PREVALENCE OF CHILD MARRIAGE AND ITS IMPACT ON MATERNAL AND CHILD HEALTH IN INDIA

Dissertation submitted to Jawaharlal Nehru University
in partial fulfillment of the requirements for
award of the degree of

MASTER OF PHILOSOPHY

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2018

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20 JULY 2018

DECLARATION

I, Pintu Paul, hereby declare that the dissertation entitled **"Prevalence of Child Marriage and Its Impact on Maternal and Child Health"** submitted by me in partial fulfillment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** is my bonafide work and that it has not been submitted so far in part or in full, for any degree or diploma of this university or any other university.

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CERTIFICATE

It is hereby recommended that the dissertation may be placed before the examiners for evaluation.
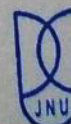
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Dedicated

To

Maa & Baba

Acknowledgment

Words are insufficient to express my affection for Riya Paul. She has always been with me during my tough time. Her encouragement and unconditional support made this work successful.

I am deeply indebted to my uncle, aunty, and relatives for their encouragement and support in every moment of my life.

Finally, I want to dedicate this work to my mother and father for their lifelong struggle in my entire career to make me what I am today. Thanks to dada & boudi for their love, blessings, and support.

Place: JNU, New Delhi   *(Pintu Paul)*

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CRC	Convention on the Rights of the Child
DHS	Demographic Health Survey
DLHS	District Level Household and Facility Survey
HIV	Human Immunodeficiency Virus
IHDS	India Human Development Survey
JSY	Janani Suraksha Yojana
MDG	Millennium Develop Goal
MICS	Multiple Indicators Cluster Survey
NFHS	National Family Health Survey
NRHM	National Rural Health Mission
SDG	Sustainable Development Goal
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Chapter-1
Introduction

1.1 Statement of the Problem

Child marriage, also known as early marriage or forced marriage is a human right violation which adversely affects the health and well-being of adolescent girls.[1] UNICEF defined child marriage as the marriage or union below 18 years of age.[2] Child marriage is highly prevalent among the girls who are living in impoverished areas, having low educational attainment, and poor economic status.[3]

The practice of child marriage is typically driven by poverty, socio-cultural norms, and discrimination against girls.[4] The timing of marriage especially arranged marriage and selection of spouse is typically decided by parents or clan community in Indian society. Parents often marry off their daughter to reduce the financial burden on the household. Dowry tradition forces parents to marry off their daughter at very early age because the bride price will be high if she becomes older. Parents may often think that they can improve their social status through their daughter's marriage with upper caste family (i.e., hypergamy).[5] In a country like India where the desire for children is high especially son child, the younger bride is preferred because they have longer reproductive span to produce children and they can easily be controlled.[6] Additionally, younger brides have less probability of previous sexual contact which is essential to protect the prestige and honor of the groom's family as well as the bride's family.[7]

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[1] United Nations Population Fund. "Marrying too young: End child marriage." (2012); United Nations Children's Fund. "Ending child marriage: Progress and prospects." (2014).

[2] United Nations Children's Fund. "Convention on the Rights of the Child." (1989); United Nations Population Fund. "Marrying too young: End child marriage." (2012).

[3] Nour, Nawal M. "Child marriage: a silent health and human rights issue." *Reviews in obstetrics and gynecology* 2, no. 1 (2009): 51; Raj, Anita, Niranjan Saggurti, Donta Balaiah, and Jay G. Silverman. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India: a cross-sectional, observational study." *The Lancet* 373, no. 9678 (2009): 1883-1889.

[4] Nour, "Child marriage: a silent health and human rights issue."

[5] Bloom, David E., and Palli Hanumantha Reddy. "Age patterns of women at marriage, cohabitation, and first birth in India." *Demography* 23, no. 4 (1986): 509-523.

[6] Jensen, Robert, and Rebecca Thornton. "Early female marriage in the developing world." *Gender & Development* 11, no. 2 (2003): 9-19.

[7] Jensen et al. "Early female marriage in the developing world." 9-19; Arnold, Fred, Minja Kim Choe, and Tarun K. Roy. "Son preference, the family-building process and child mortality in India." *Population studies* 52, no. 3 (1998): 301.

In Hindu tradition, marriage is considered as a sacrament for parents because of '*Kanya Daan*' in marriage which earns religious merit.[8] Among Hindus, parents prefer to marry-off their daughter before the onset of puberty because "purity" at marriage is very important in Hindu culture.[9] Parents also believe that marriage at an early age protects their daughter from premarital sexual activity, sexual abuse, and unwanted pregnancies and the sexually transmitted diseases.[10]

Child marriage has significant demographic, social, economic, and health implications. It denies girls from education and employment opportunities at very early age.[11] Child marriage adversely affects the reproductive health status of women.[12] Child marriage is significantly associated with early pregnancy and childbearing which increases the risk of morbidities during pregnancy and childbirth such as gestational hypertension, bleeding, and obstructed labor.[13] Complications-related to pregnancy and childbirth are the leading causes of maternal deaths in developing countries among young adolescent girls.[14] Child married women are more likely to married with an older partner.[15] The younger bride may have lower power, status, and autonomy in the household when the husband-wife age gap is larger. Husband or mother-in-law may exert power to control young bride as they are less physically, emotionally, and mentally mature.[16] Therefore, they have lower decision-making ability on health care and other household decisions. Lower status in the family and controlling nature of husband over young bride exposes to risk of intimate partner violence.[17] Spousal violence further linked to increased risk of adverse health outcomes among women and children.[18]

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[8] Arnold et al. "Son preference, the family-building process and child mortality in India." 301.

[9] Bloom et al. "Age patterns of women at marriage, cohabitation, and first birth in India." 509-523.

[10] Nour "Child marriage: a silent health and human rights issue."; Jain, Saranga, and Kathleen Kurz. *New insights on preventing child marriage: A global analysis of factors and programs*. International Center for Research on Women (ICRW), 2007.

[11] Nour, Nawal M. "Health consequences of child marriage in Africa." *Emerging infectious diseases* 12, no. 11 (2006): 1644.

[12] Ibid.

[13] Nour "Child marriage: a silent health and human rights issue."

[14] Gibbs, Cassandra M., Amanda Wendt, Stacey Peters, and Carol J. Hogue. "The impact of early age at first childbirth on maternal and infant health." *Paediatric and perinatal epidemiology* 26 (2012): 259-284; World Health Organization. "Health for the world's adolescents: a second chance in the second decade: summary." (2014). United Nations Children's Fund, "The state of the world's children 2009: maternal and newborn health." Vol. 9. *Unicef*, 2008.

[15] Jensen, Robert, and Rebecca Thornton. "Early female marriage in the developing world." *Gender & Development* 11, no. 2 (2003): 9-19.

[16] Ibid.

[17] Raj, Anita, Niranjan Saggurti, Danielle Lawrence, Donta Balaiah, and Jay G. Silverman. "Association between adolescent marriage and marital violence among young adult women in

Moreover, young bride has lower decision-making ability to use the family planning methods[19] leads to unplanned pregnancies,[20] increased risk of sexually transmitted infections including HIV.[21] Child marriage also linked to the health and well-being of children. Children born to adolescent mother are vulnerable to prematurity and low birth weight.[22] Child marriage also increases the risk of children's physical growth, morbidity, and mortality. Poor health outcomes of child married women, and their offspring are partly attributed to their biological immaturity.[23] Further, limited decision-making ability on health care, restricted physical mobility, lower educational attainment, and poverty among child bride increases the risk of adverse health outcomes.

The harmful practice of child marriage not only affects the health of young women but also increases the vulnerability of several adverse health outcomes of their offspring. Therefore, it is crucial to understand the mechanism behind the practice of child marriage and to what extent it affects the health status of women and their children which could help some policy intervention. Therefore, this study aims to examine the prevalence of child marriage and its socioeconomic correlates. Further, this study assesses the association between child marriage and health outcomes of women and children.

India." *International Journal of Gynecology & Obstetrics* 110, no. 1 (2010): 35-39; Kidman, Rachel. "Child marriage and intimate partner violence: a comparative study of 34 countries." *International journal of epidemiology* 46, no. 2 (2016): 662-675; Garcia-Moreno, Claudia, Henrica AFM Jansen, Mary Ellsberg, Lori Heise, and Charlotte H. Watts. "Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence." *The lancet* 368, no. 9543 (2006): 1260-1269.

[18] Campbell, Jacquelyn C. "Health consequences of intimate partner violence." *The lancet* 359, no. 9314 (2002): 1331-1336.

[19] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889;

[20] Nour, "Health consequences of child marriage in Africa." 1644; Adhikari, Ramesh, Kusol Soonthorndhada, and Pramote Prasartkul. "Correlates of unintended pregnancy among currently pregnant married women in Nepal." *BMC International Health and Human Rights* 9, no. 1 (2009): 17.

[21] Clark, Shelley. "Early marriage and HIV risks in sub-Saharan Africa." *Studies in family planning* 35, no. 3 (2004): 149-160.

[22] Fall, Caroline HD, Harshpal Singh Sachdev, Clive Osmond, Maria Clara Restrepo-Mendez, Cesar Victora, Reynaldo Martorell, Aryeh D. Stein et al. "Association between maternal age at childbirth and child and adult outcomes in the offspring: a prospective study in five low-income and middle-income countries (COHORTS collaboration)." *The Lancet Global Health* 3, no. 7 (2015): e366-e377; Fall, Caroline HD, Clive Osmond, Dominic S. Haazen, Harshpal Singh Sachdev, Cesar Victora, Reynaldo Martorell, Aryeh D. Stein, Linda Adair, Shane Norris, and Linda M. Richter. "Disadvantages of having an adolescent mother." *The Lancet Global Health* 4, no. 11 (2016): e787-e788.

[23] National Research Council, and Committee on Population. "The changing transitions to adulthood in developing countries: Selected studies." *National Academies Press,* 2006.

1.2 Root Cause of Child Marriage Practice in India

Several studies have documented that structural and contextual factors perpetuate the practice of child marriage.[24] However, little has been explored about the customary norms in practicing child marriage in India which is rooted in the long-term gender discrimination in our patriarchal society. Domination of women by men has long been a tradition in Indian society. Patriarchy plays an essential role in persistent discrimination against girls and women in India. Women are often subjected to patriarchal values and norms of the society.[25] Gender norms restrict women from many aspects of life. Social norms perpetuate several harmful practices among girls. Child marriage is recognized as a dangerous practice because it violates fundamental human rights of girls. Moreover, female genital mutilation is another harmful practice which is highly prevalent in Africa, occurs as a result of social norms in the African country. Child marriage is a barrier to girls' education and opportunities. Child marriage affects social, economic, physiological aspects of girls. Dowry or bride price is such a social norm which reinforces the practice of child marriage in India. The timing of marriage and spouse selection are typically decided by parents or clan community in Indian society where girls have lower decision-making ability in her family. Parents often married-off their daughter at an early age to reduce the economic burden. In a patriarchal society, young brides are preferable because of several reasons. In a society like India where the desire for son child high, young bride have reproductive long duration to produce son. Young bride can easily controlled as they are physically and mentally immature. Moreover, purdah is typically practiced to avoid eye contact from senior male member of the household and society. Therefore, women's sexually can be controlled. Practice of purdah or veil added to their seclusion or subordination which restricts women from several aspects such as educational and economic opportunities, physical mobility[26], and access to resources.

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[24] Srivastava, Jagdish Narain. "Socio-economic determinants of child marriage in Uttar Pradesh." *Demography India* 12, no. 1 (1983): 59-73; Das, N. P., and Devamoni Dey. "Female age at marriage in India: trends and determinants." *Demography India* 27, no. 1 (1998): 91-115; Kamal, SM Mostafa, Che Hashim Hassan, Gazi Mahabubul Alam, and Yang Ying. "Child marriage in Bangladesh: trends and determinants." *Journal of biosocial Science* 47, no. 1 (2015): 120-139.

[25] Kandiyoti, Deniz. "Bargaining with patriarchy." *Gender & Society* 2, no. 3 (1988): 274-290.

[26] It is worth mentioning that in Muslim communities, women are generally allowed to go out from their home and does their work by wearing full black colored veil.

Another factor which fosters the practice of child marriage among upper caste family is claiming father's inheritance. Women do not generally claim father's property after marriage. Even if she claims for father's inheritance, she loses the relationship with her natal family or even chance of being killed.[27] The possession of land can be one reason for early age at marriage of daughter in upper caste families in rural India. Agarwal stated that there are several factors which affect women's ability to claim and control over land.[28] The post-marital residence is an important factor for women ability to claim land from their natal family. Village exogamy (outside village marriage) is the major constraint in claiming and controlling parental land. The practice of purdah adversely affects education and labor force participation. It also restricts women's physical and social mobility and freedom to interact with men and make fear to claim and control over land.[29] Along with these, poverty, impoverish residence, low educational attainment and several other structural and contextual factors perpetuate the practice of child marriage.

1.3 Child Marriage in India: Regional Context

Marriage below 18 years of age is prohibited for girls in India by the law. Despite legal enforcement, the practice of child marriage is widespread in India. Although the child marriage is highly persisted in rural areas, a substantial proportion of girls in urban areas are trapped in this harmful tradition. According to NFHS-4 (2015-16), 27% of women aged 20-24 years are married before 18 years of age. About half of the girls were married before 18 years of age just a decade ago (47% in 2005-06). The practice of child marriage substantially varies across rural-urban residence and geographical regions of India. The north-south differences in marriage timing have been primarily observed. This can be explained by differences in social norms and kinship system in northern and southern part of India.[30] For instance, in southern part of India cross-cousin marriage is preferable, whereas, in Northern India, it is prohibited.

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[27] Gupta, Monica Das. "Selective discrimination against female children in rural Punjab, India." *Population and Development Review* (1987): 77-100.

[28] Agarwal, Bina. *A field of one's own: Gender and land rights in South Asia*. Vol. 58. Cambridge University Press, 1994.

[29] Ibid.

[30] Karve, Iravati. "Kinship Organisation in India." *Asia Publishing House* (1965); Dyson, Tim, and Mick Moore. "On kinship structure, female autonomy, and demographic behavior in India." *Population and development review* (1983): 35-60.

Therefore, the fear of losing land inheritance is less in the Southern part, but in north India, exogamy is practiced which restrict women from claiming father's inheritance. Women in the south enjoy greater autonomy than the northern women.[31] Unlikely, West Bengal has higher women's status in society; nevertheless, the practice of child marriage is very high in Bengal. This harmful tradition is predominantly observed in rural Bengal. This high prevalence of child marriage in rural Bengal is maybe because of patriarchal values and customs of family and society. In addition, Poverty, increasing dowry demand, illiteracy and insecurity reinforce this tradition in rural Bengal. Likewise, sex ratio is a measure of gender discrimination which is much higher in the southern states than the northern states. Additionally, seclusion practice (the practice of purdah or veil) is highly prevalent in northern India, whereas the practice of purdah is almost absent in southern India.[32] Das Gupta's study found women are structurally marginalized in the kinship system (patrilineal in organization and patrilocal in residence). In this part, son preference is strongly persisted mainly due to economic contributions to the household which translated into excess female mortality.[33] Despite high female death in Punjab, the practice of child marriage is marginal. The caste system has reinforced the subordination of women in this region where strong patriarchal norms have been observed.

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[31] Dyson et al. "On kinship structure, female autonomy, and demographic behavior in India." 35-60.

[32] Desai, Sonalde, and Lester Andrist. "Gender scripts and age at marriage in India." *Demography* 47, no. 3 (2010): 667-687; Agarwal, "*A field of one's own.*"

[33] Das Gupta, "Selective discrimination against female children in rural Punjab, India." 77-100.

1.4 Health Consequences of Child Marriage: Some Empirical Evidences

Child marriage leads to several adverse health outcomes for women and their children such as poorer reproductive health, increased risk of HIV/AIDS and other sexually transmitted infections, maternal and child morbidity and mortality. For instance, child marriage significantly associated with increased risk of unintended pregnancy, and pregnancy termination; and lower use of contraception.[34] Additionally, child marriage also related to the use of maternal health care services such as antenatal visits, institutional delivery, and delivery by skilled health personnel.[35] Raj et al. found maternal child marriage has significantly associated with increased likelihood of stunting and underweight among the children below five years of age.[36] Similarly, Nasrullah et al. revealed that maternal child marriage was significantly associated with an increased likelihood of children's recent diarrhea and marginally associated with an increased risk of child and infant mortality in Pakistan.[37] Child marriage is also associated with early childbearing of women. Several studies have found that those women who married at an early age are more likely to have childbirth at a younger age. Early childbearing of women substantially increases complications during pregnancy childbirth which are the leading causes of maternal mortality among young mother. Other researchers have associated child marriage with an increased risk of intimate partner violence. Apart from age at marriage, adverse health outcomes of women and children are attributed to the several structural and environmental factors such as lower socioeconomic status, unhygienic environment, limited access to health care, limited health knowledge, and lower autonomy among young brides. Although child marriage leads to several adverse health consequences, it has widely practiced in South Asian and Sub-Saharan countries.

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[34] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889.

[35] Godha, Deepali, David R. Hotchkiss, and Anastasia J. Gage. "Association between child marriage and reproductive health outcomes and service utilization: a multi-country study from South Asia." *Journal of Adolescent Health* 52, no. 5 (2013): 552-558.

[36] Raj, Anita, Niranjan Saggurti, Michael Winter, Alan Labonte, Michele R. Decker, Donta Balaiah, and Jay G. Silverman. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India: cross sectional study of a nationally representative sample." *Bmj* 340 (2010): b4258.

[37] Nasrullah, Muazzam, Rubeena Zakar, Muhammad Zakria Zakar, and Alexander Krämer. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." *The Journal of pediatrics* 164, no. 3 (2014): 639-646.

1.5 An Overview of Literature

This review provides comprehensive research evidence on the issue of child marriage and its health implications. Although the analysis of the present study is based on India, evidence on the link between child marriage and health outcomes has been collected from South Asian and Sub-Saharan countries. There is an emerging body of literature available on the linkages between child marriage and maternal and child health consequences. Studies from lower-middle nations have shown that maternal age at marriage significantly associated with reproductive health, sexually transmitted diseases, increased risk of complications during pregnancy and childbirth, and maternal mortality.

1.5.1   Prevalence of Child Marriage

According to the United Nations Population Fund (UNFPA), 140 million girls will marry before their 18th birthday, and 50 million girls will marry before their 15th birthday between 2011 and 2020. The United Nations Children's Fund estimated the prevalence of child marriage using Demographic Health Survey (DHS), Multiple Indicator Cluster Survey (MICS) and other nationally representative surveys which demonstrate the pervasiveness of child marriage in lower-middle income countries. One in three girls are married before 18 years of age, and one in nine girls are married before 15 years of age in developing the world. Sub-Saharan and South Asian countries have the highest rates of child marriage. Niger (76%) has the highest rate of child marriage in the world. Among South Asian countries, Bangladesh (59%) has the highest proportion of child marriage followed by Nepal (40%), Afghanistan (35%), and India (27%). However, India has the highest number of a child bride worldwide followed by Bangladesh, Nigeria, Brazil, and Ethiopia. Latin America, middle-east, and East European countries also have a substantial proportion of child marriage. Worldwide, the mean age at marriage has increased over the period. However, the rate of increase considerably varies across countries.

India has witnessed for lower female age at marriage over a longer period. The practice of child marriage remains unchanged until the third quarter of 20th century in India. It started to decline after the enforcement of '*Child Marriage Restrained Act*' in 1976 where legal age of marriage raises from 14 to 18 for girls and from 18 to 21 for boys.

Besides, the '*Prohibition of Child Marriage Act,'* 2006 came into force in 2007 which takes legal actions against child marriage tradition leads to a substantial decline in next decade. Despite, enforcement of the law against this harmful practice, a considerable proportion of women are married before the legal age of marriage in India. According to the National Family Health Survey-4, about 27% of the women aged 20-24 years are married before 18 years of age. If we look at the absolute number of child bride in India, the situation is more alarming.

In India, census and various national sample surveys provide the data on child marriage. Census of India, National Family Health Survey (NFHS), District Level Household Survey (DLHS), and India Human Development Survey (IHDS) are the main sources of data on age at marriage. These sources of data have widely been used for making policy and program to prevent child marriage practice.

1.5.2 Determinants of Age at Marriage

Identifying the determinants of female age at marriage has long interest among the researcher and policymaker in developing countries. Despite several laws and legislation to eliminate child marriage, it has widely been practiced in many developing countries. Nearly half of the women (47%) were affected by child marriage just a decade ago in India.[38] Currently, there are still a substantial proportion of women (27%) married before the legal age of marriage.[39] Therefore, it is a major challenge for policymaker and stakeholder to eliminate the child marriage practice. It is well established from the previous literature that education attainment economic status of the household and residence are the prominent determinants of female age at marriage. Moreover, child marriage is often determined by customary norms of the society. Besides, it is unclear that how patriarchal culture of India perpetuates the child marriage practice. However, some of the literature showed that women status, gender norms determine the child marriage practice. The evidence is also found in the north-south differences of child marriage. The more egalitarian part of south shows lower prevalence child marriage as compared to more culturally rigid north India. Sexual control of men over women, a form of patriarchal culture reinforces the practice of child marriage. Women are dominated by men in patriarchal norms and culture and their decision regarding marriage often overlooked.

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[38] National Family Health Survey Report, 2005-06.
[39] National Family Health Survey Report, 2015-16.

Therefore, patriarchal norms and culture are recognized as the root cause of child marriage in India. Furthermore, rural residence, lower level of education, poor education status, and lower decision making the power of women reinforces the practice of child marriage. Many researchers identified the determinants beyond the individual characteristics of the girl child. Family relationship and societal norms influence the timing of marriage in India where girls have lower power, status, and autonomy in the household.

Place of residence has a significant impact on age at marriage of a girl. Several studies have documented that urban women are less likely to marry as child compared to their rural counterparts because urbanization promotes the culture of late marriage.[40] With increasing level of urbanization and modernization, girls tend to be more educated and employed. Nonetheless, the relationship is not always consistency. For example, Singh and Samara (1996) in their study indicates a considerable variation in the prevalence of early marriage among less urbanized countries of Africa.[41] Furthermore, While studying the determinants of age at marriage many studies found that after inclusion of other factors such as education, employment status, and parent's characteristics in multivariate analysis the effects of place of residence seems to be negligible.

Studies consistently showed that girl's education can substantially delay in marriage.[42] Education has a direct and indirect impact on age at marriage. The aspiration for the job becomes higher among the educated women which makes them delay in marriage. Education has a strong and significant relationship with the timing of marriage in most of the developing countries.[43]

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[40] Choe, Minja Kim, Shyam Thapa, and Vinod Mishra. "Early marriage and early motherhood in Nepal." *Journal of biosocial science* 37, no. 2 (2005): 143-162; Kamal, SM Mostafa. "Socio-economic determinants of age at first marriage of the ethnic tribal women in Bangladesh." *Asian Population Studies* 7, no. 1 (2011): 69-84.
[41] Singh, Susheela, and Renee Samara. "Early marriage among women in developing countries." *International family planning perspectives* (1996): 148-175.
[42] Ahmed, Ashraf Uddin. "Socioeconomic determinants of age at first marriage in Bangladesh." *Journal of biosocial science* 18, no. 1 (1986): 35-42; Kamal, "Socio-economic determinants of age at first marriage of the ethnic tribal women in Bangladesh." 69-84; Field, Erica, and Attila Ambrus. "Early marriage, age of menarche, and female schooling attainment in Bangladesh." *Journal of political Economy* 116, no. 5 (2008): 881-930.
[43] Singh et al., "Early marriage among women in developing countries." 148-175; Jensen et al. "Early female marriage in the developing world." 9-19.

A study conducted in Matlab region of rural Bangladesh indicates that delay in marriage substantially increases female schooling.[44] Moreover, a study among women age 25-44 years in Peninsular Malaysia found that education is the single most important factor for delaying marriage.[45] Similarly, a study by Lee among ever-married women age 25 and above in Peninsular Malaysia found a direct effect of education on age at marriage. The results of the study demonstrated that the increase in years of education substantially increases the age at marriage of women even after controlling for age, ethnicity, childhood place of residence, and pre-marital work status.[46] Several studies from Nepal consistently showed that staying longer duration in school substantially delayed in marriage timing of girl.[47] A study in Hong Kong determined that compared to the secondary level of education women with primary or no formal schooling significantly have higher risk and women with above secondary level of education have a lower risk of getting married.[48] However, a study of ethnic tribal women in Bangladesh demonstrated that the difference in age at marriage by education is significant only after when girls completed their secondary level of education.[49] Unlikely, a study in Karnataka, during 1980-81 found that education is partially associated with delaying of marriage; instead, other socioeconomic and cultural factors contributed to the delay in marriage.[50] Parent's education also has a significant impact on marriage timing of their daughter. Many studies have documented that lower age at marriage is significantly associated with parent's higher level of education.[51]

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[44] Field et al. "Early marriage, age of menarche, and female schooling attainment in Bangladesh." 881-930.

[45] Von Elm, Barbara, and Charles Hirschman. "Age at first marriage in Peninsular Malaysia." *Journal of Marriage and the Family* (1979): 877-891.

[46] Lee, Kok-Huat. "Age at first marriage in Peninsular Malaysia." *Journal of Marriage and the Family* (1982): 785-798.

[47] Aryal, Tika Ram. "Age at first marriage in Nepal: differentials and determinants." *Journal of Biosocial Science* 39, no. 5 (2007): 693-706; Choe et al. "Early marriage and early motherhood in Nepal." 143-162.

[48] Wong, Odalia MH. "The socioeconomic determinants of the age at first marriage among women in Hong Kong." *Journal of Family and Economic Issues* 26, no. 4 (2005): 529-550.

[49] Kamal, "Socio-economic determinants of age at first marriage of the ethnic tribal women in Bangladesh." 69-84.

[50] Hatti, Neelambar, and Rolf Ohlsson. "Impact of education on age at marriage." *Demography India* 14, no. 2 (1985): 159-73.

[51] Aryal, "Age at first marriage in Nepal: differentials and determinants." 693-706; Choe et al. "Early marriage and early motherhood in Nepal." 143-162; Wong, "The socioeconomic determinants of the age at first marriage among women in Hong Kong." 529-550.

It is also evident from several studies that the aspiration for the job is greater among the highly educated women. Hence, they become independent and often take their marriage decision on their own. A study of ethnic tribal women in Bangladesh revealed that the employed women are more likely to delay their marriage than their unemployed counterparts.[52] Moreover, a study in Nepal found that female engaged in services have a lower risk of getting married at an early age than those female engaged in household activities.[53] However, Singh and Samara (1994) in their study did not find any significant relationship between women's participation in the labor force and age at marriage using DHS data in developing countries.[54]

Poverty is the leading cause of early marriage in developing countries. Studies consistently showed that the prevalence of child is higher among girls who are resided in the poorest quintile of household wealth. However, a study in Nepal found that economically well-off families are more likely to marry-off their daughter at an early age most probably because of religious customs and prestigious matter.[55]

Menarche is another important determinant for female age at marriage.[56] For instance, early age at menarche significantly increases the risk of getting married in adolescent age.[57]

1.5.3 Child Marriage and Its Association with Maternal Health
1.5.3.1 Reproductive Health Outcomes

Studies from India, Nepal, Bangladesh, and Pakistan showed a direct association between child marriage and women's reproductive and sexual health. Recently, a growing number of study from South Asian countries in general and India, in particular, revealed that child marriage is significantly associated with reproductive health outcomes of women.[58]

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[52] Kamal, "Socio-economic determinants of age at first marriage of the ethnic tribal women in Bangladesh." 69-84.

[53] Aryal, "Age at first marriage in Nepal: differentials and determinants." 693-706.

[54] Singh et al. "Early marriage among women in developing countries." 148-175.

[55] Aryal, "Age at first marriage in Nepal: differentials and determinants." 693-706.

[56] Field et al. "Early marriage, age of menarche, and female schooling attainment in Bangladesh." 881-930; Udry, J. Richard, and Robert L. Cliquet. "A cross-cultural examination of the relationship between ages at menarche, marriage, and first birth." *Demography* 19, no. 1 (1982): 53-63; Buck, Carol, and Kathleen Stavraky. "The relationship between age at menarche and age at marriage among childbearing women." *Human Biology* (1967): 93-102; Desai et al. "Gender scripts and age at marriage in India." 667-687; Singh, Abhijeet, and P. Espinoza Revollo. "Teenage marriage, fertility, and well-being: Panel evidence from India." (2016).

[57] Singh et al. "Teenage marriage, fertility, and well-being: Panel evidence from India."

[58] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India: a cross-sectional, observational study." 1883-1889; Raj, Anita. "When the

For instance, a study of young married women aged 20-24 years in South Asian countries documented that child marriage has found to be significantly associated with increased likelihood of unintended pregnancy, multiple unintended pregnancies, and pregnancy termination, and decreased likelihood of early fertility, and history of rapid repeat childbirth.[59] Similarly, a study of young married women aged 20-24 years in India states that women who married late as compared to early married women were less likely to have miscarriage or stillbirth even after controlling for the experience of physical violence.[60] Likewise, a study of young married women aged 20-24 years in India reports that child married women were more likely to have at least one childbirth, three or more childbirths, a repeat childbirth in less than 24 months compared to adult married women even after adjusting for relevant demographics. Child marriage was also associated with increased likelihood of an unwanted pregnancy, multiple unwanted pregnancies, and pregnancy termination and decreased likelihood of childbirth in the 1st year of marriage even after adjusted for respondent's age, education level, wealth index, area of residence, region of residence, and religion.[61]

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mother is a child: the impact of child marriage on the health and human rights of girls." *Archives of Disease in Childhood* (2010); Santhya, Kidangamparampil G., Usha Ram, Rajib Acharya, Shireen J. Jejeebhoy, Faujdar Ram, and Abhishek Singh. "Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India." *International perspectives on sexual and reproductive health* (2010): 132-139; Santhya, K. G. "Early marriage and sexual and reproductive health vulnerabilities of young women: a synthesis of recent evidence from developing countries." *Current opinion in obstetrics and gynecology* 23, no. 5 (2011): 334-339; Santhya, K. G., and Shireen J. Jejeebhoy. "Sexual and reproductive health needs of married adolescent girls." *Economic and Political Weekly* (2003): 4370-4377; Prakash, Ravi, Abhishek Singh, Praveen Kumar Pathak, and Sulabha Parasuraman. "Early marriage, poor reproductive health status of mother and child well-being in India." *BMJ Sexual & Reproductive Health* 37, no. 3 (2011): 136-145; Nasrullah, Muazzam, Sana Muazzam, Zulfiqar A. Bhutta, and Anita Raj. "Girl child marriage and its effect on fertility in Pakistan: findings from Pakistan Demographic and Health Survey, 2006– 2007." *Maternal and child health journal* 18, no. 3 (2014): 534-543; Godha et al. "Association between child marriage and reproductive health outcomes and service utilization: a multi-country study from South Asia."

[59] Godha et al. "Association between child marriage and reproductive health outcomes and service utilization: a multi-country study from South Asia."

[60] Santhya, Kidangamparampil G., Usha Ram, Rajib Acharya, Shireen J. Jejeebhoy, Faujdar Ram, and Abhishek Singh. "Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India." *International perspectives on sexual and reproductive health* (2010): 132-139.

[61] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India: a cross-sectional, observational study."

Another study of currently married women in reproductive age group (15-49 years) in India reports that after adjusting for relevant confounding factors later married women (≥ 18 years) were more likely to have better reproductive health status than those women married at early age.[62]

Studies from developing countries confirmed that women's experience of physical and sexual violence increases the risk of poor maternal health outcomes.[63] Several previous studies also investigated the link between child marriage and spousal violence.[64] For instance, a study by Raj et al. in India revealed that women in 20-24 years of the age group who married before 18 years of age were 1.8 times more likely than those married as adults to report ever experiencing physical or sexual violence after adjusting for potential confounders.[65] Likewise, evidence from ever-married women aged 20-24 years in selected Indian states reports that women who married later (≥ 18 years) were the lesser experience of physical and sexual violence than those women who married early.[66] A study of reproductive age group married women in Nepal reports that age at marriage negatively associated with unintended pregnancy and the reason could be an earlier risk of getting pregnant.[67] Similarly, a bivariate analysis in Bangladesh reports that the proportion of unintended pregnancy was higher among the women who married before the age of 18 years compared to those women who married at age 18 years or above.[68]

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[62] Prakash at al. "Early marriage, poor reproductive health status of mother and child well-being in India."

[63] Ellsberg et al. "Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study."; Sarkar, N. N. "The impact of intimate partner violence on women's reproductive health and pregnancy outcome." *Journal of Obstetrics and Gynaecology* 28, no. 3 (2008): 266-271; Campbell. "Health consequences of intimate partner violence."; Jejeebhoy, Shireen J., K. G. Santhya, and Rajib Acharya. *Health and social consequences of marital violence: A synthesis of evidence from India*. Population Council, 2010.

[64] Jejeebhoy et al. *Health and social consequences of marital violence: A synthesis of evidence from India*.; Nasrullah, Muazzam, Rubeena Zakar, and Muhammad Zakria Zakar. "Child marriage and its associations with controlling behaviors and spousal violence against adolescent and young women in Pakistan." *Journal of Adolescent Health* 55, no. 6 (2014): 804-809; Speizer, Ilene S., and Erin Pearson. "Association between early marriage and intimate partner violence in India: a focus on youth from Bihar and Rajasthan." *Journal of interpersonal violence* 26, no. 10 (2011): 1963-1981.

[65] Raj et al. "Association between adolescent marriage and marital violence among young adult women in India."

[66] Santhya et al. "Associations between early marriage and young women's marital and reproductive health outcomes: evidence from India."

[67] Adhikari et al. "Correlates of unintended pregnancy among currently pregnant married women in Nepal." 17.

[68] Kamal, Mostafa, and Aynul Islam. "Prevalence and socioeconomic correlates of unintented pregnancy among women in rural Bangladesh." *salud pública de méxico* 53, no. 2 (2011): 108-115.

Moreover, a study in India yielded that the lower age at marriage leads to higher fertility and child loss.[69] A study on the relationship between age at marriage and fertility in Nigeria indicates that the incidence for children ever born is lesser among those women whose age at marriage is 15-19 years, 20-24 years and 25 years or above compared with those married at 14 years or before. However, after controlling for socioeconomic and mediating factors, the strength of association has been reduced.[70]

1.5.3.2 *Utilization of Maternal Health Care Services*

Few studies have examined the association between child marriage and utilization of maternal health care services. A study by Raj, A. among ever-married women aged 20-24 years using NFHS-3 in India found that compared with those who married at 20-24 years women who married in child, adolescent, and late adolescent period have higher odds of not receiving antenatal care.[71] A study in South Asian countries among ever-married women aged 20-24 years demonstrated that women who married at ≤14 years and 15-17 years have a lower likelihood of antenatal visits, delivery by skilled health personnel, and institutional delivery even after controlling for socioeconomic and demographic covariates, but not always consistent among all selected countries.[72] In a separate analysis by Godha et al. in seven lower-middle income countries using Demographic and Health Survey (DHS) revealed that the association between child marriage and utilization of maternal health care is not straightforward, depends on birth order and urban-urban residence, and significantly varies by country.[73] Similarly, Santhya et al.'s study among married women aged 20-24 years in five Indian states showed that women who married at age 18 or later have significantly higher odds of institutional delivery compared those married below 18 years of age after controlling for spousal interaction.[74]

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[69] Acharya, Arun Kumar. "The influence of female age at marriage on fertility and child loss in India." *Trayectorias* 12, no. 31 (2010): 61-80.
[70] Solanke, Bola Lukman. "Marriage age, fertility behavior, and women's empowerment in Nigeria." *SAGE Open* 5, no. 4 (2015).
[71] Raj, "When the mother is a child: the impact of child marriage on the health and human rights of girls." 931-935
[72] Godha et al. "Association between child marriage and reproductive health outcomes and service utilization: a multi-country study from South Asia." 552-558.
[73] Godha, Deepali, Anastasia J. Gage, David R. Hotchkiss, and Claudia Cappa. "Predicting maternal health care use by age at marriage in multiple countries." *Journal of Adolescent Health* 58, no. 5 (2016): 504-511.
[74] Santhya et al. "Associations between early marriage and young women's marital and reproductive health outcomes." 132-139.

A study in Pakistan for the same age group of women showed that child married women as compared with those married as adult were less likely to have any prenatal care, prenatal care by a skilled medical care provider, four or more antenatal visits, care during their last antenatal visit, delivery at home, and delivery assistance by the unskilled medical provider even after controlling for socioeconomic and demographic characteristics.[75] A study on determining the factors of antenatal care in North India revealed that the odds of receiving antenatal care were significantly higher among the women married at 19 years or above compared to those married before 19 years in these states in Madhya Pradesh and Rajasthan. However, the association was no longer significant when the home visit was included in the analysis.[76] A study in Jordon revealed that women who married at 17 years or before were significantly less likely to have hospital/home delivery compared to those married between 18-20 years of age. Moreover, the odds of birth attendant was higher among the women who married before 18 years of age than those married at 18 years or later. However, the association was statistically not significant. Furthermore, the odd of private/public hospital birth was significantly higher among the women who married at 21 or later compared to those married between 18-20 years.[77] Many studies have documented that early age at marriage is strongly associated with early pregnancy and childbirth.[78] Therefore, early pregnancy and childbearing are higher among those women who married at an early age. A study by Bhattia & Cleland showed that women who had pregnancy below 18 years of age were less likely to had routine antenatal check-up than those women who had pregnancy at 18-24 years. Moreover, the odds of institutional delivery and postnatal check-up were significantly higher among the women who had pregnancy at 25 years or later.

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[75] Nasrullah, Muazzam, Rubeena Zakar, and Alexander Krämer. "Effect of child marriage on use of maternal health care services in pakistan." *Obstetrics & Gynecology* 122, no. 3 (2013): 517-524.

[76] Pallikadavath, Saseendran, Mary Foss, and R. William Stones. "Antenatal care: provision and inequality in rural north India." *Social science & medicine* 59, no. 6 (2004): 1147-1158.

[77] Obermeyer, Carla Makhlouf, and Joseph E. Potter. "Maternal health care utilization in Jordan: a study of patterns and determinants." *Studies in family planning* 22, no. 3 (1991): 177-187.

[78] Adhikari, Ramesh K. "Early marriage and childbearing: risks and consequences." (2003): 62-66; Choe et al. "Early marriage and early motherhood in Nepal." 143-162; Moore, Kristin A., and Linda J. Waite. "Marital dissolution, early motherhood and early marriage." *Social Forces* 60, no. 1 (1981): 20-40; Schmidt, Lucie. "Risk preferences and the timing of marriage and childbearing." *Demography* 45, no. 2 (2008): 439-460; Schuler, Sidney Ruth, Lisa M. Bates, Farzana Islam, and Md Khairul Islam. "The timing of marriage and childbearing among rural families in Bangladesh: Choosing between competing risks." *Social Science & Medicine* 62, no. 11 (2006): 2826-2837.

In addition, the odds for check during the first trimester, private source of antenatal care, delivery in private section, cesarean section, and postnatal check-up was lower among the women who had pregnancy before 18 years of age compared to those who had pregnancy at 18-24 years.[79] McCaw-Binns et al.'s study in Jamaica revealed that compared to those who had the first pregnancy at 25 years of age or older, women whose first pregnancy occurred at a younger age were twice as likely not to attend or attend late for antenatal care. Several studies also found that women who married at an early age, their initiation of sexual activities also started at the early age of life.[80] Compared to those who become sexually active at 14 years or younger, women who become sexually active later in life were more likely to attend early for antenatal care.[81] Similarly, a study of married adolescent women aged 15-19 years in Nigeria indicates that compared with those who married before 18 years, women married at 18-19 years were more likely to had at least four ANC visit, safe delivery (delivery conducted either in a medical institution or home delivery assisted by skilled health personnel), and postnatal check-up within 42 days after birth after controlling for relevant background characteristics.[82]

1.5.3.3 Nutrition and Anaemia Status of Women

There is very little evidence found on the association between child marriage and nutrition and anaemia status of women. A study of ever-married women aged 15-49 years in India revealed that after adjusting for relevant socioeconomic and demographic characteristics, the likelihood of undernourishment (2.5 times higher in Andhra Pradesh and Bihar and 2.0 times higher in India) and anaemic were more among the women who had married before the age of 18 years than those women who

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[79] Bhatia, Jagdish C., and John Cleland. "Determinants of maternal care in a region of South India." *Health transition review* (1995): 127-142.

[80] Miller, Brent C., and Tim B. Heaton. "Age at first sexual intercourse and the timing of marriage and childbirth." *Journal of Marriage and the Family* (1991): 719-732; Clark, "Early marriage and HIV risks in sub-Saharan Africa." 149-160; Rindfuss, Ronald R., and S. Philip Morgan. "Marriage, sex, and the first birth interval: The quiet revolution in Asia." *Population and Development Review* (1983): 259-278.

[81] McCaw-Binns, Affette, Janet La Grenade, and Deanna Ashley. "Under-users of antenatal care: a comparison of non-attenders and late attenders for antenatal care, with early attenders." *Social science & medicine* 40, no. 7 (1995): 1003-1012.

[82] Rai, Rajesh Kumar, Prashant Kumar Singh, and Lucky Singh. "Utilization of maternal health care services among married adolescent women: insights from the Nigeria Demographic and Health Survey, 2008." *Women's Health Issues* 22, no. 4 (2012): e407-e414.

had married later.[83] Child marriage is strongly associated with early pregnancy and motherhood. Consequently, adolescent pregnancy may affect the linear and ponderal growth of young mother which further leads to depletion of fat and lean body mass.[84] Further, low body mass and iron deficiency increase the risk of complications during pregnancy and delivery, preterm delivery, and baby's low birthweight.

1.5.4 Association between Child Marriage and Health Outcomes of Children

Studies on the association between child marriage and health outcomes of children have found a weak relationship. However, very few studies have investigated the impact of child marriage on health outcomes of children. Some previous studies also determined the effect of maternal age at marriage on educational outcomes, cognitive development, and other indicators of child well-being status.[85] A study of children under five years of age born to mother aged 15-24 years in India showed a mixed association between child marriage and nutrition, morbidity and mortality. The result of the study revealed that after controlling for maternal and child demographics child marriage leads to 1.22 and 1.24 times more likelihood of stunting and underweight respectively compared to women married as adult. Child marriage was also associated with increased risk of infant/child mortality and low birth weight of children in crude analysis. However, these associations become insignificant in the adjusted analysis.[86] In a separate study, Raj showed that earlier age at marriage was associated with increased likelihood of neonatal mortality (<1 month), postneonatal infant mortality (1–12 months), and child mortality (1–5 years).[87]

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[83] Goli, Srinivas, Anu Rammohan, and Deepti Singh. "The effect of early marriages and early childbearing on women's nutritional status in India." *Maternal and child health journal*19, no. 8 (2015): 1864-1880.

[84] Rah, Jee H., Parul Christian, Abu Ahmed Shamim, Ummeh T. Arju, Alain B. Labrique, and Mahbubur Rashid. "Pregnancy and lactation hinder growth and nutritional status of adolescent girls in rural Bangladesh." *The Journal of nutrition*138, no. 8 (2008): 1505-1511.

[85] Sekhri, Sheetal, and Sisir Debnath. "Intergenerational consequences of early age marriages of girls: Effect on children's human capital." *The Journal of Development Studies* 50, no. 12 (2014): 1670-1686; Chari, A. V., Rachel Heath, Annemie Maertens, and Freeha Fatima. "The causal effect of maternal age at marriage on child wellbeing: Evidence from India." *Journal of Development Economics* 127 (2017): 42-55; Efevbera, Yvette, Jacqueline Bhabha, Paul E. Farmer, and Günther Fink. "Girl child marriage as a risk factor for early childhood development and stunting." *Social Science & Medicine* 185 (2017): 91-101.

[86] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India" b4258.

[87] Raj, "When the mother is a child: the impact of child marriage on the health and human rights of girls." 931-935.

Similarly, Nasrullah et al. also examined the associations between maternal child marriage and morbidity, mortality and the low birth births to ever-married women aged 15-24 years in Pakistan. The result of the study showed that maternal child marriage was significantly associated with an increased likelihood of children's diarrhea in the past two weeks even after adjusting for maternal and child demographics. In addition, child marriage was found to be associated with decreased likelihood of ARI in the past two weeks and ARI with fever in the past two weeks in the unadjusted and adjusted analysis. Child marriage also was found to be significantly associated with child mortality and infant mortality in crude analysis. However, the association between child marriage and child mortality and infant mortality was no longer significant in the adjusted analysis.[88]

Some studies have shown a causal effect of mother's age at marriage on children's health and well-being.[89] A study of the causal effect of maternal age at marriage on children's health outcomes using India Human Development Survey indicates that delay in marriage of mother significantly increases the size of the birth and weight-for-height of children. However, they did not found any significant effect of age at marriage on major sicknesses and infant mortality of children.[90]

1.6 Research Gaps

There is a much interest to investigate the determinants and differentials of child marriage among researcher and policymaker because of persistent of lower age at marriage over a long period in developing countries. However, in the recent decade, considerable improvement has been made in increasing female age at marriage in India and other South Asian countries by enforcing laws and policy. Although child marriage and its associated health outcomes are the major public health concern, there is a paucity of research on the link between child marriage and maternal and child health. This is may be due to the fact that inconsistent data and unavailability of unit level information regarding female age at marriage and health before the survey of National Family Health Survey (NFHS) which covers all states of India with

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[88] Nasrullah et al. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." 639-646.
[89] Field et al., "Early marriage, age of menarche, and female schooling attainment in Bangladesh." 881-930; Sekhri et al. "Intergenerational consequences of early age marriages of girls." 1670-1686; Chari et al. "The causal effect of maternal age at marriage on child wellbeing." 42-55; Efevbera et al. "Girl child marriage as a risk factor for early childhood development and stunting." 91-101.
[90] Chari et al. "The causal effect of maternal age at marriage on child wellbeing." 42-55.

sufficient sample size to estimate state level and the district level prevalence of child marriage based on the United Nations definition. However, there is a growing interest in this issue among the researcher especially from the field of public health, and demography. Moreover, empirical assessment of child marriage and its association with the health of mother and children has been neglected in social science discipline in general and geography in particular.

However, this study makes a comprehensive assessment of child marriage and its association with maternal and child health. Most of the previous studies have shown differential health outcomes and utilization of health care by marriage before 18 vs. 18 or later. This study categorizes female age at marriage into three groups, ≤14 years, 15-17 years, and ≥18 years in with accordance with the international definition of child marriage[91] to understand differential impact of marriage at early adolescent and late adolescent on health status. Although there is a growing interest to investigate the relationship between age at marriage and health outcomes of women, still very few have been studied in this area. However, several studies from South Asian countries have documented that child marriage has directly linked to the reproductive health of women. However, there is a paucity of research on the effect of child marriage on other dimensions of health outcomes of women such as utilization of maternal health care services, nutritional status, maternal morbidity, and mortality. Moreover, it is evidenced that women's health status primarily determined by adequate use of maternal health care services. The access to health care among child married women typically decided by husband and other members of the household. However, studies show that child bride have lower decision making authority in their husband's family. Therefore, it is very crucial to understand the health implications of child marriage by assessing the impact of child marriage on the utilization of maternal health care services. Again, the present study examines the association between child marriage and undernourishment and anaemia status of women which is remain a neglected area of research. This study assesses the independent effect of child marriage on malnutrition and anaemia status of women after accounting for a range of relevant socioeconomic and demographic characteristics.

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[91] United Nations Children's Fund. "The state of the world's children 2012: children in an urban world." (2012).

Furthermore, there is very little evidence has been found on the association between child marriage and health outcomes of children. Moreover, most of the study was restricted to their sample to the births of young married women.

Therefore, these studies are unable to estimate the impact of child marriage on child health among births of all women in the reproductive age group. Moreover, the current study assesses the effects of child marriage on all essential outcomes of child marriage. Furthermore, the association between child marriage and anaemia status of children have not been studied previously. The present study aims to fulfill this gap of research by assessing the link between child marriage and childhood anaemia. Moreover, the current study assesses the impact of child marriage on neonatal and postneonatal mortality which has not been studied separately in previous studies. Mother's health status may be impacted differently in neonatal child from postneonatal child. Therefore, the present study did a comprehensive empirical assessment which will able to understand the impact of child marriage on maternal and child health outcomes more clearly. Thus, policy maker and stakeholder can intervene to improvement of health status of women who are already married at younger age as well as unmarried girls though preventing early age of marriage.

1.7 Rationale of the Study

The present study proposes to examine the prevalence of child marriage and related health outcomes. Although the incidence of child marriage is very high in neighboring counties such as Bangladesh, Nepal, Pakistan, and Afghanistan, a substantial proportion of girls are married as children in India. India has the highest number of child bride worldwide. Child marriage is a violation of human rights of girls as it denials girls from several aspects in life. It restricts young adolescent girls from education and employment opportunities. Child marriage also constrains physical, emotional and personal maturity. Studies from South Asia and Sub-Saharan countries demonstrated that girl child marriage is associated with poor reproductive, sexually transmitted diseases including HIV, intimate partner violence, obstetric morbidities, preterm delivery, low birthweight and maternal mortality. Moreover, child marriage also leads to poor health outcomes for newborn infants such as poor physical growth, increased risk of infectious diseases and mortality.

The practice of child marriage is more prevalent among those girls who are living in impoverished areas, belonging to backward community, economically impoverished, uneducated, and have lower autonomy in their household and society. The risk of poor maternal and child health outcomes are attributed to various socioeconomic and structural vulnerabilities such as poverty, impoverish residence, lower access to healthcare, restricted mobility, limited decision making power, and societal norms-custom-tradition. Child marriage is one such harmful practice driven by poverty and socio-cultural norm which affects health status of young married girls and their next generation. Therefore, it is crucial to understand the impact of child marriage on maternal and child health status beyond these socioeconomic and structural vulnerabilities. Moreover, few studies have documented that child marriage affects children's health and well-being. However, the link between child marriage and children's health outcomes are not clear from the previous research. Evidence has found that restricted foetal growth and undernutrition in the first two years of life leads to permanent damage in human capital formation during adulthood which can affects the life of the next generation.[92] Further, newborn and infant's health outcomes are determined by mother health and nutritional status during pregnancy. Age at marriage is a crucial determinant of health and nutritional outcomes of women during pregnancy. Therefore, it is very essential to assess the impact of early marriage age of mother on their children's health outcomes beyond structural and contextual vulnerabilities.

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[92] Victora, Cesar G., Linda Adair, Caroline Fall, Pedro C. Hallal, Reynaldo Martorell, Linda Richter, Harshpal Singh Sachdev, and Maternal and Child Undernutrition Study Group. "Maternal and child undernutrition: consequences for adult health and human capital." *The lancet* 371, no. 9609 (2008): 340-357.

