3037766	22.62
Bhojpur	580	2728407	21.26
Buxar	324	1706352	18.99
Darbhanga	527	3937385	13.38
Gaya	956	4391418	21.77
Gopalganj	281	2562012	10.97
Jamui	387	1760405	21.98
Jehanabad	288	1125313	25.59
Kaimur (Bhabua)	302	1626384	18.57
Katihar	465	3071029	15.14
Khagaria	362	1666886	21.72
Kishanganj	164	1690400	9.70
Lakhisarai	233	1000912	23.28
Madhepura	134	2001762	6.69
Madhubani	598	4487379	13.33
Munger	299	1367765	21.86
Muzaffarpur	940	4801062	19.58
Nalanda	722	2877653	25.09
Nawada	344	2219146	15.50
Pashchim Champaran	714	3935042	18.14
Patna	860	5838465	14.73
Purba Champaran	764	5099371	14.98
Purnia	495	3264619	15.16
Rohtas	370	2959918	12.50
Saharsa	555	1900661	29.20
Samastipur	590	4261566	13.84
Saran	502	3951862	12.70
Sheikhpura	193	636342	30.33
Sheohar	137	656246	20.88
Sitamarhi	317	3423574	9.26
Siwan	461	3330464	13.84
Supaul	203	2229076	9.11
Vaishali	736	3495021	21.06

Appendix 4.7: Number of Nurses working in the Districts of Bihar, 2012.

Districts	Number of Nurses Working	Population	Nurses per lakh population
Araria	27	2811569	0.96
Aurangabad	87	2540073	3.43
Banka	66	2034763	3.24
Begusarai	89	2970541	3.00
Bhagalpur	82	3037766	2.70
Bhojpur	26	2728407	0.95
Buxar	22	1706352	1.29
Darbhanga	38	3937385	0.97
Gaya	85	4391418	1.94
Gopalganj	26	2562012	1.01
Jamui	75	1760405	4.26
Jehanabad	47	1125313	4.18
Kaimur (Bhabua)	23	1626384	1.41
Katihar	93	3071029	3.03
Khagaria	57	1666886	3.42
Kishanganj	24	1690400	1.42
Lakhisarai	47	1000912	4.70
Madhepura	29	2001762	1.45
Madhubani	25	4487379	0.56
Munger	45	1367765	3.29
Muzaffarpur	35	4801062	0.73
Nalanda	108	2877653	3.75
Nawada	56	2219146	2.52
Pashchim Champaran	55	3935042	1.40
Patna	75	5838465	1.28
Purba Champaran	67	5099371	1.31
Purnia	108	3264619	3.31
Rohtas	34	2959918	1.15
Saharsa	54	1900661	2.84
Samastipur	110	4261566	2.58
Saran	36	3951862	0.91
Sheikhpura	35	636342	5.50
Sheohar	22	656246	3.35
Sitamarhi	71	3423574	2.07
Siwan	12	3330464	0.36
Supaul	36	2229076	1.62
Vaishali	77	3495021	2.20

Appendix 4.8: Availability of Assets in households for each districts of Bihar, Census of India, 2011.