1.8 Objectives

This study aims to examine the macro and micro assessment of child marriage and its association with maternal and child health outcomes. To fulfill the aim of this study the specific objectives are:

1. To examine trends, prevalence, socioeconomic and demographic differentials in child marriage.
2. To study the district-level assessment of child marriage and its relationship with district developmental indicators.
3. To examine the factors affecting high incidence of child marriage in India.
4. To assess the association of child marriage with reproductive health, utilization of maternal health care and nutritional status of women in India.
5. To examine the association between child marriage and child health outcomes in India.

1.9 Research Questions

1. Who are the most vulnerable girls in child marriage?
2. How does child marriage prevalence vary by socioeconomic status?
3. How are the socioeconomic development indicators associated with prevalence of child marriage at the district-level?
4. How does region impact on the prevalence of child marriage in India?
5. How does and to what extent child marriage affect maternal health status?
6. Is there any significant relationship between maternal child marriage and child health outcomes?

1.10 Hypotheses

1. Child marriage increases the risk of adverse reproductive health outcomes, low body mass, and anaemia among women.
2. Child married women are less likely to use maternal health care services compared to adult married women.
3. Child marriage is associated with increased risk of morbidity, mortality, low birth weight and poor nutritional outcomes of children.
4. Mother's poor health status is linked to morbidity and mortality of their children.

1.11 Database

The present study is entirely based on secondary data obtained from the National Family Health Survey and Census of India (2011).

1.11.1 National Family Health Survey

This study uses the data from all rounds of the National Family Health Survey (1992-93, 1998-99, 2005-06, & 2015-16). NFHS is a large-scale, nationally representative cross-sectional sample survey conducted throughout India. This survey provides vast information on fertility, mortality, family planning, utilization of maternal and child health care services and nutrition. The survey was conducted by the International Institute for Population Science, Mumbai.

The first National Family Health Survey (NFHS-1) was conducted in 1992-93. A total number of 89,777 ever-married women aged 13-49 years were interviewed in this survey.

The second round of National Family Health Survey (NFHS-2) was conducted in 1998-99. A total number of 90,303 ever-married women aged 15-49 years were interviewed.

The third round of National Family Health Survey (NFHS-3) collected information from a nationally representative sample of 109,041 households. A total number of 124,385 women aged 15-49 years were interviewed from all 29 states.

The fourth round of the National Family Health Survey (NFHS-4) was conducted in 2015-16. NFHS-4 is a nationally representative sample survey of more than six lakh households based on 2011 population census. NFHS-4 was selected sample using a stratified two-stage sampling design comprising of 28,586 clusters, 8,397 in urban, 20,059 in rural, and 130 from slums list provided by Municipal Corporation Offices (MCOs). In the first stage, clusters were selected using probability proportional to clusters size. In the second stage, 22 households from each cluster were selected with an equal opportunity systematic selection from the household listing. A detailed description of the sampling procedure is presented in the final report of NFHS-4, 2015-16. The NFHS-4 successfully interviewed 699,686 women aged 15-49 years with a response rate of 97%, and 112,122 men aged 15-54 years with a response rate of 92%.

1.11.2 Census of India (2011)

Census of India is a population-based survey conducted all over India. Census of India provides a variety of information regarding population and household characteristics. The current study uses district-level information on socioeconomic developmental indicators from Primary Census Abstract (PCA), 2011.

1.12 Methodology

This study quantitatively examines the association between child marriage and health outcomes of women and children. Descriptive statistics and multivariate analyses are carried out in the present study. Descriptive statistics uses both univariate and bivariate percentage distribution. Moreover, to assess the nature of the association between outcome variables and predictors Pearson's chi-square test has been used. A series of linear regression models (OLS) has been employed to examine the association between child marriage and district developmental indicators. Binary logistic regression models are estimated to examine the association between child marriage and several adverse health outcomes of mother and children. Moreover, a set of control variables have been adjusted in multivariate analysis.

1.12.1 Measurement of Child Marriage Prevalence

The prevalence of child marriage has been estimated based on the United Nations definition. Therefore, prevalence of child marriage[93] is measured as:

$$\frac{\text{Number of women aged } 20-24 \text{ years who were married or in union before the age of } 15}{\text{Total number of women aged } 20-24 \text{ years}} \times 100$$

And,

$$\frac{\text{Number of women aged } 20-24 \text{ years who were married or in union before the age of } 18}{\text{Total number of women aged } 20-24 \text{ years}} \times 100$$

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[93] Mathur, Sanyukta, Margaret Greene, and Anju Malhotra. "Too young to wed: the lives, rights and health of young married girls." (2003); United Nations Children's Fund "The state of the world's children 2009: maternal and newborn health."

1.12.2 Bivariate Analyses

Bivariate analyses are carried out to examine the association between child marriage and indicators of health and other socioeconomic predictors of child marriage and health. Cross-tabulation and Pearson's chi-square test has been carried out for the analysis.

1.12.2.1 Pearson's Chi-square Test

Pearson's chi-square has generally been used to test the association between two categorical variables. The formula for Pearson's chi-square is as follows:

$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i}$$

Where χ^2 is the value of chi-square, O_i indicates observed frequencies, and E_i denotes expected frequencies.

1.12.3 Multivariate Analyses

The present study uses linear regression model, binary logistic regression model, and Fairlie's non-linear decomposition model for multivariate analyses. The linear regression model is fitted to examine the impact of socioeconomic developmental indicators on child marriage prevalence at the district-level. Moreover, the effect of region has been assessed using bivariate and multiple linear regression model based on '*Ordinary Least Square*' method. Binary logistic regression models have used to examine the determinants of child marriage using a set of socioeconomic characteristics as explanatory variables in the model. In this analysis, age at first marriage of women is dichotomized as 1 if women married below 18 years of age, 0 if married at 18 or later. The socioeconomic predictor variables are either binary or categorical or combination of both. Furthermore, most comprehensive analyses have been done on the association between child marriage and health status of women and children using bivariate and multivariate logistic regression models. In this case, health outcomes of mother and children are dichotomized (yes=1/no=0). The main explanatory is women's age at married which has been dichotomized as married below 18 years vs. married at 18 or later. Below 18 years of marriage, age is further classified into marriage at ≤14 years and 15-17 years. A set of socioeconomic and demographic characteristics have been controlled in multivariate logistic models.

1.12.3.1 Linear Regression Model (OLS)

Linear regression model can be expressed as:

$$Y_i = \alpha + bX_i + e_i$$

Where *Yi* is the dependent variable, X_i is explanatory variable, α denotes constant term or intercept of the regression, *b* is the coefficient value of the explanatory variable *(Xᵢ)*, or *slope* of the regression line and e_i indicates error term.

Further, this study has used linear regression with multiple explanatory variables. The form of multiple linear regression can be written as:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \varepsilon_i$$

Where k denotes number of explanatory variables.

1.12.3.2 Binary Logistic Regression Model

Binary logistic regression generally used for binary outcome. The explanatory variables can be continuous, binary or categorical.
The bivariate function of logistic regression is as follows:

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

Where P is an estimated probability, z is the predictor variable, and e is the base of the natural logarithm. Multivariate logistic regression function is as follows:

$$P = \frac{1}{1 + e^{-(b_0 + b_1 X_1 + b_2 X_2 + \cdots + b_k X_k)}}$$

Odds and logit of P:

$$logit\ P = b_0 + b_1 X_1 + b_2 X_2 + \cdots + b_k X_k$$

$$\log\frac{P}{1 - P} = b_0 + b_1 X_1 + b_2 X_2 + \cdots + b_k X_k$$

Where, P/(1 – P) indicates odds, and log[P/(1 – P)] denotes log odds or logit of P.[94]

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[94] Retherford, Robert D., and Minja Kim Choe. *Statistical models for causal analysis*. John Wiley & Sons, 2011.

The results of the logistic regression are presented in unadjusted and adjusted odds ratio with 95% confidence interval.

1.12.3.3   Fairlie's Decomposition Analysis

Perhaps the most common technique of identifying and quantifying the causes of inter-group differences is Blinder-Oaxaca decomposition analysis (1973).[95] Blinder-Oaxaca decomposition is used when the outcome variable is linear. However, for the non-linear outcome, a new technique of decomposition has employed, estimated from logit regression was first described by Fairlie (1999, 2006).[96]

Fairlie's (1999) decomposition equation can be expressed as:

$$\overline{Y}^A - \overline{Y}^C = \left[\sum_{i=1}^{N^A} \frac{F(X_i^A \hat{\beta}^A)}{N^A} - \sum_{i=1}^{N^C} \frac{F(X_i^C \hat{\beta}^A)}{N^C}\right] + \left[\sum_{i=1}^{N^C} \frac{F(X_i^C \hat{\beta}^A)}{N^C} - \sum_{i=1}^{N^C} \frac{F(X_i^C \hat{\beta}^C)}{N^C}\right] (1.1)$$

Where N_j is the sample size for group j. The first part of the bracket in the equation indicates the difference that is due to group differences in the distribution of X, and the second part denotes differences in the group processes determining levels of Y. $\overline{Y}^j$ is the average probability of the binary outcome of interest for group j and F as the cumulative distribution function for the logistic model.

Moreover, equation 1.1 provides contribution of each independent variable to the differences independent variable estimated from βcoefficient of logit regression model.

The independent contribution of X_1 to the gap in outcome variable can be expressed as:

$$\frac{1}{N^C}\sum_{i=1}^{N^C} F\left(\hat{\alpha}^* + X_{1i}^A \hat{\beta}_1^* + X_{2i}^A \hat{\beta}_2^*\right) - F(\hat{\alpha}^* + X_{1i}^C \hat{\beta}_1^* + X_{2i}^C \hat{\beta}_2^*) \qquad (1.2)$$

Similarly, the contribution of X_2 can be conveyed as:

$$\frac{1}{N^C}\sum_{i=1}^{N^C} F\left(\hat{\alpha}^* + X_{1i}^C \hat{\beta}_1^* + X_{2i}^A \hat{\beta}_2^*\right) - F(\hat{\alpha}^* + X_{1i}^C \hat{\beta}_1^* + X_{2i}^C \hat{\beta}_2^*) \qquad (1.3)$$

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[95] Blinder, Alan S. "Wage discrimination: reduced form and structural estimates." *Journal of Human resources* (1973): 436-455; Oaxaca, Ronald. "Male-female wage differentials in urban labor markets." *International economic review* (1973): 693-709.

[96] Fairlie, Robert W. "The absence of the African-American owned business: An analysis of the dynamics of self-employment." *Journal of Labor Economics* 17, no. 1 (1999): 80-108; Fairlie, Robert W. "An extension of the Blinder-Oaxaca decomposition technique to logit and probit models." *Journal of economic and social measurement* 30, no. 4 (2006): 305-316.

1.13 Study Setting

The present assesses the prevalence of child marriage and its association with maternal and child health using a nationally representative cross-sectional sample survey in India. India, a lower-middle income country is located in South Asia (based on World Bank classification). India has witnessed for lower female age at marriage with approximately 27% of the married women aged 20-24 years are married before 18 years of age in 2015-16. According to the '*Child Marriage Restraint Act,*' 1976 girls' marriage below the age of 18 was prohibited, and it is a punishable offense once after the '*Child Marriage Prohibition Act*' was enacted in 2006. Although considerable decline has been observed in child marriage prevalence, still a significant proportion of women will continue to marry before the legal age of marriage. Social norms primarily drive child marriage in India. Additionally, poverty, illiteracy, impoverish residence reinforces the practice of child marriage in India. Moreover, the majority of girls in India are lived in rural areas, having lower educational attainment, economically deprived and lower status in the household. Further, adverse maternal and child health is a serious public problem in India. Maternal mortality related to pregnancy and childbirth is the leading causes of death among young married women in India. Moreover, low body mass and iron deficiency among adolescent mother primarily occur due to lower consumption of nutritious food which increases the risk of obstetric complications, restricted foetal growth, preterm delivery, low birthweight, and child mortality. India is characterized by highly discriminated space for female in food consumption, education, and economic possession. Moreover, in India, women have lower decision-making ability in marriage, utilization of health care services, and other aspects of life. Therefore, it is essential to study the impact of child marriage on health outcomes of women and children in India where significant proportions of them have poor health status.

1.14 Conceptual Framework of the study

A framework has been developed for analyzing the relationship between child marriage and health costs of women and children. Based on existing literature and acknowledging structural and contextual background, this study mainly focuses risk of child marriage for women and children's adverse health outcomes. Child marriage occurs due to the complex interplay of socioeconomic, environmental, and cultural factors. Several risk factors have been identified from the review of earlier studies for the practice of child marriage such as poverty, lower access to education, and socio-cultural norms. However, the present study aims to assess the contribution of socioeconomic factors in child marriage practice. Studies have mentioned that pre-marital risk factors such as food discrimination in the household, limited educational opportunity directly affect the health and nutritional status of women.[97] Once girls married before their biological immaturity, they become more vulnerable to adverse health outcomes as well as increase the risk of children's negative health outcomes. However, the present study focuses on structural factors which are the main driving force of child marriage as well as health and nutritional status of women and children. A significant number of studies have examined the association of child marriage with the reproductive health status of women. Moreover, some studies have also shown the impact of early marriage on marital violence which has a negative impact on their health as well as their children's health and well-being. However, very little studies have examined the effect of child marriage on other dimensions of child marriage. Evidence has found that child marriage directly associated with increased risk of early childbearing and motherhood.[98] Women's reproductive health often gets adversely affected primarily because of their biological immaturity. Women are not capable of childbearing in adolescent age as their incomplete physiological growth which leads to complications during pregnancy and labour and higher incidence of intrauterine foetal death, stillbirth, and maternal mortality.

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[97] Siefert, Kristine, Colleen M. Heflin, Mary E. Corcoran, and David R. Williams. "Food insufficiency and the physical and mental health of low-income women." *Women & health* 32, no. 1-2 (2001): 159-177; Pascoe, Elizabeth A., and Laura Smart Richman. "Perceived discrimination and health: a meta-analytic review." *Psychological bulletin* 135, no. 4 (2009): 531; Khan, M. E., Richard Anker, S. K. Ghosh Dastidar, and Sashi Bairathi. *Inequalities between men and women in nutrition and family welfare services: an in-depth enquiry in an Indian village*. No. 992546723402676. International Labour Organization, 1987.

[98] Choe eta al. "Early marriage and early motherhood in Nepal." 143-162; Goli et al. "The effect of early marriages and early childbearing on women's nutritional status in India." 1864-1880.

In this context, the study aims to assess the relationship between child marriage and reproductive health outcome of women after accounting for a range of socioeconomic vulnerabilities. Moreover, the reproductive health status of women is directly related to their use of maternal health care services. Lower use of maternity care attributed to several contextual and structural factors such as lack of knowledge, poverty, and socio-cultural norms. Moreover, access to maternal care is determined by women's decision-making ability in the household. It is also well documented that child marriage is highly prevalent among poor, uneducated, and among those women who are living in impoverished areas. With this backdrop, this study aims to assess whether the utilization of maternal health care services is adequate among the women who married before their legal age of marriage than their later married counterparts. Furthermore, nutritional deficiency of women is determined by several socioeconomic, demographic, and environmental factors. Childbearing in adolescent age affects women's physical growth and nutritional status.[99] Based on the evidence from previous studies, the current study employs an empirical strategy to examine the link between child marriage and nutrition and anaemia status of women. However, the impact of mother's age at marriage may not be directly associated with their children's health outcomes as indicated by several prior studies.[100] Besides, evidence has shown that poor maternal health is linked to the postnatal growth restriction.[101] Moreover, maternal behavior on child health care may impact on their children's health outcomes. For instance, the decision regarding immunization and breastfeeding significantly affects child health and well-being. Therefore, this study aims to examine the independent impact of child marriage on indicators of children's health such as nutritional outcome, anaemia, low birth weight, birth size, morbidity, and mortality, after accounting for a range of potential predictive factors related to mother's and children's socioeconomic and demographic characteristics.

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[99] Rah et al. "Pregnancy and lactation hinder growth and nutritional status of adolescent girls in rural Bangladesh." 1505-1511.

[100] Sekhri et al. "Intergenerational consequences of early age marriages of girls." 1670-1686; Chari et al. "The causal effect of maternal age at marriage on child wellbeing" 42-55; Efevbera et al, "Girl child marriage as a risk factor for early childhood development and stunting." 91-101.

[101] Black, Robert E., Cesar G. Victora, Susan P. Walker, Zulfiqar A. Bhutta, Parul Christian, Mercedes De Onis, Majid Ezzati et al. "Maternal and child undernutrition and overweight in low-income and middle-income countries." *The lancet* 382, no. 9890 (2013): 427-451.

Figure 1.1: Conceptual framework for examining the association of child marriage on maternal and child health
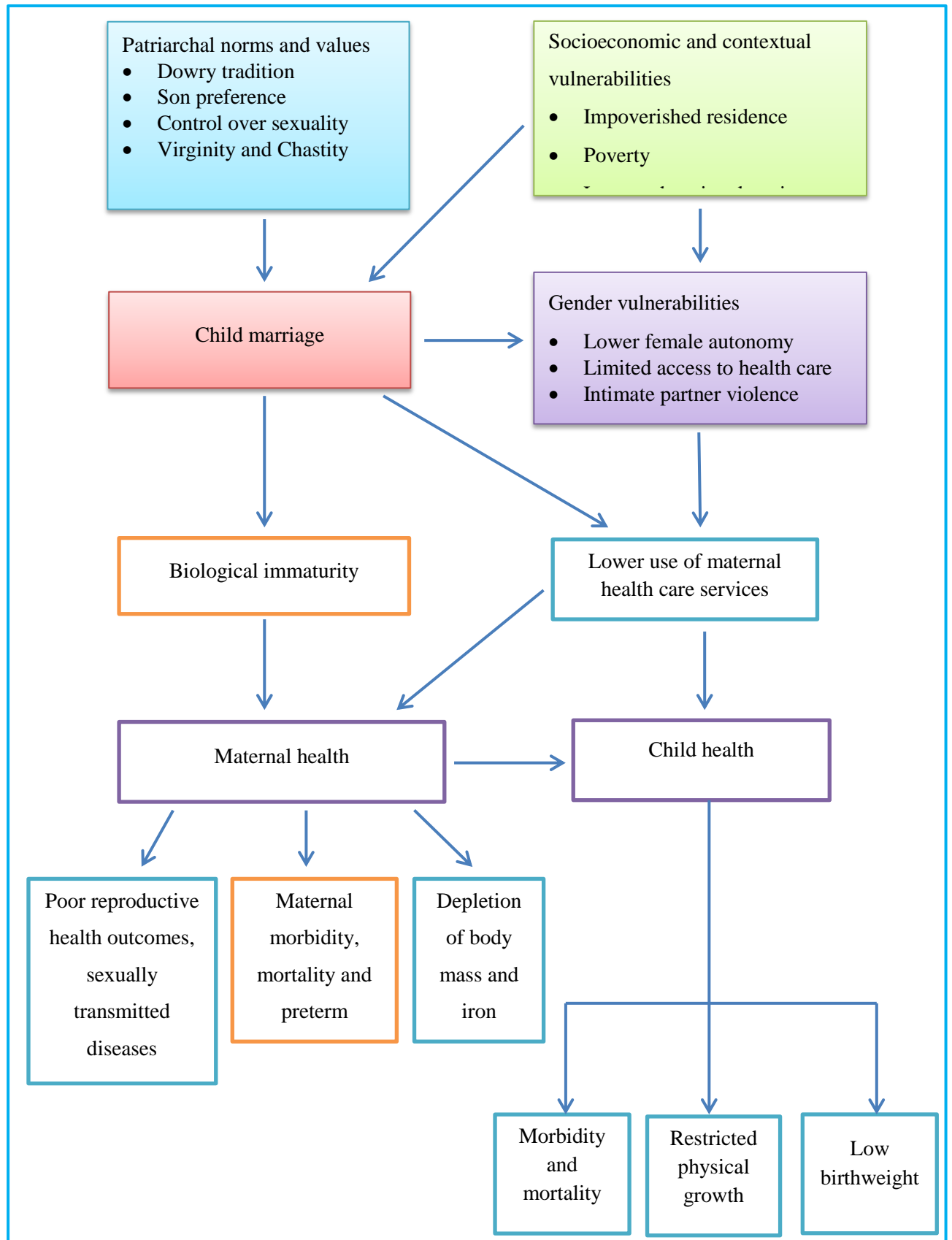
1.15 Organization of the Study

The study has organized in six chapters.

The first chapter provides a brief introduction, background of the study in several sub-divisions such as root cause of child marriage practice in India, regional context of child marriage practice in India and some empirical evidence on health implications of child marriage. Further, this chapter illustrates an overview of literature, objectives, research questions, hypotheses, data source and methodology, research gaps, rational of the study, study setting, and conceptual framework.

The second chapter examines the global and regional prevalence of child marriage. In examining the regional prevalence, state-level and district-level incidence of child marriage have been estimated using unit-level information from NFHS-4. Further, a relationship has been established between child marriage and the socioeconomic development of district.

The third chapter deals with the assessment of child marriage incidence using unit level information. First, a trend has been analyzed in child marriage prevalence by socioeconomic status of women during 1992-93 to 2015-16 (NFHS-1 to NFHS-4). Secondly, the prevalence of child marriage by socioeconomic and demographic characteristics of women has been estimated at the aggregate level. Moreover, four states have been selected from different socioeconomic background to examine the prevalence of child marriage in these states. However, prevention of child marriage is very essential to protect girls from adverse social, economic, and health condition. Therefore, possible socioeconomic drivers of child marriage have been identified, and their relative impact on child marriage has been analyzed. Further, the contribution of socioeconomic factors for child marriage prevalence in each region has been examined.

The fourth chapter assesses the association of child marriage with women's health costs. The present study has selected reproductive, nutrition, and anaemia status of women. Moreover, the health status of women is primarily determined by the utilization of maternal health care. For the purpose of the study, this chapter has divided into three sections. The first section has examined the relationship of child marriage with selected reproductive health outcomes of women. Second section deals with the relationship of child marriage with maternity care which largely impacts on women's health as well as their children's health outcomes.

The last part aims to analyze the link between child marriage and malnutrition and anaemia status of women.

The fifth chapter aims to examine the relationship between child marriage and children's health outcomes. This chapter has two broad sections. The first section of this chapter deals with the association of child marriage with children's nutrition, anaemia status, low birth weight, small birth size. The second section focuses on short-term morbidities and mortality of children under-5 and its association with child marriage of mother.

The last chapter provides a summary of conclusion of the study with policy implications, limitation, strength, and future research scope of the study.

Chapter-2

Prevalence of Child Marriage: Macro-level Assessment

This chapter analyses the prevalence of child marriage in lower-middle income countries in general and India in particular. It also looks at the state-level and district-level prevalence of child marriage. Almost every society around the world practiced harmful child marriage at different points in time. However, with the advent of educational development, socioeconomic development and changing social norms substantially reduces the practice of child marriage in many parts of the world. Nevertheless, the practice of child marriage remains pervasive and elusive in Sub-Saharan and South Asian countries. Child marriage also persists among the Latin American, Caribbean, and East European countries but the levels are not high. Child marriage is highly prevalent among the poor, and, uneducated households and those living in rural areas. India is one of the South Asian countries where majority of the population are living in rural areas, having low education, economically deprived, and characterized by rigid social norms which lead to harmful practice like child marriage.

2.1. Global Prevalence of Child Marriage

According to the UNICEF, more than 700 million women are reported that they were married below 18 years of age.[102] An estimated 15 million girls are married every year before their 18th birthday.[103] Despite several international commitment and national laws, the practice of child marriage is highly prevalent in lower-middle income countries. Though the practice of child marriage has been reducing considerably, it still affects a significant proportion of young adolescent girls. Comparing child marriage prevalence across regions or countries is difficult to assess because of the survey on child marriage has conducted in the different period among the countries. However, the regional prevalence of child marriage has been estimated by the UNICEF across the world using the database from DHS, MICS and other nationally representative surveys. In addition, country-level prevalence of child marriage has presented in the graph from the same data source.

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[102] UNICEF, "Ending child marriage."
[103] Ibid.

Figure 2.1: Prevalence of child marriage across regions of the world (2003-2016)
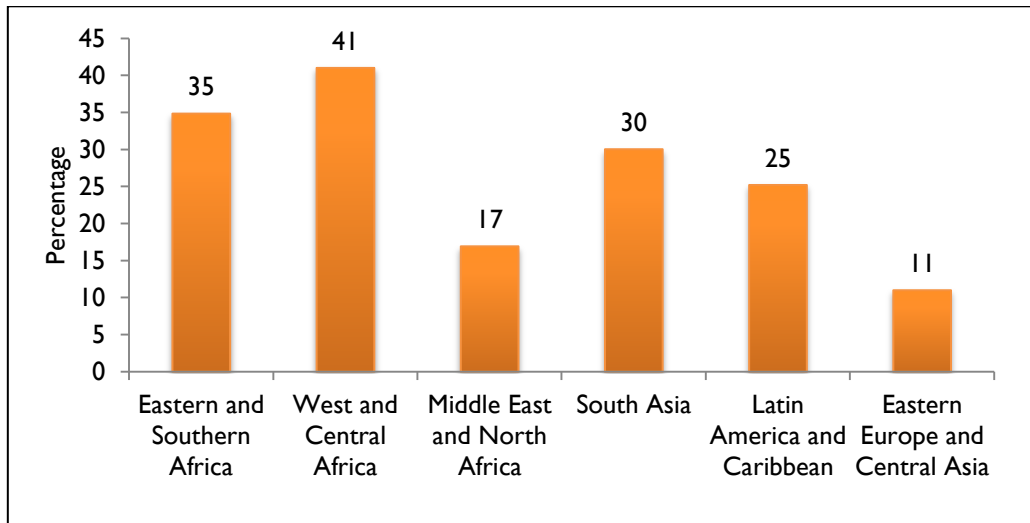
Source: UNICEF database

Figure 2.1 depicts the prevalence of child marriage across different regions of the world. The graph shows that the incidence of child marriage substantially varies across regions. West and Central Africa have the highest rate of child marriage (41%), followed by Eastern and Southern Africa (35%), South Asia (30%). Moreover, Latin America, Caribbean, Middle East and North African countries have witnessed a substantial proportion of child marriage. The pervasiveness of child marriage in African and South Asian countries due to higher incidence of poverty, socio-cultural norms and tradition, higher gender inequality and lower socioeconomic development.[104]

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[104] Jensen et al. "Early female marriage in the developing world." 9-19; Singh et al. "Early marriage among women in developing countries." 148-175.

Figure 2.2: Top 30 countries with the highest prevalence of child marriage below 15 & 18 years of age (2010-15)
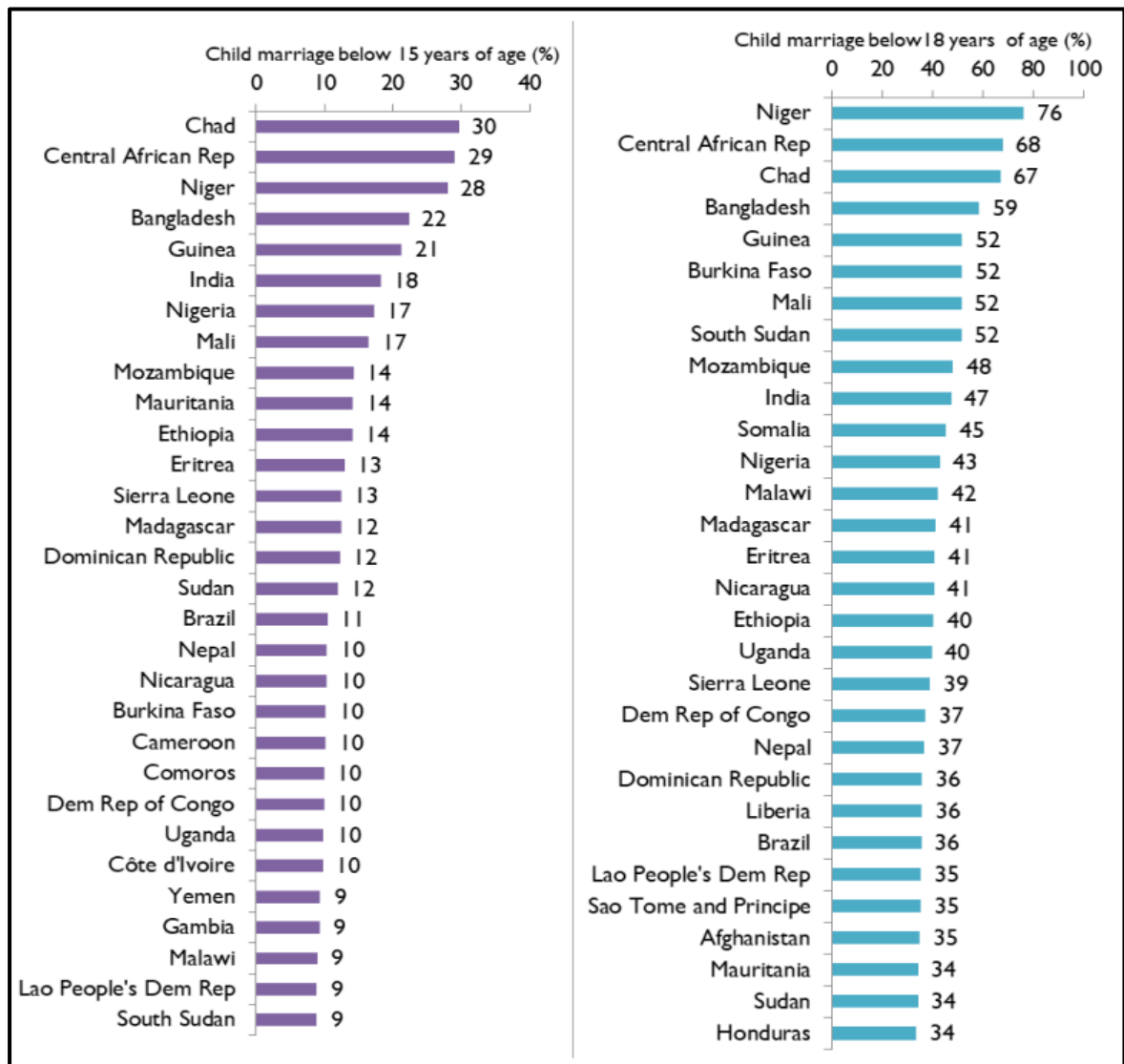
Figure 2.2 presents the prevalence of child marriage in the top 30 countries of the world for 15 years of age using the data from DHS, MICS and other nationally representative surveys estimated by UNICEF collected during 2010-2015. Chad (30%) shows the highest rate of child marriage by the age of 15, followed by Central African Republic (29%), and Niger (28%). Bangladesh (22%) and India (18%) from South Asian countries also depicts higher incidence of child marriage by 15 years of age. Moreover, the graph demonstrates top 30 countries with highest prevalence of child marriage by the age of 18. Sub-Saharan nations remain in the top position. Niger (78%) indicates the highest rate of child marriage (by the age of 18) worldwide, followed by Central African Republic (68%), and Chad (67%).

Among the South Asian countries, Bangladesh (59%) witnesses highest proportion of marriage below 18 years of age, followed by India (47%), and Nepal (37%). Other South Asian countries such as Nepal (40%), Pakistan (21%), Afghanistan (35%), and Sri Lanka (12%) also have higher proportion of women married below 18 years of age. However, it is worth to mention that recent estimate demonstrates a considerable decline in child marriage prevalence in India presumably because of advancement in educational attainment and socioeconomic development.

2.2 Prevalence of Child Marriage in India

This section of the study aims to assess the national-level, state-level, and district-level prevalence of child marriage. The study has estimated the rural-urban incidence of child marriage during 1992-93 to 2015-16. Further, the state-level incidence of child marriage has calculated for 15 and 18 years of age using the dataset from the recent round of National Family Health Survey (NFHS-4). Despite enforcement of the law, large segment of girls continues to marry before 18 years of age in India. India has a long history to prevent child marriage practice by enforcement of laws and legislation. '*Child Marriage Restraint Act,*' *1929* set the legal age of marriage 14 years for girls and 18 years for boys. In 1976, '*Child Marriage Restraint Amendment Act*' raised the legal age marriage from 14 to 18 years for girls and 18 to 21 years for boys. The '*Prohibition of Child Marriage Act*' *2006* replaces the earlier '*Child Marriage Restraint Act*' to strengthen the law of minimum marriage age.

2.2.1   National-level Incidence of Child Marriage

Overall, 27% of the women married below 18 years of age in 2015-16. Poverty, socio-cultural norms and discrimination against girls are the main driving force of child marriage in India. Although the mean age at marriage has risen in India, a substantial proportion of girls are affected by this harmful practice. Despite legal enforcement, programmes and policies to prevent child marriage practice and to save the girls from human right violation, it remains high among impoverished, uneducated, and the areas where rigid social norms persist.

Figure 2.3: Rural-urban prevalence of child marriage during 1992-93 to 2015-16 in India
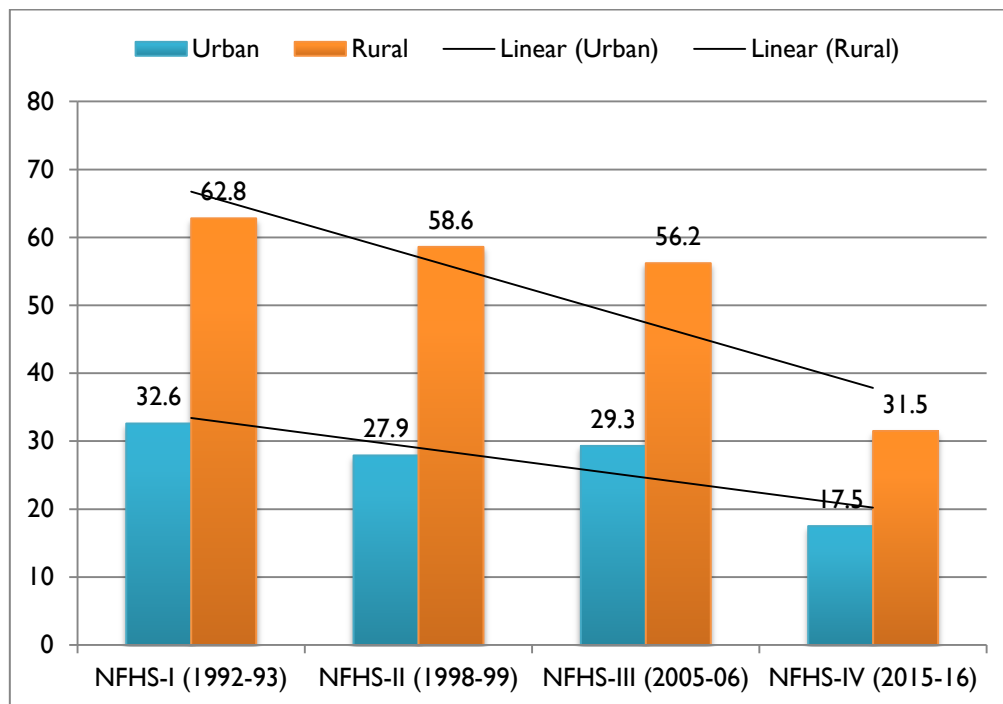
Source: Estimated from NFHS-1, NFHS-2, NFHS-3, & NFHS-4.

Figure 2.3 shows the rural-urban prevalence of child marriage in India from the period 1992-93 to 2015-16 using the most reliable and acceptable dataset which is commonly used to measure the prevalence of child marriage based on UN definition. The figure depicts the declining trend in child marriage over the period for both rural and urban. However, there was a slow decline between the years 1992-93 (overall, 54.2%) and 2005-06 (overall, 47.4%). Almost half of the young girls married before 18 years of age during 2005-06. Nonetheless, child marriage prevalence is declining much faster in rural areas than the urban areas. The recent Demographic and Health Survey (NFHS-4) demonstrates that approximately 27% of the women are married as children. Although the prevalence of child marriage is declining, the rate of decrease is not the desired level. It is apparent from the analysis that still a large number of girls continue to marry before their 18th birthday.

2.2.2 Prevalence of Child Marriage at the State-level

This section of the study aims to identify the high incidence states of child marriage. The incidence of child marriage may vary across states and union territories mainly because of different socioeconomic development and cultural setting. Moreover, the nature of gender discrimination, marriage norms, and differential state policy on education makes different timing of marriage across states. By identifying and analyzing the higher incidence states of child marriage will enable policy recommendations to prevent child marriage practice and preserve girls' human rights.

Figure 2.4: Prevalence of child marriage married below 15 and 18 years of age across Indian states and union territories, NFHS-4 (2015-16)
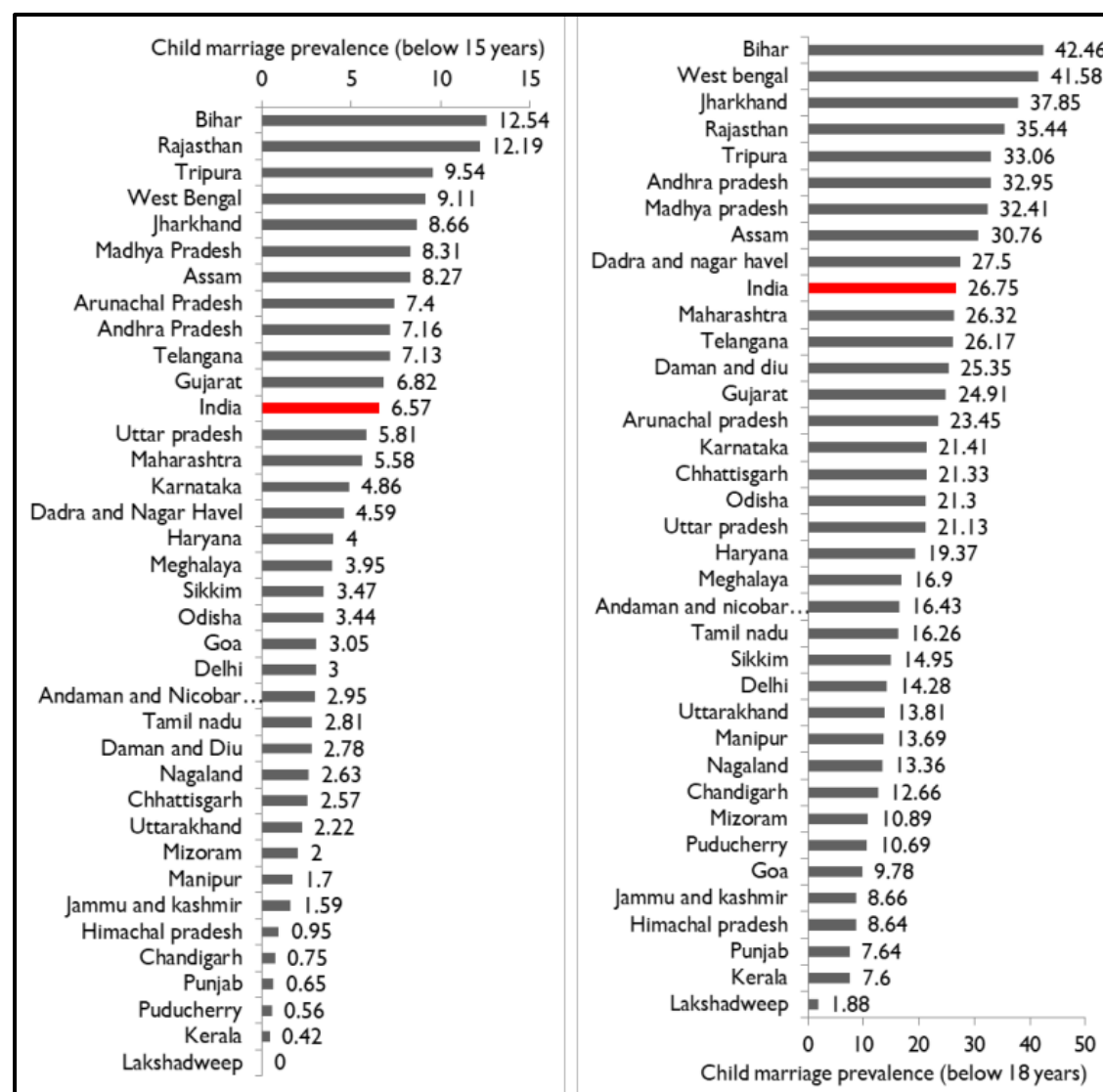
Source: Estimated from NFHS-4

Figure 2.4 presents the prevalence of child marriage (below 15 and 18 years of age) across Indian states and union territories. Overall, 6.57 percent of girls are married before 15 years of age in India. The proportion of women married below the age of 15 years substantially varies across Indian states and union territories, ranging from 0% in Lakshadweep to 12.54% in Bihar. Other higher prevalence states are Rajasthan (12.19%), Tripura (9.54%), West Bengal (9.11%), Jharkhand (8.66%), Madhya Pradesh (8.31%), and Assam (8.21%). Overall, 26.75% of the women aged 20-24 years are married before 18 years of age in India. Bihar (42.46%) has the highest rate of child marriage, followed by West Bengal (41.58%), Jharkhand (37.85%), Rajasthan (35.44%), Tripura (33.06%), and Andhra Pradesh (32.95%). On the other hand, Lakshadweep (1.88%) has the lowest prevalence of child marriage. Also, Kerala (7.6%) has the lowest incidence of child marriage among states, followed by Punjab (7.64%), Himachal Pradesh (8.64%), Jammu & Kashmir (8.66%), and Goa (9.78%). Therefore, it can be understood from the analysis that child marriage is highly prevalent in those areas where a large segment of people are living in rural areas, have higher incidence of poverty, and remarkably lower level of education.

2.2.3   Prevalence of Child Marriage: A District-Level Analysis

This section of the study assesses the district-level incidence of child marriage in India using the database from NFHS-4. Census of India collects data on age at marriage at the district-level. However, the census does not provide single age wise data on age at marriage. Therefore, the prevalence of child marriage based on UN definition cannot be assessed using Census Data because estimation of child marriage prevalence requires unit level information with single age. Moreover, DLHS and IHDS provide unit level information regarding age at first marriage. Nevertheless, DLHS does not collect the data from all the states, and the sample size is small for district-level estimation. IHDS does not obtain the information from all the districts of India and has relatively small size. The Demographic Health Survey (DHS) and Multiple Indicator Cluster Surveys (MICS) are commonly used for the estimation of child marriage prevalence at the international level to compare cross-country prevalence. The latest round NFHS provides information on married and unmarried women at the unit level with sufficient sample size from which district-level prevalence of child marriage has been estimated using the United Nations definition of child marriage.

District-level prevalence of child marriage before the age of 15 and 18 years are depicted in the figure below (see appendix-1 for child marriage prevalence of each district). The purpose of these maps is to understand spatial variation in the prevalence of child marriage.

Map 2.1: Prevalence of child marriage (below 15 years of age) in India, NFHS-4 (2015-16)
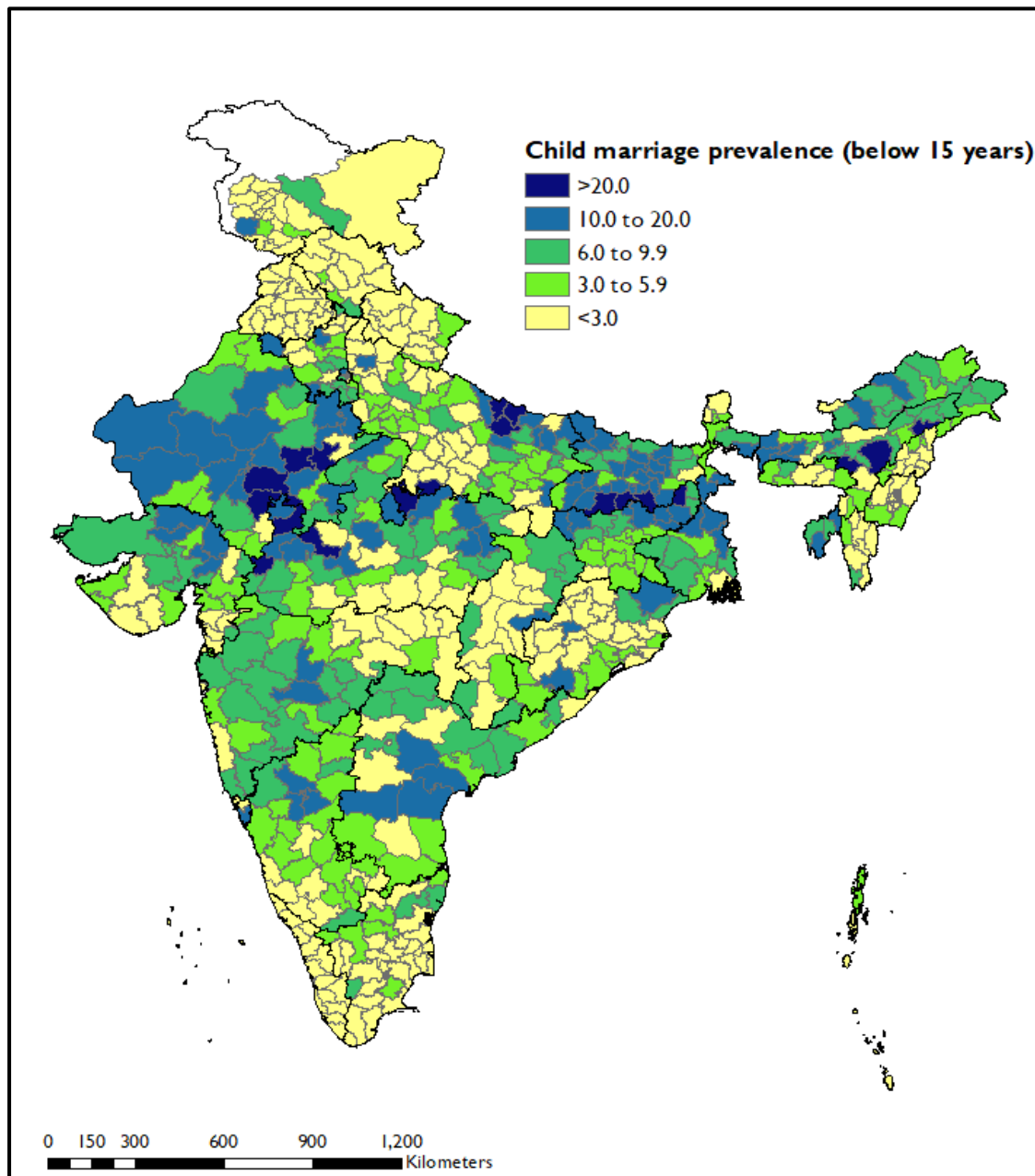
Source: Estimated from NFHS-4

Map 2.2: Prevalence of child marriage (below 18 years of age) in India, NFHS-4 (2015-16)
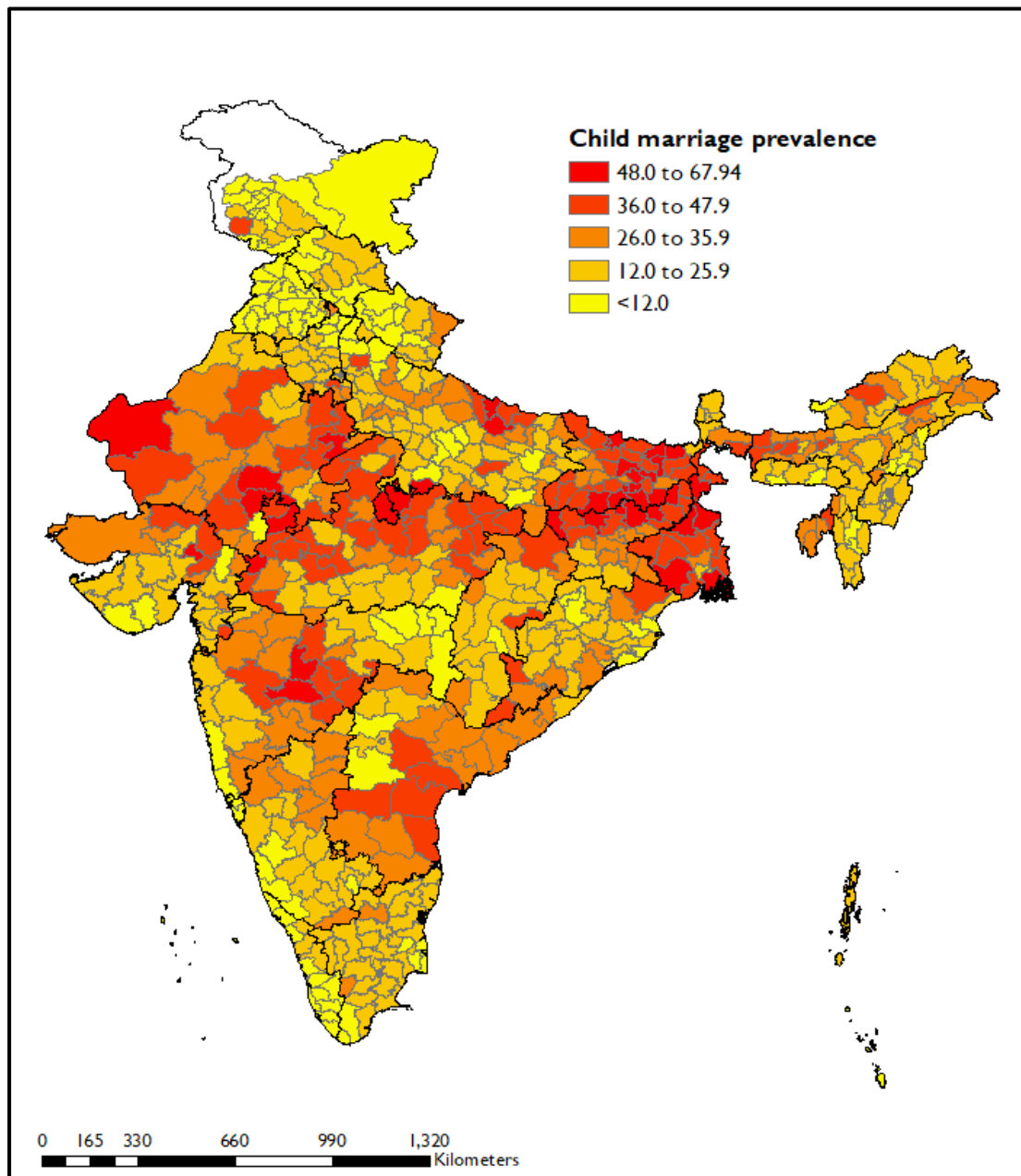
Source: Estimated from NFHS-4

2.2.3.1 Child Marriage Hotspot Districts (marriage below 18 years)

This section of the study aims to identify the child marriage hotspot district of India. First, all the districts have been ranked from top to bottom by the prevalence of child marriage. Secondly, the top 96 districts have been identified whose prevalence is more than 40%. Further, the districts are categorized into two groups, more than 50% and 40% to 50% prevalence of child marriage. Among the 96 districts, 27 districts have more than 50% prevalence of child marriage, and 69 districts indicate 40% to 50% prevalence of child marriage. The following table presents child marriage hotspot districts of India.

Table 2.1: Child marriage (below 18 years) hotspot districts in India, NFHS-4 (2015-16)

Child marriage prevalence	Distribution of hotspot districts among the states (Total=96)
>50%	Total (27) Uttar Pradesh (1), Jharkhand (5), Bihar (11), Rajasthan (2), West Bengal (4), Madhya Pradesh (2), Maharashtra (1), and Gujarat (1)
40-50%	Total (69) West Bengal (7), Bihar (12), Uttar Pradesh (6), Rajasthan (11), Maharashtra (5), Madhya Pradesh (11), Jharkhand (5), Assam (5), Andhra Pradesh (4), Gujarat (2), and Chhattisgarh (1)

Source: Estimated from NFHS-4

Among the 27 districts where child marriage is above 50%, Bihar has the highest number of districts (11), followed by Jharkhand (5), and West Bengal (4). Moreover, between the prevalence of 40-50%, twelve districts are from Bihar, eleven from Rajasthan & Andhra Pradesh, seven from West Bengal, and six from Uttar Pradesh. Therefore, most of the child marriage hotspot districts are found in Bihar, West Bengal, Rajasthan, and small patches of Madhya Pradesh, Uttar Pradesh, Maharashtra, and Andhra Pradesh state. Therefore, effort should be made to increase the age at marriage of girls in the high incidence states. Promoting education, providing financial incentives for girls' education, and awareness about the harmful impact of child marriage can prevent the practice of child marriage. Rigid customary norms may play an essential role in these high incidence states for persistent child marriage. Advancement in education can change the mind of people and make aware of the harmful effect of child marriage.

Map 2.3: Child marriage (married below 18 years) hotspot districts in India, NFHS-4 (2015-16)
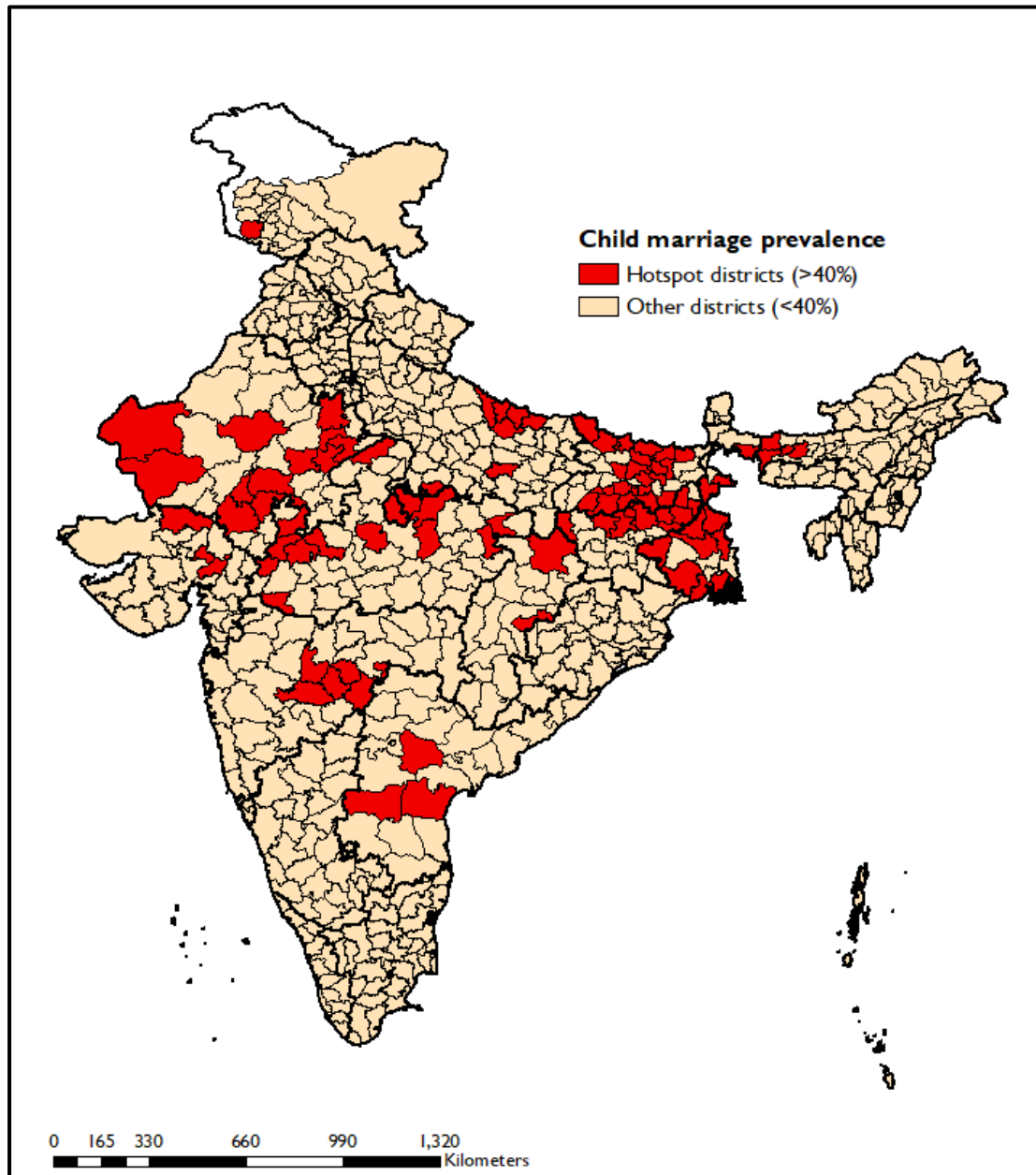
Source: Estimated from NFHS-4

2.2.3.2 Child Marriage and Its Relationship with District Developmental Indicators

The purpose of this section of analysis is to capture the macro-picture of child marriage and its relationship with district development indicators that could help arrive at policy perspectives. For the purpose of the study, the dataset has been combined from Census of India (2011) and National Family Health Survey (NFHS-4, 2015-16) to investigate the impact of socioeconomic developmental indicators on the prevalence child marriage at the district level. The study includes all the districts of India as per the Census 2011. Child marriage prevalence and indicators of social infrastructure (i.e., household having electricity facility, household using improved sources of drinking water, household having toilet facility, and using clean cooking fuel) have been estimated from NFHS-4, 2015-16. Appropriate sampling weights have been used to estimate the indicators from NFHS-4. The calculated weight is based on the Census of India (2011). Moreover, the indicators of women's status (i.e., sex ratio, female literacy, and female work participation rate), proportion share of the marginalized population (proportion of Scheduled Caste and Scheduled Tribe), and level of urbanization have been estimated using Census of India (2011).

2.2.3.2.1 Social Infrastructure and Child Marriage

Developmental process may reduce the harmful practice of child marriage. For instance, electrification in a village might increase aspiration of girls for schooling.[105] Hence, they are more likely to spend in school. Spending more time in school also increase the timing of marriage among girls.[106] Water facility may also impact on child marriage practice. For instance, in many Indian villages, especially among the poor water is not available within the premise. Fetching water from long distance is a responsibility of girls and women in a patriarchal society like India.[107]

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[105] Khandker, Shahidur R., Douglas F. Barnes, Hussain Samad, and Nguyen Huu Minh. *Welfare impacts of rural electrification: evidence from Vietnam*. The World Bank, 2009; Khandker, Shahidur R., Douglas F. Barnes, and Hussain A. Samad. "Welfare impacts of rural electrification: A panel data analysis from Vietnam." *Economic Development and Cultural Change* 61, no. 3 (2013): 659-692; Chaudhuri, Kausik, and Susmita Roy. "Gender gap in educational attainment: evidence from rural India." *Education Economics* 17, no. 2 (2009): 215-238.

[106] Field et al. "Early marriage, age of menarche, and female schooling attainment in Bangladesh." 881-930.

[107] Joshi, Deepa. "Caste, gender and the rhetoric of reform in India's drinking water sector." *Economic and Political Weekly* (2011): 56-63.

Therefore, in many rural and urban areas especially among the poor where water is not available within the premises, taking them long hours to collect water at home compels girls to leave their school as they have less time to attending school.[108] The relationship between toilet facility in the household and health and nutritional status of an individual is well established.[109] However, toilet facility may not be directly related to the child marriage practice. As a part of the socioeconomic developmental process, it can be assumed that household with toilet facility is more likely to break away from harmful cultural practices. Moreover, toilet facility reflects economic condition of the family, although it is a custom not to build a toilet in the household in many parts of the country where rigid social norms persist. Similarly, cooking fuel also represents the economic condition of the household. It has been assumed that household using clean cooking fuel are economically well-off than the household using solid cooking fuel. Poverty makes vulnerable for the marriage of girls' at a younger age.

2.2.3.2.2 *Women's Status and Child Marriage*

The study selected three indicators (i.e., female literacy rate, female work participation rate, and sex ratio,) of women's status to investigate the impact of women's status on child marriage. The study hypothesizes that better women's status significantly reduces the incidence of child marriage. Better women's status enables girls to take their marriage decision by themselves. Moreover, women can choose their partner if they have autonomy in their family. Despite better women's status, West Bengal indicates higher incident of child marriage.

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[108] Paul, Tanushree. "Viewing National Water Policies through a Gendered Lens." *Economic and Political Weekly* (2017): 76-84.

[109] Jose, Sunny, and K. Navaneetham. "Social infrastructure and women's undernutrition." *Economic and Political Weekly*(2010): 83-89; Ngure, Francis M., Brianna M. Reid, Jean H. Humphrey, Mduduzi N. Mbuya, Gretel Pelto, and Rebecca J. Stoltzfus. "Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: making the links." *Annals of the New York Academy of Sciences* 1308, no. 1 (2014): 118-128; Bhutta, Zulfiqar A., Jai K. Das, Arjumand Rizvi, Michelle F. Gaffey, Neff Walker, Susan Horton, Patrick Webb, Anna Lartey, and Robert E. Black. "Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?." *The lancet* 382, no. 9890 (2013): 452-477; Bartram, Jamie, Kristen Lewis, Roberto Lenton, and Albert Wright. "Focusing on improved water and sanitation for health." *The Lancet* 365, no. 9461 (2005): 810-812; Saxena, Shipra, and Anjal Prakash. "Sanitation and Health." *Rural Infrastructure: Sanitation, Housing, Health Care* (2008): 3; Shuval, Hillel I., Robert L. Tilden, Barbara H. Perry, and Robert N. Grosse. "Effect of investments in water supply and sanitation on health status: a threshold-saturation theory." *Bulletin of the World Health Organization* 59, no. 2 (1981): 243.

Moreover, Punjab and Haryana marked by higher gender discrimination and inequality where the incidence of female foeticide is highly prevalent. However, spatial analysis of previous section the study demonstrates lower incidence of child marriage in Punjab and Haryana. Although the selected indicators are the proxy measure of women's status, it still reflects women's level of autonomy in the household and society.

2.2.3.2.3. *Marginalized Groups and Child Marriage*

Scheduled Castes (SC) and Scheduled Tribes (ST) are considered as marginalized group of the population. However, patriarchal values and norms are highly important among higher caste family. Moreover, the rigidity of caste system is much more among the upper caste Hindu family. On the contrary, tribal society is more egalitarian regarding women's marriage decision making. In a tribal community, women enjoy comparatively greater autonomy than their hierarchical non-tribal counterparts. However, the incidence of poverty is higher among the SC & ST population. As already stated poverty is the main driving force of child marriage, the incidence of child marriage may be high among SC & ST population.

2.2.3.2.4 *Urbanization and Child Marriage*

Level of urbanization is a crucial indicator for the socioeconomic development of a district. Several prior studies have documented that women living in urban areas are less likely to marry in childhood compared to their rural counterparts. However, Singh and Samara (1996) found considerable heterogeneity in the association between early ages of marriage and level of urbanization.[110] Moreover, recent evidence shows a slower rate of decline in urban areas, whereas, in rural counterparts, the incidence of child marriage is reducing at the much faster rate. Urbanization and modernization make changes the family patterns. Joint family has broken down into nuclear and girls have increasing educational and employment opportunities[111] which translate into increasing age at marriage in urban areas.

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[110] Singh et al. "Early marriage among women in developing countries." 148-175.

[111] Ghosh, Rabindra Nath, and K. C. Roy. "The changing status of women in India: Impact of urbanization and development." *International Journal of Social Economics* 24, no. 7/8/9 (1997): 902-917.

Table 2.2: Descriptive statistics for prevalence of child marriage and district socio-economic developmental indicators (n=640)

Variables	Mean	Std. Dev.	Min.	Max.	Data Source
Child marriage (%)	24.56	13.55	0.00	67.94	NFHS-4, 2015-16
Household having electricity facility (%)	90.43	13.01	29.13	100	,,
Household having water facility (%)	88.03	12.86	28.09	100	,,
Household having toilet facility (%)	63.54	27.23	10.5	100	,,
Household using clean cooking fuel (%)	37.43	23.79	1.03	100	,,
Sex ratio (female per 1000 male)	945	60.61	534	1184	Census of India-2011
Scheduled caste population (%)	14.86	9.13	0.00	50.17	,,
Scheduled tribe population (%)	17.71	27.00	0.00	98.58	,,
Female literacy (%)	63.74	12.83	30.29	97.67	,,
Female work participation (%)	28.33	11.76	6.36	64.04	,,
Urban population (%)	26.40	21.12	0.00	100	,,

Source: Estimated from Census of India (2011) and NFHS-4, 2015-16.

Table 2.2 presents descriptive statistics for child marriage and district socioeconomic development indicators. The average prevalence of child marriage is 24.56% (SD±13.55) ranging from 0% to 67.94% among all the districts of India. Majority of the households are having electricity facility (90.43%; SD±13.01) and using improved sources of drinking water (88.03%; SD±12.86). About two-thirds of the households are having toilet facility (63.54%; SD±27.23); more than one-third of the households are using clean fuel for cooking (37.43%; SD±23.79). On an average, the proportion of the SC and ST population are 14.86% (SD±9.13) and 17.71% (SD±27.0), respectively. Moreover, the average female literacy and female work participation are 63.74% (SD±2.83) and 28.33% (SD±11.76), respectively. However, the district level variation ranges from 30.29% to 97.67% for female literacy rate and from 6.36% to 64.04% for female work participation rate. The average level of urbanization is 26.40% (SD±21.12) ranging from 0% to 100% among all the districts of India.

Figure 2.5: Boxplot showing the distribution of districts across child marriage and socioeconomic indicators
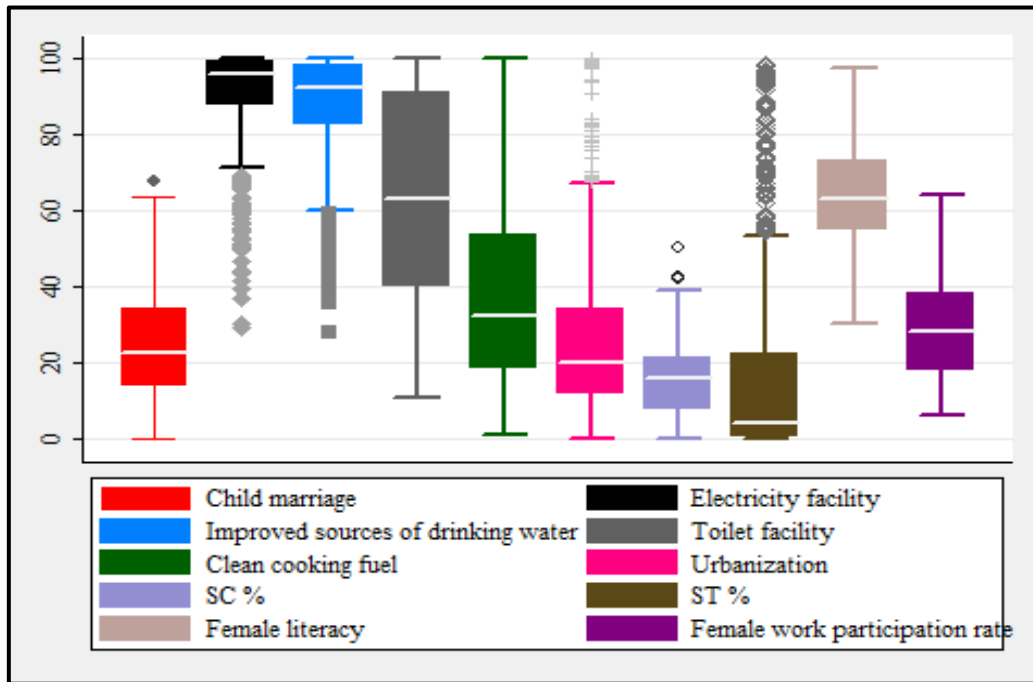
Box plot for child marriage and district socioeconomic developmental indicators has depicted in figure 2.5. The graph shows the level of variation in child marriage and socioeconomic developmental indicators across the districts of India. Majority of the districts are lying between 15% and 35% for child marriage prevalence. Moreover, the graph shows substantial variation across districts regarding toilet facility and the use of clean fuel for cooking.

Table 2.3: Correlation matrix showing relationship between child marriage and district socioeconomic developmental indicators

Socioeconomic characteristics	Child marriage rate (%)	Electricity facility (%)	Improved sources of drinking water (%)	Toilet facility (%)	Clean cooking fuel (%)	Sex ratio (female/1000 male)	Urbanization (%)	Proportion of SC population (%)	Proportion of ST population (%)	Female literacy rate (%)	Female work participation rate (%)
Child marriage (%)	1.00										
Electricity facility (%)	-0.45	1.00									
Improved sources of drinking water (%)	-0.07	-0.07	1.00								
Toilet facility (%)	-0.53	0.49	-0.01	1.00							
Clean cooking fuel (%)	-0.46	0.51	0.13	0.55	1.00						
Sex ratio (female/1000 male)	-0.11	0.12	-0.14	-0.08	-0.05	1.00					
Urbanization (%)	-0.34	0.42	0.07	0.44	0.77	-0.11	1.00				
Proportion of SC population	0.07	-0.01	0.28	-0.20	0.02	-0.10	-0.04	1.00			
Proportion of ST population	-0.05	0.01	-0.35	0.03	-0.24	0.09	-0.19	-0.61	1.00		
Female literacy rate (%)	-0.54	0.49	0.04	0.61	0.54	0.16	0.57	-0.04	-0.07	1.00	
Female work participation rate (%)	0.12	0.14	-0.38	-0.20	-0.22	0.35	-0.33	-0.24	0.53	-0.20	1

Source: Estimated from Census of India (2011) and NFHS-4, 2015-16.

Table 2.3 presents the correlation matrix for the association between child marriage and district socioeconomic development indicators in India. This study hypothesized that developmental process might impact on the practice of child marriage. Child marriage has shown significant negative association with electricity facility (r= -0.45), toilet facility (r= -0.53), clean cooking fuel (r= -0.46), urbanization (r= -0.34), and female literacy (r= -0.54). The analyses suggest that the districts with higher proportion of electricity facility, toilet facility, and using clean cooking fuel are less likely to practice child marriage. Moreover, the districts with higher level of urbanization, sex ratio, and female literacy rate have lower prevalence of child marriage. Surprisingly, female work participation rate was negatively correlated with child marriage prevalence.

Women are forced to do low paid jobs and work at very young age because of poverty which curtails possibility to continue their education. Therefore, they are more likely to marry at an early age because the dowry demand will be less if she is young. However, improved sources of drinking water (r= -0.07), sex ratio (r= -0.11), proportion of SC (r= 0.07), and ST (r= -0.05) were not significantly correlated with the prevalence of child marriage. Also, indicators of household amenities were significantly correlated with each other and other dimensions of socioeconomic development. For instance, electricity facility was positively correlated with toilet facility (r= 0.49), clean cooking fuel (r= 0.51), sex ratio (r= 0.12), female literacy (r= 0.49), and work participation rate (r= 0.12). Similarly, improved sources of drinking water were positively associated with clean cooking fuel and proportion of SC population and negatively correlated with sex ratio, the proportion of ST, and female work participation rate. Moreover, toilet facility had a positive correlation with clean cooking fuel, urbanization, and female literacy rate and negatively correlated with the proportion of SC population and female work participation rate. Further, clean cooking fuel was positively correlated with the proportion of urban population, female literacy and negatively correlated with the proportion of ST population and female work participation. Sex ratio was positively correlated with the proportion of ST population, female literacy, and female work participation rate and negatively correlated with urbanization. The proportion of the urban population was positively correlated with female literacy and negatively correlated with % of ST population and female work participation rate. The proportion of SC was negatively correlated with female work participation; whereas the proportion of ST was positively correlated with female work participation rate. Female literacy was negatively associated with female work participation rate.

Figure 2.6: Graphical association between prevalence of child marriage and district socioeconomic development indicators
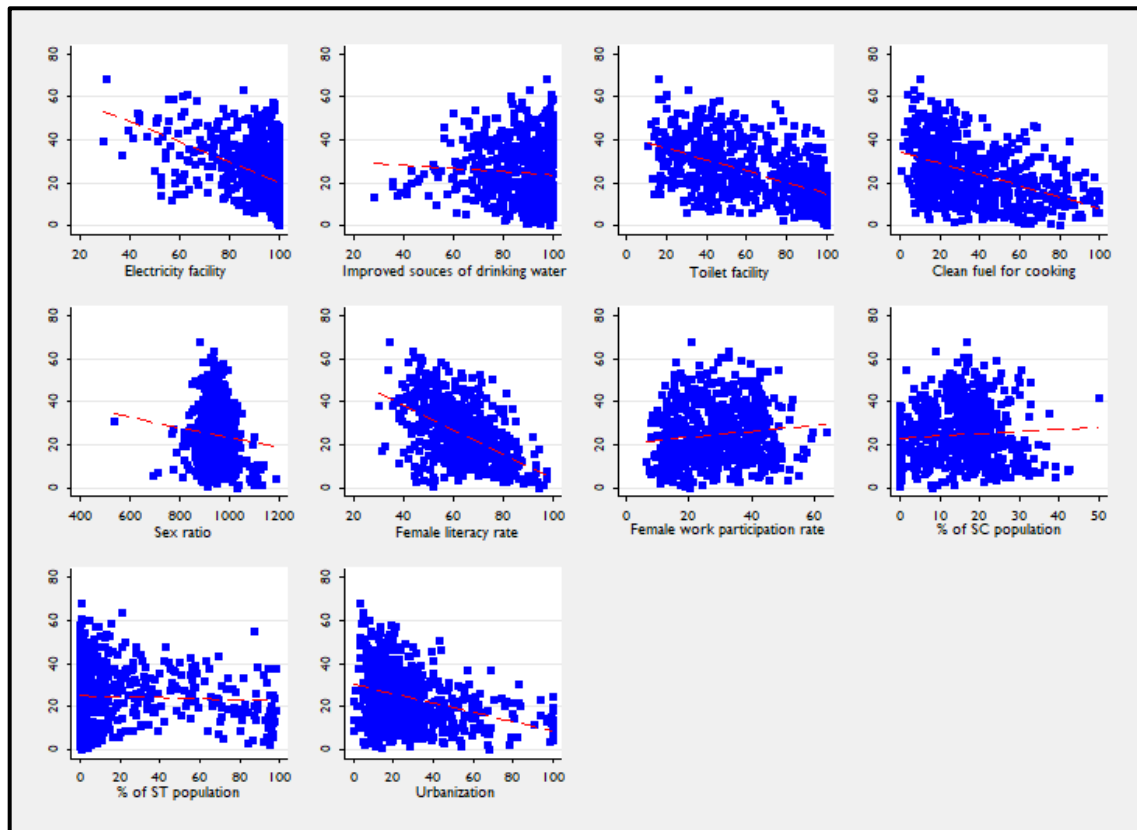
Source: Estimated from NFHS-4

Figure 2.6 depicts the graphical analysis of the association between child marriage and district developmental indicators. Electricity facility, toilet facility, clean fuel for cooking, female literacy, and level of urbanization had a strong negative association with child marriage prevalence. Moreover, improved sources of drinking water, sex ratio, and female work participation rate, the proportion of Scheduled Castes and Scheduled Tribes population had a weak association with child marriage.

Table 2.4: OLS estimates for impact of district socioeconomic development indicators on the prevalence of child marriage (Dependent variable: Prevalence of child marriage (%))

Variables	Model 1 β-coef.	Model 2 β-coef.	Model 3 β-coef.	Model 4 β-coef.	Model 5 β-coef.
Electricity facility	-0.218*** (0.0407)				-0.193*** (0.0429)
Improved sources of drinking water	-0.0725** (0.0344)				-0.0665* (0.0359)
Toilet facility	-0.173*** (0.0199)				-0.0999*** (0.0229)
Clean fuel for cooking	-0.0863*** (0.0235)				-0.154*** (0.0310)
Sex ratio		-0.00590 (0.00823)			-0.0241*** (0.00781)
Female literacy rate		-0.558*** (0.0372)			-0.258*** (0.0482)
Female work participation rate		0.0261 (0.0427)			0.204*** (0.0527)
Proportion of SC			0.0954 (0.0743)		-0.103* (0.0606)
Proportion of ST			-0.00329 (0.0251)		-0.119*** (0.0235)
Urbanization				-0.217*** (0.0239)	0.112*** (0.0343)
Constant	64.86*** (4.682)	64.95*** (7.266)	23.20*** (1.520)	30.29*** (0.808)	94.06*** (8.094)
Observations	640	640	640	640	640
R-squared	0.353	0.289	0.005	0.115	0.428

SC, Scheduled Caste; *ST,* Scheduled Tribe
*** p<0.01, ** p<0.05, * p<0.1
Standard errors in parenthesis

Table 2.4 presents OLS estimates for the association of district developmental indicators with the prevalence of child marriage. Regression analyses (OLS) reveals that district socioeconomic development indicators have a significant impact on the prevalence of child marriage. In the first model, the impact of indicators of household amenities and facilities on child marriage has been assessed. The result demonstrates that electricity facility (β = -0.218, p <0.01), improved sources of sources of drinking water (β = -0.0725, p <0.05), sanitation (β = -0.173, p <0.01), and clean fuel for cooking (β = -0.0863, p <0.01) had a significant negative association with child marriage. In model 2, the impact of women's status on the prevalence of child marriage has been examined. The analyses reveal that only female literacy rate (β = -

0.558, $p < 0.01$) had a significant negative impact on the prevalence of child marriage. However, the present analysis did not find any significant association of sex ratio and female work participation rate with child marriage. The result of the third model showed that the proportionate share of marginalized group of the population had no significant association with child marriage. Moreover, urbanization ($\beta = -0.217$, $p < 0.01$) had a significant negative impact on the prevalence of child marriage. Although the strength of association attenuated in the full model but remains significant for electricity facility ($\beta = -0.193$, p < 0.01), improved sources of drinking water ($\beta = -0.0665$, $p < 0.1$), and toilet facility ($\beta = -0.0999$, $p < 0.01$); clean cooking fuel ($\beta = -0.154$, $p < 0.01$). Moreover, sex ratio ($\beta = -0.0241$, $p < 0.01$) had a significant negative impact on the prevalence of child marriage in the full model after controlling for social infrastructure, female literacy rate, female work participation rate, proportion of SC&ST, and urbanization. However, sex ratio was not significant in model 2 where only female literacy rate and female work participation has been controlled. However, female work participation rate ($\beta = 0.204$, $p < 0.01$) was positively associated with the prevalence of child marriage. The results also demonstrate that the proportion of Scheduled Caste ($\beta = -0.103$, $p < 0.1$) and Scheduled Tribe ($\beta = -0.119$, $p < 0.01$) had a significant negative association with child marriage after adjusting for other socioeconomic variables. However, level of urbanization ($\beta = 0.112$, $p < 0.01$) was positively associated with child marriage prevalence after inclusion of other relevant factors in the full model.

2.2.3.3 Regional Impact on Child Marriage Prevalence

This section proposes to assess the impact region on the prevalence of child marriage. In the previous section, how socioeconomic development impact on child marriage has been examined. Nevertheless, region may effect on child marriage because culturally regions are different from one region to another. For instance, northern part of India is characterized by rigid patriarchal norms and higher incidence of discrimination against girls. In contrast to the southern part of India where girls have more value in the society. Moreover, eastern part of India is culturally different from other parts of the country and has a different code of marriage. Therefore, the present study aims to investigate how region effect child marriage practices.

Six regions have been constructed on the basis of NFHS division of region, namely, north, central, east, northeast, west, and south. Furthermore, a series of dummy variable created to examine the influence of each region on the prevalence of child marriage individually. The following table shows codification of regions with number of districts.

Table 2.5: Codebook for the dummy region

Variables	Code	Number of districts (n)
Northern region	If north=1, otherwise=0	north=131, otherwise=509
Central region	If central=1, otherwise=0	Central=139, otherwise=501
Eastern region	If east=1, otherwise=0	East=111, otherwise=529
North-eastern region	If northeast=1, otherwise=0	Northeast=86, otherwise=554
Western region	If west=1, otherwise=0	West=66, otherwise=574
Southern region	If south=1, otherwise=0	South=107, otherwise=533

Source: Computed from NFHS-4

Table 2.6: OLS estimates for regional impact on child marriage prevalence

Region	Model I	Model II	Model III	Model IV	Model V	Model VI
	β-coef.	β-coef.	β-coef.	β-coef.	β-coef.	β-coef.
North	-7.779***					
	(-1.292)					
Central		2.796**				
		(-1.295)				
East			13.48***			
			(-1.311)			
Northeast				-2.807*		
				(-1.568)		
West					0.824	
					(-1.762)	
South						-6.399***
						(-1.414)
Constant	26.15***	23.95***	22.22***	24.94***	24.47***	25.63***
	-0.585	-0.604	-0.546	-0.575	-0.566	-0.578
R-squared	0.054	0.007	0.142	0.005	0	0.031

*** p<0.01, ** p<0.05, * p<0.1; standard errors in parenthesis

Table 2.6 presents OLS regression results for the regional effect on child marriage. A series of six models were assessed to determine the effect of each region on child marriage separately. The result reveals that the prevalence of child marriage in north (β = -7.779, p<0.01), northeast (β = -2.807, p<0.1), and southern region (β = -6.399, p<0.01) was significantly lower than their other counterparts. Moreover, central (β =

2.796, p<0.05) and eastern region (β = 13.48, p<0.01) had significantly higher prevalence of child marriage compared to their other counterparts.

The above table presents the crude effect of each region on child marriage. However, it is already stated that district socioeconomic development factors significantly effect on child marriage. Now, the current study aims to assess the impact of region after controlling for socioeconomic development factors.

Table 2.7: Impact of region and socioeconomic developmental indicators on child marriage prevalence

Variables	Model I	Model II
	β-coef.	β-coef.
North	-0.857	-5.305***
	(-1.589)	(-1.583)
Central	7.518***	-4.038**
	(-1.568)	(-1.647)
East	16.47***	4.856***
	(-1.652)	(-1.817)
Northeast	2.9	8.780***
	(-1.766)	(-2.213)
West	6.069***	5.233***
	(-1.909)	(-1.699)
South ®		
Electricity facility		-0.0779*
		(-0.0424)
Improved sources of drinking water		-0.0363
		(-0.0338)
Toilet facility		-0.111***
		(-0.0287)
Clean fuel for cooking		-0.123***
		(-0.0327)
Sex ratio		-0.0299***
		(-0.00795)
Proportion of SC		0.0837
		(-0.0617)
Proportion of ST		-0.143***
		(-0.0238)
Female literacy rate		-0.424***
		(-0.0487)
Female work participation rate		0.203***
		(-0.0511)
Urbanization		0.133***
		(-0.0325)
Constant	19.23***	93.24***
	(-1.179)	(-8.691)
R-squared	**0.196**	**0.515**

Significance levels: *** p<0.01, ** p<0.05, * p<0.1; standard errors in parenthesis.

Table 2.7 demonstrates effect of region and socioeconomic and developmental factors on child marriage. In model I, crude effect of region on child marriage has been assessed. Further, in model II, other predictor variables were included to examine the net effect of region on child marriage prevalence. Crude association showed that the prevalence of child marriage was significantly higher in central (β = 7.518, p<0.01), east (β = 16.47, p<0.01), and western (β = 6.069, p<0.01) region compared to southern region. However, after inclusion of potential covariates in model II, north (β = -5.305, p<0.01) and central region (β = -4.038, p<0.05) showed significantly lower prevalence of child marriage; and east (β = 4.856, p<0.01), northeast (β = 8.78, p<0.01), and western region (β = 5.233, p<0.01) demonstrated significantly higher prevalence of child marriage compared to southern region. Electricity facility (β = -0.0779, p<0.1), toilet facility (β = -0.111, p<0.01), clean fuel for cooking (β = -0.123, p<0.01), sex ratio (β = -0.0299, p<0.01), proportion of Scheduled Tribe population (β = -0.143, p<0.01), and female literacy rate (β = -0.424, p<0.01) had a significant negative impact on child marriage prevalence. Surprisingly, female work participation rate (β = 0.203, p<0.01) and level of urbanization (β = 0.133, p<0.01) were positively associated with child marriage.

2.3 Discussion and Conclusion

The present chapter analyses the prevalence of child marriage at the micro-level. The first part of this chapter describes global scenario in child marriage prevalence. The study finds that child marriage is highly prevalent among African and South Asian countries. However, Latin American, Caribbean, Middle-East, and East European countries showed a considerable proportion of child marriage. Therefore, child marriage is pervasive among the countries where majority of the people are living in rural areas, poor, uneducated, and have lower women's status. Further, the study assesses national, state, and district-level incidence of child marriage in India using unit level data from NFHS-4 which will enable to make policy and programmes to prevent child marriage practice. State-level and district-level prevalence of child marriage indicate that socioeconomically impoverished states and districts have higher incidence of child marriage. The study also identified the hotspot districts of child marriage which suggests strengthening of laws and policy to prevent the practice of child in these higher incidence states.

The present study also examined the impact of district socioeconomic developmental indicators on the prevalence of child marriage. The result indicates that social infrastructure, women's status, and level of urbanization significantly associated with the prevalence of child marriage. The current study suggests that improvement in social infrastructures such as electrification in the village, availing toilet facility, advancement in education, and increasing level of urbanization may reduce the practice of child marriage. However, the current analysis does not undermine the influence of social norms on child marriage practice. The practice of child marriage is deeply rooted in patriarchal culture and religious beliefs in India. The purpose of child marriage practice is to control women's sexuality. Although, the decision of marriage takes place at the local level and typically decided by parents and other family member or clan community, development process by and large effect on the practice of child marriage. Furthermore, the study examines the impact of region on the prevalence of child marriage. The analyses demonstrate that eastern and central region significantly associated with increased likelihood of child marriage compared to the southern region. The kinship system makes lower age at marriage in south from other parts of the country. The rigidity of socio-cultural norms is less in southern part of India. For instance, chastity of women is less important, female sexuality and physical movement are less controlled.[112] The cultural of cross-cousin marriage, village endogamy are highly preferred in the south Indian kinship system.[113] Therefore, intervention must be enacted to reduce the practice of child marriage in those areas where the incidence of child marriage is highly prevalent.

This study provides a detailed account of the state and district level prevalence of child marriage in India. Though the analysis has been done to identify the factors affecting incidence of child marriage at the aggregate level, the study is unable to find out the reason for practicing the child marriage in that particular high incident district. Further, in-depth, focused research is needed to know the exact reason behind the practice of child marriage in these high incidence districts.

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[112] Dyson et al. "On kinship structure, female autonomy, and demographic behavior in India." 35-60.
[113] Agarwal, "A field of one's own" 316-378

Chapter-3

Child Marriage: Trends, Prevalence by Socio-Economic Characteristic and Its Correlates

The present chapter examines trends, prevalence by socioeconomic characteristics, and correlates of child marriage using the unit level data from NFHS-4. At the aggregate level, the incidence of child marriage has substantially reduced from 47% in 2005-06 to 27% in 2015-16. However, the level of changes may not be the same across the socioeconomic groups. Therefore, an attempt has been made to examine differential changes in the prevalence of child marriage across socioeconomic groups. As child marriage is considered as a harmful practice that adversely affects social, economic and health condition of adolescent girls, effort should be made to prevent the practice of child marriage. In the previous chapter, an analysis has been made to assess the relationship between socioeconomic development and child marriage at the district level. It is unable to explain the factors affecting child marriage prevalence at the micro-level. Therefore, the current chapter attempts to identify the determinants of child marriage at the individual, socio-economic characteristics and regional levels.

3.1 Trends of Child Marriage in India

Considerable improvement has been reported in reducing the incidence of child marriage. It is still prevalent among rural, poor, and uneducated women. India's child marriage remained pervasive until '*Child Marriage Restraint Amendment Act*' came up in 1976 when legal enforcement has been initiated to increase the marriage age from 14 to 18 years for girls. Therefore, child marriage started to decline during the last quarter of the 20th century. One may also observe that considerable gains occurred during the previous decade due to declining child marriage. This section of the study presents trends in child marriage prevalence among women aged 15-49 years from 1992-93 to 2005-06. The table (3.1) depicts changes in socioeconomic status among ever-married women aged 15-49 years during the period 1992-93 to 2015-16.

Table 3.1: Changes in socioeconomic characteristics among ever-married women aged 15-49 years from the period 1992-93 to 2015-16 in India

Socioeconomic characteristics	1992-93	1998-99	2005-06	2015-16	Changes
Place of residence					
Urban	26.18	26.18	32.82	34.63	+8.45
Rural	73.82	73.82	67.18	65.37	-8.45
Caste					
Scheduled caste/tribe	–	27.26	27.56	30.93	+3.67
Other backward class	–	33.23	40.53	45.47	+12.24
Other	–	39.5	31.91	23.6	-15.9
Religion					
Hindu	81.98	81.75	80.6	80.57	-1.41
Muslim	12	12.53	13.63	13.78	+1.78
Other	6.02	5.71	5.77	5.64	-0.38
Women's education					
No education	61.68	53.44	40.59	27.46	-34.22
Primary	16.35	16.9	14.7	12.46	-3.89
Secondary	18.6	21.77	37.41	47.31	+28.71
Higher	3.38	7.89	7.3	12.76	+9.38
Partner's education					
No education	34.48	28.67	27.41	19.51	-14.97
Primary	25.67	18.96	16.16	14.92	-10.75
Secondary	30.83	34.66	45.07	51.52	+20.69
Higher	9.02	17.71	11.36	14.06	+5.04
Respondent's current working status					
Not working	66.85	62.63	63.65	76.0	+9.15
Working	33.15	37.37	36.35	24.0	-9.15
Standard of living					
Low	–	32.94	–	–	–
Medium	–	46.86	–	–	–
High	–	20.20	–	–	–
Wealth index					
Poorest	–	–	17.46	17.72	+0.26
Poorer	–	–	18.99	19.56	+0.57
Middle	–	–	20.17	20.56	+0.39
Richer	–	–	20.99	21.16	+0.17
Richest	–	–	22.4	21.0	-1.4
Total (N)	89,506	90,303	1,24,383	6,99,686	–

Source: Estimated from NFHS-1, NFHS-2, NFHS-3, & NFHS-4

Table 3.1 presents changes in the socioeconomic status of ever-married women aged 15-49 years during the period 1992-93 to 2015-16. The proportion of women living in urban areas increased by 8.45% points from 26.18% in 1992-93 to 34.63% in 2015-16. The percentage of SC/ST and OBC women increased by 3.67% and 12.24% points respectively, whereas, other caste women decreased by 15.9% points between 1992-93 and 2015-16. The proportion of Muslim women increased by 1.78% during 1992-93 to 2015-16. Considerable improvement has been observed in educational attainment of women during 1992-93 to 2015-16. The proportion of women with secondary and higher level of education increased by 28.71% and 9.38% points respectively. The educational attainment of the husband also improved during the same period. Respondent's current unemployment rate increased by 9.15% points. The standard of living and wealth index is a measure of the economic status of the household. NFHS-1 did not measure the economic status of the household. NFHS-2 estimated standard of living by ownership of durable goods and dwelling characteristics of the household. A score was assigned to each item and divided the household into low medium, and high by score index. In NFHS-3 & NFHS-4, wealth index has been generated from a number of consumer goods and household characteristics using principal component analysis. Therefore, the standard of living may not be comparable to wealth quintile of the household because the number of household items for calculating standard of living and wealth index was different. Surprisingly, the proportion of poorest and poorer women increased by 0.26% and 0.57% points respectively, whereas, women belonged in richest wealth quintile decreased by 1.4% points between 2005-06 to 2015-16.

Table 3.2: Changes in the prevalence of child marriage among ever-married women aged 15-49 years from the period 1992-93 to 2015-16 by background characteristics in India.

Background characteristics	1992-93	1998-99	2005-06	2015-16	Changes
Place of residence					
Urban	49.11	45.69	48.17	36.71	-12.4
Rural	71.01	69.66	71.61	51.85	-19.16
Caste					
Scheduled caste/tribe	na	71.61	72.73	51.33	-20.28
Other backward class	na	64.63	68.53	47.65	-16.98
Other	na	56.22	51.83	39.02	-17.2
Religion					
Hindu	66.69	64.74	65.72	47.69	-19
Muslim	69.18	66.53	66.5	47.57	-21.61
Other	38.28	37.06	39.44	30.38	-7.9
Women's education					
No education	76.75	78.29	80.96	62.89	-13.86
Primary	64.05	66.13	70.22	57.55	-6.5
Secondary	38.9	43.62	46.35	39.42	0.52
Higher	6.07	11	8.17	9.34	3.27
Partner's education					
No education	76.98	78.76	79.92	59.45	-17.53
Primary	70.02	71.4	73.51	55.92	-14.1
Secondary	57.75	59.18	59.51	43.44	-14.31
Higher	32.41	38.05	32.87	21.8	-10.61
Respondent's current working status					
Not working	61.93	58.19	60.65	43.16	-18.77
Working	72.02	72.09	70.71	51.4	-20.62
Standard of living					
Low	–	76.57	–	–	–
Medium	–	64.8	–	–	–
High	–	38.63	–	–	–
Wealth index					
Poorest	–	–	82.12	60.35	-21.77
Poorer	–	–	78.41	56.79	-21.62
Middle	–	–	70.02	50.39	-19.63
Richer	–	–	57.39	41.33	-16.06
Richest	–	–	35.62	26.94	-8.68
Overall (%)	65.28	63.38	64.43	46.73	-17.7
Total (N)	89,463	90,303	94,194	5,14,112	–

Source: Estimated from NFHS-1, NFHS-2, NFHS-3, & NFHS-4

Table 3.2 shows changes in the prevalence of child marriage by socioeconomic characteristics during the period 1992-93 to 2015-16. Although the incidence of child marriage decreased in both rural and urban areas, the rate of reduction is much faster in rural areas (19.16% points) than the urban areas (12.4%) during 1992-93 to 2015-16. The prevalence of child marriage decreased by 20.28% among the Scheduled Castes & Scheduled Tribes women from 71.61% in 1998-99 to 51.33% in 2015-16. Child marriage decreased by 19% points among the Hindus compared with 21.61% points among the Muslim women. The prevalence reduced by 13.86% points among the women who had no education during the period 1992-93 to 2015-16. Surprisingly, child marriage increased by 3.27% among higher educated women, ranging from 6.07% in 1992-93 to 9.34% in 2015-16. During the same period, partner's education showed a considerable decline in child marriage. The incidence of child marriage also declined among both employed and unemployed women. The prevalence of child marriage was substantially higher among the women who belonged to low in the standard of living in 1998-99. Likewise, the high rate of child marriage found among the poorest and poorer quantile of wealth index. The prevalence of child decreased among all the quintiles of household wealth between 2005-06 to 2015-16.

Figure 3.1: Child marriage prevalence (married before 18 years of age) by age cohort of women aged 20-49 years, NFHS-4 (2015-16)
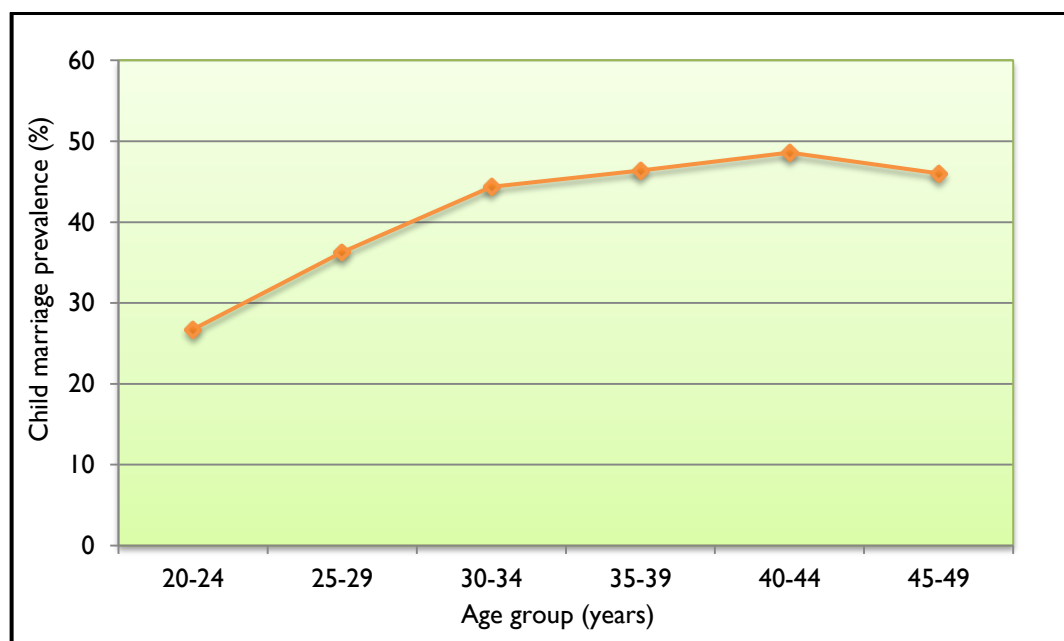
Source: Estimated from NFHS-4

Figure 3.1 depicts the prevalence of child marriage by age cohort of women aged 20-49 years. However, child marriage rate is typically obtained from 20-24 years age cohort to get the recent prevalence according to the UNICEF estimate. The figure depicts that the incidence is higher among the older women compared to younger women. Therefore, child marriage has substantially decreased over the time.

3.2 Prevalence of Child Marriage by Socioeconomic and Demographic Characteristics

Although the practice of child marriage persists among all groups of people in India, it substantially varies by socioeconomic and demographic characteristics of women such as age, rural-urban residence, caste, religious affiliation, education attainment, economic status, employment status and geographical region of residence.

A range of socioeconomic and demographic variables such as the type of place of residence, caste, religion, age, women's and husband's education, national region, and wealth quintiles of the household have been included to perform the analysis. Place of residence has categorized into rural and urban to examine the rural-urban differences in child marriage prevalence. Caste is divided into three groups, Scheduled Caste/Scheduled Tribe, other backward class, and other. Likewise, the religious affiliation of women is classified into Hindu, Muslim, Christian, and other. Women's and husband's education level has divided into four groups, namely, no education, primary, secondary, and higher. Current working status of women is grouped into working and not working. The national region of the country has categorized into six national regions: north, central, east, north-east, west, and south. Household wealth has classified into five groups, poorest, second, middle, richer, and richest. Wealth index has been constructed by ownership of consumer items and household characteristics. A composite score has been generated for each member of household using principal component analysis and diving the distribution into five equal categories, each represents 20% of the distribution, between 1 (poorest) and 5 (richest).

Figure 3.2: Percentage of women aged 20-24 years married below 15 years of age by background characteristics in India, NFHS-4 (2015-16)
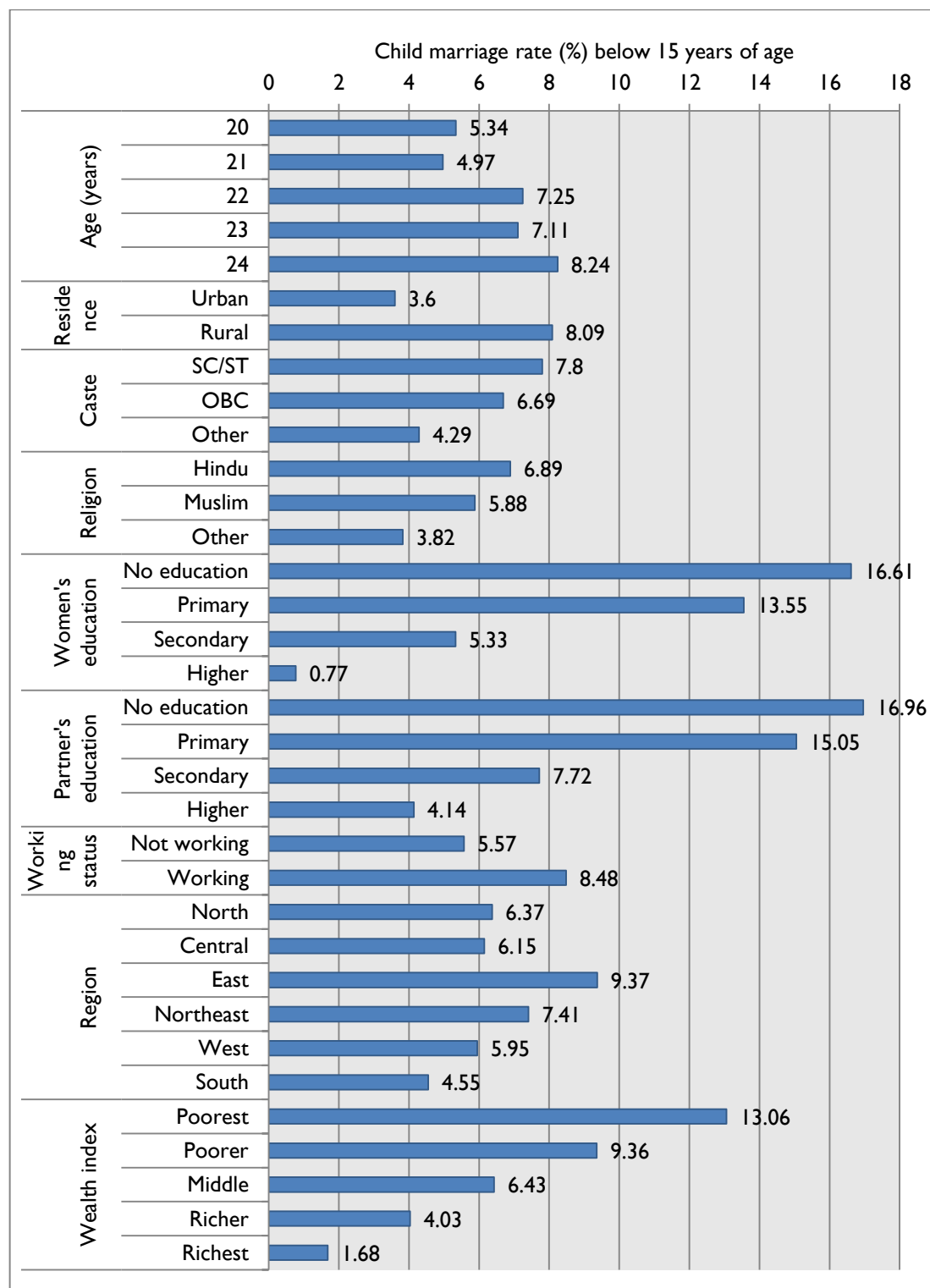
Source: Estimated from NFHS-4

Figure 3.2 depicts the prevalence of child marriage (below 15 years of age) by socioeconomic and demographic characteristics of women. Overall, 6.6% of the women aged 20-24 years married before 15 years of age in India. About 8% of the women married before 15 years of age in rural areas compared with 3.6% in urban counterparts. The proportion of women married below 15 years was substantially lower among upper caste than the SCs/STs and OBCs. Moreover, the prevalence was higher among Hindu women than the Muslim and other religious women. This higher prevalence of child marriage among Hindu women may be because girls preferably married-off before they reach puberty according to Hindu code culture. Child marriage considerably varied by their education level as well as their husband's educational level. For instance, child marriage was highly prevalent among those women who had no education or primary level of education. Nonetheless, the prevalence was very low among highly educated women. However, the prevalence is still very high among highly educated husband compared to women education. The proportion of child marriage was higher among those women who were employed than their unemployed counterparts. The prevalence of child marriage also varies by geographical region of residence. The highest prevalence of child marriage was found in the eastern region. On the contrary, the lowest prevalence was found in the southern region. Household wealth status is a significant determinant of child marriage. Child marriage was highly prevalent among the women who belonged to the poorest & poorer wealth quintile.