Districts	Radio/ Transistor	Television	Computer/Laptop		Telephone/Mobile Phone		
			With Internet	Without Internet	Landline only	Mobile only	Both
Pashchim Champaran	25.9	9.8	0.5	5.3	1.8	49	1.6
Purba Champaran	36.3	9.8	0.8	6.4	2.5	55.6	1.4
Sheohar	38.3	7.9	0.3	4.2	1.5	53.3	1.1
Sitamarhi	34.4	8.3	0.5	5.3	1.7	43.5	1.3
Madhubani	33.3	8.2	0.6	6.7	2.1	50.2	1.7
Supaul	24.3	6	0.4	5.3	1.4	44.4	1.2
Araria	22.4	7.2	0.5	4.9	1.5	40.2	1.2
Kishanganj	15.4	8.6	0.3	3.9	1.3	36.4	1.2
Purnia	19.7	9.9	0.7	4.6	1.5	37.6	1.2
Katihar	21.4	9.7	0.5	3.9	1.3	36.2	1.3
Madhepura	18.6	5.8	0.3	5.5	1.5	42.8	1.3
Saharsa	16.5	8.3	0.5	4.8	1.3	42.3	1.5
Darbhanga	24.8	9.9	0.8	5.8	2.1	50.6	2
Muzaffarpur	27.4	18.1	1.1	6.6	3.2	52.7	1.9
Gopalganj	36.7	14.6	0.9	7.1	3.2	70.3	1.5
Siwan	33.4	13.6	0.7	6.2	2.6	69.5	1.5
Saran	38	20	0.7	5.1	2.5	62.1	1.5
Vaishali	31.6	16	0.8	5.5	2.4	57.7	1.5
Samastipur	21.6	9.9	0.6	5.4	2	48.6	1.4
Begusarai	17.9	12.9	0.8	6.5	2.3	52	1.8
Khagaria	17.3	9.5	0.5	6.1	1.5	45.8	1.5
Bhagalpur	23.4	20.8	1.2	7.1	2.4	50.4	1.8
Banka	20.7	8.6	0.4	5.4	1.6	45	1
Munger	21.6	26.5	1	5.8	2.5	52.4	1.8
Lakhisarai	17.6	18.9	0.7	4.7	1.7	55.1	1.5
Sheikhpura	19.4	15.7	0.6	7.9	2.1	55	2.3
Nalanda	16.7	17.9	0.9	8.1	2.7	51.5	2
Patna	23.8	47.3	4.3	9.6	4	61.7	3.5
Bhojpur	28.7	21.1	0.9	7.5	2.9	59.4	2.3
Buxar	30	18.4	0.7	6.7	2.7	62	1.7
Kaimur (Bhabua)	25.4	19.9	0.9	6.2	2.6	56.7	1.8
Rohtas	27.1	23.3	1	7	2.7	64	1.8
Aurangabad	26.6	11.8	0.6	7.4	2.2	57.2	1.4
Gaya	23.5	15.6	1	7.3	2.4	51.6	1.6
Nawada	16.7	9.8	0.5	7.7	1.7	49.7	1.4
Jamui	16.6	8.8	0.6	6.7	2.6	48	1.2
Jehanabad	28.8	13.7	0.5	5.35	1.7	51.7	1.15
Bihar	**25.8**	**14.5**	**0.9**	**6.2**	**2.2**	**51.6**	**1.6**

Appendix 4.8: Availability of Assets in households for each districts of Bihar, Census of India, 2011 (cont.)

Districts	Bicycle	Scooter/ Motorcycle/Moped	Car/ Jeep/Van	Households with TV, Computer/Laptop, Telephone/mobile phone and Scooter/ Car
Pashchim Champaran	60.1	6.8	1.5	0.4
Purba Champaran	62.1	8	2	0.6
Sheohar	49.3	5.2	0.9	0.3
Sitamarhi	43.3	5.3	1	0.4
Madhubani	46.2	6.6	1.3	0.5
Supaul	43.7	5	0.9	0.2
Araria	49.7	5.7	0.9	0.3
Kishanganj	52.9	5.8	0.7	0.3
Purnia	45.6	6.3	1.3	0.7
Katihar	46.3	5.7	0.8	0.5
Madhepura	42.4	5.3	1.1	0.3
Saharsa	35.3	5.6	1	0.5
Darbhanga	39.8	6.5	1.3	0.6
Muzaffarpur	57.9	9.9	2.5	1.2
Gopalganj	74.2	12.3	2.3	0.8
Siwan	70.3	11.8	2	0.8
Saran	67.3	10.7	1.7	0.8
Vaishali	62.8	9.5	1.8	0.7
Samastipur	53.9	6.6	1.2	0.5
Begusarai	49.6	6.9	1.6	0.8
Khagaria	30.5	4.3	1	0.3
Bhagalpur	39.1	8.5	1.5	1.5
Banka	41.9	6.4	0.9	0.4
Munger	42.7	9.2	1.4	1.1
Lakhisarai	29.8	5.8	1.5	0.5
Sheikhpura	32.4	6.7	1.7	0.6
Nalanda	24.9	6	1.6	0.8
Patna	45	18.4	5.2	6.4
Bhojpur	49.8	10.5	1.8	1
Buxar	52.6	10	2	0.8
Kaimur (Bhabua)	45.3	9.4	2.7	0.8
Rohtas	49.3	10.9	2.4	1
Aurangabad	50.4	8.4	1.8	0.6
Gaya	42.6	8.6	1.7	1.1
Nawada	21.8	4.6	1.2	0.4
Jamui	36.8	6	1.6	0.4
Jehanabad	42.7	7	1.3	0.5
Bihar	**48.7**	**8.1**	**1.7**	**1**