Figure 3.3 depicts the incidence of child marriage (below 18 years of age) by socioeconomic and demographic characteristics of women. The incidence of child marriage was substantially higher among the rural women compared to their urban counterparts (31.45% vs. 17.52%). The incidence of child marriage was also higher among the Scheduled Caste & Scheduled Tribe women. Child marriage rate considerably differs by women's and husband's educational level. It has found that child marriage was highly prevalent among those women who had no education or primary level of education. Nonetheless, child marriage was very low among higher educated women. Besides, a husband with no education or primary level of education also had very high rate of child marriage. However, child marriage remains pervasive among higher educated husband, whereas, the prevalence is very less among women who had higher level of education (21.16% vs. 3.93%).

The prevalence of child marriage also varies by geographical region of residence. The eastern region has the highest rate of child marriage (38.25%), followed by northeast (27.95%), west (25.76%), central (24.1%), and south (21.35%). The incidence of child marriage has significant varies by wealth quintiles. The prevalence drastically declined from lower quintile to higher quintile of household wealth.

Figure 3.3: Percentage of women aged 20-24 years married before 18 years of age by background characteristics in India, NFHS-4 (2015-16)
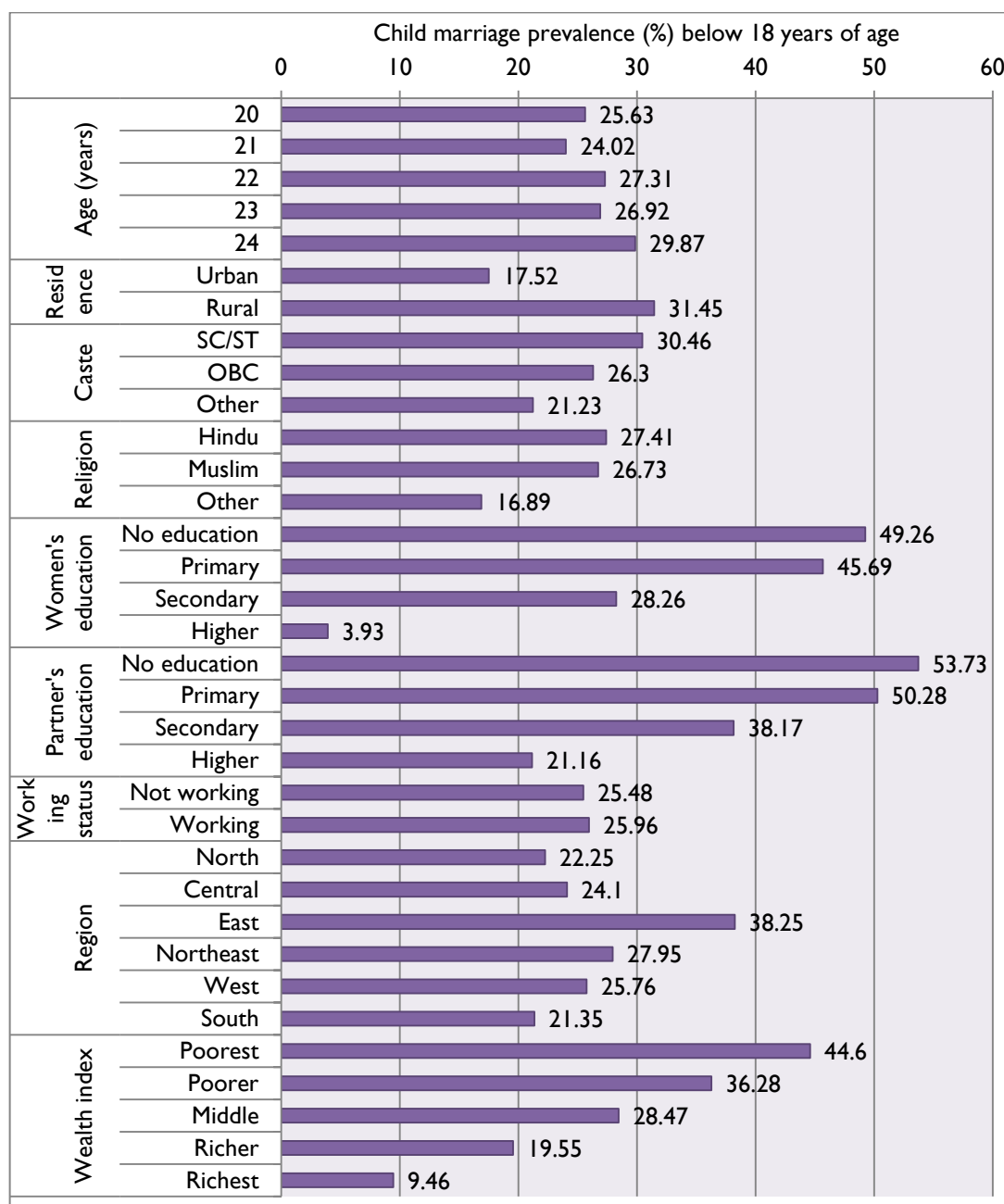
Source: Estimated from NFHS-4

Figure 3.4: Percentage of women aged 20-24 years married before 18 years of age at the intersection of religion, caste, education, and wealth index in India, NFHS-4 (2015-16)
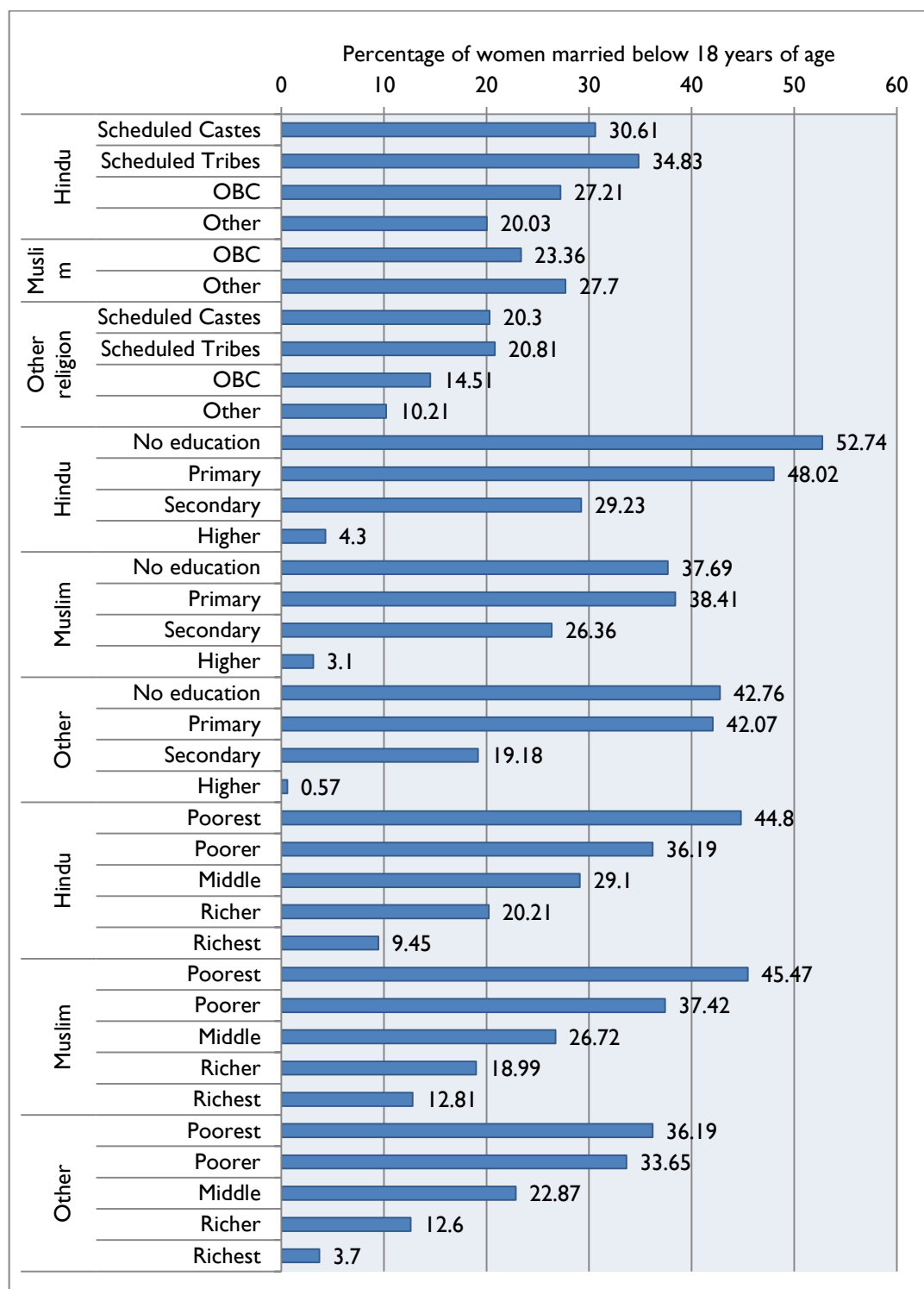
Source: Estimated from NFHS-4

Figure 3.4 presents the prevalence of child marriage (below 18 years of age) by the intersection of religion, caste, education, and wealth index. The graph shows that the incidence of child marriage among backward caste from Hindu religion is comparatively higher than the upper caste Hindu religion. However, substantial proportion of women among upper caste Hindus are married before 18 years of age. Backward classes from Muslim religion have 4% lower incidence of child marriage than the women belongs to upper strata in the Muslim community. Among the other religious groups, SC/ST represents highest proportion of child marriage, followed by OBC and other castes. Moreover, the figure depicts prevalence of child marriage by the intersection of religion and education. It has been observed that the prevalence of child marriage is decreasing with increasing level of education among all the religious groups. However, almost half the Hindu women with no education or primary level of education are married as child, whereas, it is less than 40% among Muslim women. The prevalence of child marriage is also reducing from upper to lower wealth quintile of household among all religious groups. Moreover, close examination reveals that the prevalence is almost same among Hindus and Muslims in poorest and poorer quintile. However, in middle and richer wealth quintiles, Hindu women indicates slightly higher prevalence of child marriage than the Muslims. The findings also reveal that even among the wealthier strata, Hindu women constitute approximately 10% prevalence of child marriage. Muslim women represent 4% higher prevalence of child marriage than the Hindu women in richest wealth quintile. It is worth mentioning that very less proportion of women are married as minor among those women who belong to richest in wealth quintile of other religious groups. Additionally, women belonging in lower quintile of household wealth from other religious groups have comparatively lower prevalence of child marriage than the women who belong to Hindu and Muslim religion.

3.3 Prevalence of Child Marriage in the Selected States

The previous section estimated the incidence of child marriage at the aggregate level. In this section, four states have been selected to analyze the socioeconomic differentials in child marriage across selected states. The selected states are West Bengal from eastern region, Uttar Pradesh from northern region, Maharashtra from western region, and Kerala from southern region. Although women have better status in West Bengal, a significant proportion of women are married off early. Uttar Pradesh is socioeconomically underdeveloped, and the rigidity of caste system is very high which foster the practice of child marriage. On the contrary, Maharashtra is an economically prosperous state. However, eastern Maharashtra is impoverished. Lastly, Kerala is socioeconomically developed state, and women's status is also high in this state. Therefore, four socioeconomically different states from different parts of the country have been selected for the analysis. It assists in understanding the nature of child marriage prevalence in four different socioeconomic setting.

Figure 3.5 demonstrates the prevalence of child marriage among ever-married women aged 15-49 years in West Bengal, Uttar Pradesh, Maharashtra, and Kerala. The prevalence of child marriage was very high among all the caste category in West Bengal. Likewise, Uttar Pradesh and Maharashtra also showed very high child marriage among all castes. Among the Hindus, West Bengal and Uttar Pradesh depicted high prevalence of child marriage. However, in Kerala, the incidence of child marriage was substantially lower among Hindus. The rate of child marriage among Muslim women was very high in West Bengal. In addition, the prevalence was almost similar in all other states among Muslims. The prevalence of child marriage decreased with increasing level of education in all states. However, in Uttar Pradesh, a substantial proportion of child marriage had occurred among the women with higher education.

Figure 3.5: Percentage of women aged 15-49 years married before 18 years of age in India, NFHS-4 (2015-16)
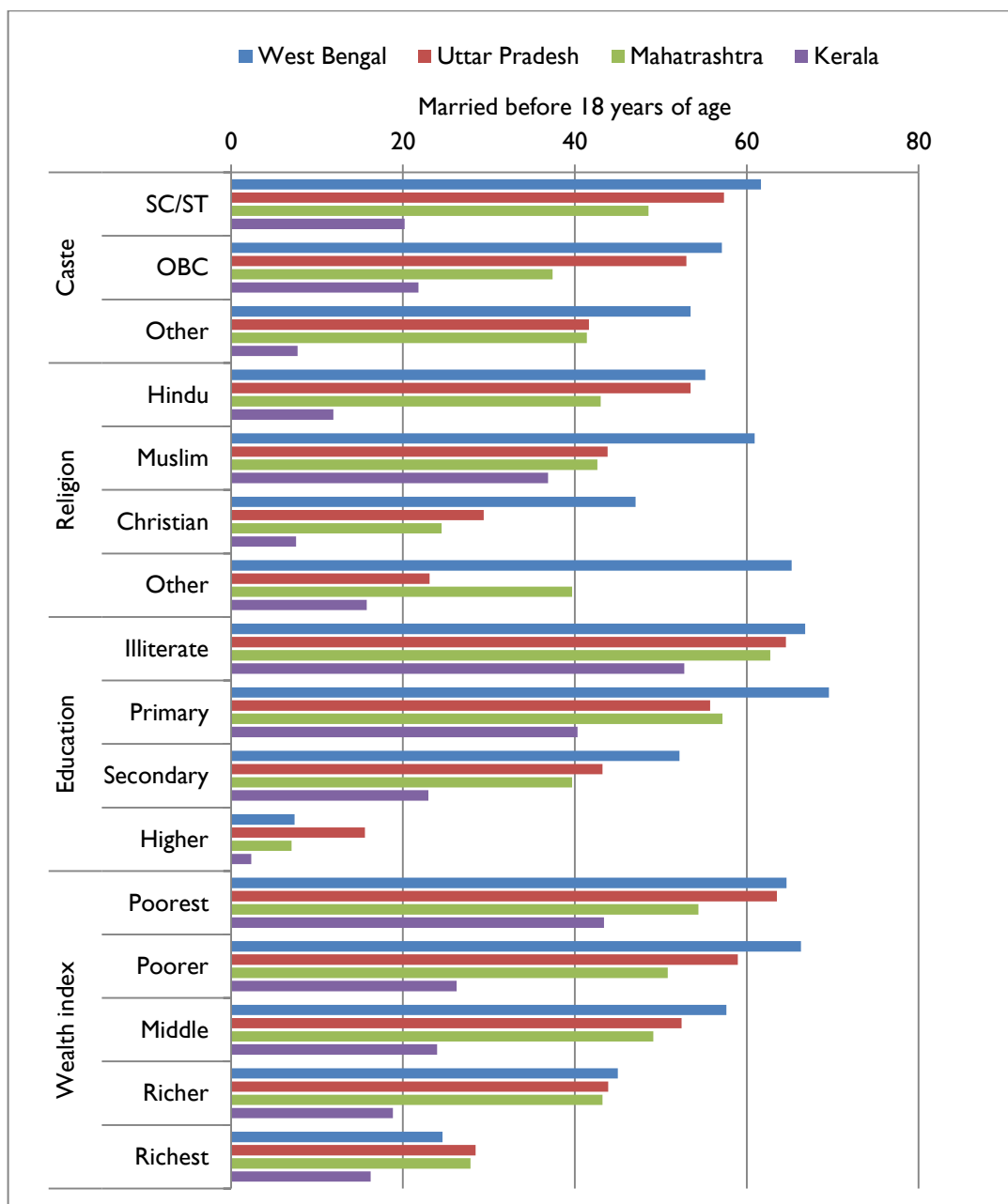
Source: Estimated from NFHS-4

3.4 Determinants of Child Marriage in India

The present section determines prevalence of child marriage in India using unit-level data. Determining the prevalence of child marriage is essential to combat the practice through policy and program. This study identifies most important possible factors of child marriage which will enable to make policies and programmes for preventing child marriage. Several studies have examined the determinants of age at marriage in India and other developing countries. However, the current study attempts to identify some socioeconomic and demographic factors of child marriage that significantly influences the child marriage practice. The selected independent variables are age of women, place of residence, caste, religion, education level of women and husband, occupational status of women, region, wealth status of the household, and women's exposure to mass media. However, the current analysis is restricted to the married women aged 20-24 years to understand the current nature of child marriage determining factors.

Table 3.3: Factor affecting child marriage prevalence among women aged 20-24 years in India, NFHS-4 (2015-16)

Characteristics	Model I	Model II
	OR (95% CI)	OR (95% CI)
Respondent's current age (years)		
20 ®	1.00	1.00
21	0.819*** (0.778 - 0.864)	0.864** (0.758 - 0.985)
22	0.730*** (0.696 - 0.766)	0.794*** (0.705 - 0.896)
23	0.667*** (0.635 - 0.701)	0.707*** (0.626 - 0.800)
24	0.695*** (0.662 - 0.730)	0.700*** (0.620 - 0.791)
Place of residence		
Rural ®	1.00	1.00
Urban	1.004 (0.962 - 1.047)	0.971 (0.874 - 1.078)
Caste		
Scheduled caste/tribe ®	1.00	1.00
Other backward class	1.120*** (1.080 - 1.162)	1.264*** (1.154 - 1.385)
Other	1.077*** (1.026 - 1.131)	1.182*** (1.046 - 1.336)
Religion		
Hindu ®	1.00	1.00
Muslim	0.815*** (0.775 - 0.858)	0.732*** (0.644 - 0.831)
Other	0.708*** (0.663 - 0.757)	0.705*** (0.595 - 0.835)
Respondent's educational level		
No education ®	1.00	1.00
Primary	0.876*** (0.832 - 0.924)	0.948 (0.828 - 1.085)
Secondary	0.512*** (0.490 - 0.535)	0.548*** (0.488 - 0.616)
Higher	0.174*** (0.161 - 0.189)	0.206*** (0.167 - 0.254)
Partner's educational level		

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No education ®		1.00
Primary		1.016 (0.872 - 1.183)
Secondary		0.879* (0.771 - 1.003)
Higher		0.674*** (0.562 - 0.809)
Respondent's occupation		
Not working ®		1.00
Professional†		0.858 (0.517 - 1.424)
Agricultural		1.554*** (1.374 - 1.756)
Other‡		1.245*** (1.068 - 1.452)
Region		
North ®	1.00	1.00
Central	0.882*** (0.840 - 0.925)	0.924 (0.818 - 1.042)
East	1.163*** (1.104 - 1.225)	1.336*** (1.172 - 1.523)
Northeast	1.107*** (1.035 - 1.185)	1.133 (0.955 - 1.345)
West	1.212*** (1.135 - 1.294)	1.336*** (1.148 - 1.556)
South	1.070** (1.006 - 1.138)	1.081 (0.930 - 1.256)
Wealth quintiles of household		
Poorest ®	1.00	1.00
Poorer	0.888*** (0.847 - 0.931)	0.886** (0.787 - 0.998)
Middle	0.730*** (0.693 - 0.770)	0.768*** (0.672 - 0.878)
Richer	0.573*** (0.539 - 0.609)	0.630*** (0.540 - 0.735)
Richest	0.414*** (0.384 - 0.446)	0.447*** (0.370 - 0.540)
Exposure to mass media		
No exposure ®	1.00	1.00
Partial exposure	0.965 (0.924 - 1.008)	1 (0.897 - 1.116)
Full exposure	0.881*** (0.819 - 0.948)	0.815** (0.676 - 0.982)
Constant	1.927*** (1.803 - 2.059)	1.513*** (1.257 - 1.822)
Model χ^2	7493.04***	1457.3***
-2 log-likelihood	-46,227	-7,551.91
Observations	74,819	12,496

® Reference category; *** p<0.01, ** p<0.05, * p<0.1; Confidence interval in parenthesis
† includes technical, administrative, and managerial worker
‡clerical, sales, service, domestic and household, skilled and unskilled manual worker

Table 3.3 presents logistic regression results for socioeconomic and demographic determinants of child marriage. The regression result revealed that the socioeconomic status of women, age, and geographical location significantly associated with child marriage. Partner's education status and women's occupation also identified as important determinants of child marriage. In the model I, partner's education and women's occupation were excluded because of considerable number of missing cases in these both variables. All the possible predictors were included in the II model to examine the net impact of each variable.

Compared to Scheduled Caste/Scheduled Tribe, women who belonged to other backward classes (OR 1.12, 95% CI 1.08 – 1.16) and other castes (OR 1.08, 95% CI 1.03 – 1.13) were more likely to married-off as children. Religion is also important for child marriage practice in India where an early age at marriage is often driven by religious tradition.[114] Muslim (OR 0.86, 95% CI 0.78 – 0.86) and other religious women (OR 0.71, 95% CI 0.66 – 0.76) were significantly less likely to married-off as child compared to Hindu women. Women's educational status has also found a crucial determinant of child marriage. Consistent with other studies, this study also indicates that women with higher educational attainment were less likely to married-off as child compared with illiterate women. Partner's educational level also has a significant effect on child marriage. However, the strength of association for partner's education is week compared to women's education. The likelihood women married below 18 years of age were significantly higher among the women who were engaged in agricultural activities (OR 1.554, 95% CI 1.37 – 1.75) as compared to their unemployed counterparts. This is mainly because agriculture is largely rural based activities and typically poor and rural segment of women are engaged with agricultural activities for their livelihood even after marriage. In the model I, compared to northern region the likelihood of child marriage in central region was significantly lower (OR 88, 95% CI 0.84 – 0.93). Besides, the possibility of child marriage in east (OR 1.16, 95% CI 1.10 – 1.23), northeast (OR 1.11, 95% CI 1.04 – 1.19), west (OR 1.21, 95% CI 1.14 – 1.29), and southern region (OR 1.07, 95% CI 1.01 – 1.14) was significantly higher than the northern region. However, in model II, only eastern and western region significantly associated with higher incidence of child marriage after inclusion of partner's education and women's occupation variable. Wealth quintile is a measure of the economic condition of the household. Household with richest wealth quintile represents more than 50% lower likelihood of child marriage as compared to the household with poorest wealth quintile. Moreover, women's full exposure to mass media significantly decreases the risk of getting married in childhood.

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[114] Bloom, David E., and Palli Hanumantha Reddy. "Age patterns of women at marriage, cohabitation, and first birth in India." *Demography* 23, no. 4 (1986): 509-523.

3.5 Rural-Urban Differences in Child Marriage: A Decomposition Analysis

Consistent with other studies, the current study also found that rural women are married-of at an early age compared to the urban women. This rural-urban differences in child marriage may be occurred because of several socioeconomic, demographic, cultural factors. Therefore, the present study interested to investigate the contribution of socioeconomic and demographic factors in rural-urban child marriage prevalence gap. Fairlie's decomposition analysis allows explaining the gap between two groups when the outcome variable is in binary form. The prevalence of child marriage is dichotomized as married below 18 years and married at 18 years or later. The predictor variables for decomposition analysis are included as either continuous or dichotomized form. Women's current age in years is a continuous variable. Caste has been categorized as backward caste (Scheduled Caste/Scheduled Tribe and Other backward classes) and other than backward caste which constitutes upper caste women. Similarly, religion is categorized as Muslim and other (all other religious groups). Women's educational level has been dichotomized into illiterate/primary and other (secondary/higher). Household economic status is derived from ownership of the household asset and dwelling characteristics. A score has been generated using principal component analysis for each individual and divided into five quintiles, each represents 20% of the sample, between 1 (Poorest) and 5 (richest).[115] The wealth quintile has been dichotomized as poor (poorest and poorer) and otherwise (middle, richer, and richest). Women's exposure to mass media has been constructed from the questions where women were asked how frequently they were read newspaper or magazine, hear the radio and seen television. By this information, women were categorized into no exposure, and otherwise (partial and full exposure). A dummy variable has been included to examine the regional differences in child marriage prevalence. Previously, it has found that eastern region showed a significantly higher proportion of child marriage than the other regions. Therefore, region of residence has been classified as east and otherwise to capture the contribution of region to the prevalence of child marriage. For the study, disadvantaged groups are assigned as '1' and otherwise coded as 0'. The following table shows the categorization and coding for the outcome and predictor variables.

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[115] NFHS-4 Report, 2015-16

Table 3.4: Categorization and coding of outcome and predictor variables for decomposition analysis, NFHS-4 (2015-16)

Indicators	Categorization
Outcome variable	
Child marriage prevalence	1= married before 18 years; 0= married at 18 years or later
Predictor variables	
Age in years	20 to 24 years
Caste	1= Scheduled Caste, Scheduled Tribe, and Other Backward Classes; 0= Other caste
Religion	1= Muslim; 0= other than Muslim
Education	1= illiterate or primary; 0= secondary and higher education
Household economic status	1= poorest and poorer in wealth quintile; 0= middle, richer, and richest wealth quintile
Mass media exposure	1= no mass media exposure; 0= otherwise
Region	1=Eastern region; 0=other than eastern region

Table 3.5: Percentage distribution of background characteristics of women by the type of place of residence among women aged 20-24 years in India, NFHS-4 (2015-16)

Variables	Rural %	Urban %	Total N
Age in years			
20	23.1	21.0	27,789
21	17.5	18.6	21,856
22	22.0	21.8	26,837
23	19.1	19.2	23,601
24	18.3	19.4	22,872
Caste			
SC/ST	36.3	23.4	44,628
OBC	44.8	46.3	48,685
Other	19.0	30.3	23,834
Religion			
Hindu	82.4	73.5	90,801
Muslim	12.4	21.0	18,386
Other	5.2	5.6	13,768
Women's education level			
No education	16.9	7.2	17,817
Primary	12.0	7.8	13,129
Secondary	52.4	45.9	63,808
Higher	18.7	39.1	28,201
Wealth status of household			
Poorest	22.9	2.3	21,369

Poorer	26.5	7.0	26,419
Middle	24.4	16.1	27,069
Richer	17.2	31.7	25,241
Richest	9.0	42.8	22,857
Exposure to mass media			
No exposure	21.5	4.9	21,077
Partial exposure	69.6	78.1	87,920
Full exposure	8.9	17.1	13,958
Region			
North	13.5	15.9	25,763
Central	27.5	20.8	34,941
East	26.1	14.2	22,222
North-East	4.2	1.9	16,034
West	11.0	20.2	9,519
South	17.7	27.0	14,476

Source: Estimated from NFHS-4

The majority of the rural women were belonging in backward caste, had a very lower level of education, economically poor, and had no or very limited exposure to mass media. In contrast, most of the urban women belong to an upper caste, had higher level of education, belongs to richest quintile of household wealth, and comparatively greater exposure to mass media than the rural women (table 3.5).

Table 3.6: Fairlie's decomposition of rural-urban differences in child marriage prevalence, NFHS-4 (2015-16)

Rural prevalence rate	0.4123	
Urban prevalence rate	0.3079	
Rural/urban difference	**0.1044**	

Contribution to difference:	Coeff.	%
Age in years	0.0030***	2.9
Caste: Backward castes	0.0006	0.5
Religion: Muslim	0.0025***	2.4
Education: Illiterate/primary	0.0231***	22.1
Household economic status: Poor	0.0406***	38.9
Mass media exposure: No mass media exposure	0.0039***	3.8
Region: Eastern region	0.0047***	4.5
All variables included (total explained)	**0.0784**	**75.1**

*** $p < 0.01$.

Table 3.6 presents the result of decomposition analysis for rural-urban differences in child marriage prevalence. The results show that the gap between the rural-urban child marriage prevalence is 0.1044. The selected demographic and socioeconomic predictors significantly contributed to the rural-urban prevalence gap. The decomposition result indicates that these socioeconomic and demographic predictors have explained 75.1% (0.0784 out of 0.1044) of total difference. Poor economic status of household is the most significant contributor to child marriage prevalence (38.9%), followed by women's illiteracy/primary level of education (22.1%), region (4.5%) and mass media exposure (3.8%).

3.6 Regional Differences in Child Marriage Prevalence

In the previous section of the study, socioeconomic and demographic differentials of child marriage prevalence have been assessed. However, child marriage also differs across the geographical region of residence. The variation may be because of differential socioeconomic development and cultural differences. For example, patriarchal norms and customs are much more rigid in northern India than its southern counterparts which may affect girls' position in the household and society. Further, patriarchal norms coupled with religious custom may increase the vulnerability of girls to marry at very early age preferably before puberty. Therefore, it is essential to understand the regional differences in child marriage prevalence across socioeconomic groups and the predictors of child marriage in different regions.

Table 3.7 illustrates the prevalence of child marriage by socioeconomic and demographic factors across region of residence. Overall, the highest prevalence of child marriage is found in the eastern region (49.8%), followed by northeast (45.5%), and west (39.7%). The prevalence child marriage substantially varies by respondent's current age, place of residence, caste, religion, women's and husband's education, respondent's working status, wealth quintile of household, and exposure to mass media in all the region.

Table 3.7: Prevalence of child marriage by background characteristics of ever-married women aged 20-24 years by region of residence in India, NFHS-4 (2015-16)

Characteristics	North	Central	East	Northeast	West	South
Respondent's current age in years						
20	42.9	42.5	58.2	56.1	49.3	46.2
21	39.2	36.4	47.9	49.9	41.4	38.8
22	37.2	35.5	49.3	45.0	39.7	33.5
23	32.0	35.6	44.9	40.2	34.0	30.4
24	32.7	37.4	48.3	37.5	37.1	31.1
Type of place of residence						
Rural	39.5	40.1	51.4	45.7	43.0	38.3
Urban	29.5	27.2	42.1	44.5	35.1	29.3
Caste						
SC/ST	37.5	41.3	52.3	41.1	46.8	38.1
OBC	40.0	36.4	49.4	37.0	36.1	34.1
Other	27.0	31.1	46.3	48.3	35.2	30.6
Religion						
Hindu	38.4	38.6	49.4	40.0	40.8	34.8
Muslim	36.7	29.0	51.5	58.7	35.5	33.7
Other	16.6	24.6	47.0	34.7	34.5	39.2
Women's education status						
No education	54.5	52.8	61.3	59.5	56.9	56.0
Primary	49.6	47.1	62.4	60.2	56.6	54.1
Secondary	31.5	32.7	44.8	42.0	40.1	37.2
Higher	13.9	15.8	18.7	7.8	7.6	8.3
Husband's education status						
No education	53.69	47.71	58.7	58.26	57.83	54.09
Primary	43.13	43.12	60.6	49.6	52.61	45.93
Secondary	34.01	37.23	47.47	37.15	39.84	32.91
Higher	21.88	22.25	29.03	19.06	23.39	14.89
Respondent's current working status						
Not working	33.36	34.67	48.42	39.97	36.36	29.81
Working	39.88	54.57	65.23	54.49	55.43	41.01
Wealth status of household						
Poorest	56.1	51.3	57.6	57.3	60.3	53.4
Poorer	54.9	41.7	52.8	47.9	48.6	46.7
Middle	43.7	34.5	44.2	39.6	44.5	39.6
Richer	31.2	26.7	35.5	33.2	36.0	30.6
Richest	20.3	18.4	19.6	21.6	22.2	20.6
Exposure to mass media						
No exposure	55.3	47.7	56.8	54.8	53.0	49.1
Partial exposure	34.2	34.1	47.2	43.2	38.4	35.4
Full exposure	23.5	27.5	37.6	29.7	34.5	26.1
Overall	**36.4**	**37.3**	**49.8**	**45.5**	**39.7**	**34.8**

*Weighted percentage

Table 3.8: Factors affecting prevalence of child marriage among ever-married women aged 20-24 years by region of residence in India, NFHS-4 (2015-16)

Variables	North (n=14,334)	Central (n=22,728)	East (n=15,890)	Northeast (n=7,522)	West (n=6,051)	South (n=8,294)
Respondent's current age						
20 years ®	1.00	1.00	1.00	1.00	1.00	1.00
21 years	0.835***	0.838***	0.811***	0.750***	0.851*	0.796***
	(0.734 - 0.949)	(0.760 - 0.923)	(0.729 - 0.902)	(0.638 - 0.882)	(0.707 - 1.026)	(0.673 - 0.941)
22 years	0.782***	0.756***	0.754***	0.601***	0.729***	0.676***
	(0.697 - 0.877)	(0.692 - 0.825)	(0.684 - 0.832)	(0.516 - 0.700)	(0.613 - 0.867)	(0.579 - 0.790)
23 years	0.673***	0.764***	0.674***	0.508***	0.640***	0.586***
	(0.598 - 0.757)	(0.699 - 0.835)	(0.609 - 0.747)	(0.435 - 0.593)	(0.536 - 0.765)	(0.501 - 0.686)
24 years	0.712***	0.833***	0.692***	0.501***	0.715***	0.538***
	(0.633 - 0.800)	(0.762 - 0.910)	(0.625 - 0.766)	(0.430 - 0.585)	(0.600 - 0.853)	(0.461 - 0.628)
Type of place of residence						
Rural ®	1.00	1.00	1.00	1.00	1.00	1.00
Urban	1.052	0.881***	1.027	1.205***	1.094	0.986
	(0.956 - 1.157)	(0.812 - 0.956)	(0.929 - 1.135)	(1.051 - 1.381)	(0.955 - 1.254)	(0.879 - 1.105)
Caste						
SC/ST ®	1.00	1.00	1.00	1.00	1.00	1.00
OBC	1.364***	1.173***	1.103**	0.783***	1.024	1.092
	(1.249 - 1.490)	(1.099 - 1.251)	(1.024 - 1.189)	(0.673 - 0.911)	(0.891 - 1.177)	(0.978 - 1.220)
Other	0.947	1.294***	0.995	0.93	1.108	1.068
	(0.856 - 1.049)	(1.171 - 1.430)	(0.893 - 1.109)	(0.790 - 1.096)	(0.950 - 1.293)	(0.889 - 1.282)
Religion						
Hindu ®	1.00	1.00	1.00	1.00	1.00	1.00
Muslim	0.718***	0.596***	0.944	1.679***	0.89	0.821**
	(0.642 - 0.803)	(0.539 - 0.658)	(0.851 - 1.047)	(1.380 - 2.043)	(0.739 - 1.071)	(0.700 - 0.962)
Other	0.502***	0.607**	0.745***	0.758***	0.947	0.991

	(0.428 - 0.588)	(0.402 - 0.917)	(0.638 - 0.871)	(0.672 - 0.855)	(0.738 - 1.214)	(0.768 - 1.278)
Women's education level						
No education ®	1.00	1.00	1.00	1.00	1.00	1.00
Primary	0.853***	0.814***	0.882**	0.982	1.026	0.941
	(0.756 - 0.963)	(0.746 - 0.889)	(0.792 - 0.983)	(0.818 - 1.179)	(0.824 - 1.278)	(0.753 - 1.176)
Secondary	0.510***	0.473***	0.504***	0.520***	0.578***	0.500***
	(0.460 - 0.566)	(0.439 - 0.510)	(0.462 - 0.550)	(0.443 - 0.611)	(0.482 - 0.694)	(0.421 - 0.592)
Higher	0.182***	0.205***	0.233***	0.167***	0.0914***	0.0745***
	(0.154 - 0.216)	(0.179 - 0.234)	(0.196 - 0.277)	(0.116 - 0.239)	(0.0636 - 0.131)	(0.0570 - 0.0974)
Household wealth quintiles						
Poorest ®	1.00	1.00	1.00	1.00	1.00	1.00
Poorer	1.073	0.803***	0.95	0.894	0.759***	0.897
	(0.928 - 1.242)	(0.742 - 0.868)	(0.873 - 1.034)	(0.771 - 1.036)	(0.618 - 0.932)	(0.701 - 1.146)
Middle	0.752***	0.670***	0.844***	0.728***	0.704***	0.751**
	(0.647 - 0.873)	(0.611 - 0.734)	(0.759 - 0.938)	(0.617 - 0.860)	(0.570 - 0.870)	(0.590 - 0.957)
Richer	0.562***	0.527***	0.691***	0.687***	0.542***	0.631***
	(0.479 - 0.658)	(0.474 - 0.587)	(0.601 - 0.795)	(0.562 - 0.840)	(0.432 - 0.681)	(0.490 - 0.814)
Richest	0.424***	0.418***	0.362***	0.485***	0.331***	0.600***
	(0.357 - 0.503)	(0.366 - 0.477)	(0.284 - 0.462)	(0.358 - 0.656)	(0.252 - 0.434)	(0.450 - 0.801)
Exposure to mass media						
No exposure ®	1.00	1.00	1.00	1.00	1.00	1.00
Partial exposure	0.913	0.945	0.983	1.133*	0.965	1.032
	(0.812 - 1.026)	(0.880 - 1.015)	(0.907 - 1.066)	(0.988 - 1.300)	(0.814 - 1.144)	(0.807 - 1.320)
Full exposure	0.898	0.972	0.985	0.787**	0.837	0.873
	(0.744 - 1.084)	(0.848 - 1.113)	(0.840 - 1.154)	(0.639 - 0.969)	(0.639 - 1.097)	(0.654 - 1.165)
Constant	1.848***	1.774***	2.042***	2.082***	2.290***	2.180***
	(1.590 - 2.149)	(1.612 - 1.951)	(1.848 - 2.256)	(1.682 - 2.577)	(1.793 - 2.923)	(1.589 - 2.991)

® Reference category; *** p<0.01, ** p<0.05, * p<0.1; Confidence interval in parenthesis

Table 3.8 demonstrates factors affecting child marriage prevalence across region of residence. The likelihood of women married below 18 years was higher when the women became older in all the region. Women who resided in urban areas are associated with lower likelihood of child marriage prevalence in the central region (OR 881, 95% CI 0.812 – 0.9560 and increased likelihood of child marriage in the northeast region (OR 1.205, 95% CI 1.051 – 1.381) than its rural counterparts. However, urban residence was not significantly associated with the prevalence of child marriage in other regions. Hierarchical status of women in society also a significant predictor of child marriage in India. The risk of women married before 18 years was significantly higher among those women who are belonged to other backward classes in north (OR 1.364, 95% CI 1.249 – 1.490), central (OR 1.173, 95% CI 1.099 – 1.251), and eastern region (OR 1.103, 95% CI 1.024 – 1.189) than those belonged to Scheduled Caste/Scheduled Tribe. Moreover, Northeast region showed significantly lower likelihood of child marriage among other backward classes (OR 0.783, 95% CI 0.673 – 0.911) compared to SC/ST. Women belonged to other caste which represents upper caste in caste hierarchy are more likely to marry before 18 years in the central region (OR 1.294, 95% CI 1.171 – 1.430) than the Scheduled Caste and Scheduled Tribe women. However, the association was not significant in all other region. Moreover, women belonged to Muslim showed significantly lower likelihood of child marriage in north (OR 0.718, 95% CI 0.642 – 0.803), central (OR 0.596, 95% CI 0.539 – 0.658), and southern region (OR 0.821, 95% CI 0.700 – 0.962) compared to those women who believed in Hinduism. Women belonging in oher eligious groups also indicated a lower likelihood of child marriage than the Hindus. Women's educational level was found to be a strong predictor of child marriage. The likelihood of child marriage prevalence was decreasing with increasing level of education in all the region. Wealth status of household is another important predictor of child marriage. Being resided in the upper quintile of household wealth significantly decreases the likelihood of child marriage in all the region. Women's exposure to mass media also showed significant association with child marriage prevalence. The odds of child marriage was lower for partial and full media exposure than the women who had no exposure to mass media. However, the association between women's exposure to mass media and prevalence of child marriage was significant in Northeast region only; all other regions had no significant association with child marriage.

3.7 Discussion and Conclusion

The present chapter analyses trends, prevalence, and socioeconomic determinants of child marriage. Although considerable decline has been observed in child marriage prevalence over the period, the rate of reduction is not the desired level. The findings of the study also reveal that the incidence of child marriage significantly varies by socioeconomic background. Women who are resided in rural areas, have no or very lower level of educational attainment, and economically poor are more likely to marry before 18 years of age. The findings of the study show that child marriage is significantly higher among Hindus compared to Muslim and other religious groups. Moreover, upper caste women are more likely to marry at an early age than the Scheduled Tribes and Scheduled Castes. The importance of religious norms is greater among Hindus. Among Hindus, parents wanted to protect virginity and purity of their daughter by marrying them at an early age.[116] On the other hand, the notion of purity and pollution is absent among tribal.[117] The intersection of caste, religion, education, and wealth index indicates exciting results on child marriage prevalence where most disadvantaged groups are vulnerable to married-off before age 18. Furthermore, four socioeconomically different states have been selected to examine the variations in child marriage prevalence across socioeconomic groups. Additionally, potential socioeconomic and demographic factors have been identified to suggest some policy recommendation to prevent the practice of child marriage. The findings of the study demonstrate that education is the single most crucial factor in determining the prevalence of child marriage. Compared with higher educated women, illiterate are five times, and women with a secondary level of education are two times more likely to marry in childhood. The results are consistent with several other studies conducted in India and elsewhere. Spending more time in schools often away parents to think of their marriage, and young girls become aware of the harmful impact of child marriage. Moreover, young girls become more aspire to do the job when they cross the secondary level of education. Therefore, advancement in education among girls substantially reduces the incidence of child marriage. Therefore, the build-up of new schools in the village area, improvement in school infrastructure, quality education may increase the girls' age at marriage. Household economic condition also found to

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[116] Mitra, Aparna. "The status of women among the scheduled tribes in India." *The Journal of Socio-Economics* 37, no. 3 (2008): 1202-1217.
[117] Ibid.

be a crucial factor of child marriage. Women belonging to the wealthier strata are more than twice less likely to marred as children. Therefore, financial incentives should be provided to the poorer family to increase the level of education among girl. Other important predictors include women's occupational status, caste, religion, and region of residence. This study also determined the contribution of potential predictors in rural-urban child marriage prevalence gap. The analysis also found that the economic status of household and education explains the majority of the gap. Therefore, policies and programme to prevent child marriage must address the education of girl and poverty. Furthermore, the study examined regional differences in child marriage and its socioeconomic determinants. The study finds that the eastern and central part of India indicates a higher incidence of child marriage. Therefore, effort should be made to increase the women's age at marriage in these high incidence child marriage areas.

Chapter-4
Impact of Child Marriage on Maternal Health Outcomes

This chapter examines the relationship between child marriage and health outcomes of women. Several studies have documented that child marriage adversely affects the health and well-being of mother and their children. For the purpose of this study, the chapter has been divided into three sections. The first section at examining the relationship of child marriage with selected reproductive health outcomes women, such as women with at least one child ever born, three or more childbirth, child death, childbirth in the 1st year of marriage, last child unwanted, and pregnancy termination. Women's reproductive health status is often determined by the use of maternal health care services.[118] To address this question, the second section of this chapter proposes to assess the relationship of child marriage with maternity care. Further, evidences have documented that inadequate use of maternal health care increases the risk of poor nutritional status, maternal complications, and mortality.[119] The third section of this study examines the association of child marriage with nutrition and anaemia status of women. The present research is unable to assess the impact of child marriage on maternal morbidity and mortality due to data constraints.

4.1. Association between Child Marriage and Reproductive Health Status of Women

Earlier studies have indicated that marrying in childhood has serious adverse health consequences for women and infants. Despite its adverse impact health, the practice of child marriage has widely practiced in India. Studies also demonstrate that women living in impoverished areas, economically deprived conditions, having lower education status, and with high gender inequalities are at higher risk of child marriage.[120] Although the recent estimate showed a substantial decline in child

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[118] Gogoi, Mousumi, Sayeed Unisa, and Ranjan Kumar Prusty. "Utilization of maternal health care services and reproductive health complications in Assam, India." *Journal of Public Health* 22, no. 4 (2014): 351-359.

[119] Khan, Khalid S., Daniel Wojdyla, Lale Say, A. Metin Gülmezoglu, and Paul FA Van Look. "WHO analysis of causes of maternal death: a systematic review." *The lancet* 367, no. 9516 (2006): 1066-1074; Ronsmans, Carine, Wendy J. Graham, and Lancet Maternal Survival Series steering group. "Maternal mortality: who, when, where, and why." *The lancet* 368, no. 9542 (2006): 1189-1200.

[120] United Nations Children's Fund. "Early marriage: a harmful traditional practice. A statistical exploration." (2005); Jain et al. "*New insights on preventing child marriage*."; Nour,"Health consequences of child marriage in Africa" 1644.

marriage from 47% in 2005-06 to 27% in 2015-16, the prevalence is still very high in many parts of the country. The previous chapter of this study noted that child marriage is highly prevalent in West Bengal, Bihar, Rajasthan, Uttar Pradesh, Madhya Pradesh, and Andhra Pradesh. Previous research has confirmed that child marriage leads to poor reproductive health (intrauterine fetal death, stillbirth, and miscarriage), increased risk of sexually transmitted disease (i.e. genital herpes, chlamydia, syphilis, and HIV/AIDS), maternal morbidity (i.e. antepartum and postpartum haemorrhage, pre-eclampsia/eclampsia, prolonged or obstructed labour, placenta praevia, postpartum sepsis and fistula) and mortality.[121] For instance, women who married below 18 years of age have increased likelihood of fertility, unintended pregnancy, and pregnancy termination[122]; and lower likelihood of contraception use before first childbirth, antenatal visits, institutional delivery, and delivery by skilled health personnel.[123] Marriage before physical and emotional maturity of women also increases the risks of morbidity and mortality of infants, children's stunting, premature birth or baby's low birth weight.[124] For example, Raj et al.'s study found that the women who married before 18 years their children are more likely to stunted and underweight.[125] In addition, Nasrullah et al. revealed that mother's marriage in childhood significantly increases the risk of children's recent diarrhea and marginally associated with increased likelihood of child and infant mortality in Pakistan.[126] Child

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[121] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Raj, "When the mother is a child: the impact of child marriage on the health and human rights of girls." 931-935; Raj, Anita, and Ulrike Boehmer. "Girl child marriage and its association with national rates of HIV, maternal health, and infant mortality across 97 countries." *Violence against women*19, no. 4 (2013): 536-551; Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543; Santhya et al. "Associations between early marriage and young women's marital and reproductive health outcomes." 132-139; Santhya, "Early marriage and sexual and reproductive health vulnerabilities of young women." 334-339; Santhya et al. "Early marriage and HIV/AIDS." 1291-1297.
[122] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543.
[123] Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558; Nasrullah et al. "Effect of child marriage on use of maternal health care services in pakistan." 517-524
[124] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India." b4258; Nasrullah et al. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." 639-646.
[125] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India." b4258
[126] Nasrullah et al. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." 639-646.

marriage is also associated with an increased risk of intimate partner violence.[127] It is also evidenced that physical and sexual abuse leads to deterioration of health and nutrition among young married women. These adverse health outcomes have been attributed to the several socioeconomic and demographic characteristics, including limited access to health care, limited health knowledge, and lower autonomy among young brides. Therefore, an attempt has been made to examine the association between child marriage and reproductive health status of women accounting for relevant socioeconomic and demographic factors.

4.1.1. Study Sample

The study uses the data from the fourth round of the National Family Health Survey (NFHS). NFHS-4 successfully interviewed 699,686 women aged 15-49 years with a response rate of 97%, and 112,122 men aged 15-54 years with a response rate of 92%. Out of these, the information on age at first marriage is available for 514,112 ever-married women.

4.1.2. Description of Variables

4.1.2.1. Dependent Variables

The dependent variables are binary indicators of reproductive health outcomes. The selected reproductive health outcomes are at least one childbirth, three or more childbirth, children's death, childbirth in the 1st year of marriage, last child unwanted, and pregnancy termination.

4.1.2.2. Explanatory Variables

The key explanatory variable is women's age at marriage. Women's age at marriage has been categorized into two groups, marriage before 18 years of age and marriage at 18 years or later. Moreover, for more precise analysis, women's age at marriage is further categorized into three groups, ≤14 years, 15-17 years, and ≥18 years.

Other explanatory variables include socioeconomic and demographic characteristics of women. The variables are selected on the basis of earlier studies in this area. Socioeconomic characteristics include place of residence, caste, religion,

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[127] Raj et al. "Association between adolescent marriage and marital violence among young adult women in India." 35-39; Nasrullah et al. "Child marriage and its associations with controlling behaviors and spousal violence against adolescent and young women in Pakistan." 804-809.

women's education, partner's education, region, working status, wealth status, and exposure to media.

Place of residence has been categorized into urban and rural. Urban is adopted as the reference category to compare the residential difference in reproductive health outcomes. Caste[128] has been categorized into Scheduled Caste/Scheduled Tribe, Other Backward Classes (OBC), and others. Similarly, the religious affiliation[129] of women is included as a predictor variable to assess the religious differences in reproductive health outcomes. Religion has been classified into Hindu, Muslim, Christian, and others.

Women's education is a crucial determinant of reproductive health status. Women's completed years of education is grouped into illiterate or no education, primary (1-5), secondary (6-10), and higher (11+). Illiterate is considered as a reference category to examine the differentials in reproductive health outcomes by educational level with reference to illiterate women. Women's current working status is included to capture the influence of women's work participation in reproductive health. Women's exposure to mass media is also an important factor for reproductive health. Women's media exposure has been constructed by access to information from newspaper and magazine, radio, and television. On the basis of this three exposure ever-married women is categorized into three groups such as no exposure (if women do not have access any of these exposure), partially exposure (if women have access at least two exposures), and full exposure (if women have access to all the three exposures). Household wealth quintile has been calculated from ownership of household assets including consumer items and dwelling characteristic. A score has been generated for each individual using principal component analysis and categorized into five quintiles, each represents 20% of the score, between 1 (poorest) and 5 (richest).

Demographic characteristics of women include current age in years, spousal age difference, and modern method of contraception use. Women's current age has been categorized into five groups, 15-19 years, 20-24 years, 25-29 years, 30-34 years,

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[128] Caste is a rigid hierarchical system in India. Brahman constitutes the highest position in hierarchal strata and Sudra represents bottom position. There are more than 2500 caste found in India with different sets of norms and beliefs.

[129] India is a multi-religious country. Hindu constitutes largest proportion of population, followed by Muslim, and Christian. NFHS-4 classified religious affiliation of people into seven groups, namely, Hindu, Muslim, Christian, Sikh, Buddhist/neo-Buddhist, Jain, and Other. Other includes Jews, Parsis/Zoroastrians, and those following 'no religion'.

and 35-49 years. The youngest group (15-19 years) is adopted as the reference category to examine differentials in reproductive health outcomes by age group. Similarly, spousal age difference in years has been categorized into three groups, ≤4 years (referenced category), 5-9 years, and ≥10 years. A dichotomous variable indicates that whether a woman is using modern method of contraception or not. The modern method of contraception is included to assess the impact of contraception use on women's reproductive health status. Lastly, region variable is included to capture sociocultural norms and beliefs, health behavior and attitudes across regions. The country has been classified into six broad regions from 29 states and 7 union territories, namely, north, central, east, north-east, west, and south.[130]

4.1.3. Analytical Approach

The primary objective of this section of the study is to examine the relationship between child marriage and reproductive health status of women. Bivariate and multivariate analyses were carried out to fulfill the objective of the study. Bivariate analyses were performed to assess the nature of the relationship between women's age at marriage and socioeconomic and demographic characteristics of women. Pearson chi-square test was used to assess the significance level of differences in women's background characteristics by women's age at marriage. Association of child marriage with selected reproductive health outcomes were estimated by unadjusted and adjusted odds ratio (OR) with 95% confidence interval (CI) using binary logistic regression models. Adjusted analyses were controlled for age, place of residence, caste, religion, women education, partner's education, region, spousal age gap, contraception use, working status, wealth index, and media exposure.

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[130] Regional classification of India is based on NFHS-4 (IIPS, Mumbai). North: Delhi, Haryana, Chandigarh, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, and Uttarakhand; Central: Madhya Pradesh, Chhattisgarh, and Uttar Pradesh; East: Jharkhand, Odisha, Bihar, and West Bengal; Northeast: Arunachal Pradesh, Assam, Manipur, Nagaland, Sikkim, Meghalaya, Mizoram and Tripura; West: Goa, Gujarat, Maharashtra Dadra & Nagar Haveli, and Daman & Diu,; South: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana, Andaman & Nicobar Islands, Lakshadweep, and Pondicherry.

4.1.4. Results

Table 4.1: Percentage distribution of child marriage and adult marriage by different socioeconomic and demographic characteristics of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Socioeconomic and demographic characteristics	Child marriage (n= 227,636)		Adult marriage (n=286,476)		*p*-value
	N	weighted %	n	weighted %	
Respondent's current age (years)					<0.001
15-19	13,172	73.27	5,046	26.73	
20-24	30,459	40.5	47,527	59.5	
25-29	38,590	40.31	62,118	59.69	
30-34	40,049	46.5	51,241	53.5	
≥35	1,05,366	49.62	1,20,544	50.38	
Place of residence					<0.001
Urban	51,222	36.71	94,506	63.29	
Rural	1,76,414	51.85	1,91,970	48.15	
Caste					<0.001
Scheduled caste/tribe	82,932	51.33	98,289	48.67	
Other Backward Caste	98,304	47.65	1,07,092	52.35	
Other	37,353	39.02	67,465	60.98	
Religion					<0.001
Hindu	1,83,321	47.69	2,08,119	52.31	
Muslim	28,476	47.57	36,427	52.43	
Christian	9,301	29.98	24,631	70.02	
Other	6,538	30.67	17,299	69.33	
Women's education					<0.001
No education	1,05,776	62.89	70,844	37.11	
Primary	40,248	57.55	35,047	42.45	
Secondary	77,515	39.42	1,38,781	60.58	
Higher	4,097	9.34	41,804	90.66	
Partner's education					<0.001
No education	9,512	59.45	7,416	40.55	
Primary	7,015	55.92	6,191	44.08	
Secondary	19,214	43.44	28,263	56.56	
Higher	2,559	21.8	9,445	78.2	
Region					<0.001
North	38,878	40.37	64,656	59.63	
Central	71,645	52.84	63,884	47.16	
East	52,024	55.08	45,993	44.92	
North-East	21,857	39.25	44,365	60.75	
West	17,685	41.89	25,284	58.11	
South	25,547	40.04	42,294	59.96	
Spousal age gap (years)					<0.001
≤4	18,146	41.43	27,770	58.57	
5 to 9	13,091	47.16	16,117	52.84	
≥10	4,824	51.39	5,108	48.61	
Modern method of contraception use					<0.001

No	1,18,505	42.95	1,72,150	57.05	
Yes	1,08,856	50.97	1,14,176	49.03	
Current working status					<0.001
Not working	27,866	43.16	39,943	56.84	
Working	10,558	51.4	11,522	48.6	
Wealth Quintile					<0.001
Poorest	58,838	60.35	43,033	39.65	
Poorer	57,785	56.79	52,457	43.21	
Middle	48,555	50.39	57,839	49.61	
Richer	38,028	41.33	62,189	58.67	
Richest	24,430	26.94	70,958	73.06	
Exposure to mass media					<0.001
No exposure	67,337	60.11	49,347	39.89	
Partial	1,49,805	44.76	2,08,785	55.24	
Full	10,494	29.25	28,344	70.75	

p-value is calculated from Pearson chi-square test.

n= sample size

Sample size may not correspond to the percentages because of weighted analyses.

Table 4.1 presents percentage distribution of ever-married women aged 15-49 years by socioeconomic and demographic characteristics. Significant differences were found in socioeconomic and demographic characteristics the women who were married before age 18 compared to those married at age 18 years or later (p <0.001). The prevalence of child marriage was higher among those women who were young, uneducated, poor, residing in rural areas, and from central and eastern region of the country. The incidence of child marriage was also higher among the women who belonged to the Scheduled Castes & Scheduled Tribes, practiced Hinduism, and had no or very limited exposure to media. The husband of child married women also has lower educational attainment. Women who married in childhood compared to women married as adults reported greater use of modern method of contraception (51% vs. 49%), although the differences are marginal. The spousal age gap was higher among the women who married as children compared to their adult married counterparts (51.4% vs. 48.6%). Child marriage is highly prevalent among those women who were currently working compared to their non-working counterparts (51.4% vs. 48.6%).

Table 4.2: Association between child marriage and selected reproductive health outcomes of ever-married women aged 15-49 years in India, NFHS-4 (2015-16).

Reproductive health outcomes	Overall N (Weighted %)	Child marriage (N=227,636) N (Weighted %)	Adult marriage (N=286,476) N (Weighted %)	OR (95% CI)	Adjusted OR (95% CI)
At least one childbirth				2.29 (2.25 - 2.34)*	3.25 (3.02 - 3.49)*
No	52850 (10.51)	14629 (6.60)	38221 (13.94)		
Yes	461262 (89.49)	213007 (93.40)	248255 (86.06)		
Three or more childbirth				3.03 (3.00 - 3.07)*	2.56 (2.47 - 2.66)†
No	297914 (61.36)	99699 (47.63)	198215 (73.40)		
Yes	216198 (38.64)	127937 (52.37)	88261 (26.60)		
Death of children				2.33 (2.29 - 2.37)*	1.63 (1.56 - 1.71)*
No	447185 (87.69)	186067 (82.93)	261118 (91.87)		
Yes	66927 (12.31)	41569 (17.07)	25358 (8.13)		
Childbirth in the 1st year of marriage				0.48 (0.47 - 0.49)*	0.50 (0.48 - 0.52)*
No	330791 (78.56)	167049 (84.71)	163742 (72.68)		
Yes	94492 (21.44)	30002 (15.29)	64490 (27.32)		
Last child unwanted				1.32 (1.28 - 1.36)*	1.29 (1.18 - 1.41)*
No	169885 (90.85)	62318 (89.44)	107567 (91.77)		
Yes	16864 (9.15)	7380 (10.56)	9484 (8.23)		
Pregnancy termination				1.07 (1.05 - 1.08)*	1.19 (1.14 - 1.24)*
No	433424 (84.41)	190973 (84.41)	242451 (84.82)		
Yes	80688 (15.59)	36663 (15.59)	44025 (15.18)		

* p <0.01
N= Sample size
Sample size may not correspond to the percentages because of weighted analyses.
Adjusted analyses controlled for respondent's age, place of residence, caste, religion, women education, partner's education, region, spousal age gap, contraception use, working status, wealth index, and media exposure.

Table 4.2 presents the relationship of child marriage with selected reproductive health outcomes of women aged 15-49 years. The results of the study revealed that 93.4% of the child married women had one or more childbirth compared to 86.06% of adult married women. More than half (52.37%) of the child married women had three or more childbirth, whereas, about one-fourth (26.6%) adult married women had three or more children. Moreover, child married women reported higher rate of child death than the women who married in adulthood (17.7% vs. 8.13%).

Similarly, women married as minors are more likely to report unwanted childbirth (10.56% vs. 8.23%) and pregnancy termination (15.59% vs. 15.18%) than the women married in later age. Moreover, childbirth in the 1st year of marriage was lower among the women who married below 18 years of age than those married in adulthood (15.29% vs. 27.32%).

Regression analysis revealed that respondents who married as minor compared to women married at 18 or later were more likely to have at least one childbirth (OR 2.29, 95% CI 2.25-2.34), three or more childbirth (OR 3.03, 95% CI 3.00-3.07), children's death (OR 2.33, 95% CI 2.29-2.37), unwanted last child (OR 1.32, 95% CI 1.28-1.36), and pregnancy termination (OR 1.07, 95% CI 1.05-1.08). Moreover, child married women compared to adult married women were less likely to have childbirth in the 1st year of marriage (OR 0.48, 95% CI 0.47-0.49). After adjustment for relevant socioeconomic and demographic factors, the likelihood of at least one childbirth (adjusted OR 3.25, 95% CI 3.02-3.49), three or more childbirth (adjusted OR 2.56, 95% CI 2.47-2.66), children's death (adjusted OR 1.63, 95% CI 1.56-1.71), unwanted last child (adjusted OR 1.29, 95% CI 1.18-1.41), and pregnancy termination (adjusted OR 1.19, 95% CI 1.14-1.24) were significantly higher; and the likelihood of childbirth in 1st year of marriage (adjusted OR 0.50, 95% CI 0.48-0.52) was significantly lower among the women who married in childhood than those married in adulthood.

Table 4.3 presents selected reproductive health outcomes by women's age at marriage. In overall, majority of the ever-married women (89.5%) had at least one child; about 39% of the women reported three or more children. More than one in ten women (12.3%) reported the death of children after birth. More than one in five women (21.4%) reported having a child within the first year of marriage, 9.2% of the women reported that the last child was unwanted, and 15.6% reported pregnancy termination (i.e. miscarriage, abortion, or stillbirth).

Table 4.3: Reproductive health outcomes by age at marriage of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Reproductive Health Outcomes	Women married at age ≤14 years, N (weighted %)	Women married at age 15-17 years, N (weighted %)	Women married at age ≥18 years, N (weighted %)	Total N (weighted %)	*p*-value
At least one child ever born					<0.001
No	3784 (4.8)	10845 (7.6)	38221 (13.9)	52850 (10.5)	
Yes	75892 (95.2)	137115 (92.4)	248255 (86.1)	461262 (89.5)	
Three or more child ever born					<0.001
No	27838 (38.0)	71861 (53.0)	198215 (73.4)	297914 (61.4)	
Yes	51838 (62.0)	76099 (47.0)	88261 (26.6)	216198 (38.6)	
Children died					<0.001
No	61580 (78.5)	124487 (85.4)	261118 (91.9)	447185 (87.7)	
Yes	18096 (21.5)	23473 (14.6)	25358 (8.1)	66927 (12.3)	
Childbirth in the 1st years of marriage					<0.001
No	61901 (88.7)	105148 (82.4)	163742 (72.7)	330791 (78.6)	
Yes	7764 (11.3)	22238 (17.6)	64490 (27.3)	94492 (21.4)	
Last child unwanted					<0.001
No	16902 (87.7)	45416 (90.1)	107567 (91.8)	169885 (90.8)	
Yes	2339 (12.3)	5041 (9.9)	9484 (8.2)	16864 (9.2)	
Pregnancy termination ever					<0.001
No	66864 (83.9)	124109 (84.0)	242451(84.8)	433424 (84.4)	
Yes	12812 (16.1)	23851 (16.0)	44025 (15.2)	80688 (15.6)	

p-value is calculated from Pearson chi-square test.
N= Sample size
Sample size may not correspond to the percentages because of weighted analyses.

Moreover, the study found significant differences in reproductive health outcomes by women's age at marriage (p <0.001). The findings of the study revealed that 95.2% of the women married by the age of 14 or before and 92.4% of the women married between 15-17 years of age reported at least one childbirth compared to 86.1% of the women who married at the age of 18 years or later. Similarly, 62% and 47% of women married at the age of 14 or before, between 15-17 years reported three or more childbirth respectively compared to 26.6% of the later married women (≤18 years). The women who married early were more likely to have child loss compared to later married women (21.5% vs. 8.1%). In addition, women who married below 15 years of age were less likely to have childbirth in one year of marriage than those later married women (11.3% vs. 27.3%). Again, women married at age 14 years or below were more likely than those who married later report unwanted/mistimed births (12.3% vs. 8.2%) and pregnancy termination (16.1% vs. 15.2%).

Table 4.4: Association between maternal age at marriage and reproductive health outcomes of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Reproductive Health Outcomes	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
At least one child ever born		
≤14 years	3.215 (3.112 - 3.322)[†]	2.878 (2.576 - 3.216)[†]
15-17 years	1.967 (1.926 - 2.010)[†]	3.407 (3.143 - 3.694)[†]
≥18 years ®		
At least one child ever born		
≤14 years	4.494 (4.422 - 4.566)[†]	3.058 (2.905 - 3.220)[†]
15-17 years	2.448 (2.416 - 2.480)[†]	2.337 (2.242 - 2.436)[†]
≥18 years ®		
Children's death		
≤14 years	3.098 (3.033 - 3.163)[†]	1.791 (1.688 - 1.900)[†]
15-17 years	1.931 (1.894 - 1.969)[†]	1.538 (1.459 - 1.621)[†]
≥18 years ®		
Childbirth in the 1st year of marriage		
≤14 years	0.338 (0.330 - 0.346)[†]	0.373 (0.349 - 0.398)[†]
15-17 years	0.567 (0.557 - 0.577)[†]	0.556 (0.532 - 0.581)[†]
≥18 years ®		
Last pregnancy unwanted		
≤14 years	1.557 (1.485 - 1.633)[†]	1.255 (1.100 - 1.432)[†]
15-17 years	1.226 (1.183 - 1.271)[†]	1.307 (1.187 - 1.439)[†]
≥18 years ®		
Pregnancy terminated ever		
≤14 years	1.069 (1.047 - 1.092)[†]	1.207 (1.141 - 1.276)[†]
15-17 years	1.068 (1.050 - 1.086)[†]	1.182 (1.130 - 1.237)[†]
≥18 years ®		

Abbreviation: OR, Odds Ratio; CI, Confidence Interval; ® Reference category
[†] $p < 0.01$
Adjusted analyses controlled for age, place of residence, caste, religion, women education, partner's education, region, spousal age gap, contraception use, working status, wealth index, and media exposure.

Women married at ≤14 years and 15-17 years compared to those married at ≥18 years of age were more likely to have at least one childbirth (≤14 years: AOR 2.88, 95% CI 2.58-3.22; 15-17 years: AOR 3.41, 95% CI 3.14-3.7), three or more childbirth (≤14 years: AOR 3.06, 95% CI 2.91-3.22; 15-17 years: AOR 2.34, 95% CI 2.24-2.44), children's death (≤14 years: AOR 1.79, 95% CI 1.69-1.90; 15-17 years: AOR 1.53, 95% CI 1.46-1.62), unwanted last birth (≤14 years: AOR 1.26, 95% CI 1.10-1.44; 15-17 years: AOR 1.31, 95% CI 1.19-1.44), and pregnancy termination (≤14 years: AOR 1.21, 95% CI 1.14-1.28; 15-17 years: AOR 1.18, 95% CI 1.13-1.24); and less likely to have childbirth in first year of marriage (≤14 years: AOR 0.37, 95% CI 0.35-0.40; 15-17 years: AOR 0.56, 95% CI 0.53-0.58) ever after controlling for several important socioeconomic and demographic con-founder (Table 4.4).

4.1.5. Discussion

This study reveals a comprehensive analysis of the relationship of child marriage with reproductive health status among married women aged 15-49 years in India. The findings of the study demonstrate that even after accounting for relevant covariates women who married at age ≤14 years, and 15-17 years were more likely to have at least one childbirth, three or more childbirth, died of children, unwanted last birth, and pregnancy termination compared to those women who married at ≥18 years. Moreover, women who married in childhood are less likely to have childbirth in the 1st year of marriage than their adult married peers. These findings are consistent with other previous cross-sectional studies.[131] For instance, Raj et al.'s study found that child married women as compared to adults married women were more likely to have childbirth, history of rapid/ repeated childbirth, unwanted pregnancy, multiple unwanted pregnancies, and pregnancy termination, and less likely to have childbirth in the 1st year of marriage.[132] Nasrullah et al. found similar results on the association of child marriage with fertility behavior in Pakistan.[133] Similar evidence has been found on the relationship between child marriage and indicators of fertility, contraceptive behavior, and maternal health care utilization in selected South Asian countries.[134] A study in Bangladesh among married women aged 20-49 years revealed that child marriage significantly increases the risk of fertility, children's death, unwanted or mistimed pregnancy, and pregnancy termination compared to those who married at adulthood.[135] Consistent with earlier studies, the previous chapter of this current research also documented that women who married at an early age have poor socioeconomic status, lower level of education, and limited exposure to mass media. Moreover, poor socioeconomic status significantly increases the risk of adverse health and nutritional outcomes.

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[131] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543; Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558; Kamal, SM Mostafa. "Decline in child marriage and changes in its effect on reproductive outcomes in Bangladesh." *Journal of health, population, and nutrition* 30, no. 3 (2012): 317; Adhikari et al. "Correlates of unintended pregnancy among currently pregnant married women in Nepal." 17.

[132] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889.

[133] Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543.

[134] Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558

[135] Kamal, "Decline in child marriage and changes in its effect on reproductive outcomes in Bangladesh." 317

In a patriarchal society like India where marriage is the prerequisite for childbirth, childbearing begins soon after marriage. Prior studies also demonstrated that child marriage is directly associated with early childbearing of women in developing countries like India. Consistent with other studies this study also revealed that the likelihood of childbearing is higher among the childhood married women. In Indian society where women are recognized as an instrument for childbearing, women do childbirth soon after marriage to prove her fertility; otherwise, she would be blamed for infertile and biologically incapable of childbearing. Moreover, when women married at an early age, their reproductive span becomes longer resulting high fertility. Child marriage typically persists in the rigid socio-cultural setting. Previous chapter has revealed that child marriage is pervasive in those areas where customary norms are highly valued such as in Bihar, rural parts of West Bengal, Uttar Pradesh, Rajasthan, north-western part of Madhya Pradesh, Eastern part of Maharashtra, and Assam. In areas where customary norms are much more rigid, birth of son child is highly preferred. In this cultural setting, daughter is recognized as an economic burden and son is highly preferred presumably because son provides labour, and old age financial support.[136]

Therefore, the desire for children especially son is higher among the women who married at an early age. The study also reveals that the child mortality is higher among the women who married at before the age of 18. The higher number of children's death after childbirth among child married women may be due to their biological and physical immaturity, complications during pregnancy and childbirth, and preterm delivery. Childbirth during the 1st year of marriage is lower among the early married women partly attributed to the biological and physical immaturity. In addition, later married women already passed substantial time for childbirth. Hence, they hurry for childbearing once they married.[137]

Moreover, the current study showed that child marriage is associated with an increased risk of unplanned pregnancies and pregnancy termination. These findings

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[136] Arnold et al. "Son preference, the family-building process and child mortality in India." 301-315; Cain, Mead. "Perspectives on family and fertility in developing countries." *Population Studies* 36, no. 2 (1982): 159-175; Das Gupta, Monica, Jiang Zhenghua, Li Bohua, Xie Zhenming, Woojin Chung, and Bae Hwa-Ok. "Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea." *The Journal of Development Studies* 40, no. 2 (2003): 153-187.

[137] Kamal, "Decline in child marriage and changes in its effect on reproductive outcomes in Bangladesh." 317.

are consistent with previous studies in India and elsewhere.[138] It is also apparent from the analysis that age at marriage is not only the single factor for the reproductive health status of women. Current research has found that rural-urban residence, women's and husband's education, and socioeconomic status significantly contributed to fertility and reproductive health status of women. The current programme and policy on child marriage mainly targeted unmarried minor girls as providing financial incentives for delayed marriage, improvement of girls' educational facilities, and enhanced job opportunities. These programmes should be broadened to address the health status of a married adolescent. Thus, efforts should be made to awareness of family planning, decision making the authority of women, access to healthcare services and utilization which has a direct link in women's reproductive health status. In addition to this, rural, backward caste, poorer and less educated women must be recognized in policy and programme as they are more vulnerable to adverse reproductive health risk.

4.2. Association between Child Marriage and Utilization of Maternal Health Care Services among Ever-Married Women Who Have At Least One Child in past 5 Years Preceding the Survey

Mortality related to pregnancy and childbirth is the leading causes of death among young married women in developing countries.[139] Inadequate maternal health care services significantly contributed to maternal mortality.[140] In a patriarchal society like India where gender inequality and discrimination against girls is deeply-rooted in the society, the practice of child marriage is widespread. This high incidence of child marriage attributed to poor socioeconomic status, lack of education, lower decision-making ability, and limited access to health care services resulting in high fertility, unintended pregnancy, pregnancy termination and several other adverse pregnancy outcomes which further reinforce the risk of maternal mortality and morbidity.

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[138] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543; Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558; Kamal, "Decline in child marriage and changes in its effect on reproductive outcomes in Bangladesh." 317; Adhikari et al. "Correlates of unintended pregnancy among currently pregnant married women in Nepal." 17.

[139] Adolescent Pregnancy: Issues in Adolescent Health and Development. *World Health Organization*. 2004.

[140] Thaddeus, Sereen, and Deborah Maine. "Too far to walk: maternal mortality in context." *Social science & medicine* 38, no. 8 (1994): 1091-1110; Murray, Christopher JL, and Alan D. Lopez. "Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study." *The lancet* 349, no. 9063 (1997): 1436-1442.

Previous studies have shown that women who married at an early age are more likely to have poor economic status, lower education attainment, and reside in rural areas.[141] Moreover, poor, rural, less educated, and lower autonomous women have lower access to maternal health care services.[142] Therefore, this present section of the study aims to assess the relationship between child marriage and utilization of maternal health care services among married women aged 15-49 years who had one or more births during the five years preceding the survey date.

4.2.1. Study Sample

This study utilizes the data from the fourth round of the National Family Health Survey conducted in 2015-16. NFHS-4 is a nationally representative sample survey of more than six lakh households. The NFHS-4 successfully interviewed 699,686 women aged 15-49 years with a response rate of 97%, and 112,122 men aged 15-54 years with a response rate of 92%. Among the women interviewed, 190,797 were having live birth during the five years preceding the survey date. Out of these women, the information on age at marriage is available for 186,749 ever-married women. Therefore, the study considers 186,749 ever-married women aged 15-49 years in the analysis.

4.2.2. Description of variables

4.2.2.1. Outcome Variables

Utilization of maternal health care has been assessed through indicators of pregnancy care, delivery care, and postnatal care. Pregnancy care has been measured from an adequate number of antenatal visits and timing of the first antenatal visit.[143]

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[141] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Kamal, SM Mostafa, Che Hashim Hassan, Gazi Mahabubul Alam, and Yang Ying. "Child marriage in Bangladesh: trends and determinants." *Journal of biosocial Science* 47, no. 1 (2015): 120-139; Aryal, "Age at first marriage in Nepal: differentials and determinants." 693-706; Choe et al. "Early marriage and early motherhood in Nepal." 143-162.

[142] Navaneetham, Kannan, and Arunachalam Dharmalingam. "Utilization of maternal health care services in Southern India." *Social science & medicine* 55, no. 10 (2002): 1849-1869; Chakraborty, Nitai, M. Ataharul Islam, Rafiqul Islam Chowdhury, Wasimul Bari, and Halida Hanum Akhter. "Determinants of the use of maternal health services in rural Bangladesh." *Health promotion international* 18, no. 4 (2003): 327-337; Bloom, Shelah S., David Wypij, and Monica Das Gupta. "Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city." *Demography* 38, no. 1 (2001): 67-78; Govindasamy, Pavalavalli, and B. M. Ramesh. "Maternal education and the utilization of maternal and child health services in India." (1997).

[143] Mistry, Ritesh, Osman Galal, and Michael Lu. "Women's autonomy and pregnancy care in rural India: a contextual analysis." *Social science & medicine* 69, no. 6 (2009): 927.

At least four antenatal visits during pregnancy are considered as adequate number of antenatal visits.[144] The proper timing of first antenatal visit is defined as the antenatal visit(s) within first three months of pregnancy.[145] Delivery attended by a trained person or in an institutional setting is considered as 'safe delivery' according to the recommendation of World Health Organization standards.[146] Delivery by a trained person was defined whether delivery assisted by a doctor, ANM/nurse/midwife or other health worker. In contrast, delivery by the unskilled person was defined as those assisted by a traditional health worker (*Dai*), friends/relatives or other person. Institutional deliveries were defined as those deliveries occurred in a medical institution such as government hospital, dispensary, primary health centre, community health centre or sub-centre, non-governmental hospital and private clinic. In addition, postnatal check-up within six weeks after birth is considered as a postnatal care indicator as per the recommendation of WHO.[147]

4.2.2.2. *Explanatory Variables*

socioeconomic and demographic predictors such as place of residence (urban and rural), respondent's current age (15-19, 20-24, 25-29, 30-34, and 35+ years), caste (SC/ST, OBC, and other), religion (Hindu, Muslim, and other), region (north, central, east, north-east, west, and south), women's education (no education, primary, secondary, and higher), husband's education (no education, primary, secondary, and higher), working status (not working and working), mass media exposure (no exposure, partial exposure, and full exposure), and wealth quintile of household (poorest, poorer, middle, richer, and richest) have been included in the analysis.

4.2.3. Analytical approach

Bivariate and multivariate analyses were carried out to assess the relationship between child marriage and maternity care married women aged 15-49 years who had a live birth in the last 5 years preceding the survey. Bivariate analyses were applied to examine the nature of the association between maternal health care utilization by

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[144] WHO recommendations on antenatal care for a positive pregnancy experience. *World Health Organization*, 2016.
[145] Ibid.
[146] Department of Pregnancy Safer. "Integrated Management of Pregnancy and Childbirth: Standards for Maternal and Neonatal care." *World Health Organization*. (2007): 71.
[147] WHO recommendations on postnatal care of the mother and newborn. World Health Organization. (2013): 16.

socioeconomic and demographic predictors. Binary logistic regression was used to examine the association between child marriage and indicators of maternal health care utilization, namely, at least four antenatal visits, first antenatal visit within first trimester, institutional delivery, delivery assistance by skilled health personnel, and postnatal check-up within six weeks after delivery. The regression results are presented by estimated odds ratio and 95% confidence interval.

4.2.4. Results

Table 4.5: Percentage distribution of maternal health care use by background characteristics of ever-married women aged 15-49 years who had live birth during the last 5 years preceding the survey in India, NFHS-4 (2015-16)

Background characteristic	At least four ANC	ANC within first trimester	Institutional delivery	Delivery by skilled health personnel	PNC within six weeks after birth
Type of place of residence					
Urban	67.1	76.3	90.5	91.3	72.0
Rural	45.2	67.5	77.5	80.0	57.1
Respondent's current age (years)					
15-19	54.5	67.1	85.0	86.4	61.9
20-24	53.5	70.3	84.4	86.2	63.7
25-29	53.4	71.6	82.3	84.3	62.8
30-34	50.5	70.3	79.7	81.8	60.7
35+	39.6	65.7	69.1	72.4	51.1
Caste					
Scheduled Caste/Scheduled Tribe	48.1	67.1	77.2	79.5	57.7
Other backward class	48.6	71.2	82.3	84.2	62.0
Other	61.8	74.1	86.1	87.8	67.8
Religion					
Hindu	51.3	70.2	83.1	84.7	62.7
Muslim	49.3	70	72.1	76.2	53.2
Christian	63.1	74.6	81.4	83.3	68.3
Other	67.0	71.5	84.4	88.1	71.8
Region					
North	50.5	74.8	85.6	88.0	66.9
Central	32.0	63.9	73.6	75.0	52.9
East	41.9	63.0	72.6	77.7	50.1
Northeast	49.3	64.7	71.3	75.0	53.7
West	72.3	77.5	91.2	90.9	72.1
South	78.9	78.8	96.1	95.8	79.5
Respondent's educational level					
No education	28.2	61.0	63.7	67.9	43.2

Primary	45.7	65.3	75.6	78.8	54.6
Secondary	61.6	73.0	89.4	90.4	69.5
Higher	73.7	80.8	97.0	96.6	80.8
Partner's educational level					
No education	33.9	63.3	62.9	68.0	42.5
Primary	47.3	62.8	74.6	77.3	54.1
Secondary	58.7	73.4	86.7	87.7	67.3
Higher	71.4	79.8	95.3	95.1	78.1
Respondent's current working status					
Not working	55.3	71.8	83.5	85.1	63.6
Working	53.0	70.9	77.0	79.1	60.2
Exposure to mass media					
No exposure	24.6	58.6	62.8	67.1	40.7
Partial exposure	60.1	73.0	86.8	88.2	67.8
Full exposure	64.5	74.5	93.1	93.7	73.5
Wealth Index					
Poorest	25.2	58.0	61.3	65.7	40.1
Poorer	44.7	64.2	77.1	80.0	54.8
Middle	57.7	71.3	86.9	88.2	66.9
Richer	66.5	76.0	91.9	92.7	74.0
Richest	73.9	81.5	96.2	96.1	79.7

Abbreviation: ANC, Antenatal care; PNC, Postnatal care

Note: weighted percentage; Sample size may not correspond to the percentages because of weighted analyses.

Table 4.5 presents percentage distribution of maternal health care utilization among ever-women aged 15-49 years during last 5 years preceding the survey by background characteristics. A significant difference was found in the usage of maternal health care by age, place of residence, caste, religion, region, women's and husband's education, work status, mass media exposure, and wealth status.

Table 4.6: Differential usage of maternal health care services among child married and adult married women aged 15-49 years who had live birth during last 5 years preceding the survey in India, NFHS-4 (2015-16)

Utilization of maternal health care	Overall N (weighted %)	Child marriage N (weighted %)	Adult marriage N (weighted %)	p-value
At least 4 ANC				<0.001
No	96945 (48.2)	43840 (57.8)	53105 (41.92)	
Yes	88056 (51.8)	25361 (42.2)	62695 (58.08)	
ANC within the first trimester				<0.001
No	45773 (29.64)	18431 (34.73)	27342 (26.67)	
Yes	108339 (70.36)	34808 (65.27)	73531 (73.33)	
Institutional delivery				<0.001
No	40511 (18.47)	19938 (25.62)	20573 (13.8)	
Yes	145790 (81.53)	49568 (74.38)	96222 (86.2)	
Delivery by skilled health personnel				<0.001
No	36174 (16.46)	17893 (22.55)	18281 (12.49)	
Yes	150575 (83.54)	51805 (77.45)	98770 (87.51)	
Postnatal check-up within six weeks of delivery				<0.001
No	75683 (38.11)	34311 (46.68)	41372 (32.51)	
Yes	109754 (61.89)	34996 (53.32)	74758 (67.49)	

p-value is calculated from Pearson chi-square test.
N= sample size
Sample size may not correspond to the percentages because of weighted analyses.

Table 4.6 provides percentage distribution in the utilization of maternal health care services by child married and adult married women. Overall, 51.8%, 70.4%, 81.5%, 83.5%, and 61.9% of the ever-married women aged 15-49 years had at least 4 ANC, ANC within 3 months of pregnancy, institutional delivery, delivery by skilled health personnel, and postnatal check-up within six weeks of birth, respectively. There were significant differences maternity care services between child married and adult married women (p <0.001). Child married women reported lower ANC visits compared to adult married women (42.2% vs. 58.08%). The first ANC visit within three months of pregnancy is significantly lower among child married women than the women who married at later age (65.27% vs. 73.33%). Moreover, the proportion of institutional delivery is lower among the women married as minor than those women who married in adulthood (74.38% vs. 86.2%). Similarly, Women who married before 18 years of age were less likely to report delivered by skilled health personnel compared to those women who married at 18 years or later (77.45% vs. 87.51%). Child married women reported a substantially lower proportion of postnatal check-up

within six weeks after delivery compared to adult married women (53.32% vs. 67.49%).

Table 4.7: Binary logistic regression representing an association between child marriage and utilization of maternal health care services among women aged 15-49 years who had live birth during last 5 years preceding the survey in India, NFHS-4 (2015-16)

Outcome variables	OR (95% CI)	Adjusted OR (95% CI)
At least 4 ANC		
No ®		
Yes	0.53 (0.517 - 0.537)†	0.82 (0.777 - 0.873)†
ANC within the first trimester		
No ®		
Yes	0.68 (0.668 - 0.699)†	0.81 (0.765 - 0.867)†
Institutional delivery		
No ®		
Yes	0.47 (0.454 - 0.476)†	0.74 (0.692 - 0.794)†
Delivery by skilled health personnel		
No ®		
Yes	0.49 (0.478 - 0.503)†	0.77 (0.717 - 0.826)†
Postnatal check-up within six weeks of delivery		
No ®		
Yes	0.55 (0.540 - 0.561)†	0.79 (0.752 - 0.840)†

Abbreviation: OR, Odds Ratio; CI, Confidence Interval.
® Reference category
† $p < 0.01$
Adjusted analyses controlled for respondent's age, place of residence, caste, religion, region, women's and partner's educational level, work status, exposure to mass media, and wealth index.

Table 4.7 presents regression results for the association between child marriage and utilization of maternal health care services. Crude analyses revealed that women who married as children were significantly less likely to had at least four ANC (OR 0.53, 95% CI 0.517 – 0.537), and ANC within three months of pregnancy (OR 0.68, 95% CI 0.668 – 0.699), institutional delivery (OR 0.47, 95% CI 0.454 – 0.476), delivery by skilled health personnel (OR 0.49, 95% CI 0.478 – 0.503), and postnatal check-up within six weeks of delivery (OR 0.55, 95% CI 0.540 – 0.561).

Moreover, after adjusting for relevant background characteristics childhood marriage was significantly associated with lower likelihood at least four ANC (Adjusted OR 0.82, 95% CI 0.777 – 0.873), ANC within first three months of pregnancy (Adjusted OR 0.81, 95% CI 0.765 – 0.867), institutional delivery (Adjusted OR 0.74, 95% CI 0.692 – 0.794), delivery by skilled health personnel (Adjusted OR 0.77, 95% CI 0.717 – 0.826), and postnatal check-up within six weeks after delivery (Adjusted OR 0.79, 95% CI 0.752 – 840).

Table 4.8: Binary logistic regression representing an association between child marriage (age at ≤14 years and 15-17 years) and utilization of maternal health care services among women aged 15-49 years who had live birth during last 5 years preceding the survey in India, NFHS-4 (2015-16)

Maternal health care indicators	OR (95% CI)	Adjusted OR (95% CI)
At least 4 ANC		
≤14 years	0.36 (0.350 - 0.373)[†]	0.69 (0.633 - 0.762)[†]
15-17 years	0.60 (0.592 - 0.617)[†]	0.87 (0.820 - 0.930)[†]
≥18 years ®		
ANC within the first trimester		
≤14 years	0.60 (0.582 - 0.627)[†]	0.77 (0.701 - 0.853)[†]
15-17 years	0.71 (0.696 - 0.731)[†]	0.83 (0.774 - 0.886)[†]
≥18 years ®		
Institutional delivery		
≤14 years	0.36 (0.343 - 0.368)[†]	0.69 (0.623 - 0.759)[†]
15-17 years	0.52 (0.507 - 0.534)[†]	0.77 (0.710 - 0.826)[†]
≥18 years ®		
Delivery by skilled health personnel		
≤14 years	0.38 (0.370 - 0.398)[†]	0.73 (0.656 - 0.802)[†]
15-17 years	0.54 (0.529 - 0.559)[†]	0.79 (0.731 - 0.853)[†]
≥18 years ®		
Postnatal check-up within six weeks of delivery		
≤14 years	0.43 (0.415 - 0.441)[†]	0.72 (0.659 - 0.781)[†]
15-17 years	0.61 (0.593 - 0.619)[†]	0.83 (0.777 - 0.876)[†]
≥18 years ®		

Abbreviation: OR, Odds Ratio; CI, Confidence Interval.
® Reference category
[†] p<0.01
Adjusted analyses controlled for respondent's age, place of residence, caste, religion, region, women's and partner's educational level, work status, exposure to mass media, and wealth index.

For more precise analysis, a separate assessment was carried out to examine the association of child marriage with maternal health care where women's age at first marriage was categorized into three groups, ≤14 years, 15-17 years, and ≥18 years. The odds of at least four ANC visits and ANC in first three months of pregnancy were significantly lower for women who married at ≤14 years, and 15-17 years of age compared to those women married at ≥18 years. Similarly, women who married at ≤14 years, 15-17 years were significantly lower likelihood of institutional delivery, delivery assistance by skilled health personnel, and have postnatal check-up within six weeks of delivery than those women who married at ≥18 years even after controlling for background characteristics (Table 4.8).

4.2.5. Discussion

The findings of the study revealed that about 11% and 40% of the ever-married women who had live births during the last 5 years preceding the survey were married before 15 and 18 years of age, respectively. Several other studies have confirmed that these women are mostly lived in rural areas, belonged to a backward section of society, poor and uneducated. The result of the study shows that child marriage is significantly associated with indicators of prenatal care (at least four antenatal visits and first antenatal visit within three months of pregnancy), delivery care (institutional delivery and delivery assistance by skilled health personnel), and postnatal care (postnatal check-up within six weeks after delivery). Women who married before 18 years of age were significantly less likely to use maternal health care services than those who married at 18 years or later even after accounting for socioeconomic and demographic background factors. The findings are consistent with previous studies conducted in India and elsewhere.[148] For instance, a study of young married women aged 20-24 years in selected South Asian countries revealed that the number of antenatal visits, delivery by skilled health personnel, and delivery at the institution is lower among the women who married at age ≤14 and 15-17 years than those married at age ≥18 years.[149]

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[148] Raj, "When the mother is a child: the impact of child marriage on the health and human rights of girls." 931-935; Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558; Nasrullah et al. "Effect of child marriage on use of maternal health care services in pakistan." 517-524.

[149] Godha et al. "Association between child marriage and reproductive health outcomes and service utilization." 552-558.

Nasruallah et al.'s study demonstrated similar findings on the association of child marriage with prenatal care, antenatal care, and delivery care.[150] The lower use of maternal health care services substantially increases the risk of obstetric complications such as pre-eclampsia, eclampsia, hemorrhage, prolonged/obstructed labor, and postpartum infections which are the major causes of maternal death. Additionally, the findings of the study also indicate that women's socioeconomic status significantly determines the utilization of maternal health care. Therefore, strengthening of existing policies and enacting new policy among young adolescent married women will improve their usage of maternal health care.

4.3. Association between Child Marriage and Nutrition and Anaemia Status of Ever-Married Women Aged 15-49 Years

Previous studies consistently showed that under-nutrition and iron deficiency significantly increases the risk of maternal morbidity and mortality during pregnancy, delivery, and postpartum period.[151] Moreover, child marriage increases the risk of obstetric morbidity[152] which further leads to intrauterine growth restriction,[153] preterm delivery,[154] low birthweight,[155] perinatal morbidity, and mortality.[156] It is evident from many studies that child marriage is more likely to occur among the girls who are from rural and impoverished areas, economically poor, regions with high gender

[150] Nasrullah et al. "Effect of child marriage on use of maternal health care services in pakistan." 517-524.

[151] Black, Robert E., Cesar G. Victora, Susan P. Walker, Zulfiqar A. Bhutta, Parul Christian, Mercedes De Onis, Majid Ezzati et al. "Maternal and child undernutrition and overweight in low-income and middle-income countries." *The lancet* 382, no. 9890 (2013): 427-451; Van Den Broek, Nynke. "Anaemia and micronutrient deficiencies: reducing maternal death and disability during pregnancy." *British Medical Bulletin* 67, no. 1 (2003): 149-160; Bhutta, Zulfiqar A., Tahmeed Ahmed, Robert E. Black, Simon Cousens, Kathryn Dewey, Elsa Giugliani, Batool A. Haider et al. "What works? Interventions for maternal and child undernutrition and survival." *The lancet* 371, no. 9610 (2008): 417-440; Brabin, Bernard J., Mohammad Hakimi, and David Pelletier. "An analysis of anemia and pregnancy-related maternal mortality." *The Journal of nutrition* 131, no. 2 (2001): 604S-615S.

[152] Nour, "Child marriage: a silent health and human rights issue."; UNICEF, "The state of the world's children 2009."

[153] Bujold, Emmanuel, Stephanie Roberge, Yves Lacasse, Marc Bureau, Francois Audibert, Sylvie Marcoux, Jean-Claude Forest, and Yves Giguere. "Prevention of preeclampsia and intrauterine growth restriction with aspirin started in early pregnancy: a meta-analysis." *Obstetrics & Gynecology* 116, no. 2 (2010): 402-414.

[154] Goldenberg, Robert L., Jennifer F. Culhane, Jay D. Iams, and Roberto Romero. "Epidemiology and causes of preterm birth." *The lancet* 371, no. 9606 (2008): 75-84.

[155] Kramer, Michael S. "Determinants of low birth weight: methodological assessment and meta-analysis." *Bulletin of the world health organization* 65, no. 5 (1987): 663.

[156] Conde-Agudelo, Agustin, José M. Belizán, and Cristina Lammers. "Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study." *American journal of obstetrics and gynecology* 192, no. 2 (2005): 342-349.

discrimination, and lower access to health care.[157] Previous studies have also documented that women living in impoverished areas, socioeconomically poor and the areas with low access to health care are more likely to suffer from nutritional deficiency.[158] Therefore, this study aims to examine the association between child marriage and nutrition and anaemia status of women.

4.3.1. Description of variables

4.3.1.1. Outcome Variables

Malnutrition and anaemia among women are the outcome variables in the present section of the study. Malnutrition is assessed from women's Body Mass Index (BMI). BMI is a measure of thinness or fatness. WHO BMI cut-off points are ≤ 18.49 kg/m^2 (underweight), 18.5-24.9 kg/m^2 (normal), and ≥ 25.0 kg/m^2 (overweight or obese). For the purpose of the study, sampled women were restricted to the underweight and normal category. Anaemia levels of women have been assessed by the presence of haemoglobin in the blood. Blood sample for anaemia testing was collected from ever-married women by health investigators. Blood samples were drawn from a drop of blood taken from a finger prick collected in a microcuvette. Haemoglobin analysis was conducted on-site with battery operated portable HemoCue Hb 201+ analyzer. On the basis of haemoglobin levels, ever-married women are classified as severe (<7 g/dl), moderate (7-9.9 g/dl), mild (10.0-10.9 g/dl), and not anaemic (≥ 11.0 g/dl). Haemoglobin levels were adjusted for cigarette smoking and altitude above 1000 metres. Prevalence of any anaemia is the outcome variable in this study. If women have haemoglobin level <11.0 g/dl considered as the prevalence of any anaemia (prevalence of any anaemia is coded as '1' otherwise '0').

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[157] Black, Maggie. "Early Marriage: Child Spouses." *Innocenti Digest. UNICEF*, 2001; Jain et al, "New insights on preventing child marriage,"; Nour, "Health consequences of child marriage in Africa." 1644; Nour,. "Child marriage: a silent health and human rights issue." 51; Unicef, "Marrying too young. End child marriage."

[158] Holmes, Valerie A., Maria S. Barnes, H. Denis Alexander, Peter McFaul, and Julie MW Wallace. "Vitamin D deficiency and insufficiency in pregnant women: a longitudinal study." *British Journal of Nutrition* 102, no. 6 (2009): 876-881; Sachan, Alok, Renu Gupta, Vinita Das, Anjoo Agarwal, Pradeep K. Awasthi, and Vijayalakshmi Bhatia. "High prevalence of vitamin D deficiency among pregnant women and their newborns in northern India." *The American journal of clinical nutrition* 81, no. 5 (2005): 1060-1064; Suharno, Djoko, D. Karyadi, C. E. West, and Joseph GAJ Hautvast. "Supplementation with vitamin A and iron for nutritional anaemia in pregnant women in West Java, Indonesia." *The Lancet* 342, no. 8883 (1993): 1325-1328; Black et al. "Maternal and child undernutrition and overweight in low-income and middle-income countries." 427-451.

Child marriage is the exposure of interest in the present study. women's age at first marriage was categorized into below 18 years and 18 years and above. Further, for more precise analysis, age at first marriage was classified into ≤14 years, 15-17 years, and ≥18 years.

Important socioeconomic and demographic controlling factors such as respondent's current age (15-19 years, 20-24 years, 25-29 years, 30-34 years, and ≥35 years), total children ever born (≤2 and ≥3), place of residence (rural and urban), caste (SC/ST, OBC, and other), religious affiliation (Hindu, Muslim, Christian, and other), region (north, central, east, north-east, west, and south), women's and partner's education status (no education, primary, secondary, and higher), wealth quintile of household (poorest, poorer, middle, richer, and richest), and exposure to mass media (no exposure, partial exposure, and full exposure) were included in the analysis.

4.3.2. Analytical Approach

4.3.3. Results

Table 4.9: Prevalence of Malnutrition among ever-married women aged 15-49 years by socioeconomic and demographic characteristics in India, NFHS-4 (2015-16)

Characteristics	Normal		Malnourished		Total women	Chi-square value
	N	%	N	%		
Age at marriage (years)						1764.51*
<18 years	1,67,743	78.6	46,444	21.4	2,14,187	
≥18 years	2,20,790	82.6	44,887	17.4	2,65,677	
Respondent's current age (years)						28200.00*
15-19	74,017	58.6	47,413	41.4	1,21,430	
20-24	86,955	72	31,894	28	1,18,849	
25-29	87,068	78.8	22,526	21.2	1,09,594	
30-34	74,768	82.3	15,646	17.7	90,414	
35+	1,84,744	84.7	33,180	15.3	2,17,924	
Total children ever born						1775.34*
≤2	3,38,350	75	1,09,123	25	4,47,473	
≥3	1,69,202	79.4	41,536	20.6	2,10,738	
Place of residence						5394.48*
Urban	1,52,745	83.2	30,782	16.8	1,83,527	
Rural	3,54,807	73	1,19,877	27	4,74,684	
Caste						1905.01*
Scheduled Caste/Scheduled Tribe	1,82,899	72.4	58,516	27.6	2,41,415	
Other Backward Classes	1,95,080	76.3	62,694	23.7	2,57,774	
Other	1,05,005	81.2	23,890	18.8	1,28,895	
Religion						5871.04*
Hindu	3,68,893	75.7	1,21,369	24.3	4,90,262	
Muslim	68,281	77.7	19,024	22.3	87,305	

	N	%	N	%	Total	
Christian	43,941	84.5	5,658	15.5	49,599	
Other	26,437	81.4	4,608	18.6	31,045	
Women's education level						2408.48*
No education	1,41,104	74.8	46,371	25.2	1,87,475	
Primary	64,697	77.1	18,655	22.9	83,352	
Secondary	2,40,447	75.3	73,957	24.7	3,14,404	
Higher	61,304	83.4	11,676	16.6	72,980	
Husband/partner's education level						1074.04*
No education	12,788	74.7	4,317	25.3	17,105	
Primary	10,017	78.3	2,870	21.7	12,887	
Secondary	36,823	81.9	7,705	18.1	44,528	
Higher	9,485	88.9	1,150	11.1	10,635	
Region						10600.00*
North	1,05,360	79.9	24,841	20.1	1,30,201	
Central	1,29,917	73.6	47,340	26.4	1,77,257	
East	86,174	73.2	34,946	26.8	1,21,120	
Northeast	80,890	78.1	13,418	21.9	94,308	
West	37,374	74.1	14,598	25.9	51,972	
South	67,837	81.7	15,516	18.3	83,353	
Wealth Index						19800.00*
Poorest	86,218	65	44,174	35	1,30,392	
Poorer	1,05,669	70.7	39,504	29.3	1,45,173	
Middle	1,09,772	76.5	30,520	23.5	1,40,292	
Richer	1,05,481	81.9	22,076	18.1	1,27,557	
Richest	1,00,412	87.2	14,385	12.8	1,14,797	
Exposure to mass media						4878.99*
No exposure	96,789	69	41,187	31	1,37,976	
Partial exposure	3,62,672	78.1	97,787	21.9	4,60,459	
Full exposure	48,091	79	11,685	21	59,776	

* p<0.001
N= Sample size
%= weighted sample
Sample size may not correspond to the percentages because of weighted analyses.