Appendix 4.9: Female Literacy Rate, Urban Population % and PNDDP of Bihar

Districts	Female Literacy Rate	Urban Population%	Percapita Net District Domestic Product
Araria	43.93	6.00	7875.117
Aurangabad	59.71	9.32	9739.142
Banka	47.66	3.50	8218.027
Begusarai	55.21	19.18	15600.51
Bhagalpur	54.89	19.83	15332.08
Bhojpur	58.03	14.29	11026.14
Buxar	58.63	9.64	9950.017
Darbhanga	45.24	9.74	9696.304
Gaya	53.34	13.24	10570.02
Gopalganj	54.81	6.35	10793.61
Jamui	47.28	8.26	8872.03
Jehanabad	55.01	12.01	9941.208
Kaimur (Bhabua)	58.4	4.03	9215.638
Katihar	44.39	8.92	9949.22
Khagaria	49.56	5.23	10202.14
Kishanganj	46.76	9.53	8864.993
Lakhisarai	52.57	14.29	11666.24
Madhepura	41.74	4.42	7641.603
Madhubani	46.16	3.60	8243.448
Munger	62.08	27.79	18859.8
Muzaffarpur	54.67	9.86	13797.33
Nalanda	53.1	15.91	11186.2
Nawada	48.86	9.71	8562.565
Pashchim Champaran	44.69	9.99	8860.488
Patna	61.96	43.07	59530.98
Purba Champaran	45.12	7.87	9510.274
Purnia	42.34	10.51	9047.806
Rohtas	62.97	14.45	12303.18
Saharsa	41.68	8.24	10807.17
Samastipur	51.51	3.47	9564.547
Saran	54.42	8.94	9407.085
Sheikhpura	53.4	17.13	8539.132
Sheohar	45.26	4.28	6332.611
Sitamarhi	42.41	5.56	8511.68
Siwan	58.66	5.49	9571.235
Supaul	44.77	4.74	7542.393
Vaishali	56.73	6.67	11151.71

Appendix 4.10: Percentage of households electrified in the districts of Bihar, 2012.

Districts	Total Number of household	No of households electrified	% of households electrified
Araria	561455	43290	7.71
Aurangabad	387122	44456	11.48
Banka	380013	62359	16.41
Begusarai	596110	120373	20.19
Bhagalpur	563306	174534	30.98
Bhojpur	415555	62153	14.96
Buxar	262398	46760	17.82
Darbhanga	805786	127442	15.82
Gaya	690505	112617	16.31
Gopalganj	421727	69375	16.45
Jamui	308291	32633	10.59
Jehanabad	299449	29844	9.97
Kaimur - Bhabua	245048	52899	21.59
Katihar	617063	60900	9.87
Khagaria	327701	40641	12.40
Kishanganj	335711	58718	17.49
Lakhisarai	164430	44491	27.06
Madhepura	401001	23236	5.79
Madhubani	901539	113281	12.57
Munger	263749	90461	34.30
Muzaffarpur	947863	180651	19.06
Nalanda	487322	101378	20.80
Nawada	346749	31162	8.99
Pashchim Champaran	708065	57546	8.13
Patna	957441	546859	57.12
Purba Champaran	984303	74979	7.62
Purnia	640713	86058	13.43
Rohtas	455878	114893	25.20
Saharsa	368212	41342	11.23
Samastipur	850353	88021	10.35
Saran	641742	94787	14.77
Sheikhpura	103748	20065	19.34
Sheohar	148889	10004	6.72
Sitamarhi	733083	66263	9.04
Siwan	544879	52935	9.72
Supaul	440804	51028	11.58
Vaishali	632626	70001	11.07
Bihar	**18940629**	**3098435**	**16.36**

Appendix 4.11: Percentage of Households to Total Households by Household Amenities