Table 4.9 presents the prevalence of undernourishment by predictor variables. The prevalence of malnutrition was substantially higher among the women who married before 18 years of age compared to those women who married at 18 years or later (21.4% vs. 17.4%, p <0.001). The malnutrition prevalence was also high among the women who are young, living in rural areas, poor, uneducated, had no or limited exposure to mass media, and who were from the central and eastern region of the country.

Table 4.10: Prevalence of anaemia by socioeconomic and demographic characteristics of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Characteristics	Not anaemic		Any Anaemia		Total women	Chi-square value
	N	%	N	%		
Age at first marriage (years)						296.15*
<18 years	1,04,539	45.4	1,19,370	54.6	2,23,909	
≥18 years	1,37,931	47.9	1,42,849	52.1	2,80,780	
Respondent's current age (years)						151.59*
15-19	58,046	45.9	63,684	54.1	1,21,730	
20-24	57,220	46.5	63,045	53.5	1,20,265	
25-29	54,579	47.3	58,118	52.7	1,12,697	
30-34	47,261	48.0	47,870	52.0	95,131	
35+	1,15,233	47.0	1,19,855	53.0	2,35,088	
Total children ever born						291.60*
≤2	2,28,076	47.7	2,35,151	52.3	4,63,227	
≥3	1,04,263	45.2	1,17,421	54.8	2,21,684	
Place of residence						960.83*
Urban	1,01,821	49.2	96,044	50.8	1,97,865	
Rural	2,30,518	45.8	2,56,528	54.2	4,87,046	
Caste						991.78*
Scheduled Caste/Scheduled Tribe	1,15,655	42.9	1,31,589	57.1	2,47,244	
Other Backward Class	1,29,252	47.8	1,39,237	52.2	2,68,489	
Other	71,546	50.3	65,970	49.7	1,37,516	
Religion						4460.88*
Hindu	2,38,543	46.3	2,70,453	53.7	5,08,996	
Muslim	45,659	49.4	46,210	50.6	91,869	
Christian	31,692	52.4	19,231	47.6	50,923	
Other	16,445	47.0	16,678	53.0	33,123	
Women's education level						2471.80*
No education	85,790	43.6	1,07,437	56.4	1,93,227	
Primary	41,417	45.4	45,383	54.6	86,800	
Secondary	1,63,598	47.8	1,64,174	52.2	3,27,772	
Higher	41,534	52.4	35,578	47.6	77,112	
Partner's education level						250.90*
No education	7,563	42.3	9,982	57.7	17,545	
Primary	6,141	45.1	7,223	54.9	13,364	
Secondary	22,711	47.0	24,475	53.0	47,186	
Higher	6,049	51.4	5,577	48.6	11,626	
Region						10300*
North	66,009	48.2	71,463	51.8	1,37,472	
Central	86,997	48.1	96,257	51.9	1,83,254	
East	49,151	39.9	74,820	60.1	1,23,971	
Northeast	59,032	54.9	37,320	45.1	96,352	
West	26,765	49.9	27,860	50.1	54,625	

South	44,385	48.7	44,852	51.3	89,237	
Wealth Index						3806.07*
Poorest	54,842	41.3	76,352	58.7	1,31,194	
Poorer	69,719	44.9	77,461	55.1	1,47,180	
Middle	71,735	46.7	72,818	53.3	1,44,553	
Richer	69,193	49.0	66,099	51.0	1,35,292	
Richest	66,850	51.8	59,842	48.2	1,26,692	
Exposure to mass media						1870.68*
No exposure	61,410	43.3	78,383	56.7	1,39,793	
Partial exposure	2,37,272	47.4	2,44,797	52.6	4,82,069	
Full exposure	33,657	50.6	29,392	49.4	63,049	

N= sample size
%=weighted percentage
Sample size may not correspond to the percentages because of weighted analyses.

Table 4.10 provides anaemia prevalence by socioeconomic and demographic characteristics of women. The prevalence of anaemia was higher among the women who married as children than those women who married as adult (54.6% vs. 52.1%, p <0.001). The prevalence of anaemia was also higher among those women who were young, residing in rural areas, belonged to Scheduled Caste/Scheduled Tribe, practiced Hindu religion, and had no or very limited level of education, and the women who were from the eastern region of the country.

Table 4.11: Association between child marriage and BMI and anaemia status of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Nutritional Indicators	Child marriage N (weighted %)	Adult marriage N (weighted %)	OR (95% CI)	Adjusted OR (95% CI)
Body Mass Index			1.286 (1.268 - 1.305)[†]	0.935 (0.898 - 0.972)[†]
Normal	167743 (78.63)	220790 (82.56)		
Thin	46444 (21.37)	44887 (17.44)		
Anaemia			1.102 (1.090 - 1.114)[†]	0.989 (0.960 - 1.019)
No	104539 (45.45)	137931 (47.86)		
Yes	119370 (54.55)	142849 (52.14)		

[†] $P < 0.01$
N= sample size
Sample size may not correspondent to the percentages because of weighted analyses.
Adjusted analyses controlled for respondent's current age, total children ever born, place of residence, caste, religion, women's and partner's education, region, and wealth index.

Crude analysis showed that women married below 18 years of age were significantly associated with increased likelihood of undernourishment (OR 1.286, 95% CI 1.268 – 1.305) and anaemic (OR 1.102, 95% CI 1.090 – 1.114) compared to those married at 18 years or above. However, the prevalence of child marriage was significantly associated with decreased likelihood of undernourishment (Adjusted OR 0.935, 95% CI 0.898 – 0.972) after inclusion of socioeconomic and demographic control factors. In addition, the association between child marriage and women's anaemia was no longer significant in adjusted analysis (Table 4.11).

Table 4.12: Prevalence of nutritional status by age at first marriage of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Nutritional Indicators	Overall N (weighted %)	Women married at ≤14 years N (weighted %)	Women married at 15-17 years N (weighted %)	Women married at ≥18 years N (weighted %)	P value
Body Mass Index					1800*
Normal	388533 (80.71)	58444 (78.61)	109299 (78.65)	220790 (82.56)	
Thin	91331 (19.29)	16568 (21.93)	29876 (21.35)	44887 (17.44)	
Anaemia					301.5*
No	242470 (46.73)	36800 (45.68)	67739 (45.32)	137931 (47.86)	
Yes	262219 (53.27)	41465 (54.32)	77905 (54.68)	142849 (52.14)	

* $P < 0.001$
N= sample size
Sample size may not correspondent to the percentages because of weighted analyses.

Table 4.12 provides prevalence of low body mass and anaemia by age at marriage of women. Women's thin BMI and anaemia significantly differed between women married at ≤14 years and ≥18 years. However, there was marginal variation has been found between the women married at ≤14 years and 15-17 years in the prevalence of low BMI and anaemia level of women.

Table 4.13: Association between age at marriage and nutritional status of ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Nutritional indicators	OR (95% CI)	Adjusted OR (95% CI)
Body Mass Index (BMI)		
≤14 years	1.288 (1.263 - 1.314)†	0.902 (0.855 - 0.952)†
15-17 years	1.285 (1.265 - 1.306)†	0.952 (0.911 - 0.994)*
≥18 years ®		
Anaemia		
≤14 years	1.092 (1.075 - 1.109)†	0.928 (0.891 - 0.968)†
15-17 years	1.108 (1.094 - 1.122)†	1.02 (0.987 - 1.054)
≥18 years ®		

* P < 0.05
† P < 0.01

Adjusted analyses controlled for respondent's current age, total children ever born, place of residence, caste, religion, women's and partner's education, region, and wealth index.

Women's age at marriage was significantly associated with undernourishment and anaemia status of women. Women married below 15 years and 15-17 years as compared to women married at 18 years or above were significantly associated with increased likelihood of undernourishment and anaemic in crude analysis. However, age at marriage was significantly associated with decreased likelihood of under-nutrition after controlling for relevant socioeconomic and demographic factors. Moreover, women married at ≤14 years were associated with reduced likelihood of anaemic compared to women married at ≥18 years. The association between women married at 15-17 years, and women's anaemia status was no longer significant in the adjusted analysis (Table 4.13).

4.3.4. Discussion

The findings of this study reveal that a significant proportion of women are married before the legal age of marriage (below 18 years) in India. Bivariate association showed a significant relationship of child marriage with body mass and anaemia status of women. However, the inclusion of relevant socioeconomic and demographic factors in multivariate analysis substantially attenuated its significant relationship and the association between child marriage and undernourishment and anaemia status becomes insignificant.

Although there is very little evidence on the association of child marriage with nutritional status of women, the findings of present study are consistent with other previous studies.[159] Consistent with other studies[160] this study also found that woman's undernourishment and anaemia was substantially varies by age of the women, rural-urban residence, socioeconomic status, and region of residence. Several studies have documented that child marriage directly associated with early pregnancy and childbirth. Furthermore, early pregnancy and childbearing hinder linear and ponderal growth[161] and depletion of nutrition among women.[162] Further, nutritional deficiency leads to several adverse maternal and foetal health outcomes such as complications during pregnancy, labor, and postpartum period, preterm delivery and baby's low birthweight.[163]

4.4. Conclusion

This study provides important insights on examining the association between child marriage and health outcomes of ever-married women aged 15-49 years. The findings of the study reveal that child marriage has significantly associated with increased risk of several adverse reproductive health outcomes such as high fertility, child death, unwanted childbirth, and pregnancy termination. These adverse reproductive health outcomes occurred as a result of lower use of maternal health care services. Further, this study has demonstrated that child married women are less likely to have antenatal visits, institutional delivery, delivery by skilled health personnel, and post-natal check-up. Malnutrition and anaemia status of women are often characterized by

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[159] Goli et al. "The effect of early marriages and early childbearing on women's nutritional status in India." 1864-1880.

[160] Black et al. "Maternal and child undernutrition and overweight in low-income and middle-income countries." 427-451; Ayoya, Mohamed Ag, Gerburg Maria Spiekermann-Brouwer, Abdel Kader Traoré, Rebecca Joyce Stoltzfus, and Cutberto Garza. "Determinants of anemia among pregnant women in Mali." *Food and nutrition bulletin* 27, no. 1 (2006): 3-11; Sethuraman, Kavita, Richard Lansdown, and Keith Sullivan. "Women's empowerment and domestic violence: the role of sociocultural determinants in maternal and child undernutrition in tribal and rural communities in South India." *Food and Nutrition Bulletin* 27, no. 2 (2006): 128-143; Radhakrishna, Rokkam, and C. Ravi. "Malnutrition in India: Trends and determinants." *Economic and Political Weekly* (2004): 671-676.

[161] Rah et al. "Pregnancy and lactation hinder growth and nutritional status of adolescent girls in rural Bangladesh." 1505-1511.

[162] Goli et al. "The effect of early marriages and early childbearing on women's nutritional status in India." 1864-1880; King, Janet C. "The risk of maternal nutritional depletion and poor outcomes increases in early or closely spaced pregnancies." *The Journal of nutrition* 133, no. 5 (2003): 1732S-1736S.

[163] Black et al. "Maternal and child undernutrition and overweight in low-income and middle-income countries." 427-451; Dharmalingam, A., K. Navaneetham, and C. S. Krishnakumar. "Nutritional status of mothers and low birth weight in India." *Maternal and child health Journal* 14, no. 2 (2010): 290-298.

poverty, inadequate use of maternal health care services, and scarcity of nutrient in the food. Besides, lower use maternal health care services among the women who married as children are more vulnerable to undernourishment and anaemic resulting pregnancy and childbirth-related morbidity and mortality. Findings of this study confirmed that malnutrition and presence of anaemia are higher among the women who married at an early age compared to the women who married in later ages. Besides, a range of socioeconomic and demographic factors are associated with utilization of maternal health care services, depletion of body mass, anaemia, and adverse reproductive health outcomes. Therefore, efforts should be made to increase women's age at marriage as well as to reduce socio-economic vulnerabilities which may result in adequate use of maternal health care among young married women. Adequate uses of maternal health care services are associated with reduced risk of life-threatening morbidities during pregnancy, labor, and postpartum period and mortality. Moreover, poor, rural, young, and uneducated women need special attention as they have lower access to maternal health care services resulting in adverse reproductive health outcomes and high maternal morbidity and mortality.

Chapter-5
Impact of Child Marriage on Health Outcomes of Children Under-5

Prior studies have documented that child marriage adversely affect reproductive health, increases the risk of sexually transmitted diseases including HIV, risk of domestic violence, maternal morbidity, and mortality.[164] However, the effect of child marriage on children's health outcomes is not apparent. Moreover, little evidence has been found on the association between child marriage and health outcomes of children.[165] The purpose of this present study is to examine the intergenerational impact of child marriage.

Although considerable advancement has been made in reducing child and neonatal mortality, its burden remains very high in developing countries.[166] Globally, 5.6 million children died before their fifth birthday in 2016, mostly because of preventable infectious diseases such as preterm birth complications, intrapartum-related complications, pneumonia, malaria diarrhoea, and neonatal sepsis.[167]

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[164] Raj et al. "Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India." 1883-1889; Raj, "When the mother is a child."; Raj et al. "Girl child marriage and its association with national rates of HIV, maternal health, and infant mortality across 97 countries." 536-551; Nasrullah et al. "Girl child marriage and its effect on fertility in Pakistan." 534-543; Santhya et al. "Associations between early marriage and young women's marital and reproductive health outcomes." 132-139; Santhya, "Early marriage and sexual and reproductive health vulnerabilities of young women." 334-339; Santhya et al. "Early marriage and HIV/AIDS." 1291-1297.

[165] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India." b4258; Nasrullah et al. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." 639-646.

[166] Liu, Li, Hope L. Johnson, Simon Cousens, Jamie Perin, Susana Scott, Joy E. Lawn, Igor Rudan et al. "Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000." *The Lancet* 379, no. 9832 (2012): 2151-2161; You, Danzhen, Gareth Jones, Kenneth Hill, Tessa Wardlaw, and Mickey Chopra. "Levels and trends in child mortality, 1990–2009." *The Lancet* 376, no. 9745 (2010): 931-933; Hill, Kenneth, Rohini Pande, Mary Mahy, and Gareth Jones. "Trends in child mortality in the developing world: 1960 to 1996." (1999); Oestergaard, Mikkel Zahle, Mie Inoue, Sachiyo Yoshida, Wahyu Retno Mahanani, Fiona M. Gore, Simon Cousens, Joy E. Lawn, and Colin Douglas Mathers. "Neonatal mortality levels for 193 countries in 2009 with trends since 1990: a systematic analysis of progress, projections, and priorities." *PLoS medicine* 8, no. 8 (2011): e1001080.

[167] Liu, Li, Hope L. Johnson, Simon Cousens, Jamie Perin, Susana Scott, Joy E. Lawn, Igor Rudan et al. "Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000." *The Lancet* 379, no. 9832 (2012): 2151-2161; Black, Robert E., Simon Cousens, Hope L. Johnson, Joy E. Lawn, Igor Rudan, Diego G. Bassani, Prabhat Jha et al. "Global, regional, and national causes of child mortality in 2008: a systematic analysis." *The lancet* 375, no. 9730 (2010): 1969-1987; Liu, Li, Shefali Oza, Daniel Hogan, Jamie Perin, Igor Rudan, Joy E. Lawn, Simon Cousens, Colin Mathers, and Robert E. Black. "Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis." *The Lancet* 385, no. 9966 (2015): 430-440; Million Death Study Collaborators. "Causes of

Socioeconomic status and several environmental factors such as unsafe water, sanitation, and hygiene significantly contributed to these diseases. In most of the cases, malnutrition plays a vital role in occurring such diseases. Therefore, children's nutritional status, morbidity, and mortality are the major area of concern in public health.

5.1. Association between Child Marriage and Nutritional Status, Anaemia, Low Birthweight, and Small Birth Size of Children Under-5

This present section of the study examines the association between child marriage and nutritional status (stunting, wasting, and underweight), anaemia, low birthweight (LBW), and small/very small birth size of children under-5. Responses were selected from the recent round of National Family Health Survey (NFHS-4). For the research purpose, the present section of the study utilized the sample of live births in the past five years as reported by ever-married women aged 15-49 years. Moreover, the study uses both children and mother's information for the analysis.

5.1.1. Description of Variables

5.1.1.1. Outcome Variables

Nutritional status of children, birth weight, and reported birth size of children below five years of age were selected for the outcome measures in this study. Nutritional outcomes were assessed from anthropometric failure such as z-scores of height-for-age (< -2 SD), weight-for-height (< -2 SD), and weight-for-age (< -2 SD). Prevalence of anaemia was assessed from haemoglobin level in the blood (coded as '1' if the children have haemoglobin level below 11.0 g/dl and '0' otherwise). Birth-weight was obtained from infant's medical card record or mother's recall. World Health Organization (WHO) defined low birthweight as "weight at birth of less than 2,500 grams (5.5 pounds)."[168] Low birth-weight of the child constructed as a dichotomous form (if the birth weight of child is less than 2500 gram coded as '1' and 0 otherwise). Infant's birth size was also used in the analysis because the birth weight was unknown for many children. Size of the birth was totally obtained from mother's recall.

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neonatal and child mortality in India: a nationally representative mortality survey." *The Lancet* 376, no. 9755 (2010): 1853-1860.

[168] Wardlaw, Tessa M., ed. Low birthweight: country, regional and global estimates. Unicef, 2004.

Mother was asked that the birth was very small, small, average, or larger. Size of the birth also created as a dichotomous variable (if mother reported that the birth was small or very small coded as '1' and '0' otherwise).

5.1.1.2. Explanatory Variables

The main exposure variable is child marriage assessed from mother's age at first marriage. To analyze the association between child marriage and children's health indicators mothers' age at first marriage is classified as marriage before 18 years of age (child marriage, also called early marriage), and marriage at ≥18 years. For more precise analysis, women's age at marriage is further categorized as marriage at ≤14 years, 15-17 years, and ≥18 years.

Child and maternal demographics are included as control variables for the analysis of the study. Child demographics include current age child, sex of the child, rural-urban residence, caste, religion, national region, and wealth quintile. The present age child has categorized into five groups, <1 years, 1 to 1.9 years, 2 to 2.9 years, 3 to 3.9 years, and 4 to 4.9 years. The youngest category (<1 years) is adopted as the reference category to compare age differentials in child health outcomes. Similarly, sex of child is included to analyze the gender differentials in child health. Place of residence is included to examine the rural-urban differences. Social groups have been categorized into the Scheduled Castes/Scheduled Tribes, other backward classes, and other. Similarly, the religious affiliation of women is included as an explanatory variable to examine the religious differences in health outcomes of children under-5. Religion is categorized into three groups, namely, Hindu, Muslim, and other. Regional dummies are included to capture the sociocultural norms and beliefs, health behavior and attitudes across regions. The national region has classified into six broad regions from 29 states and 7 UTs, namely, north, central, east, north-east, west, and south. Wealth index has been calculated from ownership of assets including consumer items of household and dwelling characteristics. A score was generated for individuals using principal component analysis and categorized into five quintiles, between 1 (poorest) and 5 (richest).

Maternal demographics include maternal age, mother's education, and maternal BMI. The current age of the mother has been categorized into five groups, 15 to 19 years, 20 to 24 years, 25 to 29 years, 30 to 34 years, and 35+ years. The youngest category (15-19 years) is adopted as the referenced category to compare

maternal age differentials in child health outcomes. Mother's education is an essential factor in the determination of child health.

Mother's years of schooling has been categorized into five educational levels, illiterate or no education, primary (1 to 5), secondary (6 to 10), and higher (11+). Body mass of mother is classified into thin, normal, and obese.

5.1.2. Analytical Approach

Bivariate and multivariate analyses were carried out to examine the association between maternal child marriage and nutritional status, birth weight, and birth size of children under-5. Bivariate analyses were carried out to assess the nature of the relationship between child marriage by maternal and child demographics. Pearson chi-square test was used to evaluate the significance level of differences in maternal and child demographics by age at marriage. The relationship between child marriage and health outcomes of children were estimated by unadjusted and adjusted odds ratio with 95% confidence interval using binary logistic regression models. Adjusted analyses were controlled for age of child, sex of child, rural-urban residence, social groups, religion, mother's age, mother's educational level, mother's BMI, national region, and wealth quintile of the household. Further, Fairlie's decomposition models were used to examine the contribution of socioeconomic predictors in the differences of nutrition and anaemia by mother's age at marriage.

5.1.3. Results

According to the National Family Health Survey, the prevalence of stunting among the children under-5 was 38% in 2015-16, 10% decreased from 2005-06. However, for the same period, the incidence of wasting remained the same (approximately 21%). Moreover, the prevalence of wasting decreased from 43% in 2005-06 to 36% in 2015-16. Additionally, considerable proportions of children under 5 years of age were found to be anaemic in 2015-16 (58%). The prevalence of low birthweight (<2500 gram) among children under-5 decreased from 22% in 2005-06 to 18% in 2015-16.

Table 5.1 presents socioeconomic and demographic characteristics of children-5 by mother's age at marriage. The majority of the births were from rural areas (71.8%), Hindu (78.8%), belonged to backward caste (79.6%), and poor (47.1%). They were predominantly from central (27.3%) and eastern (25.6%) region of the country. They also differ in their mother's demographics.

Table 5.1: Socioeconomic and demographic characteristics of births in the past 5 years to ever-married women aged 15-49 years by age at first marriage of mothers in India, NFHS-4 (2015-16).

Demographics	Births of women married at age ≤14 years (n=27,147)		Births of women married at age 15-17 years (n=70,746)		Births of women married at age ≥18 years (n=156,124)		Overall (n=254,017)		Chi-square value	P-value
	n	%	n	%	n	%	n	%		
current age of child									1270.24	<0.001
< 1	3,770	14.5	12,147	18.0	31,455	20.8	47,372	19.3		
1-1.9	4,535	17.7	13,011	19.7	30,792	20.7	48,338	20.1		
2-2.9	4,923	19.2	13,427	20.0	29,680	19.9	48,030	19.8		
3-3.9	5,942	23.4	14,338	21.3	30,036	20.1	50,316	20.8		
4-4.9	6,364	25.2	14,192	21.0	27,817	18.4	48,373	19.9		
Sex of child									1.4	0.497
Male	14,080	51.8	36,745	52.1	81,428	52.4	1,32,253	52.2		
Female	13,067	48.2	34,001	47.9	74,696	47.6	1,21,764	47.8		
Place of residence									4280.38	<0.001
Urban	3,673	15.5	13,035	21.8	43,845	33.8	60,553	28.2		
Rural	23,474	84.5	57,711	78.2	1,12,279	66.2	1,93,464	71.8		
Social groups									1977.33	<0.001
Scheduled caste/tribe	10,887	38.1	28,497	36.2	58,594	31.0	97,978	33.3		
OBC	12,061	48.2	29,241	45.7	59,226	46.2	1,00,528	46.3		
Others	3,066	13.7	10,222	18.1	31,283	22.8	44,571	20.4		
Religion									3028.23	<0.001
Hindu	21,538	82.2	53,562	79.1	1,09,532	77.9	1,84,632	78.8		
Muslim	4,052	15.5	11,580	17.7	24,308	16.0	39,940	16.5		
Christian	1,123	1.0	3,715	1.2	14,869	2.6	19,707	2.0		
Others	434	1.2	1,889	2.0	7,415	3.4	9,738	2.8		
Region									7453.95	<0.001
North	4,363	12.5	11,132	11.4	32,757	14.3	48,252	13.3		
Central	10,005	33.7	22,717	28.0	42,196	25.8	74,918	27.3		
East	7,494	33.2	18,930	31.6	27,102	21.2	53,526	25.6		
North-east	2,580	2.9	7,744	3.0	24,368	3.6	34,692	3.3		
West	1,461	9.1	4,862	12.2	11,445	13.6	17,768	12.7		
South	1,244	8.5	5,361	13.8	18,256	21.6	24,861	17.8		
Age of the mother									17500	<0.001
15-19	1,755	7.0	4,259	6.3	539	0.4	6,553	2.9		
20-24	8,544	32.3	30,032	44.0	38,283	26.4	76,859	32.3		
25-29	9,348	34.2	22,317	31.2	65,823	43.7	97,488	39.0		
30-34	4,858	17.3	9,541	12.6	33,477	20.0	47,876	17.5		
35+	2,642	9.2	4,597	5.9	18,002	9.5	25,241	8.4		

	n	%	n	%	n	%	n	%		
Mother's education level									21700	<0.001
No education	14,556	51.6	26,658	35.5	36,969	22.6	78,183	29.7		
Primary	5,060	18.9	12,358	17.1	19,427	11.5	36,845	14.0		
Secondary	7,124	27.8	30,156	44.9	77,846	49.5	1,15,126	45.7		
Higher	407	1.7	1,574	2.5	21,882	16.4	23,863	10.6		
BMI of mother									3512.06	<0.001
Thin	7,888	29.9	19,500	28.4	32,106	22.0	59,494	24.8		
Normal	16,590	60.8	43,487	60.5	96,439	60.3	1,56,516	60.4		
Obese	2,336	9.3	6,933	11.1	25,467	17.7	34,736	14.8		
Wealth quintile of household									19600	<0.001
Poorest	11,905	42.7	23,656	31.4	30,963	18.8	66,524	25.2		
Poorer	7,698	27.5	19,660	26.5	32,421	18.5	59,779	21.9		
Middle	4,340	16.7	14,105	21.0	32,219	19.8	50,664	19.8		
Richer	2,351	9.7	9,062	14.7	31,012	21.7	42,425	18.3		
Richest	853	3.5	4,263	6.5	29,509	21.2	34,625	14.9		

n= Sample size
%= Weighted percentage
Sample size may not correspond to the percentages because of weighted cases.

Most of the births of early married women were lived in rural areas (84.5% vs. 66.2%), belonged to the backward classes (86.3% vs. 77.2%), and poor (70.2% vs. 37.3%) as compared to the births of adult married women. In addition, majority of the mother married as minor had no education compared to adult married mothers (51.6% vs. 22.6%). The prevalence of thin body mass was significantly higher among early married women compared to their later married counterparts (29.9% vs. 22%) (table 5.1).

Table 5.2: Prevalence of nutritional status, anaemia, low birthweight, and small or very small birth size among births to ever-married women aged 15-49 years in past 5 years in India, NFHS-4 (2015-16).

Indicators	Sample size	Weighted %
Stunting		
No	1,35,581	61.42
Yes	85,141	38.58
Wasting		
No	1,75,296	78.8
Yes	45,426	21.2
Underweight		
No	1,43,919	64.0
Yes	76,803	36.0
Anaemia		
No	87,043	41.34
Yes	1,18,231	58.66
Low birthweight (<2500 g)		
No	1,56,619	81.81
Yes	33,539	18.19
Small/very small size of the birth		
No	2,17,465	87.7
Yes	30,699	12.3

Table 5.2 provides prevalence of nutritional status, anaemia, low birth weight, and small birth size among children below 5 years of age. More than one in three children was stunted (38.6%) or underweight (36%). About one in fifth children (21.2%) reported as wasting; more than half of the children (58.7%) were anemic. Eighteen percent of the birth (18.2%) accounted as low birthweight, and about one in eight children (12.3%) were reported as the small or very small size of the birth by mothers.

Table 5.3: Association between child marriage and nutritional status of children, low birth weight, and small or very small birth size among births in the past 5 years to ever-married women aged 15-49 years in India, 2015-16

Indicators	Child marriage (n=97,893) n (weighted %)	Adult marriage (n=156,124) n (weighted %)	OR (95% CI)	Adjusted OR (95% CI)
Stunting			1.46 (1.44 - 1.49)[‡]	1.06 (1.04 - 1.08)[‡]
No	47020 (56.05)	88561 (65.10)		
Yes	37486 (43.95)	47655 (34.90)		
Wasting			1.01 (0.99 - 1.03)	0.96 (0.93 - 0.98)[‡]
No	66367 (78.71)	108929 (78.86)		
Yes	18139 (21.29)	27287 (21.14)		
Underweight			1.40 (1.37 - 1.42)[‡]	1.02 (1.00 - 1.04)[†]
No	50339 (59.38)	93580 (67.17)		
Yes	34167 (40.62)	42636 (32.83)		
Anaemia			1.14 (1.12 - 1.16)[‡]	1.02 (1.00 - 1.04)[†]
No	31702 (39.48)	55341 (42.64)		
Yes	48211 (60.52)	70020 (57.36)		
Low birth weight			1.11 (1.08 - 1.14)[‡]	0.98 (0.95 - 1.01)[†]
No	53997 (80.83)	102622 (82.38)		
Yes	12673 (19.17)	20866 (17.62)		
Small/very small size of the birth			1.13 (1.11 - 1.16)[‡]	0.97 (0.95 - 1.00)[†]
No	82676 (86.9)	134789 (88.25)		
Yes	12497 (13.10)	18202 (11.75)		

[†] $P < 0.1$.
[‡] $P < 0.01$.
n= sample size
Abbreviation: OR, Odds Ratio; CI, Confidence Interval
Adjusted analyses controlled for age of the child, sex of the child, place of residence, caste, religion, region, maternal age, maternal education, maternal BMI and wealth index.

Table 5.3 presents association of child marriage with nutritional status, anaemia, low birthweight, and small birth size of children below 5 years of age. The prevalence of stunting was higher among the births to child married women compared to births of adult married women (43.95 vs. 34.9%). Similarly, the proportion of underweight was more among those children whose mother married as minor compared with the children of adult married mothers (40.6% vs. 32.8%). The prevalence of anemia was also higher among the children of women who married as children compared to births of adult married women (60.5% vs. 57.4%). In addition, a relatively greater proportion of children were found to be low birthweight among births to child married women compared to births to adult married women (19.2% vs. 17.6%).

Similarly, child married mothers reported a higher proportion of the small or very small size of the birth compared to adult married mothers (13.1% vs. 11.8%).

Further, regression analyses revealed that children of mothers married as minor compared with children born to adult married mothers were significantly more likely to have stunting (OR 1.46, 95% CI 1.44 - 1.49), underweight (OR 1.40, 95% CI 1.37 - 1.42), and anemia (OR 1.14, 95% CI 1.12 - 1.16). The association between child marriage and being stunted (Adjusted OR 1.06, 95% CI 1.04 - 1.08), underweight (Adjusted OR 1.02, 95% CI 1.00 - 1.04), and anaemic (Adjusted OR 1.02, 95% CI 1.00 - 1.04) of children under-5 remained significant after controlling for maternal and child demographics. However, wasting of children had no significant association with maternal child marriage in the crude analysis. Moreover, child marriage was significantly less likely to have wasted of children in adjusted analysis (Adjusted OR 0.96, 95% CI 0.93 - 0.98). In addition, low birthweight (OR 1.11, 95% CI 1.08 - 1.14), and small or very small size of the birth (OR 1.13, 95% CI 1.11 - 1.16) were significantly associated with child marriage in unadjusted analysis. However, after controlling for important maternal and child demographics, child marriage was negatively associated with low birth weight (Adjusted OR 0.98, 95% CI 0.95 - 1.01) and small or very small size of the birth (Adjusted OR 0.97, 95% CI 0.95 - 1.00) (Table 3).

Table 5.4: Prevalence of nutritional status, anaemia, low birthweight, and small or very small size at birth of children under-5 in last 5 years by maternal age at first marriage in India, NFHS-4 (2015-16)

Indicators	Births to women married at age ≤14 years (N=27,147)	Births to women married at age 15-17 years (N=70,746)	Births to women married at age ≥18 years (N=156,124)	p-value
	n (weighted %)	n (weighted %)	n (weighted %)	
Stunting				<.001
No	12197 (52.9)	34823 (57.25)	88561 (65.1)	
Yes	11014 (47.1)	26472 (42.75)	47655 (34.9)	
Wasting				<.001
No	18153 (78.59)	48214 (78.76)	108929 (78.86)	
Yes	5058 (21.41)	13081 (21.24)	27287 (21.14)	
Underweight				<.001
No	13307 (57.25)	37032 (60.2)	93580 (67.17)	
Yes	9904 (42.75)	24263 (39.8)	42636 (32.83)	
Anemic				<.001
No	8634 (38.86)	23068 (39.71)	55341 (42.64)	
Yes	13596 (61.14)	34615 (60.29)	70020 (57.36)	
Low birthweight				<.001
No	13482 (80.41)	40515 (80.97)	102622 (82.38)	
Yes	3366 (19.59)	9307 (19.03)	20866 (17.62)	
Small/very small birth size				<.001
No	22732 (86.5)	59944 (87.05)	134789 (88.25)	
Yes	3580 (13.5)	8917 (12.95)	18202 (11.75)	

p-value is calculated from chi-square test.
n= Sample size
Sample size may not correspond to the percentages because of weighted cases.

Figure 5.1: Prevalence of stunting, wasting, underweight, anaemia, low birth weight, and small/very small size of the birth among the children under-5 by their mother's age at first marriage in India, NFHS-4 (2015-16)
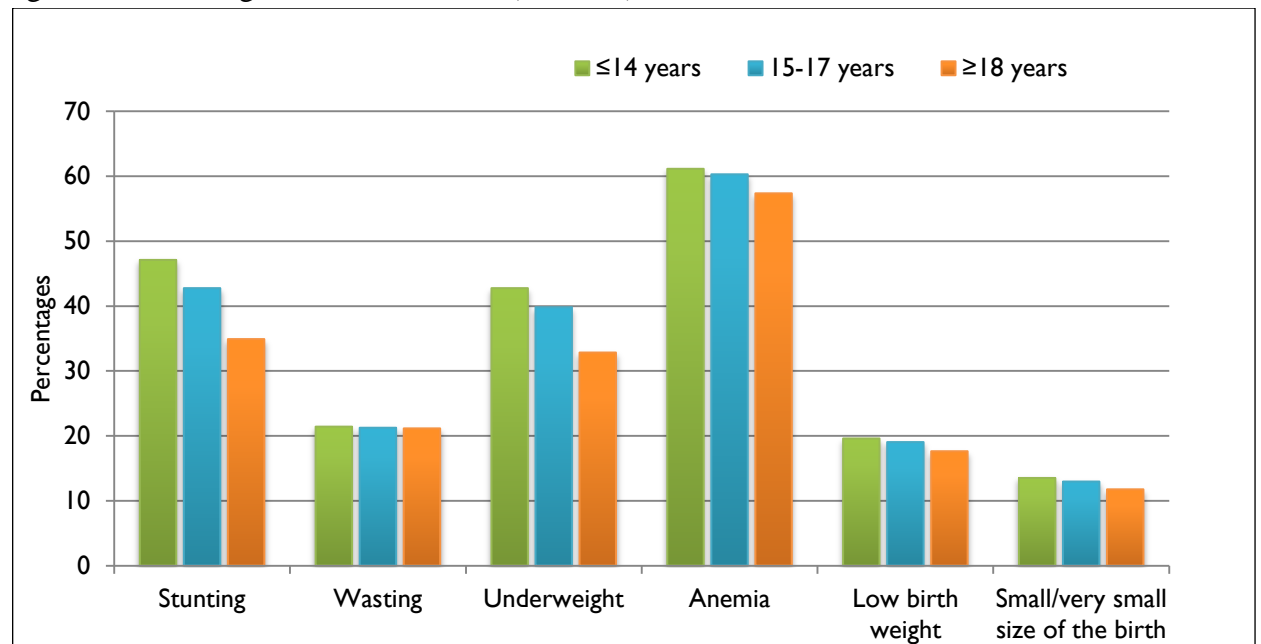
The prevalence of stunting, wasting, underweight, anaemia, low birth weight and small or very small size of the birth by mother's age at marriage is presented in table 5.4 and figure 5.1. Pearson chi-square test indicates significant differences in outcome indicators by age at marriage. The prevalence of stunting was higher among the births of women married at ≤14 years and 15-17 years compared to births of women married at ≥18 years. The prevalence of being wasted or underweight and anaemic was also higher among the births of early married women than the births of women married at ≥18 years. Additionally, women married at ≤14 years and 15-17 years were more likely to report low birthweight, and small birth size compared to mother married at ≥18 years.

Table 5.5: Association between age at marriage and nutritional status, anaemia, low birth weight, and small or very small birth size among births in the past 5 years to ever-married women aged 15-49 years in India, NFHS-4 (2015-16)

Indicators	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Stunting		
≤14 years	1.66 (1.62 - 1.71)‡	1.06 (1.03 - 1.10)‡
15-17 years	1.39 (1.37 - 1.42)‡	1.06 (1.04 - 1.08)‡
≥18 years ®		
Wasting		
≤14 years	1.02 (0.98 - 1.05)	0.96 (0.93 - 1.00)†
15-17 years	1.01 (0.98 - 1.03)	0.96 (0.93 - 0.98)‡
≥18 years ®		
Underweight		
≤14 years	1.53 (1.49 - 1.57)‡	0.99 (0.96 - 1.02)
15-17	1.35 (1.33 - 1.38)‡	1.03 (1.01 - 1.05)†
≥18 years ®		
Anaemia		
≤14 years	1.17 (1.14 - 1.20)‡	1.04 (1.00 - 1.07)†
15-17 years	1.13 (1.11 - 1.15)‡	1.01 (0.99 - 1.04)
≥18 years ®		
Low birth weight of child		
≤14 years	1.14 (1.10 - 1.19)‡	0.98 (0.94 - 1.03)
15-17	1.10 (1.07 - 1.13)‡	0.98 (0.95 - 1.01)
≥18 years ®		
Small size of child at birth		
≤14 years	1.17 (1.13 - 1.22)‡	0.98 (0.94 - 1.02)
15-17	1.12 (1.09 - 1.15)‡	0.97 (0.94 - 1.00)*
≥18 years ®		

* $P < 0.1$
† $P < 0.05$
‡ $P < 0.01$
® Reference category
Abbreviation: OR, Odds Ratio; CI, Confidence Interval.
Sample restricted to living children under 5 years of age in the past 5 years (n=254,017)
Adjusted analyses controlled for age of the child, sex of the child, place of residence, caste, religion, region, maternal age, maternal education, maternal BMI and wealth index.

Crude association showed that woman who married at the age of ≤14 years and 15-17 years were more likely to have stunting, under-weight, anemic, low birth weight, and small or very small size of the birth. However, the associations between child marriage and stunting of children under-5 weakened but remained significant after controlling for demographics and maternal BMI (≤14 years: AOR 1.06, 95% CI 1.03-1.10; 15-17 years: AOR 1.06, 95% CI 1.04-1.08).

However, in the current analysis, no significant relationship was found between child marriage and wasting of children. The study also found that the association remained significant for under-weight only when women married at the age of 15-17 years after adjusted for relevant confounders (AOR 1.03, 95% CI 1.01-1.05). Prevalence of anaemic was significantly associated with child marriage only among the women who married at the age of ≤14 years in adjusted analysis (AOR 1.04, 95% CI 1.00-1.07). The association between maternal child marriage and low birth weight of the child and small or very small size of birth was no longer significant in the adjusted analysis (Table 5.5).

5.1.4. Differences in Stunting, Underweight, and Anaemia Status of Children Under-5 by Mother's Age at Marriage: Fairlie's Decomposition Analysis

In the previous section, impact of child marriage on selected health indicators has been assessed. However, the present section aims to assess the contribution of socioeconomic and demographic factors to the differences in stunting, underweight, and anaemia status of children by child marriage and adult marriage of mother. However, the present analysis is restricted to the indicators which are significantly associated with child marriage in multivariate analysis. Moreover, the differences are significant Description of dependent and independent variables are mentioned below:

Dependent variables:

Stunting (Yes=1, No=0)

Underweight (yes=1, no=0)

Anaemia (yes=1, no=0)[169]

Independent variables:

Age of the child in years (Continuous)

Gender (Male=1/Female=0)

Birth order (3 and above=1/below 3=0)

Place of residence (Rural=1/Urban=0)

Social groups (Backward=1/Otherwise=0)[170]

Religion (Muslim=1/Otherwise=0)

Mother's age in years (Continuous)

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[169] Experience of any anaemia (severe or moderate or mild) is coded as '1', otherwise '0'.
[170] Backward Classes includes Scheduled Caste, Scheduled Tribe and Other Backward Classes; otherwise represents upper Caste women.

Mother's Body Mass Index (Thin=1/Otherwise=0)

Mother's Anaemia (Yes=1/No=0)

Mother's exposure to mass media (No mass media exposure=1/Otherwise=0)

Economic status of the household (Poor=1/Non-poor=0)[171]

Region (EAG states=1/Non-EAG states=0)[172]

Table 5.6: Fairlie's decomposition of stunting, underweight, and anaemia by mother's age at marriage in India, NFHS-4 (2015-16)

	Stunting		Underweight		Anaemia	
Mother's age at marriage <18 years	0.4453		0.4071		0.6063	
Mother's age at marriage ≥18 years	0.3527		0.3175		0.5600	
Difference	0.0927		0.0897		0.0463	
Contribution to difference:	β Coeff.	%	β Coeff.	%	β Coeff.	%
Age of child in years	0.0059***	6.4	0.0038***	4.2	-0.0067***	-14.5
Gender: Male	0.0000	0.0	0.0000	0.0	0.0000	0.0
Birth order: 3 and above	0.0075***	8.1	0.0047***	5.2	0.0015*	3.2
Place of residence: Rural	0.0004	0.4	-0.0024***	-2.6	-0.0015***	-3.3
Caste: Backward Caste	0.0026***	2.9	0.0023***	2.6	0.0013***	2.9
Religion: Muslim	0.0001	0.1	0.0000	0.0	0.0001***	0.2
Mother's age in years	0.0050***	5.4	0.0053***	5.9	0.0039***	8.4
Mother's education: Illiterate /Primary	0.0156***	16.9	0.0137***	15.3	0.0117***	25.3
Mother's BMI: Thin	0.0044***	4.7	0.0089***	9.9	0.0017***	3.6
Mother's anaemia: yes	0.0007***	0.8	0.0015***	1.6	0.0035***	7.5
Mother's exposure to mass media: No media exposure	0.0056***	6.1	0.0047***	5.2	0.0012*	2.6
Economic status of household: Poor	0.0184***	19.8	0.0183***	20.4	0.0010	2.2
Region: EAG states	0.0071***	7.6	0.0114***	12.7	0.0117***	25.3
All variables included (total explained)	0.0734	79.1	0.0721	80.4	0.0294	63.4

***p <0.01, *p <0.1

Unweighted logit regression models were performed to estimate β coefficients.

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[171] Household wealth has categorized into poor and non-poor for economic status. Poor includes bottom two quintile of wealth index, namely, poorest and poorer; whereas, non-poor constitutes middle, richer, and richest wealth quintile.
[172] Empowered Action Group (EAG) states include Bihar, Uttar Pradesh, Jharkhand, Orissa, Rajasthan, Madhya Pradesh, Chhattisgarh, and Uttarakhand.

The results of Fairlie's decomposition analysis for the differences in stunting, underweight, and anaemia of children by mother's age at marriage are presented in table 5.6. The gap between mother's age at marriage <18 years and ≥18 years in child stunting is 0.0927. The selected socioeconomic and demographic predictors together explain 79.1% of the total gap and the remaining 20.9% constitute the unexplained residual part. Mother's education and economic status of household have contributed to the majority of the gap. Economic status of the household is the largest contributor to the difference in child stunting (19.8%), followed by mother's education (16.9%), birth order (8.1%), and region (7.6%). In child underweight, the majority of gap has explained by selected socioeconomic and demographic predictors (80.4%). Economic status of the household is the largest contributor to the difference (20.4%), followed by mother's education (15.3%), region (12.7%), and mother's BMI (9.9%). For childhood anaemia, the selected predictors have explained 63.4% of the total gap. Mother's education and region together have explained more than 50% of total explained part. Moreover, Mother's anaemia has significantly contributed to the difference in childhood anaemia (7.5%).

5.1.5. Discussion

The analyses indicate that the births of women who married as minors have a higher likelihood of being stunted and underweight compared to the births of women married at later age even after accounting for relevant socioeconomic and demographic characteristics. Therefore, the poor physical growth of children born to child married mother is not only the result of socioeconomic vulnerability. The findings of the study indicate that children born to women married as minor are more susceptible to malnourishment compared to the children of adult married mothers beyond these socioeconomic vulnerabilities. The poor nutritional outcomes of children born to mothers married as minor attributed to several socioeconomic, demographic, and environmental factors. Several studies have shown that women who are married as minor are biologically immature. Further, early married women are often controlled by their husband, and mothers-in-law lead to unplanned pregnancies and pregnancy termination. Child marriage women are more vulnerable to intimate partner violence which may also increase the risk of several adverse health outcomes of their offspring.

Child married women also have lower power, status, and autonomy in the household which leads to limited decision making for their health as well as their children's health. The results are consistent with studies conducted in India.[173] However, wasting of children has no significant association with child marriage in the present study. This may be due to inclusion of a greater number of explanatory variables in the model. Therefore, the current analysis indicates that the socioeconomic and structural vulnerabilities play a significant role for being wasted of children under-5. Furthermore, the present study also examined the association between child marriage and anaemia status of children under-5. Anaemia indicates the presence of haemoglobin in the blood. Pregnant women and children under-5 are at higher risk of having anaemia.[174] Several previous studies have examined the association of maternal anaemia with birth outcomes such as preterm delivery and low birthweight. Researchers also associated children's iron deficiency with cognitive and motor development.[175] From the extensive literature search, this is the first study to examine the association between child marriage of mother and anaemia of children under-5. The result of the study reveals that births of child married women were more likelihood of being anaemic compared to the births of women married at later age even after controlling for a range of child and mother's demographics. However, the strength of association weakened after inclusion of relevant demographic in multivariate analysis. Consistent with previous studies[176] this study also demonstrates that women married as minor were more likely to have low birth weight infants compared to the mother married at later ages. However, this association was lost when controlled for relevant demographics. The result of previous chapter of this study revealed that child married women are more likely to have low body mass and anaemia. Moreover, child marriage increases the risk of several pregnancy complications. Therefore, poor maternal outcomes among child married women leads to preterm delivery and low birthweight.

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[173] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India." b4258.

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[176] Raj et al. 2010:

Evidence from several studies found that iron deficiency of mother increases the vulnerability of anaemia among infants. Moreover, infant born from reduced iron stores mother increases the risk of preterm birth and low birthweight.[177] Moreover, small/very small size of the birth was significantly associated with maternal child marriage in bivariate analysis. However, the association was no longer significant in multivariate analysis. Further, child married women have lower access to food in their household which leads to depletion of body mass and weight loss among adolescent mother. Poor nutritional status of a mother gave birth to small size or low birth weight of infants.

5.2. Association between Child Marriage and Morbidity and Mortality of Children Under-5

Globally, about 1500 children under-5 age died every day in 2016. Mortality under 5 years of age has reduced from 12.6 million in 1990 to 5.6 million in 2016.[178] Diarrhoea, pneumonia, preterm birth complications, birth asphyxia, sepsis, congenital abnormalities, malaria, infections, and other non-communicable diseases are the leading causes of death among children under 5 years of age, worldwide.[179] UN Millennium Development Goal-4 aimed to reduce two-thirds of mortality among children under-5 during 1990 to 2015. Many developing countries, especially Africa and South Asia could not reach the goal of MDG. Although considerable progress has been observed in reducing mortality among infants and children, it remains pervasive among lower-middle income countries.

Mortality among children younger than 5 years is highest in India among South Asian countries. According to the United Nations estimate, more 2.3 million children under 5 years of age died in India in 2005. In India, about 62% of child death has occurred because of five reasons: prematurity and low birthweight, diarrhoeal diseases, neonatal infections, birth asphyxia and birth trauma, and pneumonia.[180]

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Infectious diseases among infants and children under-5 have determined by a complex interplay of socioeconomic and environmental conditions. Poverty and malnutrition increase the vulnerability of such diseases. In addition, poor socioeconomic and ecological condition and adverse maternal health status increase the risk of preterm delivery and low birthweight. Moreover, preterm birth and low birthweight among newborn are at increased risk of infectious diseases, and therefore, increases the vulnerability of child death. Moreover, child marriage is pervasive among the women who are living in poor socioeconomic condition. Therefore, it is crucial to understand the impact of child marriage of mother on children's health status. Therefore, this present section of the study aims to determine the impact of child marriage on children's morbidity and mortality indicators beyond the socioeconomic condition of mother and children.

5.2.1. Measures

5.2.1.1. Outcomes Measures

Morbidity and mortality of children under-5 are the outcomes of interest in this study. The selected morbidity indicators are diarrhoea, fever, and cough in the past two weeks; and mortality indicators are child mortality, infant mortality, neonatal mortality, and postneonatal mortality. Child mortality is defined as the death of children between one and five years. Infant mortality is defined as mortality below one year of age. Further, Infant mortality is divided into neonatal mortality and postneonatal mortality. Neonatal mortality is defined death of children in below one month. Postneonatal mortality is measured as mortality of children between one month and one year of age.

5.2.1.2. Explanatory Variables

The main predictor variable is maternal child marriage measured from women's age at first marriage. Other explanatory variables include age of child (<1.0, 1.0-1.9, 2.0-2.9, 3.0-3.9, and 4.0-4.9 years), sex of child (boys and girls), place of residence (rural and urban), caste (Scheduled Caste/Tribe, other backward classes, and other), religion (Hindu, Muslim, Christian, and other), national region (north, central, east, northeast, west, and south), maternal education (no education, primary, secondary, and higher), maternal age (15-19, 20-24, 25-29, 30-34, ≥35 years), maternal BMI (thin, normal, and obese), and wealth index (poorest, poorer, middle, richer, and richest).

5.2.2. Analytical Approach

Bivariate and multivariate analyses were carried out to assess the relationship of child marriage with morbidity and mortality of children under-5. Bivariate analyses were carried out to examine the nature of the association between age at marriage and morbidity and mortality indicators of children under-5. Pearson chi-square test has been utilized to assess the significance level of differences in health indicators by age at marriage. Associations between child marriage and morbidity and mortality of children were estimated by unadjusted and adjusted odds ratio with 95% confidence interval using binary logistic regression models. Adjusted analyses were controlled for sex of child, place of residence, caste, religion, mother's age, mother's educational level, mother's BMI, national region, and wealth quintile of the household. Further, Fairlie's decomposition models were used to examine the contribution of socioeconomic predictors in the differences of mortality indicators by mother's age at marriage.

5.2.3. Results

The under-5 mortality rate has decreased from 109 deaths per 1000 live births in 2005-06 to 50 deaths per 1000 live births in 2015-16. During the same period, the infant mortality rate has declined from 79 deaths per 1000 live births to 41 deaths per 1000 live births. Moreover, the neonatal mortality rate has reduced from 49 deaths per 1000 live births in 2005-06 to 30 deaths per 1000 live births in 2015-16.

Among the children under-5 born to ever-married women aged 15-49 years, 9.2% had experienced diarrhoea in the past two weeks, 13% had experienced fever in the past two weeks, and 11.1% had experienced cough in the past two weeks (Table 1). Among the children under-5, 4.4 % died between one year and before the fifth birthday, and 4% died before their first birthday. Moreover, 2.9% of the children died within the first month of their birth, and 1.04% of the children died between 1 month and 1 years of their birth (Table 5.7).

Among the children born to child married women, 9.4% had experienced diarrhoea in past two weeks compared to 9.1% of the children born to adult married women (≥18 years) ($p < .001$). Moreover, 13% of children born to child married women had experienced fever in the past two weeks compared to 12.85% of the children born to adult married women ($p = .029$).

Table 5.7: Prevalence of morbidity and mortality of children by child marriage and adult married women aged 15-49 years in India, NFHS-4 (2015-16)

Morbidity and mortality Indicators	Overall (n=254,017)		Birth to child married women (n=97,893)		Birth to adult married women (n=156,124)		p-value
	n	weighted %	n	weighted %	n	weighted %	
Diarrhoea in past 2 weeks							< 0.001
No	2,19,799	90.77	83,726	90.59	1,36,073	90.9	
Yes	22,126	9.23	8,709	9.41	13,417	9.1	
Fever in past 2 weeks							0.029
No	2,10,479	86.99	80,251	86.76	1,30,228	87.15	
Yes	31,501	13.01	12,212	13.24	19,289	12.85	
Cough in past 2 weeks							0.003
No	2,14,130	88.92	82,051	89.04	1,32,079	88.83	
Yes	27,887	11.08	10,428	10.96	17,459	11.17	
Child mortality							< 0.001
No	2,42,429	95.6	92,649	94.88	1,49,780	96.1	
Yes	11,588	4.4	5,244	5.12	6,344	3.9	
Infant mortality							< 0.001
No	2,43,567	96.04	93,246	95.44	1,50,321	96.45	
Yes	10,450	3.96	4,647	4.56	5,803	3.55	
Neo-natal mortality							< 0.001
No	2,46,472	97.08	94,560	96.67	1,51,912	97.35	
Yes	7,545	2.92	3,333	3.33	4,212	2.65	
Post-neonatal mortality							< 0.001
No	2,51,112	98.96	96,579	98.77	1,54,533	99.1	
Yes	2,905	1.04	1,314	1.23	1,591	0.9	

p-value is calculated from chi-square test.
n= sample size
Sample size may not correspond to the percentages because of weighted analyses.

Similarly, 10.96% of the child born to women married as children had experienced cough in past two weeks compared to 11.17% of the child born to women married as adult ($p = .003$). The prevalence of child mortality (1-5 year) was higher among the children of women married as child compared to children of women married as adult (5.12% vs. 3.9%). Among the children whose mothers married as minor, 4.56% of them died before their first birthday, whereas, 3.55% of the child born to women married as adult died within one year of birth. The prevalence of neonatal mortality and post-neonatal mortality also showed a similar pattern (table 5.7).

The prevalence of neonatal mortality (<1 month) was higher among the children of women married as child compared to children of women married as adult (3.33% vs. 2.65%). Similarly, the proportion of post-neonatal mortality (1 m- 1 y) was higher among the child born to child married women compared to adult married women (1.23% vs. 0.9%) (Table 5.7).

Table 5.8: Association between maternal child marriage and morbidity and mortality of child born to women aged 15-49 years in the past 5 years in India, NFHS-4 (2015-16)

Morbidity and mortality Indicators	OR (95% CI)	Adjusted OR (95% CI)
Diarrhoea in past 2 weeks‖		
No ®		
Yes	1.04 (1.008 - 1.067)‖	1.01 (0.973 - 1.038)
Cough in past 2 weeks‖		
No ®		
Yes	0.98 (0.954 - 1.006)	0.99 (0.958 - 1.018)
Fever in past 2 weeks‖		
No ®		
Yes	1.03 (1.010 - 1.060)‡	1.04 (1.013 - 1.071)‡
Child mortality (1 - 5 y)†		
No ®		
Yes	1.33 (1.279 - 1.382)‡	1.04 (0.993 - 1.081)
Infant mortality (< 1 y)†		
No ®		
Yes	1.30 (1.247 - 1.352)‡	1.01 (0.963 - 1.054)
Neonatal mortality (< 1 m)†		
No ®		
Yes	1.27 (1.209 - 1.328)‡	0.97 (0.920 - 1.021)
Postnatal mortality (1 m – 1 y)†		
No ®		
Yes	1.37 (1.265 - 1.479)‡	1.12 (1.027 - 1.220)‖

‖ $P < 0.05$
‡ $P < 0.01$
Abbreviation: OR, Odds Ratio; CI, Confidence Interval.
‖Adjusted analyses controlled for age of the child, sex of child, place of residence, caste, religion, national region, maternal education, maternal age, maternal BMI, and wealth index.
†Adjusted analyses controlled for sex of the child, place of residence, caste, religion, national region, maternal education, maternal age, maternal BMI, and wealth index.

Crude analysis showed that child born from women who married below 18 were more likely to have diarrhoea (OR 1.04, 95% CI 1.008 - 1.067) and fever in past 2 weeks (OR 1.03, 95% CI 1.010 - 1.060) than those children whose mother married at 18 or later. The association remained only for fever after controlling for demographics (Adjusted OR 1.04, 95% CI 1.013 - 1.071). However, the present analysis did not find any significant association between maternal child marriage and children's cough in past 2 weeks (Table 5.8).

Child marriage of mothers was also found to be associated with increased likelihood of child mortality (OR 1.33, 95% CI 1.279 - 1.382) and infant mortality (OR 1.30, 95% CI 1.247 - 1.352) in crude analysis. However, these associations were lost after controlling for important maternal and child demographics. In addition, for more precise analysis, neonatal (<1 month) and post-neonatal mortality (1 month – 1 year) had constructed to assess the impact of child marriage on neonatal and post-neonatal mortality. Child marriage was also found to be associated with increased likelihood of neonatal (OR 1.27, 95% CI 1.209 - 1.328) and post-neonatal mortality (OR 1.37, 95% CI 1.265 - 1.479) in crude analysis. The association between maternal child marriage and neonatal mortality was no longer significant in the adjusted analysis. However, post-neonatal mortality was significantly associated with child marriage of mothers even after relevant maternal and child demographics (Adjusted OR 1.12, 95% CI 1.027 - 1.220) (Table 5.8).

The prevalence of diarrhoea was higher among the births of women married at ≤14 years, and 15-17 years than the births of women married at ≥18 years. Similarly, births of women married at ≤14 years and 15-17 years experienced higher fever than the births of women married at ≥18 years in past two weeks. There were also significant differences in mortality indicators by mother's age at marriage (p<0.001). Child mortality was higher among the births of women married at ≤14 years, and 15-17 years compared with births of women married at ≥18 years. Likewise, births of women married at ≤14 years and 15-17 years were more likely to experience morality below one year of age than the births of women married at ≥18 years (Table 5.9, figure 5.2&5.3).

Table 5.9: Prevalence of morbidity and mortality among children under-5 by maternal age at first marriage in India, NFHS-4 (2015-16)

Morbidity and mortality Indicators	Births to women married at ≤14 years		Births to women married at 15-17 years		Births to women married at ≥18 years		χ^2 value	p-value
	n	%	n	%	n	%		
Morbidity Indicators								
Diarrhoea in past 2 weeks							14.24	0.001
No	23,040	90.2	60,686	90.7	1,36,073	90.9		
Yes	2,428	9.8	6,281	9.3	13,417	9.1		
Fever in past 2 weeks							12.95	0.002
No	21,982	86.4	58,269	86.9	1,30,228	87.2		
Yes	3,496	13.6	8,716	13.1	19,289	12.8		
Cough in past 2 weeks							11.74	0.003
No	22,536	88.8	59,515	89.1	1,32,079	88.8		
Yes	2,946	11.2	7,482	10.9	17,459	11.2		
Mortality Indicators								
Child mortality (1- 5 y)							260.71	0.000
No	25,534	94.3	67,115	95.1	1,49,780	96.1		
Yes	1,613	5.7	3,631	4.9	6,344	3.9		
Infant mortality (<1 y)							176.46	0.000
No	25,752	95	67,494	95.6	1,50,321	96.5		
Yes	1,395	5.0	3,252	4.4	5,803	3.5		
Neo-natal mortality (<1 m)							118.55	0.000
No	26,133	96.4	68,427	96.8	1,51,912	97.4		
Yes	1,014	3.6	2,319	3.2	4,212	2.6		
Post-neonatal mortality (1 m- 1 y)							56.84	0.000
No	26,766	98.6	69,813	98.8	1,54,533	99.1		
Yes	381	1.4	933	1.2	1,591	0.9		

n= Sample size

%= Weighted percentage

Sample size may not correspond to the percentages because of weighted analyses.

Figure 5.2: Prevalence of Morbidity of children under 5 by age at marriage of mother aged 15-49 years in India, NFHS-4 (2015-16)
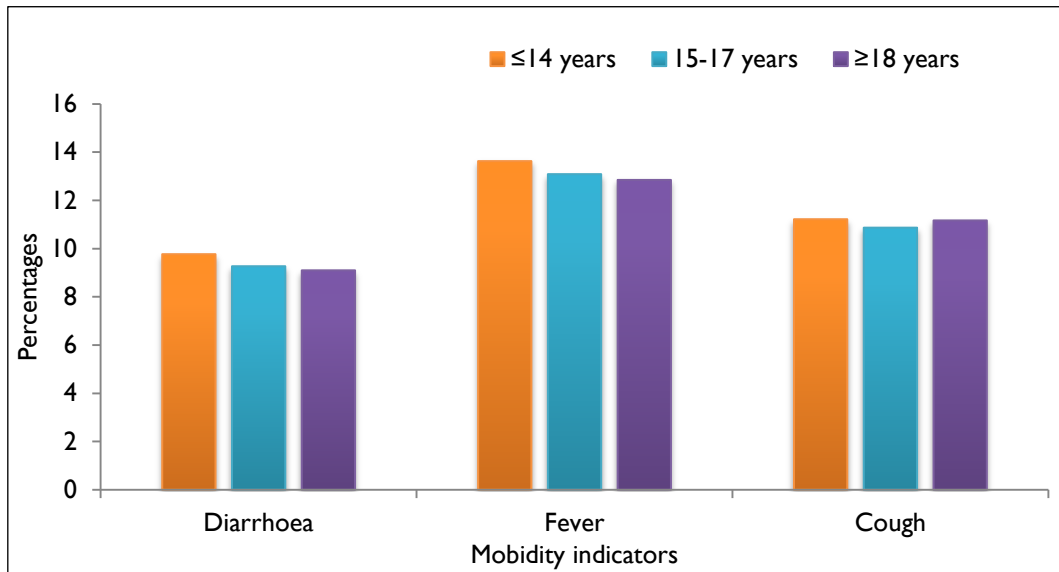
Source: Estimated from NFHS-4

Figure 5.3: Prevalence of mortality of children under 5 by age at marriage of mother aged 15-49 years in India, NFHS-4 (2015-16)
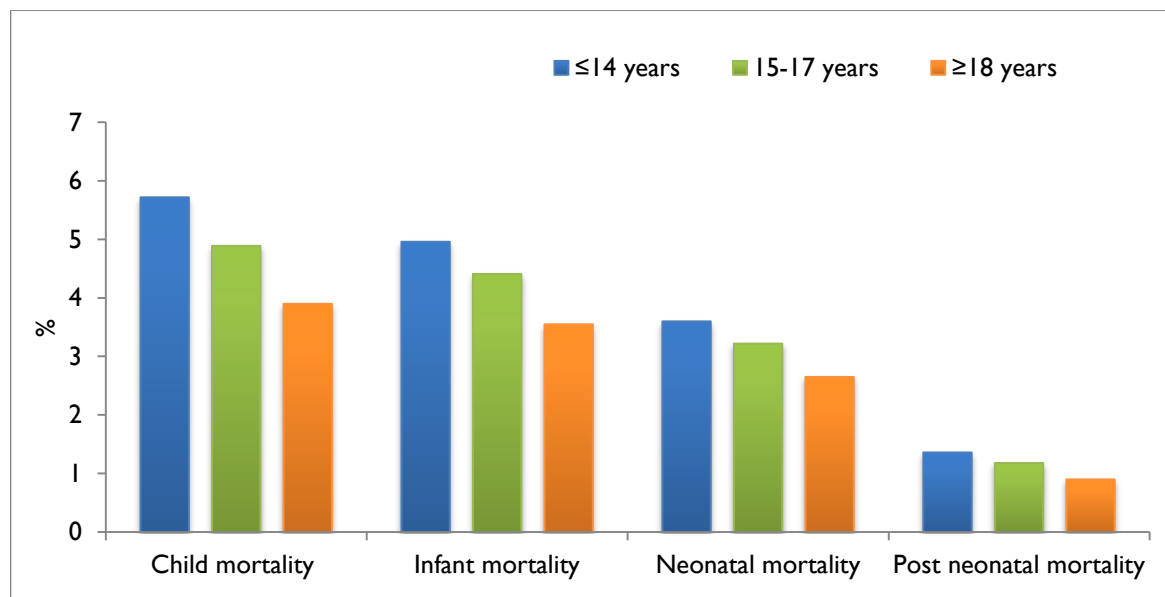
Source: Estimated from NFHS-4

Table 5.10: Association between maternal child marriage and morbidity and mortality of children under5 in India, NFHS-4 (2015-16)

Morbidity and Mortality Indicators	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Morbidity Indicators		
Diarrhoea in past 2 weeks‖		
≤14 years	1.08 (1.034 - 1.130)[‡]	1.07 (1.017 - 1.122)[‡]
15-17 years	1.02 (0.988 - 1.053)	0.983 (0.949 - 1.018)
≥18 years ®		
Fever in past 2 weeks‖		
≤14 years	1.07 (1.030 - 1.113)[‡]	1.09 (1.045 - 1.138)[‡]
15-17 years	1.021 (0.994 - 1.049)	1.024 (0.994 - 1.056)
≥18 years ®		
Cough in past 2 weeks‖		
≤14 years	1.005 (0.964 - 1.048)	1.029 (0.982 - 1.077)
15-17 years	0.97 (0.942 - 0.998)[‖]	0.973 (0.942 - 1.005)
≥18 years ®		
Mortality Indicators		
Child mortality (1-5 y)†		
≤14 years	1.50 (1.413 - 1.584)[‡]	1.07 (1.006 - 1.137)[‖]
15-17 years	1.27 (1.213 - 1.322)[‡]	1.022 (0.976 - 1.071)
≥18 years ®		
Infant Mortality (<1 y)†		
≤14 years	1.42 (1.334 - 1.507)[‡]	1.017 (0.952 - 1.085)
15-17 years	1.25 (1.198 - 1.311)[‡]	1.004 (0.956 - 1.054)
≥18 years ®		
Neo-natal Mortality (<1 m)†		
≤14 years	1.37 (1.280 - 1.475)[‡]	0.982 (0.910 - 1.060)
15-17 years	1.23 (1.163 - 1.292)[‡]	0.964 (0.911 - 1.020)
≥18 years ®		
Post-neonatal Mortality (1 m - 1 y)†		
≤14 years	1.51 (1.347 - 1.696)[‡]	1.11 (0.984 - 1.262)[*]
15-17 years	1.31 (1.204 - 1.432)[‡]	1.12 (1.021 - 1.232)[‖]
≥18 years ®		

[*] $P < 0.1$
[‖] $P < 0.05$
[‡] $P < 0.01$
® Reference category
‖Adjusted analyses controlled for age of child, sex of child, place of residence, caste, religion, region, maternal education, maternal age, maternal BMI, and wealth index.
†Adjusted analyses controlled for sex of child, place of residence, caste, religion, region, maternal education, maternal age, maternal BMI, and wealth index.

Children born to women married at age of ≤14 years and 15-17 years compared with those born to women married at ≥18 years were significantly associated with increased likelihood of diarrhoea and fever in the unadjusted models. Moreover, the analysis revealed that only women married at the age of ≤14 years retained their significant association in the adjusted model for diarrhoea and fever. However, In the current analysis, child marriage has no significant relationship with cough of children in the unadjusted and adjusted model (Table 5.10).

Moreover, crude analyses revealed that child mortality, infant mortality, neonatal mortality, and post-neonatal mortality had a significant association with child marriage of mother. However, the association was lost for infant and neonatal mortality after controlling for relevant demographics. In addition, the analysis showed that only women married at the age of ≤14 years consistently had higher odds of child mortality in the adjusted model. Women who married below 18 years of age also found to be associated with an increased likelihood of post-neonatal mortality even after adjusting for several socioeconomic and demographic factors. However, the strength of association reduced in the adjusted model (Table 5.10).

5.2.4. Differences in Child Mortality and Infant Mortality of Children Under-5 by Mother's Age at Marriage: Fairlie's Decomposition Analysis

The impact of child marriage on morbidity and mortality of children under-5 has been understood in the previous section of this chapter. However, the present section of this study aims to assess the contribution of socioeconomic and demographic factors on the gap in infant and child mortality by mother's age at marriage. However, the present analysis is restricted to mortality indicators only because significant differences have been found in children's mortality by mother age at marriage. Outcomes variables are constructed as binary indicators: child mortality (yes=1/no=0) and infant mortality (yes=1/no=0). The selected predictor variables are either continuous or binary form. The selected predictors variables include sex of the child (male/female), birth order (birth order <3/birth order ≥3), place of residence (rural/urban), caste (backward caste/forward caste), religion (Muslim/non-Muslim), mother's age in years (continuous), mother's education (illiterate & primary/secondary & higher), Mother's BMI (thin/otherwise), mother's anaemia

(yes/no), mother's exposure to mass media (no/yes), economic status of the household (poor/non-poor), and region (EAG states/non-EAG states).

Table 5.11: Fairlie's decomposition for differences in mortality indicators of children by age at marriage of mother in India, NFHS-4 (2015-16)

	Child mortality		Infant mortality	
Mother's age at marriage <18 years	0.0539		0.0478	
Mother's age at marriage ≥18 years	0.0408		0.0373	
Difference	0.0131		0.0105	
Contribution to the difference	Coefficient	%	Coefficient	%
Sex: Male	-0.0001***	-0.8	-0.0002***	-1.7
Birth order: 3 and above	-0.0002	-1.3	-0.0001	-1.4
Place of residence: Rural	0.0004*	2.8	0.0003	2.9
Caste: Backward Caste	-0.0001	-0.6	-0.0002	-2.0
Religion: Muslim	0.0000	-0.1	0.0000	-0.1
Mother's age in years	-0.0007**	-5.3	0.0002	1.7
Mother's education: Illiterate /Primary	0.0028***	21.0	0.0021***	20.5
Mother's BMI: Thin	-0.0003***	-2.5	-0.0003***	-3.0
Mother's anaemia: yes	0.0000	-0.3	0.0000	0.0
Mother's exposure to mass media: No media exposure	0.0000	0.0	0.0000	-0.1
Economic status of household: Poor	0.0024***	18.5	0.0019***	18.4
Region: EAG states	0.0033***	25.1	0.0031***	29.3
All variables included (total explained)	0.0074	56.6	0.0068	64.6

*** p<0.01, ** p<0.05, * p<0.1
Unweighted logit regression models were performed to estimate β coefficients.

The results of Fairlie's decomposition analysis have been presented in table 5.11. The selected predictor variables have explained 56.6% of the total gap (0.0074 out of 0.0131). Region is the most significant contributor to the difference in child mortality (25.1%), followed by mother's education (21%) and economic status (18.5%). Moreover, the socioeconomic predictors have explained 64.6% of the total gap for infant mortality. Similar to child mortality, region is the largest contributor to the difference in infant mortality (29.3%), followed by mother's education (20.5%), and household economic condition (18.4%).

5.2.5. Discussion

This section of the study analyses child marriage and its relationship with crucial outcomes of children's health (i.e., morbidity and mortality). The results of the study indicate that born to women married below 18 years of age were significantly associated with increased likelihood of diarrhoea compared to the births of those mother who married at later age. However, the association becomes insignificant after inclusion of relevant demographics in the adjusted analysis. Previous studies have shown that young adolescent mother produced less amount of breast milk than their adult counterparts[181] which substantially increases the risk of malnutrition and several other adverse health outcomes for their newborn. Prior studies have shown that the association of child marriage with acute respiratory infections (ARI) of children under-5. However, this study assessed the association between child marriage and fever and cough of children separately. The result of the current study reveals that the association between child marriage and children's recent cough was not significant. However, child marriage was found to be significantly associated with fever in the past 2 weeks among the children under-5 in the unadjusted and adjusted model. Among the mortality indicators, only postneonatal mortality was significantly associated with child marriage in adjusted analysis. However, child mortality, infant mortality, and neonatal mortality was found to be significantly associated with child marriage in the unadjusted model. The associations become insignificant after inclusion of relevant demographics in the adjusted analysis. The results of the study are slightly different from the previous studies conducted in India and elsewhere may be due to the fact that this study included children born to mother age 15-49 from the past 5 years in the analysis. However, prior research has limited to their sample only young married women.[182] Further, the present research demonstrates that a number of socioeconomic and demographic characteristic of children and mother determined the morbidity and mortality of children under-5. The results of the study show that the likelihood of diarrhoea decreases with increasing age. Female children were less likely to have diarrhoea compared to their male counterparts.

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[181] Lenders, Carine M., Thomas F. McElrath, and Theresa O. Scholl. "Nutrition in adolescent pregnancy." *Current opinion in pediatrics* 12, no. 3 (2000): 291-296; Motil, Kathleen J., Barbara Kertz, and Mary Thotathuchery. "Lactational performance of adolescent mothers shows preliminary differences from that of adult women." *Journal of Adolescent Health* 20, no. 6 (1997): 442-449.

[182] Raj et al. "The effect of maternal child marriage on morbidity and mortality of children under 5 in India." b4258; Nasrullah at al. "Girl-child marriage and its association with morbidity and mortality of children under 5 years of age in a nationally-representative sample of Pakistan." 639-646.

Moreover, the risk of having diarrhoea in rural areas was higher compared to their urban counterparts. Compared to Hindu children, Muslim and Christian children were more likely to have suffered from diarrhoea in past 2 weeks. The prevalence of diarrhoea also varies from their region of residence. Children who are living in the central region of the country were more likely to had diarrhoea compared to the northern region. The higher prevalence of diarrhoea in central region bcause of lower socio-economic development and the region is predominantly resided by tribal community. Mother's demographics also determined the prevalence of diarrhoea. Age of the mother has no significant impact on their children's recent diarrhoea. Surprisingly, mother's primary and secondary level of education significantly increases the likelihood of diarrhoea among children compared to the children of an illiterate mother. The likelihood of diarrhoea was significantly lower among those children whose mother had normal Body Mass Index (BMI) compared mother with thin BMI. However, obesity of mother had no significant association with diarrhoea of children. Moreover, the economic status of household has seemed to be a strong predictor of children's diarrhoea. Children belonging in richer and richest quintile of household wealth significantly had lower likelihood of diarrhoea. Similarly, socioeconomic and demographic characteristics of mother and children showed significant predictor of cough and fever of children in past 2 weeks. Furthermore, the study also reveals that several socioeconomic and demographic factors determine mortality of children under-5. For instance, child mortality was significantly lower among the female compared to their male counterparts. The likelihood of child mortality was significantly higher in rural areas compared to their urban counterparts. The region was found to be significantly associated with child mortality. Compared to northern region, central region had significantly higher incidence of child mortality. On the contrary, east, west, and southern region significantly had a lower likelihood of child mortality than the northern region. Mother with secondary and higher secondary level of education significantly had a lower prevalence of child mortality compared to the mother with no education. However, mother with normal and obese BMI significantly had a higher likelihood of mortality compared to the mother with thin BMI. Further, the likelihood of child mortality was reduced in the upper quintile of household wealth. Likewise, the socioeconomic and demographic predictors significantly associated with infant and child mortality.

Decomposition analysis of the study suggests that socioeconomic and demographic factors such as economic status, mother's education, and region significantly contributed towards differences in child morbidity and mortality. Therefore, efforts need to restraint child marriage and reduce socioeconomic vulnerabilities of women who married as minor may reduce morbidity and mortality of children under-5 in India.

5.3 Conclusion

The current study reveals that child marriage significantly increases the risk of children's stunting, underweight, and anaemia even after accounting for relevant demographics. Nevertheless, low birth weight and small/very small birth size of infant did not show any significant association with child marriage of mother after accounting for socioeconomic and demographic characteristics. Baby's low birth weight occurred as a result of short duration of gestation or lower rate of intrauterine growth.[183] Further, duration of gestation or intrauterine growth is affected by a range of genetic, demographic, physiological, obstetric, nutrition, and maternal morbidity during pregnancy-related factors.[184] Iron deficiency and low body mass of mother are the leading causes of preterm delivery and low birth weight of the infant. Micro-nutrient deficiency and depletion of nutrition occur as a result of the inadequate dietary intake. Moreover, preterm birth or low birth weight increases the risk of neonatal deaths.

Furthermore, this study examined the effect of child marriage on morbidity and mortality of children. The findings of the study show that child marriage significantly associated with increased likelihood of diarrhoea in past two weeks in unadjusted analysis, and fever in past two weeks in unadjusted and adjusted analysis.

Moreover, child marriage significantly associated with higher likelihood of child mortality and post-neonatal mortality after controlling for a range of child and mother's demographics. However, the present study did not find any significant relationship between child marriage and neonatal mortality in adjusted analysis. Mortality of children is determined by the complex interplay of socioeconomic and environmental factors.

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[183] Kramer, Michael S. "Determinants of low birth weight: methodological assessment and meta-analysis." *Bulletin of the world health organization* 65, no. 5 (1987): 663; Wardlaw, Tessa M., ed. *Low birthweight: country, regional and global estimates*. Unicef, 2004. P. 2.
[184] Kramer. Op. Cit. p.663

Evidence from previous studies documented that poor socioeconomic status, unhygienic environmental condition, and several other factors increase the risk of infectious diseases among newborn. The current study also reveals that various socioeconomic and demographic factors influence morbidity and mortality of children. Previous studies also evidenced that low body mass and iron deficiency of mother significantly increases the risk of premature birth and low birthweight of infants. Henceforth, premature babies are more vulnerable to diarrheal diseases, malaria, and other infectious diseases. Therefore, children affected by infectious diseases experienced higher likelihood of mortality.

Chapter-6
A Summary of Conclusions

This research sought to answer several questions on child marriage practice and its health implications. In the present study, an empirical strategy has been employed to examine the prevalence of child marriage across socioeconomic groups, association of district development indicators with child marriage, socioeconomic factors and regional variation in child marriage. Further, association of child marriage with several adverse health outcomes such reproductive health, utilization of maternity care, undernourishment, anaemia, and children's health outcomes has been examined using the unit level information from NFHS-4.

6.1 Most Vulnerable Girls to Child Marriage

The study has demonstrated that the girls who are living in rural areas, have no or very lower educational attainment, poor economic background, and have no or very limited media exposure have higher risk of early age at marriage. Qualitative studies have documented that the practice of child marriage is deeply rooted in socio-cultural norms and customs coupled with religious tradition of the society. Patriarchal norms and customs are rigid in impoverished areas where girls have limited education and job opportunities, lower access to health care facilities and lower autonomy in their household and society. The analysis of present study from the intersection of caste, religion, education, and economic status reveals that child marriage is also prevalent among upper caste Hindu family. Wealthier strata from Hindu and Muslim also have significant proportion of child marriage. The practice is also observed among the highly educated Hindu and Muslims. Therefore, even women are highly educated, belongs to wealthier economic strata child marriage remains a significant proportion. This is primarily because the practice has driven by rigid social norms and religious underpinnings.

6.2 Preventing Child Marriage Practice

To prevent the practice of child marriage, the current study has addressed the prominent driving forces of this practice. Though the practice of child marriage is rooted in patriarchal social norms and values, various socioeconomic and structural factors drive the practice of child marriage. The result of the study reveals that education is the prominent determinant of child marriage. Consistent with several studies conducted in developing countries, the current study also demonstrates that educational advancement substantially increases the age at marriage among girls. The secondary level of education is very crucial for girls. In most of the cases especially in rural areas, girls studied up to the secondary level of education and drop out before or after completing secondary level of education because of several reasons. Poverty is one such reason which forces to leave the girls from school. Low-income families often marry-off their daughter at an early age because dowry price will increase if she became older. In addition, rural girls are more likely to marry in adolescent age because rural community more likely to hold cultural norms and values; whereas, in urban areas, people are more likely to break harmful cultural norms and values because of educational advancement. However, no significant differences have been found between rural and urban prevalence of child marriage in multivariate analyses. The study also reveals that compared to the Scheduled Castes, Scheduled Tribes, and other backward classes, upper caste girls are more likely to marry as minor. This is maybe because of the fact that the rigidity of cultural norms and values are higher among the girl who belongs to the upper caste. Likewise, the prevalence of child marriage among Hindus is more than the Muslim and other religious groups after controlling other background characteristics. This is explained by the fact that marriage has different values in Hindu culture. Further, girls often married-off before the onset of poverty according to Hindu code of culture which is not the cultural norm among Muslims and other religious groups. The current study also finds that women engaged with agricultural activities are married early than the women who are not working. This is because poverty forces them to engage in agricultural work. Therefore, child marriage can be reduced through address the girls' socioeconomic vulnerabilities by promoting girls' education, providing economic incentives for delaying marriage and education, increasing employment opportunities for girls.

6.3 Influence of Socioeconomic Development on Child Marriage Practice

The present assess the impact of district developmental indicators on child marriage. The findings of the study reveal that social infrastructure such as electricity facility, improved sources of drinking water, toilet facility, and clean fuel for cooking significantly associated with decreased likelihood of child marriage. Improvement in social infrastructure reflects improvement in the economic condition of the household which reduces the risk of getting marriage at an early age. Moreover, improvement in an economic condition substantially increases the educational attainment among girls. Therefore, girls are likely to marry at later age. The impact of women's status quite mixed one. This is primarily because of the selection of variables for women's status. Sex ratio and female literacy accurately reflect women's position in the society. However, female work participation rate has an opposite relationship with women's status. In India, women are primarily engaged in agricultural work in rural areas for their livelihood. Women are working in the agricultural field primarily because of poorer economic condition. Therefore, women's work participation by the criteria of Census of India may not be a correct reflection of better status in the society. Consequently, the current study reveals a positive association between child marriage and women's work participation. At the aggregate level, the present study has found better women's status significantly reduces the practice of child marriage. This is supported by the argument that north-south differences in women autonomy and child marriage. Several studies documented that women's autonomy is greater in southern parts of India compared to their northern counterparts.[185] The current study shows that the prevalence of child marriage among southern states is substantially lower compared to other parts of India. The findings of the current study are supported by Dyson and Moore and Caldwell et al.'s study.[186] Their study showed that female age at marriage is substantially higher in southern parts of India compared to their northern counterparts. However, the association is not very simple as it is just concluded. The close examination of the association reveals some striking observation. For instance, few northern states such as Punjab and Haryana show lower prevalence of child marriage. However, several studies have examined that the

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[185] Dyson et al. "On kinship structure, female autonomy, and demographic behavior in India." 35-60.

[186] Caldwell, John C., Palli Hanumantha Reddy, and Pat Caldwell. "The causes of marriage change in South India." *Population studies* 37, no. 3 (1983): 343-361.

incidence of female foeticide and mortality of girl child is higher in this areas.[187] Moreover, the evidence of lower women's status and rigid socio-cultural norms also observed in this areas. In spite of these, the practice of child marriage practice has less observed in these areas. In contrary to this, West Bengal has better women's status compared to their north Indian counterparts.[188] However, considerable proportions of women are married before 18 years of age in West Bengal. The result of the current study revealed that West Bengal is the second highest child marriage prevalence state in India just after Bihar in 2015-16. The high pervasiveness of child marriage in West Bengal may be attributable to the incidence of high poverty among rural people. Moreover, the culture of West Bengal is very different from other parts of the country which is similar to the culture of adjacent Bangladesh where the prevalence of child marriage is also very high. Therefore, the pervasiveness of child marriage is only limited within a country. It cut across India-Bangladesh political boundary spread over boundary region where similar culture persists. More in-depth field observational study is needed to understand the exact reasons for child marriage practice in West Bengal. Moreover, the proportion marginalized population has no significant association with child marriage practice in bivariate analysis. However, the proportion of Scheduled Castes and Scheduled Tribe population has a significant negative association with child marriage after accounting for other socioeconomic developmental indicators. There is a general conception that marginalized population more likely to practice child marriage due to the fact that they have higher incidence of poverty and lower educational attainment. Despite these, the culture of marginalized group of people does not foster the practice of child marriage. Among the marginalized population especially among Scheduled Tribe, women have greater autonomy to take their marriage decision. Moreover, the multivariate analysis in determining the prevalence of child marriage using unit level data shows consistency in result with the district-level assessment. Therefore, improvement in economic condition and education advancement can reduce the practice of child marriage among Scheduled Caste and Scheduled Tribe which may be less effective among upper caste people. Although urbanization shows a negative association in bivariate analysis, it is less effective and even shows a positive association with child marriage after accounting for other developmental factors. Other studies also found an

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[187] Gupta, "Selective discrimination against female children in rural Punjab, India." 77-100.
[188] Raju, Saraswati. "Gendered Geographies: Space and Place in the South Asia." (2011).

inconsistent association between early marriage and level of urbanization. Urbanization may foster the overall development of the region, therefore, reduced likelihood of child marriage.

However, the primary aim of the present study is to assess the impact of child marriage on health outcomes of women and children. Though child marriage affects social, economic and physiological condition of women, the present study is restricted to only health costs of child marriage practice.

6.4 Impact of Child Marriage on Maternal Health

This study provides valuable insights on examining the association between child marriage and health outcomes of ever-married women aged 15-49 years. The findings of the study reveal that child marriage has significantly associated with increased risk of several adverse reproductive health outcomes such as high fertility, child death, unwanted childbirth, and pregnancy termination. These adverse reproductive health outcomes of women are partly attributable to the lower use of maternal health care services. Further, this study has demonstrated that child married women are less likely to have antenatal visits, institutional delivery, delivery by skilled health personnel, and post-natal check-up. Malnutrition and anemia status of women are often characterized by poverty, inadequate use of maternal health care services, and scarcity of nutrient in the food. Besides, lower use maternal health care services among the women who married as children are more vulnerable to undernourishment and anemia resulting in pregnancy and childbirth-related morbidity and mortality. Findings of this study confirmed that malnutrition and presence of anemia are higher among the women who married at an early age compared to the women who married in later ages. Besides, a range of socioeconomic and demographic factors are associated with utilization of maternal health care services, depletion of body mass, anemia, and adverse reproductive health outcomes. Therefore, efforts should be made to increase women's age at marriage as well as to reduce socio-economic vulnerabilities which may result in adequate use of maternal health care among young married women. Adequate uses of maternal health care services are associated with reduced risk of life-threatening morbidities during pregnancy, labor, and postpartum period, hence lower likelihood of mortality. Moreover, poor, rural, young, and uneducated women need special attention as they have lower access to maternal health care services

resulting in adverse reproductive health outcomes and high maternal morbidity and mortality.

6.5 Impact of Child Marriage on Child Health

Child marriage not only affects the health status of women but also increases the risk of several adverse health risks for their offspring. The findings of previous studies have demonstrated a mixed association between child marriage health and well-being of children. The current study reveals that child marriage significantly increases the risk of children's stunting, underweight, and anemia even after accounting for relevant demographics. Nevertheless, low birth weight and small/very small birth size of infant did not show any significant association with child marriage of mother after accounting for socioeconomic and demographic characteristics. Baby's low birth weight occurred as a result of short duration of gestation or lower rate of intrauterine growth.[189] Further, duration of gestation or intrauterine growth is affected by a range of genetic, demographic, physiological, obstetric, nutrition, and maternal morbidity during pregnancy-related factors.[190] Iron deficiency and low body mass of mother are the leading causes of preterm delivery and low birthweight of infants. Micro-nutrient deficiency and depletion of nutrition occur as a result of inadequate dietary intake. Moreover, preterm birth or low birth weight increases the risk of neonatal deaths.

Furthermore, this study examined the effect of child marriage on morbidity and mortality of children. The findings of the study show that child marriage significantly associated with increased likelihood of diarrhea in the past two weeks in unadjusted analysis, and fever in the past two weeks in the unadjusted and adjusted analysis. Moreover, child marriage significantly associated with higher likelihood of child mortality and post-neonatal mortality after controlling for a range of child and mother's demographics. However, the present study did not find any significant relationship between child marriage and neonatal mortality in the adjusted analysis. Mortality of children is determined by the complex interplay of socioeconomic and environmental factors. Evidence from previous studies documented that poor socioeconomic status, unhygienic environmental condition, and several other factors increase the risk of infectious diseases among newborn. The current study also reveals

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[189] Kramer, Michael S. "Determinants of low birth weight: methodological assessment and meta-analysis." *Bulletin of the world health organization* 65, no. 5 (1987): 663; Wardlaw, Tessa M., ed. *Low birthweight: country, regional and global estimates*. Unicef, 2004. p.2

[190] Kramer. Op. Cit. p.663

that various socioeconomic and demographic factors influence morbidity and mortality of children.

Evidences have found that low body mass and iron deficiency of mother significantly increases the risk of premature birth and low birthweight of infants. Henceforth, premature baby is more vulnerable to diarrheal diseases, malaria, and other infectious diseases. Therefore, children affected by infectious diseases experienced a higher likelihood of mortality.

6.6 Policy Implications

From the above analysis, it can be understood that child marriage occurs not only as a result of individual factors. The prevailing social norms in male-centered kinship structures drive the practice of child marriage. Therefore, policy measures should address the socioeconomic condition of girls, overall development of society as well as the rigid social norms to eliminate the practice of child marriage. The present study suggests that prevention of child marriage practice should be the prime concern to reduce the harmful practice of child marriage and henceforth, it will decrease the vulnerability of poor health outcomes among women and children. The current study has identified some high child marriage prevalence districts where immediate intervention is needed to prevent the practice of child marriage which would reduce the vulnerability of adverse health outcomes of women and children. However, preventing child marriage needs strengthening of existing law, enacting new policies and programmes. Therefore, it is important to understand lack in enforcement of laws and policies to prevent the practice by examining the existing laws, policies, and programmes at an international and national level which is discussed below. Along with this, some efforts can be initiated to increase the women's age at marriage as well as to reduce the health risks of married adolescent girls.

6.6.1   Existing Policies and Programmes

6.6.1.1   International Consensus and Programmes

The harmful practice of child marriage is recognized as a violation of human rights as it violates basic human rights of girls'. Several international commitments acknowledged girls right to protection from harmful practices such as marriage as minor without consent, female genital mutilation, and eliminate discrimination against girls. Article 16(2) of the *'Universal Declaration of Human Rights, 1948'* states that "marriage shall be entered into only with the free and full consent of the intending spouses." Article 16 of the *'Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW), 1979'* states that women have same right as men to "freely to choose a spouse and to enter into marriage only with their free and full consent" and "the betrothal and the marriage of a child shall have no legal effect". Moreover, United Nation's *'Convention on the Rights of the Child'* (CRC) prescribed some human rights for children where the child has "the right to protection from harmful practices, abuse, and exploitation." The United Nation's Sustainable Development Goal (SDG)-5 aimed to eliminate all forms of discrimination against women and girls including child, early, and forced marriage. Moreover, other goals of SGD such as eliminating poverty, quality education, economic opportunities for girls also ensures the reduced rate of child marriage. Despite several commitments to protect girls from harmful practices like child marriage, it remains pervasive among lower-middle income countries. Therefore, new programmes should be initiated to eliminate the practice of child marriage especially in those areas where child marriage is highly prevalent to eliminate the practice of child marriage.

6.6.1.2 National Laws, Policies and Programmes

The government of India formulated several laws and policies to prevent the practice of child marriage at different point of time. '*Child Marriage Restrained Act 1929'*, also known as '*Sarda Act'* was formulated to prohibit the marriage of girls below 14 years of age. However, in 1976, an amendment has been implemented where the minimum age for marriage was prescribed 18 years for girls and 21 years for boys. Further, Child marriage restrained act was replaced by '*Child Marriage Prohibition Act 2006'* to greater enforcement of the law. According to this act, the marriage of girls below 18 years of age is a cognizable offense. By this act, state governments

appoint child marriage prohibition officer to prevent the solemnization of marriage before the legalization of marriage. Despite legal enforcement considerable proportion of women married before 18 years of India. Therefore, efforts should be made to strengthen the existing policies and formulation of new policies and programmes to combat the practice of child marriage in India.

6.6.2 Increasing Girls Educational Opportunities

Advancement in education has delays in girls' marriage timing substantially. The policy and program should ensure access to quality education among girls from all sections of the society. With improvement in the physical infrastructure of schools such as girls' toilet facility, electricity facility in the school, and other technological facilities can ensure the enrolment and keeping girls in school for longer. Quality education can also improve girls' enrolment in schools. In India, expenditure on girls' education is much less compared to boys. Therefore, encourage in free public education with quality education can improve girls educational attainment. United Nations Millennium Develop Goal (MDG)-2 aimed to achieve universal primary education by 2015. Moreover, Sustainable Development Goal-4 targeted to provide free, equitable and quality primary and secondary education to all girls and boys by 2030. The government of India has initiated several programmes and policies for improvements in girls' education. '*Right to Education Act,*' 2009 was started to provide free and compulsory education to all up to elementary level. Under this act, *'Sarva Sikhsha Abhiyan'* programme was initiated to make free and compulsory education as a constitutional right. Recently, Government of India has started '*Beti Bachao, Beti Podhao'* Program to eliminate discrimination against the girl and ensure girl's well-being. Under this scheme, '*Sukanya Samridhi Jojana'* has initiated for girls' prosperity by increasing employment opportunities and empowering adolescent girls. Despite several policies and programmes have been initiated by central and state governments to improve girls' education, a large segment of adolescent girls are remains out of school. Thus, initiatives should be taken to incorporate the girls who are not in school in their school age. Girls' education can be ensured by providing free, quality and safe education.

6.6.3 Economic Incentives

Poverty is the leading causes of child marriage in India. Poor parents marry-off their daughter to reduce the economic burden. Dowry system is the main driving force among parents to marry off their daughter at an early age. According to the '*Dowry Prohibition Act' 1961*, giving and taking of dowry is illegal. However, it is widely practiced in India as a social norm. Therefore, strengthening of policy is needed to prohibit such practices.

Several state governments have started various scheme improving girls education and delay in marriage. For instance, West Bengal government started '*Kanyashree Scheme'* to ensure girls staying in school and delay in marriage by providing financial incentives. In spite of such economic condition, many girls' belong to poor economic status of household, and they become subject to harmful practice of child marriage. Therefore, policy should ensure delay in marriage by providing economic incentives to the poor household for girls' education and improvement in economic condition of the household.

6.6.4 Socioeconomic Development of Society

The present study revealed that socioeconomic development of locality/region substantially reduces the practice of child marriage. Development of social infrastructure such as electrification, provide drinking water facility, toilet facility would reduce the practice of child marriage by changing social norms.

6.6.5 Changing Gender Norms

In India, practice of child marriage is primarily driven by gender norms of the society. In patriarchal social structure, women are often subjected to harmful social norms. Therefore, such harmful norms should be eliminated to reduce the practice of child marriage and other forms of exploitation over women. Such harmful norms can be broken or eliminated through educational advancement and socioeconomic development which would expect to reduce the incidence of child marriage in India.

6.6.6 Addressing Health of Married Adolescent

It is also essential to address the health status of adolescent girls who are already married as minor. The current study found that maternity care is lower among the women who married before 18 years of age compared to the women who married at

later ages. Therefore, it is crucial to provide adequate health care for married adolescent girls. *'Janani Suraksha Yojana'* (JSY) of the government of India is one of the most important schemes under *'National Rural Health Mission'* (NRHM), aimed to reduce maternal and neonatal mortality especially among the poor by providing financial assistance and safe and adequate health care. The present study indicates persistent high maternal and child morbidity and mortality predominantly because of socioeconomic vulnerabilities among child married girls.

Therefore, policies and programmes should address socioeconomic vulnerabilities of adolescent girls as well as adequate utilization maternal health care services, especially among those who socioeconomically disadvantaged group.

6.7 Limitations and Strength of the Study

The study has several limitations.

1. The majority of the measures including age at marriage is self-reported which is subjected to recall bias and social desirability.

2. This study unable to assess cause-effect relationship because of the cross-sectional nature of data.

3. Educational attainment, economic status, and place of residence are not the only reasons for child marriage practice. Moreover, the present study finds that socioeconomic determinants explained 75% of the gap in the rural-urban prevalence of child marriage and 25% gap remained explained which can be explained by other factors. Qualitative studies on child marriage argued that socio-cultural norms and customs are the leading cause of child marriage which is very difficult to quantify. However, the current study was unable the capture the influence of socio-cultural factors on child marriage practice.

4. Moreover, this study assesses the district-level prevalence of child marriage. Therefore, the sample size may not be enough to estimate the prevalence for some districts.

5. Current working status of women and partner's education variable has a large number of missing cases. Therefore, inclusion of such variables in multivariate analyses reduces the number of sample size.

6. Birthweight is missing for many children. Moreover, size of birth is also included in the analysis which is totally based on recalling of mother. These

measures have recall bias, and therefore, the reliability and validity of the data are questionable.

However, the study has several strengths.

1. This study made a comprehensive analysis of child marriage prevalence and its association with maternal and child health outcomes.

2. The study is based on a nationally representative sample survey with a large number of sample sizes. Therefore, analyses have been carried out to estimate the prevalence of child marriage and its association with health outcomes with high precision.

3. Prevalence of child marriage estimation based United Nations requires unit level data of married and unmarried girls. NFHS-4 provides such unit level information from which district-level prevalence of child marriage has been estimated. This is first survey which enables us to estimate the prevalence of child marriage in all the districts with high precision.

4. This study included women in the reproductive age group and under-5 children from the same age group of women. Therefore, results from the association of child marriage with health outcomes represent all women in the reproductive age group and children below five years of age. However, most of the previous research restricted their sample to young married women and therefore, unable to generalize the other groups of women.

5. Lastly, the study included a range of socioeconomic and demographic predictors in multivariate analysis to assess the independent impact of child marriage on health outcomes.

6.8   Future Research Scope

Although the present study provides important insights on the prevalence of child marriage and its association with several adverse health outcomes of women and their children, this area of research needs to be explored for preventing harmful practice of child marriage and to address adverse health condition of young adolescent girls by strengthening of existing policies and formulation of new policies and programs.

1. The present study is unable assess the causal relationship because of cross-sectional nature data. However, longitudinal study can be done to assess the causal impact of child marriage on health outcomes of women and children.

2. Studies on socio-cultural norms in practicing child marriage are scarce. The present research unable to explain the mechanism behind the practicing child marriage beyond socioeconomic vulnerabilities. The impact of socio-cultural norms can be understood from in-depth field study.