	Material of Roof		Number of Dwelling rooms	
Districts	**Grass/ Thatch/ Bamboo/ Wood/Mud etc.**	**Plastic/ Polythene**	**No exclusive room**	**One room**
Pashchim Champaran	46.9	0.3	2.2	36.8
Purba Champaran	41.5	0.5	1.7	37.5
Sheohar	52.2	0.4	1.6	47.1
Sitamarhi	37.2	0.6	1.8	51.8
Madhubani	42.2	0.6	2.4	47.8
Supaul	48.4	2.7	2.9	51.9
Araria	36.8	1.5	4.1	57.6
Kishanganj	14	4.6	4.9	64.6
Purnia	39.6	1.4	5.4	58.5
Katihar	28	0.6	3.2	62.1
Madhepura	46.1	2.1	3.1	58.6
Saharsa	47.1	1.4	3.6	61
Darbhanga	28	2.5	4	66.7
Muzaffarpur	38.7	0.9	2.9	48.9
Gopalganj	20.1	0.4	2.7	31.3
Siwan	10.9	0.4	2.1	37
Saran	20	0.4	2.1	38.2
Vaishali	37.8	0.7	2.6	51.4
Samastipur	31	3.1	2.5	65.2
Begusarai	24.5	1.5	3.7	66.7
Khagaria	38.4	2.1	4.4	70.3
Bhagalpur	30.7	1.2	2.5	56.1
Banka	44.8	0.6	2.1	47.4
Munger	27	0.7	2.4	50
Lakhisarai	21.4	0.5	6.3	37.3
Sheikhpura	23.5	0.5	2.3	26.9
Nalanda	21.6	0.7	3.4	27.6
Patna	17.8	0.7	2.4	27.7
Bhojpur	19.6	0.8	2.2	26
Buxar	18.8	1.1	3	24.6
Kaimur (Bhabua)	20.3	0.7	2.2	25.5
Rohtas	17.5	0.7	2.2	23.7
Aurangabad	27	0.6	2	20.8
Gaya	29	0.6	1.5	19.4
Nawada	22.6	0.7	1.7	18.8
Jamui	18.8	0.8	3.5	41.1
Jehanabad	25	0.7	1.5	18.4

Appendix 4.11: Percentage of Households to Total Households by Household Amenities (cont.)

	Main source of lightening			
Districts	**Kerosene**	**Solar energy**	**Other oil**	**Any other**
Pashchim Champaran	90.9	0.4	0.3	0.2
Purba Champaran	91.3	0.5	0.4	0.2
Sheohar	92.2	0.6	0.2	0.3
Sitamarhi	89.9	0.4	0.3	0.3
Madhubani	86.3	0.5	0.2	0.4
Supaul	87.7	0.4	0.1	0.2
Araria	91.6	0.3	0.2	0.1
Kishanganj	81.9	0.2	0.3	0.1
Purnia	85.8	0.2	0.3	0.1
Katihar	89.2	0.3	0.2	0.3
Madhepura	93.5	0.3	0.3	0.1
Saharsa	88	0.3	0.2	0.2
Darbhanga	83	0.4	0.3	0.4
Muzaffarpur	80.1	0.3	0.2	0.2
Gopalganj	82.4	0.5	0.3	0.2
Siwan	89	0.6	0.4	0.2
Saran	84	0.6	0.4	0.2
Vaishali	87.8	0.4	0.3	0.3
Samastipur	88.7	0.3	0.2	0.3
Begusarai	79	0.3	0.2	0.2
Khagaria	86.9	0.3	0.2	0.2
Bhagalpur	67.7	0.5	0.4	0.3
Banka	82.3	0.6	0.3	0.3
Munger	64.5	0.4	0.4	0.3
Lakhisarai	71.5	0.9	0.1	0.3
Sheikhpura	78.9	1	0.5	0.3
Nalanda	77.1	1.3	0.3	0.4
Patna	41.9	0.4	0.2	0.2
Bhojpur	82.4	1.7	0.4	0.4
Buxar	80.2	1.1	0.5	0.3
Kaimur (Bhabua)	77	0.5	0.5	0.3
Rohtas	73.4	0.6	0.3	0.4
Aurangabad	86.2	1.6	0.4	0.2
Gaya	82	0.9	0.4	0.2
Nawada	88.8	1.5	0.3	0.3
Jamui	87.9	0.8	0.3	0.2
Jehanabad	82.8	1.1	0.5	0.3

Appendix 4.11: Percentage of Households to Total Households by Household Amenities (cont.)

	Type of fuels used for cooking				
Districts	**Fire-wood**	**Crop residue**	**Cowdung cake**	**Coal,Lignite,Charcoal**	**Any other**
Pashchim Champaran	53.5	30.7	9.6	0.1	0.3
Purba Champaran	49.6	36.2	7.8	0.1	0.5
Sheohar	34.7	45	15.9	0	1.2
Sitamarhi	43.4	34.8	14.2	0.1	1.5
Madhubani	45.6	18.7	27.4	0.1	2.1
Supaul	30.7	34.4	29.2	0.1	2.4
Araria	18.2	72.1	5.6	0.1	0.6
Kishanganj	15	75.3	3	0.2	2.5
Purnia	16.4	74.6	2.4	0.1	0.8
Katihar	18.7	70.4	4.2	0.2	0.9
Madhepura	31.5	52.5	11.6	0.2	0.9
Saharsa	28.9	45.9	17.6	0.2	1.1
Darbhanga	39.7	30.9	18.6	0.4	2.1
Muzaffarpur	45.8	35.5	7.2	0.4	1
Gopalganj	48.3	39.7	3.7	0.1	0.2
Siwan	54.9	30.3	5.8	0.2	0.3
Saran	52.5	26	11.7	0.5	0.5
Vaishali	49.6	28.7	12.2	0.3	1.2
Samastipur	36.6	48.8	6.9	0.1	1.7
Begusarai	39.2	41.5	8.7	0.7	0.9
Khagaria	24.3	63.4	6.7	0.2	0.4
Bhagalpur	30.8	30.3	17.6	7.7	1.4
Banka	32.6	23.3	35.6	1.3	2.5
Munger	45.2	12.6	20.8	1.1	0.7
Lakhisarai	30.2	19.9	39.5	0.9	0.6
Sheikhpura	9.5	24.4	54.9	1.6	1.8
Nalanda	14.1	17.1	54.2	2.6	1.5
Patna	16	7.3	37.5	2.8	1.2
Bhojpur	24.5	7.2	53.3	0.9	1.5
Buxar	22.1	6.3	58	0.8	1
Kaimur (Bhabua)	23	5.1	64	0.6	1
Rohtas	21	6.2	58.7	2.5	1.1
Aurangabad	22.8	9.2	57.8	1.7	1.1
Gaya	34.6	13.4	37.1	3.5	1.8
Nawada	30.9	16.2	40.7	3.6	1.7
Jamui	54.1	14.1	24	1.5	1.1
Jehanabad	17.9	12.1	56.3	1.7	2.3

Appendix 4.11: Percentage of Households to Total Households by Household Amenities (cont.)

	Location of drinking water source	**Kitchen facility**	**Number of households not having latrine**
Districts	Away from the premises	Does not have kitchen	No latrine
Pashchim Champaran	8	54.6	84.1
Purba Champaran	8.4	62.4	81.8
Sheohar	10.2	64.8	79.6
Sitamarhi	16.7	63.6	79.2
Madhubani	15.8	39.5	81.5
Supaul	4.8	25.9	89.2
Araria	5.5	16.5	90.6
Kishanganj	10	9.5	89.6
Purnia	8.2	17.9	86.3
Katihar	10.2	21.7	82.5
Madhepura	7.2	30.7	86.9
Saharsa	9.5	43.7	83.3
Darbhanga	15.9	51.7	74.9
Muzaffarpur	9.2	70.9	72.9
Gopalganj	5.5	60	80
Siwan	5.1	69.9	77.1
Saran	8.2	72.7	78.6
Vaishali	12.3	75.8	72.8
Samastipur	13.3	72.2	81.2
Begusarai	10.6	64.7	68.7
Khagaria	11.4	55.5	76.2
Bhagalpur	18.5	57.6	66.3
Banka	28.9	77.9	87.7
Munger	16.5	65.6	61.2
Lakhisarai	18.4	71.7	68.2
Sheikhpura	21.8	74.8	71.1
Nalanda	20.4	77.1	69.3
Patna	10.2	58.1	47
Bhojpur	5.9	70.8	72.8
Buxar	7.4	67.5	75.3
Kaimur (Bhabua)	17.4	65.9	83.3
Rohtas	5.7	67.3	71.8
Aurangabad	9.9	74.4	78.2
Gaya	19	69.1	75.8
Nawada	18.9	72.1	77.7
Jamui	28.4	75.5	85.2
Jehanabad	11.9	74.9	72.2

Appendix 4.12:Composite Index of various district level variables in Bihar

Districts	Health Infrastructure Index	Health Manpower Index	Socio-economic development index	Quality of life index
Araria	-2.27	-4.59	-0.84	5.40
Aurangabad	1.71	1.42	0.00	-0.74
Banka	3.09	1.24	-0.54	1.38
Begusarai	-1.01	0.76	0.40	-0.95
Bhagalpur	0.66	0.94	0.91	-2.77
Bhojpur	0.66	0.25	0.45	-2.41
Buxar	-1.76	0.40	0.23	-2.27
Darbhanga	-2.54	-2.18	-0.27	0.66
Gaya	-0.95	-0.07	0.31	-1.88
Gopalganj	-0.82	-2.41	0.01	-0.52
Jamui	6.41	1.60	-0.24	-0.05
Jehanabad	4.17	5.37	-0.26	-2.35
Kaimur (Bhabua)	1.48	-0.60	0.33	-1.16
Katihar	-0.31	-0.39	-0.70	3.24
Khagaria	-0.65	1.36	-0.38	2.40
Kishanganj	-1.27	-3.33	-0.61	3.51
Lakhisarai	1.13	3.96	0.33	-3.24
Madhepura	-0.20	-3.29	-0.81	5.29
Madhubani	-0.12	-3.04	-0.59	2.40
Munger	-0.59	2.43	1.20	-5.39
Muzaffarpur	-0.94	-1.52	0.38	-0.56
Nalanda	2.47	3.42	0.59	-3.47
Nawada	3.96	-1.00	-0.14	-1.09
Pashchim Champaran	-1.52	-1.26	-0.61	2.80
Patna	-2.41	0.20	4.93	-12.15
Purba Champaran	-3.19	-1.58	-0.52	2.06
Purnia	-0.96	0.45	-0.44	4.17
Rohtas	-1.80	-2.48	0.82	-3.16
Saharsa	-1.76	1.97	-0.50	3.59
Samastipur	-2.14	-0.66	-0.54	1.74
Saran	-0.19	-2.28	-0.18	-0.92
Sheikhpura	5.75	6.65	0.42	-2.66
Sheohar	-0.63	3.95	-1.10	3.13
Sitamarhi	-2.25	-1.96	-0.85	1.52
Siwan	0.69	-3.18	-0.18	-0.96
Supaul	-1.19	-1.72	-0.80	5.21
Vaishali	-0.72	1.18	-0.21	0.20

Appendix 5.1: Explanatory Variables used in Logistic Regression

Socio-economic Background Characteristics	Frequency(N)	Percent
Respondent's current Age		
15-19	1681	37.1
20-24	3869	42.5
25-29	3487	39.7
30-34	2625	36
35+	4346	29.7
Mother's age at birth		
<25 yrs@	14608	38.7
25-34 yrs	685	36.8
>35 yrs	716	28.1
No of living children		
0	715	15
1	2435	44.5
2	2724	41.5
3	2552	34.2
4+	7582	37.7
No of living sons		
0	9110	28.7
1	5816	53.3
2+	1083	63.4
Religion		
Hindu	13024	34.2
Muslim	2950	48.2
Others	35	35.3
Caste Groups		
SC & ST	3949	40.4
OBC	9298	35.2
Others	2750	33.6
Place of residence		
Rural	14877	36.7
Urban	1131	29.1

Appendix 5.1: Explanatory Variables used in Logistic Regression (cont.).

Women's education	Frequency	Percentage
No education	112	38.4
Less than 5 yrs	1100	33.4
5-9 yrs	2238	31.5
>10 yrs	1326	28.3
Wealth index		
Poor	11519	39.6
Medium	2618	32.6
Rich	1872	25.8
Media Exposure		
Yes	4683	31
No	6938	37.4
Regions of Bihar		
Saryupar Plain	1248	40
Mithila	4952	36.2
Kosi	3180	35.7
Ganga-son divide	1614	32.8
Magadha Anga Plain	5014	36.5