Appendices

Appendix-1

District-level prevalence of child marriage in India, NFHS-4 (2015-16)

Districts	Child marriage (%)	Districts	Child marriage (%)	Districts	Child marriage (%)
Shrawasti	67.94	Aurangabad	46.16	Katihar	39.21
Godda	63.47	Prakasam	46.10	Bankura	39.00
Supaul	60.78	Morigaon	45.96	Ahmadnagar	38.98
Jamui	60.19	Vidisha	45.85	Purnia	38.95
Garhwa	58.77	Ujjain	45.54	Guntur	38.94
Madhepura	58.55	Siddharth Nagar	45.17	Datia	38.76
Begusarai	57.93	Dakshin Dinajpur	45.07	Sri Potti Sriramulu N	38.65
Bhilwara	57.21	Nalanda	44.63	Singrauli	38.42
Maldah	56.77	Parbhani	44.49	Rohtas	38.34
Jhabua	54.50	Sidhi	44.47	Sagar	38.11
Gaya	54.37	Rajsamand	44.46	Alirajpur	37.91
Mandsaur	53.95	Darbhanga	44.31	Nabarangapur	37.88
Chittaurgarh	53.61	Purba Champaran	44.08	Kurung Kumey	37.84
Murshidabad	53.50	Pashchim Champaran	44.03	Buldana	37.72
Nawada	53.08	Purba Medinipur	44.01	Sahibganj	37.67
Paschim Medinipur	52.64	Jamtara	43.85	Kaimur (Bhabua)	37.66
Giridih	52.55	Puruliya	43.74	Neemuch	37.63
Deoghar	52.26	Kurnool	43.48	The Dangs	37.59
Samastipur	52.25	Barpeta	43.16	Buxar	37.53
Sitamarhi	51.30	Nanded	43.14	Sheopur	37.47
Birbhum	51.28	Nadia	43.08	Darrang	37.44
Bid	51.25	Barwani	43.05	Dewas	37.43
Sheohar	51.13	Surguja	42.83	Satna	37.40
Sheikhpura	50.84	Madhubani	42.74	Bharatpur	37.33
Khagaria	50.43	Saharsa	42.66	Rewa	37.31
Kodarma	50.40	Jehanabad	42.64	Sehore	37.29
Gandhinagar	50.35	Nagaur	42.17	Dindori	37.18
Jalna	49.85	Koch Bihar	41.78	Latehar	37.14
Karauli	49.79	Kheda	41.65	Latur	37.08
Tikamgarh	49.46	Arwal	41.53	Sabarkantha	37.01
Lalitpur	49.29	Bongaigaon	41.51	Umaria	36.95
Chatra	49.01	Balrampur	41.50	Shivpuri	36.91
Araria	48.94	Mahbubnagar	41.32	Munger	36.88
South Twenty Four Par	48.80	Barddhaman	41.22	North Tripura	36.72
Lakhisarai	48.65	Pratapgarh	41.19	North Twenty Four Par	36.54
Gonda	48.61	Hingoli	41.18	Gurgaon	36.52
Jaisalmer	48.37	Pakur	41.10	Muzaffarpur	36.51
Mahrajganj	48.18	Nalgonda	40.89	Churu	36.39
Banka	48.04	Kokrajhar	40.87	Guna	36.34
Banaskantha	47.86	Bahraich	40.86	Jhalawar	36.30
Rajgarh	47.81	Alwar	40.84	Medak	36.25
Ratlam	47.78	Hazaribagh	40.79	Dhemaji	36.21
Vaishali	47.77	Udaipur	40.42	Koppal	35.88
Sawai Madhopur	47.68	Shahdol	40.12	Goalpara	35.79
Dumka	47.38	Dausa	40.09	Belgaum	35.67
Chhatarpur	47.27	Damoh	40.04	Budaun	35.66
Tonk	47.26	Mewat	39.95	Nagaon	35.59
Shajapur	47.15	Palamu	39.90	Solapur	35.58
Barmer	46.67	Uttar Dinajpur	39.66	South Tripura	35.46
Dhubri	46.20	Malkangiri	39.27	Ashoknagar	35.43

Districts	Child marriage (%)	Districts	Child marriage (%)	Districts	Child marriage (%)
Dhaulpur	35.36	Kolhapur	30.87	Etah	27.06
Bundi	35.13	Gopalganj	30.82	Gulbarga	27.02
Ajmer	35.04	Kawardha	30.71	Sangli	26.97
Patan	35.04	Mirzapur	30.66	Faizabad	26.94
Mayurbhanj	35.03	Bokaro	30.64	Dibrugarh	26.93
Bhojpur	34.89	Panna	30.61	Washim	26.85
Koraput	34.72	West Tripura	30.57	Burhanpur	26.62
Jodhpur	34.67	Daman	30.46	Chittoor	26.60
East Kameng	34.61	Kachchh	30.35	Pithoragarh	26.57
Jalpaiguri	34.49	Shahjahanpur	30.20	Panchmahal	26.56
Rayagada	34.42	West Godavari	30.13	Anjaw	26.35
Dhalai	34.35	Saran	29.97	Raichur	26.25
Jalgaon	34.22	Adilabad	29.92	Purbi Singhbhum	26.13
Aurangabad	34.20	Dhanbad	29.92	Peren	26.01
Dhule	33.97	Ganjam	29.82	Baleshwar	25.93
Kheri	33.87	Anuppur	29.79	Mahoba	25.91
Chandauli	33.72	Bhagalpur	29.70	West Nimar	25.91
Baran	33.71	Vizianagaram	29.63	West Kameng	25.90
Bhind	33.43	Yadgir	29.63	Harda	25.76
Bikaner	33.37	Mahamaya Nagar	29.47	Karbi Anglong	25.72
Saraikela Kharsawan	33.17	Jaipur	29.46	Tinsukia	25.65
Narmada	33.08	Dungarpur	29.44	Rajouri	25.64
Sonbhadra	33.03	Bellary	29.17	Haora	25.60
Sitapur	32.84	Visakhapatnam	29.17	Ghazipur	25.49
Dohad	32.83	Patna	29.14	Dhenkanal	25.44
Mahesana	32.60	Palwal	29.10	Sant Ravidas Nagar (B	25.41
Jalor	32.44	Theni	29.09	Longleng	25.39
Dhar	32.41	Chamarajanagar	29.01	Kishanganj	25.38
Chirang	32.40	Anantapur	28.98	Mathura	25.35
Khammam	32.40	Mandla	28.94	Gajapati	25.32
Bagalkot	32.20	Narsimhapur	28.90	Nalbari	25.22
Nashik	31.96	Raisen	28.90	Jaintia Hills	25.15
Lohit	31.92	Udalguri	28.58	Gadag	25.12
Hugli	31.90	Lohardaga	28.52	Gorakhpur	24.98
Bijapur	31.88	Banswara	28.29	Nizamabad	24.87
Sant Kabir Nagar	31.82	Basti	28.29	Lakhimpur	24.85
Jashpur	31.81	Y.S.R.	28.20	Siwan	24.72
East Godavari	31.59	Sibsagar	28.19	Surendranagar	24.68
Krishna	31.37	Lower Dibang Valley	28.05	North & Middle Andama	24.65
Nayagarh	31.28	Dharmapuri	27.90	Yanam	24.53
Pali	31.28	Morena	27.87	Pune	24.47
Kushinagar	31.16	Ranchi	27.80	Farrukhabad	24.35
Chitrakoot	31.13	Khunti	27.78	Bharuch	24.33
Katni	31.08	Ramgarh	27.69	Sikar	24.24
Osmanabad	31.08	Golaghat	27.65	Gumla	24.00
Korea (Koriya)	31.05	Warangal	27.64	Vadodara	23.98
Upper Subansiri	31.05	Kendujhar	27.59	West Khasi Hills	23.97
Kamrup	31.02	Dadra & Nagar Haveli	27.50	Jhunjhunun	23.78
Sirohi	30.98	Anand	27.42	Sonitpur	23.75
Karimganj	30.95	Baksa	27.41	Dharwad	23.70

Districts	Child marriage (%)	Districts	Child marriage (%)	Districts	Child marriage (%)
Davanagere	23.64	Yavatmal	20.78	Mahendragarh	18.71
Bhiwani	23.63	Jorhat	20.72	The Nilgiris	18.67
Krishnagiri	23.52	West Siang	20.6	Chandel	18.56
Srikakulam	23.45	Ribhoi	20.55	Madurai	18.45
Baudh	23.44	Senapati (Excluding 3	20.34	Mainpuri	18.43
Indore	23.44	Dindigul	20.30	Ghaziabad	18.32
Debagarh	23.42	Korba	20.24	Hoshangabad	18.30
Malappuram	23.34	Haveri	20.22	Janjgir - Champa	18.22
Papumpare	23.32	Ballia	20.21	Tamenglong	18.16
Aligarh	23.20	Dima Hasao	20.20	Chhindwara	18.14
Hanumangarh	23.06	Doda	20.18	Khordha	18.11
Rangareddy	22.95	Chitradurga	20.17	Kishtwar	18.08
Nandurbar	22.94	Bastar	20.11	Champhai	17.93
Hailakandi	22.93	Bageshwar	20.07	Mamit	17.80
South West	22.86	Chikkaballapura	20.07	Mumbai Suburban	17.79
Etawah	22.81	Kaushambi	20.03	Kaithal	17.78
Sultanpur	22.79	Viluppuram	19.99	Kullu	17.77
Rohtak	22.72	Valsad	19.93	Hisar	17.68
Satara	22.66	Virudhunagar	19.92	Navsari	17.61
Karur	22.57	East Garo Hills	19.91	Cuttack	17.55
Kinnaur	22.51	Coimbatore	19.87	Punch	17.48
Erode	22.38	Varanasi	19.86	Jind	17.44
Deoria	22.36	Ahmadabad	19.85	Thiruvallur	17.36
Thane	22.36	Tiruvannamalai	19.84	Seoni	17.34
Bidar	22.32	Kota	19.69	Hamirpur	17.33
Hardoi	22.30	Chandrapur	19.58	Bijapur	17.25
Firozabad	22.22	Mahasamund	19.55	Rajnandgaon	17.24
Jhansi	22.19	Salem	19.53	Lunglei	17.22
Mandya	22.18	Champawat	19.46	Porbandar	17.17
Mysore	22.17	Kolar	19.41	Tapi	17.15
Sonapur	22.16	Dakshin Bastar Dantew	19.39	Fatehabad	17.14
Jalaun	22.10	Dimapur	19.36	Tumkur	17.14
Kandhamal	22.09	Kanpur Dehat	19.35	Cachar	16.92
Anugul	22.02	Chikmagalur	19.28	Durg	16.91
Darjiling	21.85	Changlang	19.18	Reasi	16.87
Kamrup Metropolitan	21.69	Dibang Valley	19.14	Kiphire	16.75
Kalahandi	21.66	New Delhi	19.10	Kannauj	16.72
Faridabad	21.59	Nuapada	19.05	Jhajjar	16.67
Bara Banki	21.51	Auraiya	19.00	Narayanpur	16.66
Bilaspur	21.44	Raigarh	18.97	Surat	16.56
Raigarh	21.37	Ganganagar	18.96	Mon	16.53
Pashchimi Singhbhum	21.32	Raipur	18.91	Namakkal	16.49
Agra	21.25	Jaunpur	18.85	Allahabad	16.23
Rewari	21.14	West Garo Hills	18.84	Sirsa	16.04
Gwalior	21.02	Banda	18.80	North West	15.94
Ramanagara	21.02	Udham Singh Nagar	18.80	East District	15.75
Sonipat	20.99	Upper Siang	18.78	Tiruppur	15.71
Gautam Buddha Nagar	20.97	Jamnagar	18.76	South District	15.63
Kanshiram Nagar	20.96	East Nimar	18.74	Kolasib	15.51
Bangalore Rural	20.95	Bulandshahr	18.73	Sundargarh	15.51

Districts	Child marriage (%)	Districts	Child marriage (%)	Districts	Child marriage (%)
Hardwar	15.50	Chandigarh	12.66	Moradabad	9.29
Rajkot	15.44	Tuensang	12.62	Diu	9.18
Jabalpur	15.33	Palakkad	12.54	Phek	8.99
Ukhrul	15.29	Thoothukkudi	12.43	Shimla	8.94
South	15.23	Chamoli	12.32	Meerut	8.88
Uttara Kannada	15.21	Kancheepuram	12.30	Gadchiroli	8.84
Panipat	15.10	North District	12.25	East Khasi Hills	8.78
Nainital	15.09	Kendrapara	12.17	Dehradun	8.64
Cuddalore	15.03	Udhampur	12.17	Ratnagiri	8.62
Lawngtlai	14.95	Rae Bareli	12.13	Kupwara	8.59
Pilibhit	14.86	Sahibzada Ajit Singh	12.09	Muktsar	8.59
Simdega	14.72	Hyderabad	12.06	Karnal	8.57
Balangir	14.69	Saiha	12.06	Balaghat	8.56
Bhopal	14.69	Wokha	12.03	Dhamtari	8.48
Bishnupur	14.66	Vellore	12.01	Shahid Bhagat Singh N	8.40
Tiruchirappalli	14.60	North East	11.99	Chamba	8.38
Ramanathapuram	14.48	Ariyalur	11.96	Muzaffarnagar	8.37
Uttar Bastar Kanker	14.48	Jyotiba Phule Nagar	11.94	Puri	8.30
North	14.42	Sambalpur	11.80	Sindhudurg	8.29
Baghpat	14.31	Uttarkashi	11.64	Fatehgarh Sahib	8.25
Bhavnagar	14.30	Bangalore	11.63	Nicobars	8.25
Mandi	14.30	Solan	11.63	Yamunanagar	8.11
Fatehpur	14.22	Karaikal	11.56	Jajapur	8.08
South Andaman	14.09	Amreli	11.46	Shimoga	7.97
Amravati	14.02	Unnao	11.45	Samba	7.88
Mau	13.98	Pratapgarh	11.36	Kanpur Nagar	7.80
Perambalur	13.96	Jharsuguda	11.21	West	7.72
Thoubal	13.92	Ramban	11.13	Dakshina Kannada	7.70
Wayanad	13.80	Barnala	11.11	Tarn Taran	7.67
Lahul And Spiti	13.78	Panchkula	11.09	Wardha	7.67
Churachandpur	13.75	Azamgarh	11.03	Saharanpur	7.65
Bargarh	13.73	Moga	10.77	Ambala	7.63
Lower Subansiri	13.69	Kodagu	10.58	Ganderbal	7.62
Thanjavur	13.65	Junagadh	10.52	Sirmaur	7.56
Bilaspur	13.63	Mumbai	10.30	Firozpur	7.53
Tirap	13.50	Rudraprayag	10.30	Gurdaspur	7.49
Kolkata	13.43	Amritsar	10.28	Serchhip	7.33
Pudukkottai	13.37	Kannur	10.24	Thiruvarur	7.17
Karimnagar	13.35	South Garo Hills	10.22	Nagapattinam	7.08
Mansa	13.29	Tehri Garhwal	9.97	Kozhikode	7.06
Ambedkar Nagar	13.27	Kurukshetra	9.93	Tawang	7.06
Akola	13.21	Faridkot	9.92	Kathua	6.98
Hassan	13.16	Puducherry	9.92	Nagpur	6.97
Imphal East	13.15	Rampur	9.90	Jammu	6.86
East Siang	13.00	North Goa	9.89	Bijnor	6.75
West District	13.00	Jagatsinghapur	9.72	Hoshiarpur	6.71
Betul	12.94	Almora	9.67	Kapurthala	6.71
Bareilly	12.88	Lucknow	9.63	Ludhiana	6.37
Chennai	12.82	South Goa	9.60	Udupi	6.28
Sivaganga	12.77	Imphal West	9.46	Bhadrak	6.20

Districts	Child marriage (%)
Garhwal	6.19
Tirunelveli	6.00
Central	5.85
East	5.80
Kanniyakumari	5.74
Gondiya	5.72
Bathinda	5.71
Aizawl	5.67
Patiala	5.59
Bandipore	5.43
Zunheboto	5.43
Leh	5.24
Sangrur	5.06
Kargil	4.57
Jalandhar	4.55
Anantnag	4.49
Rupnagar	4.49
Bhandara	4.48
Mahe	4.16
Kasaragod	4.02
Una	3.97
Kollam	3.74
Idukki	3.69
Srinagar	3.65
Baramula	3.61
Kulgam	3.52
Mokokchung	3.23
Hamirpur	2.99
Shupiyan	2.92
Badgam	2.82
Thiruvananthapuram	2.58
Kohima	2.44
Kangra	2.41
Thrissur	2.31
Lakshadweep	1.88
Kottayam	1.34
Alappuzha	1.24
Pathanamthitta	1.17
Pulwama	0.69
Ernakulam	0.00

Source: Estimated from NFHS-4

Appendix-2A

Logistic regression results for the association between child marriage and reproductive health outcomes of ever-married women aged 15-49 years in India, 2015-16

Table 2.1: Logistic regression for the association between child marriage and at least one childbirth

Characteristics	At least one child born	
	Unadjusted OR (95% CI) n= 5,14,112	Adjusted OR (95% CI) n= 80,681
Age at marriage		
<18 years	2.292*** (2.249 - 2.337)	3.247*** (3.020 - 3.491)
18 or above ®		
Respondent's Current age (years)		
15-19 ®		
20-24		11.43*** (10.31 - 12.66)
25-29		37.82*** (33.78 - 42.34)
30-34		75.69*** (66.29 - 86.43)
35+		106.7*** (94.18 - 120.9)
Place of residence		
Urban ®		
Rural		0.985 (0.920 - 1.054)
Caste		
Scheduled caste/Scheduled tribe ®		
Other Backward Classes		1.05 (0.981 - 1.124)
Other		1.024 (0.942 - 1.114)
Religion		
Hindu ®		
Muslim		1.113** (1.019 - 1.215)
Christian		1.267** (1.044 - 1.537)
Other		1.169* (0.981 - 1.394)
Women's education		
No education ®		
Primary		1.073 (0.959 - 1.200)
Secondary		1.002 (0.912 - 1.101)
Higher		0.646*** (0.571 - 0.731)
Partner's education		
No education ®		
Primary		1.218*** (1.082 - 1.371)
Secondary		1.252*** (1.132 - 1.384)
Higher		0.979 (0.865 - 1.108)
Region		
North ®		
Central		1.206*** (1.095 - 1.330)
East		1.419*** (1.279 - 1.574)
Northeast		1.307*** (1.082 - 1.579)
West		1.068 (0.966 - 1.181)
South		1.225*** (1.109 - 1.353)
Spousal age gap (years)		
≤4 ®		
5 to 9		1.236*** (1.162 - 1.315)
≥10		1.045 (0.950 - 1.150)
Modern method of contraception use		
No ®		
Yes		10.14*** (9.201 - 11.18)
Current working status		
Not working ®		
Working		0.825*** (0.765 - 0.889)
Wealth index		
Poorest ®		
Poorer		0.915* (0.826 - 1.013)
Middle		0.841*** (0.753 - 0.940)

| | Richer | 0.838*** (0.742 - 0.946) |
| | Richest | 0.760*** (0.664 - 0.870) |

Exposure to mass media
  No exposure ®

Partial		0.902** (0.824 - 0.988)
Full		0.802*** (0.707 - 0.910)
Constant	6.174*** (6.108 - 6.240)	0.114*** (0.0948 - 0.136)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.2: Logistics regression for the association between child marriage and three or more childbirth

Characteristics	Three or more children born	
	Unadjusted OR (95% CI) n= 5,14,112	Adjusted OR (95% CI) n= 80,681
Age at marriage		
<18 years	3.033*** (2.999 - 3.069)	2.563*** (2.470 - 2.661)
18 or above ®		
Respondent's current age (years)		
15-19 ®		
20-24		24.15*** (13.62 - 42.81)
25-29		148.0*** (83.72 - 261.5)
30-34		330.1*** (186.7 - 583.5)
35+		650.1*** (367.9 - 1,149)
Place of residence		
Urban ®		
Rural		0.988 (0.944 - 1.033)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other Backward Classes		0.868*** (0.831 - 0.907)
Other		0.672*** (0.637 - 0.709)
Religion		
Hindu ®		
Muslim		2.383*** (2.248 - 2.527)
Christian		1.241*** (1.098 - 1.402)
Other		0.855*** (0.769 - 0.951)
Women's education		
No education ®		
Primary		0.751*** (0.711 - 0.793)
Secondary		0.530*** (0.504 - 0.558)
Higher		0.209*** (0.188 - 0.232)
Partner's education		
No education ®		
Primary		0.96 (0.903 - 1.020)
Secondary		0.915*** (0.867 - 0.966)
Higher		0.703*** (0.646 - 0.764)
Region		
North ®		
Central		1.339*** (1.254 - 1.429)
East		0.760*** (0.710 - 0.813)
Northeast		0.670*** (0.595 - 0.754)
West		0.743*** (0.695 - 0.794)
South		0.370*** (0.346 - 0.395)
Spousal age gap (years)		
≤4 ®		
5 to 9		0.926*** (0.890 - 0.964)
≥10		0.744*** (0.703 - 0.788)
Modern method of contraception use		
No ®		
Yes		1.580*** (1.521 - 1.641)

Current working status		
Not working ®		
Working		0.984 (0.943 - 1.026)
Wealth index		
Poorest ®		
Poorer		0.880*** (0.826 - 0.937)
Middle		0.708*** (0.661 - 0.758)
Richer		0.547*** (0.507 - 0.589)
Richest		0.409*** (0.375 - 0.446)
Exposure to mass media		
No exposure ®		
Partial exposure		0.764*** (0.724 - 0.807)
Full exposure		0.713*** (0.651 - 0.781)
Constant	0.362*** (0.359 - 0.365)	0.00545*** (0.00306 - 0.00968)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.3: Logistic regression for the association between child marriage and death of child

	Death of child	
Characteristics	Unadjusted OR (95% CI) n= 5,14,112	Adjusted OR (95% CI) n= 80,681
Age at marriage		
<18 years	2.327*** (2.288 - 2.367)	1.631*** (1.555 - 1.710)
18 or above ®		
Respondent's current age (years)		
15-19 ®		
20-24		3.830*** (2.878 - 5.097)
25-29		6.345*** (4.791 - 8.402)
30-34		9.544*** (7.211 - 12.63)
35+		15.16*** (11.48 - 20.02)
Place of residence		
Urban ®		
Rural		1.013 (0.954 - 1.076)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other Backward Classes		0.97 (0.921 - 1.022)
Other		0.896*** (0.836 - 0.961)
Religion		
Hindu ®		
Muslim		1.031 (0.959 - 1.109)
Christian		0.98 (0.820 - 1.171)
Other		0.991 (0.855 - 1.149)
Women's education		
No education ®		
Primary		0.866*** (0.810 - 0.924)
Secondary		0.626*** (0.586 - 0.669)
Higher		0.381*** (0.326 - 0.446)
Partner's education		
No education ®		
Primary		0.928** (0.868 - 0.992)
Secondary		0.827*** (0.778 - 0.879)
Higher		0.647*** (0.576 - 0.726)
Region		
North ®		
Central		1.443*** (1.336 - 1.559)
East		0.914** (0.841 - 0.993)
Northeast		0.819** (0.700 - 0.959)
West		0.719*** (0.657 - 0.787)
South		0.590*** (0.540 - 0.645)
Spousal age gap (years)		

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≤4 ®		
5 to 9		0.978 (0.931 - 1.028)
≥10		0.955 (0.887 - 1.028)
Modern method of contraception use		
No ®		
Yes		0.878*** (0.837 - 0.920)
Current working status		
Not working ®		
Working		1.090*** (1.036 - 1.146)
Wealth index		
Poorest ®		
Poorer		0.908*** (0.850 - 0.970)
Middle		0.730*** (0.676 - 0.789)
Richer		0.615*** (0.562 - 0.673)
Richest		0.471*** (0.422 - 0.526)
Exposure to mass media		
No exposure ®		
Partial exposure		0.933** (0.880 - 0.990)
Full exposure		0.943 (0.832 - 1.068)
Constant	0.0885*** (0.0873 - 0.0897)	0.0271*** (0.0202 - 0.0365)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.4: Logistics regression for the association between child marriage and childbirth in 1st year of marriage

Characteristics	Childbirth in 1st year of marriage	
	Unadjusted OR (95% CI) n= 4,25,283	Adjusted OR (95% CI) n= 70,717
Age at marriage		
<18 years	0.480*** (0.473 - 0.487)	0.495*** (0.476 - 0.516)
18 or above ®		
Respondent's current age (years)		
15-19 ®		
20-24		0.602*** (0.521 - 0.696)
25-29		0.438*** (0.379 - 0.505)
30-34		0.364*** (0.315 - 0.422)
35+		0.326*** (0.282 - 0.376)
Place of residence		
Urban ®		
Rural		0.916*** (0.876 - 0.957)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other Backward Classes		0.966 (0.923 - 1.012)
Other		1.005 (0.951 - 1.061)
Religion		
Hindu ®		
Muslim		1.385*** (1.308 - 1.466)
Christian		1.428*** (1.286 - 1.585)
Other		1.372*** (1.240 - 1.519)
Women's education		
No education ®		
Primary		1.137*** (1.066 - 1.213)
Secondary		1.243*** (1.172 - 1.317)
Higher		1.254*** (1.149 - 1.368)
Partner's education		
No education ®		
Primary		0.996 (0.929 - 1.066)
Secondary		0.984 (0.925 - 1.046)
Higher		0.850*** (0.782 - 0.925)
Region		

North ®		
Central		0.770*** (0.718 - 0.826)
East		0.972 (0.905 - 1.043)
Northeast		1.371*** (1.221 - 1.539)
West		0.964 (0.900 - 1.031)
South		1.532*** (1.436 - 1.635)
Spousal age gap (years)		
≤4 ®		
5 to 9		1.122*** (1.078 - 1.168)
≥10		1.134*** (1.071 - 1.201)
Modern method of contraception use		
No ®		
Yes		1.245*** (1.197 - 1.294)
Current working status		
Not working ®		
Working		1.060*** (1.014 - 1.108)
Wealth index		
Poorest ®		
Poorer		1.005 (0.935 - 1.080)
Middle		1.065 (0.987 - 1.149)
Richer		1.112** (1.025 - 1.207)
Richest		1.105** (1.008 - 1.211)
Exposure to mass media		
No exposure ®		
Partial exposure		1.157*** (1.086 - 1.232)
Full exposure		1.224*** (1.119 - 1.338)
Constant	0.376*** (0.372 - 0.379)	0.558*** (0.469 - 0.664)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.5: Logistic regression for the association between child marriage and unwanted children

Characteristics	Last child unwanted	
	Unadjusted OR (95% CI) n= 1,86,749	Adjusted OR (95% CI) n= 30,602
Age at marriage		
<18 years	1.316*** (1.275 - 1.359)	1.292*** (1.182 - 1.412)
18 or above ®		
Current age (years)		
15-19 ®		
20-24		1.325** (1.001 - 1.756)
25-29		1.667*** (1.259 - 2.207)
30-34		2.094*** (1.569 - 2.793)
35+		3.385*** (2.521 - 4.546)
Place of residence		
Urban ®		
Rural		0.832*** (0.747 - 0.927)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other Backward Classes		0.994 (0.900 - 1.098)
Other		1.309*** (1.158 - 1.480)
Religion		
Hindu ®		
Muslim		1.074 (0.953 - 1.210)
Christian		1.17 (0.845 - 1.620)
Other		0.811 (0.604 - 1.087)
Women's education		
No education ®		
Primary		0.969 (0.845 - 1.111)
Secondary		0.923 (0.815 - 1.044)
Higher		1.113 (0.914 - 1.355)

Partner's education		
No education ®		
Primary		1.174** (1.017 - 1.354)
Secondary		1.210*** (1.065 - 1.375)
Higher		0.989 (0.816 - 1.199)
Region		
North ®		
Central		1.267*** (1.106 - 1.450)
East		0.996 (0.862 - 1.150)
Northeast		0.562*** (0.417 - 0.757)
West		0.618*** (0.523 - 0.730)
South		0.387*** (0.323 - 0.464)
Spousal age gap (years)		
≤4 ®		
5 to 9		1.029 (0.939 - 1.126)
≥10		1.087 (0.938 - 1.259)
Modern method of contraception use		
No ®		
Yes		1.061 (0.973 - 1.156)
Current working status		
Not working ®		
Working		1.093 (0.982 - 1.216)
Wealth index		
Poorest ®		
Poorer		1.083 (0.958 - 1.225)
Middle		0.942 (0.815 - 1.089)
Richer		0.691*** (0.582 - 0.822)
Richest		0.567*** (0.462 - 0.696)
Exposure to mass media		
No exposure ®		
Partial exposure		1.051 (0.940 - 1.175)
Full exposure		1.446*** (1.198 - 1.745)
Constant	0.0897*** (0.0878 - 0.0917)	0.0566*** (0.0398 - 0.0805)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.6: Logistic regression for the association between child marriage and pregnancy termination ever

	Pregnancy termination ever	
Characteristics	Unadjusted OR (95% CI) n= 5,14,112	Adjusted OR (95% CI) n= 80,681
Age at marriage		
<18 years	1.068*** (1.052 - 1.084)	1.190*** (1.143 - 1.240)
18 or above ®		
Respondent's current age (years)		
15-19 ®		
20-24		2.253*** (1.934 - 2.625)
25-29		3.136*** (2.698 - 3.645)
30-34		3.978*** (3.420 - 4.626)
35+		3.615*** (3.113 - 4.196)
Place of residence		
Urban ®		
Rural		0.810*** (0.773 - 0.848)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other Backward Classes		1.04 (0.992 - 1.091)
Other		1.169*** (1.105 - 1.237)
Religion		
Hindu ®		
Muslim		1.218*** (1.149 - 1.291)

Christian		0.95 (0.834 - 1.082)
Other		0.807*** (0.712 - 0.914)
Women's education		
No education ®		
Primary		1.179*** (1.107 - 1.256)
Secondary		1.240*** (1.170 - 1.314)
Higher		0.939 (0.855 - 1.031)
Partner's education		
No education ®		
Primary		1.095** (1.022 - 1.174)
Secondary		1.197*** (1.126 - 1.272)
Higher		1.082* (0.993 - 1.180)
Region		
North ®		
Central		1.270*** (1.189 - 1.357)
East		1.028 (0.959 - 1.103)
Northeast		1.091 (0.963 - 1.235)
West		0.648*** (0.603 - 0.697)
South		0.767*** (0.716 - 0.822)
Spousal age gap (years)		
≤4 ®		
5 to 9		1.028 (0.987 - 1.072)
≥10		0.985 (0.926 - 1.047)
Modern method of contraception use		
No ®		
Yes		0.783*** (0.752 - 0.815)
Current working status		
Not working ®		
Working		1.242*** (1.188 - 1.298)
Wealth index		
Poorest ®		
Poorer		1.047 (0.978 - 1.121)
Middle		0.994 (0.923 - 1.071)
Richer		1.044 (0.964 - 1.132)
Richest		1.038 (0.948 - 1.137)
Exposure to mass media		
No exposure ®		
Partial exposure		1.172*** (1.104 - 1.245)
Full exposure		1.131*** (1.032 - 1.239)
Constant	0.179*** (0.177 - 0.181)	0.0451*** (0.0378 - 0.0538)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Association between child marriage and utilization of maternal health care services among ever-married women aged 15-49 years who had live birth during last 5 years preceding the survey in India

Table 2.7: Logistic regression for the association between child marriage and at least 4 ANC

Predictors	At least 4 ANC	
	Unadjusted OR (95% CI) n= 1,85,001	Adjusted OR (95% CI) n=30,796
Age at marriage		
<18 years	0.527*** (0.517 - 0.537)	0.824*** (0.777 - 0.873)
≥18 years ®		
Place of residence		
Urban ®		
Rural		0.891*** (0.833 - 0.952)
Respondent's current age (years)		
15-19 ®		
20-24		0.905 (0.781 - 1.049)
25-29		0.834** (0.719 - 0.968)
30-34		0.789*** (0.675 - 0.923)
35+		0.729*** (0.615 - 0.864)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		0.711*** (0.667 - 0.758)
Other		1.018 (0.940 - 1.102)
Religion		
Hindu ®		
Muslim		1.022 (0.943 - 1.108)
Other		0.763*** (0.633 - 0.920)
Region		1.581*** (1.336 - 1.872)
North ®		
Central		0.684*** (0.626 - 0.748)
East		1.254*** (1.144 - 1.375)
Northeast		1.480*** (1.259 - 1.740)
West		2.647*** (2.395 - 2.925)
South		3.980*** (3.600 - 4.400)
Women's educational level		
No education ®		
Primary		1.400*** (1.278 - 1.534)
Secondary		1.619*** (1.494 - 1.754)
Higher		2.190*** (1.933 - 2.481)
Partner's educational level		
No education ®		
Primary		1.251*** (1.134 - 1.380)
Secondary		1.147*** (1.052 - 1.251)
Higher		1.094 (0.970 - 1.234)
Respondent's current working status		
Not working ®		
Working		1.048 (0.975 - 1.126)
Exposure to mass media		
No exposure ®		
Partial exposure		1.667*** (1.545 - 1.798)
Full exposure		1.392*** (1.230 - 1.576)
Wealth index		
Poorest ®		
Poorer		1.359*** (1.248 - 1.480)
Middle		1.748*** (1.591 - 1.922)
Richer		2.305*** (2.070 - 2.567)
Richest		3.103*** (2.733 - 3.522)
Constant	1.386*** (1.369 - 1.402)	0.327*** (0.267 - 0.400)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.8: Logistic regression for the association between child marriage and ANC within first trimester

Predictors	ANC within first trimester	
	Unadjusted OR (95% CI) n= 1,54,112	Adjusted OR (95% CI) n=26,010
Age at marriage		
<18 years	0.684*** (0.668 - 0.699)	0.814*** (0.765 - 0.867)
≥18 years ®		
Place of residence		
Urban ®		
Rural		1.096** (1.020 - 1.178)
Respondent's current age (years)		
15-19 ®		
20-24		1.011 (0.865 - 1.182)
25-29		0.986 (0.842 - 1.153)
30-34		1.033 (0.875 - 1.220)
35+		0.829** (0.692 - 0.993)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.082** (1.011 - 1.157)
Other		1.032 (0.948 - 1.124)
Religion		
Hindu ®		
Muslim		1.07 (0.981 - 1.168)
Other		1.027 (0.844 - 1.250)
Region		1.014 (0.849 - 1.211)
North ®		
Central		0.742*** (0.672 - 0.820)
East		0.820*** (0.740 - 0.910)
Northeast		0.793*** (0.668 - 0.942)
West		1.361*** (1.217 - 1.523)
South		1.207*** (1.084 - 1.343)
Women's educational level		
No education ®		
Primary		1.039 (0.942 - 1.146)
Secondary		1.182*** (1.083 - 1.289)
Higher		1.270*** (1.112 - 1.451)
Partner's educational level		
No education ®		
Primary		0.866*** (0.780 - 0.960)
Secondary		1.057 (0.963 - 1.160)
Higher		1.089 (0.957 - 1.240)
Respondent's current working status		
Not working ®		
Working		1.049 (0.971 - 1.132)
Exposure to mass media		
No exposure®		
Partial exposure		1.178*** (1.086 - 1.279)
Full exposure		1.088 (0.952 - 1.244)
Wealth index		
Poorest ®		
Poorer		0.99 (0.905 - 1.084)
Middle		1.262*** (1.141 - 1.397)
Richer		1.486*** (1.324 - 1.669)
Richest		1.963*** (1.711 - 2.253)
Constant	2.749*** (2.710 - 2.789)	1.528*** (1.229 - 1.900)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.9: Logistic regression for the association between child marriage and institutional delivery

Predictors	Unadjusted OR (95% CI) n= 1,86,301	Adjusted OR (95% CI) n=30,983
Age at marriage		
>18 years	0.465*** (0.454 - 0.476)	0.741*** (0.692 - 0.794)
≥18 years ®		
Place of residence		
Urban ®		
Rural		0.982 (0.892 - 1.080)
Respondent's current age (years)		
15-19 ®		
20-24		0.785** (0.644 - 0.958)
25-29		0.625*** (0.513 - 0.762)
30-34		0.607*** (0.494 - 0.747)
35+		0.464*** (0.374 - 0.575)
Caste		
Scheduled Caste/Scheduled tribe ®		
Other backward class		1.140*** (1.056 - 1.231)
Other		1.271*** (1.141 - 1.415)
Religion		
Hindu ®		
Muslim		0.555*** (0.505 - 0.610)
Other		0.612*** (0.473 - 0.792)
Region		0.820* (0.657 - 1.022)
North ®		
Central		0.719*** (0.641 - 0.806)
East		0.835*** (0.743 - 0.939)
Northeast		0.732*** (0.600 - 0.893)
West		1.566*** (1.354 - 1.811)
South		5.248*** (4.334 - 6.353)
Women's educational level		
No education ®		
Primary		1.126** (1.020 - 1.244)
Secondary		1.503*** (1.369 - 1.650)
Higher		2.965*** (2.356 - 3.732)
Partner's educational level		
No education ®		
Primary		1.183*** (1.070 - 1.308)
Secondary		1.418*** (1.296 - 1.552)
Higher		1.807*** (1.515 - 2.155)
Respondent's current working status		
Not working ®		
Working		0.735*** (0.676 - 0.800)
Exposure to mass media		
No exposure ®		
Partial exposure		1.237*** (1.141 - 1.340)
Full exposure		1.468*** (1.203 - 1.792)
Wealth index		
Poorest ®		
Poorer		1.418*** (1.296 - 1.550)
Middle		1.717*** (1.536 - 1.919)
Richer		2.235*** (1.941 - 2.572)
Richest		4.063*** (3.334 - 4.951)
Constant	6.245*** (6.138 - 6.353)	2.742*** (2.120 - 3.548)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 2.10: Logistic regression for the association between child marriage and delivery by skilled health personnel

Predictors	Delivery by skilled health personnel	
	Unadjusted OR (95% CI) n= 1,86,749	Adjusted OR (95% CI) n=31,062
Age at marriage		
<18 years	0.490*** (0.478 - 0.503)	0.770*** (0.717 - 0.826)
≥18 years ®		
Place of residence		
Urban ®		
Rural		0.98 (0.888 - 1.080)
Respondent's current age (years)		
15-19 ®		
20-24		0.872 (0.714 - 1.065)
25-29		0.720*** (0.590 - 0.879)
30-34		0.698*** (0.567 - 0.860)
35+		0.552*** (0.445 - 0.685)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.154*** (1.068 - 1.248)
Other		1.162*** (1.042 - 1.296)
Religion		
Hindu ®		
Muslim		0.614*** (0.557 - 0.676)
Other		0.592*** (0.460 - 0.762)
Region		1.05 (0.825 - 1.338)
North ®		
Central		0.657*** (0.583 - 0.740)
East		0.857** (0.758 - 0.970)
Northeast		0.688*** (0.561 - 0.844)
West		1.219*** (1.052 - 1.412)
South		3.428*** (2.859 - 4.110)
Women's educational level		
No education ®		
Primary		1.287*** (1.161 - 1.427)
Secondary		1.525*** (1.386 - 1.678)
Higher		2.874*** (2.290 - 3.608)
Partner's educational level		
No education ®		
Primary		1.115** (1.006 - 1.236)
Secondary		1.301*** (1.186 - 1.426)
Higher		1.503*** (1.261 - 1.793)
Respondent's current working status		
Not working ®		
Working		0.755*** (0.694 - 0.822)
Exposure to mass media		
No exposure ®		
Partial exposure		1.236*** (1.138 - 1.342)
Full exposure		1.334*** (1.096 - 1.623)
Wealth index		
Poorest ®		
Poorer		1.354*** (1.236 - 1.483)
Middle		1.758*** (1.568 - 1.971)
Richer		2.256*** (1.953 - 2.605)
Richest		4.061*** (3.321 - 4.967)
Constant	7.005*** (6.881 - 7.131)	3.013*** (2.319 - 3.916)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.11: Logistic regression for the association between child marriage and postnatal check-up within six weeks of delivery

Predictors	Postnatal check-up within six weeks of delivery	
	Unadjusted OR (95% CI) n= 1,85,437	Adjusted OR (95% CI) n=30,861
Age at marriage		
<18 years	0.550*** (0.540 - 0.561)	0.794*** (0.752 - 0.840)
≥18 years ®		
Place of residence		
Urban ®		
Rural		0.97 (0.908 - 1.037)
Respondent's current age (years)		
15-19 ®		
20-24		0.98 (0.849 - 1.131)
25-29		0.886 (0.767 - 1.024)
30-34		0.850** (0.731 - 0.989)
35+		0.772*** (0.656 - 0.909)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.03 (0.969 - 1.094)
Other		1.081** (1.000 - 1.169)
Religion ®		
Hindu		
Muslim		0.749*** (0.694 - 0.809)
Other		0.917 (0.760 - 1.107)
Region		1.393*** (1.172 - 1.655)
North ®		
Central		0.791*** (0.724 - 0.864)
East		0.823*** (0.751 - 0.901)
Northeast		0.908 (0.772 - 1.068)
West		1.245*** (1.127 - 1.375)
South		2.073*** (1.873 - 2.294)
Women's educational level		
No education ®		
Primary		1.096** (1.006 - 1.194)
Secondary		1.268*** (1.175 - 1.368)
Higher		1.506*** (1.329 - 1.705)
Partner's educational level		
No education ®		
Primary		1.227*** (1.121 - 1.342)
Secondary		1.403*** (1.296 - 1.519)
Higher		1.454*** (1.294 - 1.634)
Respondent's current working status		
Not working ®		
Working		0.967 (0.903 - 1.035)
Exposure to mass media		
No exposure ®		
Partial exposure		1.286*** (1.199 - 1.379)
Full exposure		1.145** (1.014 - 1.294)
Wealth index		
Poorest ®		
Poorer		1.291*** (1.194 - 1.396)
Middle		1.499*** (1.371 - 1.639)
Richer		1.851*** (1.668 - 2.053)
Richest		2.519*** (2.223 - 2.855)
Constant	2.076*** (2.050 - 2.103)	0.769*** (0.633 - 0.934)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Association between child marriage and nutrition and anaemia status of women aged 15-49 years in India, 2015-16

Table 2.12: Logistic regression for the association between child marriage and nutritional status

Characteristics	Unadjusted OR (95% CI) N= 4,79,846	Adjusted OR (95% CI) N= 79,086
Age at marriage		
<18 years	1.286*** (1.268 - 1.305)	0.935*** (0.898 - 0.972)
≥18 years ®		
Respondent's current age (years)		
15-19 ®		1
20-24		0.843*** (0.771 - 0.921)
25-29		0.575*** (0.526 - 0.629)
30-34		0.429*** (0.391 - 0.472)
35+		0.340*** (0.310 - 0.373)
Total children ever born		
≤2 ®		
≥3		1.191*** (1.136 - 1.248)
Place of residence		
Urban ®		
Rural		1.195*** (1.136 - 1.257)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward class		0.928*** (0.889 - 0.969)
Other		0.841*** (0.793 - 0.890)
Religion		
Hindu ®		
Muslim		0.841*** (0.788 - 0.897)
Christian		0.596*** (0.507 - 0.700)
Other		0.754*** (0.666 - 0.854)
Women's education		
No education ®		
Primary		0.862*** (0.813 - 0.914)
Secondary		0.796*** (0.754 - 0.840)
Higher		0.695*** (0.627 - 0.771)
Partner's education		
No education ®		
Primary		0.903*** (0.850 - 0.959)
Secondary		0.922*** (0.875 - 0.973)
Higher		0.861*** (0.788 - 0.940)
Region		
North ®		
Central		0.962 (0.898 - 1.031)
East		0.962 (0.897 - 1.032)
Northeast		0.942 (0.832 - 1.067)
West		1.503*** (1.399 - 1.614)
South		0.836*** (0.777 - 0.900)
Wealth index		
Poorest ®		
Poorer		0.727*** (0.689 - 0.766)
Middle		0.539*** (0.508 - 0.572)
Richer		0.379*** (0.352 - 0.407)
Richest		0.233*** (0.212 - 0.256)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 2.13: Logistic regression for the association between child marriage and anaemia status of women

Characteristics	Unadjusted OR (95% CI) N= 5,04,689	Adjusted OR (95% CI) N= 83,263
Age at marriage		
<18 years	1.102*** (1.090 - 1.114)	0.989 (0.960 - 1.019)
≥18 years ®		
Respondent's current age (years)		
15-19 ®		
20-24		0.995 (0.917 - 1.079)
25-29		0.904** (0.835 - 0.980)
30-34		0.845*** (0.779 - 0.917)
35+		0.839*** (0.774 - 0.909)
Total children ever born		
≤2 ®		
≥3		1.086*** (1.049 - 1.124)
Place of residence		
Urban ®		
Rural		0.977 (0.944 - 1.011)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward class		0.874*** (0.845 - 0.904)
Other		0.808*** (0.776 - 0.842)
Religion		
Hindu ®		
Muslim		0.869*** (0.830 - 0.909)
Christian		0.900** (0.823 - 0.986)
Other		1.076* (0.990 - 1.170)
Women's education		
No education ®		
Primary		0.953** (0.910 - 0.998)
Secondary		0.926*** (0.889 - 0.966)
Higher		0.883*** (0.826 - 0.944)
Partner's education		
No education ®		
Primary		0.961 (0.915 - 1.010)
Secondary		0.960* (0.920 - 1.002)
Higher		0.910*** (0.856 - 0.968)
Region		
North ®		
Central		0.955* (0.908 - 1.004)
East		1.217*** (1.155 - 1.281)
Northeast		0.835*** (0.761 - 0.915)
West		0.904*** (0.859 - 0.951)
South		1.011 (0.962 - 1.062)
Wealth index		
Poorest ®		
Poorer		0.914*** (0.872 - 0.958)
Middle		0.886*** (0.842 - 0.931)
Richer		0.873*** (0.826 - 0.922)
Richest		0.766*** (0.719 - 0.816)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Appendix-3A

Association between child marriage and nutritional outcomes, anaemia, low birth weight, and small/very small birth size of children under-5 in India

Table 3.1: Logistic regression for the association between child marriage and stunting of children

Predictor	Stunting	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.463*** (1.437 - 1.489)	1.060*** (1.039 - 1.082)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		2.873*** (2.782 - 2.968)
2-2.9		2.879*** (2.787 - 2.975)
3-3.9		2.884*** (2.791 - 2.980)
4-4.9		2.461*** (2.380 - 2.545)
Sex of child		
Male ®		
Female		0.937*** (0.919 - 0.954)
Place of residence		
Urban ®		
Rural		0.946*** (0.923 - 0.971)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		0.940*** (0.920 - 0.961)
Other		0.783*** (0.761 - 0.807)
Religion		
Hindu ®		
Muslim		1.105*** (1.074 - 1.137)
Christian		0.936* (0.869 - 1.008)
Other		0.975 (0.919 - 1.034)
Region		
North ®		
Central		1.178*** (1.140 - 1.217)
East		0.940*** (0.908 - 0.973)
Northeast		0.765*** (0.717 - 0.817)
West		1.063*** (1.023 - 1.104)
South		0.845*** (0.814 - 0.876)
Age of the mother (years)		
15-19 ®		
20-24		1.087*** (1.020 - 1.158)
25-29		1.074** (1.007 - 1.145)
30-34		1.056 (0.988 - 1.129)
35+		1.116*** (1.039 - 1.199)
Mother's education level		
No education ®		
Primary		0.846*** (0.821 - 0.872)
Secondary		0.686*** (0.669 - 0.704)
Higher		0.508*** (0.486 - 0.531)
BMI of mother		
Thin ®		
Normal		0.827*** (0.809 - 0.846)
Obese		0.654*** (0.632 - 0.676)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.838*** (0.815 - 0.861)
Middle		0.699*** (0.677 - 0.721)
Richer		0.556*** (0.536 - 0.576)
Richest		0.439*** (0.420 - 0.459)
Constant	0.536*** (0.530 - 0.542)	0.593*** (0.547 - 0.642)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 3.2: Logistic regression for the association between child marriage and wasting of children

Predictor	Wasting	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.009 (0.988 - 1.031)	0.957*** (0.934 - 0.980)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		0.650*** (0.629 - 0.671)
2-2.9		0.555*** (0.537 - 0.575)
3-3.9		0.511*** (0.494 - 0.529)
4-4.9		0.508*** (0.491 - 0.526)
Sex of child		
Male ®		
Female		0.888*** (0.869 - 0.907)
Place of residence		
Urban ®		
Rural		0.917*** (0.891 - 0.944)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		0.934*** (0.910 - 0.958)
Other		0.888*** (0.858 - 0.918)
Religion		
Hindu ®		
Muslim		0.959** (0.927 - 0.991)
Christian		1.037 (0.954 - 1.128)
Other		0.946 (0.885 - 1.011)
Region		
North ®		
Central		0.906*** (0.872 - 0.941)
East		0.947*** (0.911 - 0.985)
Northeast		0.636*** (0.586 - 0.690)
West		1.365*** (1.308 - 1.424)
South		1.017 (0.975 - 1.061)
Age of the mother (years)		
15-19 ®		
20-24		1.166*** (1.089 - 1.248)
25-29		1.172*** (1.094 - 1.257)
30-34		1.203*** (1.118 - 1.294)
35+		1.274*** (1.177 - 1.378)
Mother's education level		
No education ®		
Primary		0.960** (0.926 - 0.995)
Secondary		0.966** (0.937 - 0.996)
Higher		0.905*** (0.862 - 0.950)
BMI of mother		
Thin ®		
Normal		0.729*** (0.711 - 0.747)
Obese		0.499*** (0.479 - 0.519)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.884*** (0.856 - 0.913)
Middle		0.800*** (0.771 - 0.830)
Richer		0.781*** (0.749 - 0.815)
Richest		0.739*** (0.702 - 0.778)
Constant	0.268*** (0.264 - 0.272)	0.720*** (0.659 - 0.786)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 3.3: Logistic regression for the association between child marriage and underweight of child

Predictor	Underweight	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.399*** (1.374 - 1.424)	1.018* (0.997 - 1.039)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		1.402*** (1.358 - 1.446)
2-2.9		1.625*** (1.574 - 1.677)
3-3.9		1.652*** (1.601 - 1.705)
4-4.9		1.696*** (1.642 - 1.752)
Sex of child		
Male ®		
Female		0.949*** (0.932 - 0.968)
Place of residence		
Urban ®		
Rural		0.891*** (0.869 - 0.914)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward class		0.916*** (0.896 - 0.936)
Other		0.792*** (0.768 - 0.815)
Religion		
Hindu ®		
Muslim		1.034** (1.005 - 1.064)
Christian		0.989 (0.917 - 1.067)
Others		0.972 (0.916 - 1.033)
Region		
North ®		
Central		1.197*** (1.158 - 1.237)
East		1.048*** (1.012 - 1.084)
North-east		0.604*** (0.563 - 0.647)
West		1.346*** (1.295 - 1.398)
South		0.965* (0.929 - 1.002)
Age of the mother		
15-19 ®		
20-24		1.104*** (1.037 - 1.174)
25-29		1.091*** (1.024 - 1.162)
30-34		1.092*** (1.022 - 1.166)
35+		1.125*** (1.048 - 1.207)
Mother's education level		
No education ®		
Primary		0.867*** (0.842 - 0.894)
Secondary		0.739*** (0.721 - 0.759)
Higher		0.534*** (0.511 - 0.559)
BMI of mother		
Thin ®		
Normal		0.637*** (0.623 - 0.651)
Obese		0.432*** (0.417 - 0.447)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.831*** (0.808 - 0.854)
Middle		0.677*** (0.656 - 0.699)
Richer		0.565*** (0.545 - 0.586)
Richest		0.443*** (0.423 - 0.464)
Constant	0.489*** (0.483 - 0.495)	0.985 (0.910 - 1.067)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

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Table 3.4: Logistic regression for the association between child marriage and anaemia of children

Predictor	Anaemia	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.140*** (1.119 - 1.161)	1.019* (0.998 - 1.041)
≥18 years ®		
Current age of child (years)		
< 1.0 ®		
1-1.9		1.124*** (1.083 - 1.166)
2-2.9		0.766*** (0.738 - 0.795)
3-3.9		0.494*** (0.476 - 0.512)
4-4.9		0.359*** (0.346 - 0.372)
Sex of child		
Male ®		
Female		1.004 (0.985 - 1.023)
Place of residence		
Urban ®		
Rural		0.923*** (0.900 - 0.946)
Caste		
Scheduled Caste/Scheduled tribe ®		
Other backward classes		0.909*** (0.888 - 0.930)
Other		0.859*** (0.834 - 0.885)
Religion		
Hindu ®		
Muslim		1.090*** (1.059 - 1.122)
Christian		0.844*** (0.786 - 0.906)
Other		1.057* (0.997 - 1.119)
Region		
North ®		
Central		0.953*** (0.921 - 0.985)
East		0.790*** (0.763 - 0.818)
Northeast		0.341*** (0.319 - 0.364)
West		0.842*** (0.810 - 0.874)
South		0.792*** (0.764 - 0.822)
Age of the mother (years)		
15-19 ®		
20-24		1.059 (0.987 - 1.137)
25-29		1.05 (0.977 - 1.128)
30-34		1.03 (0.957 - 1.110)
35+		0.995 (0.920 - 1.076)
Mother's education level		
No education ®		
Primary		0.846*** (0.820 - 0.874)
Secondary		0.728*** (0.709 - 0.748)
Higher		0.592*** (0.568 - 0.617)
BMI of mother		
Thin ®		
Normal		0.919*** (0.898 - 0.940)
Obese		0.836*** (0.809 - 0.864)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.922*** (0.895 - 0.950)
Middle		0.921*** (0.891 - 0.952)
Richer		0.788*** (0.759 - 0.817)
Richest		0.766*** (0.733 - 0.801)
Constant	1.345*** (1.329 - 1.361)	4.284*** (3.918 - 4.685)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 3.5: Logistic regression for the association between child marriage and low birthweight of child

Predictor	Low birth weight	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.109*** (1.083 - 1.136)	0.977* (0.949 - 1.005)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		1.02 (0.981 - 1.061)
2-2.9		1.034* (0.994 - 1.076)
3-3.9		1.008 (0.968 - 1.049)
4-4.9		0.981 (0.941 - 1.023)
Sex of child		
Male ®		
Female		1.195*** (1.166 - 1.225)
Place of residence		
Urban ®		
Rural		0.919*** (0.890 - 0.948)
Caste		
Scheduled caste/Scheduled tribe ®		
Other backward classes		0.945*** (0.918 - 0.974)
Other		0.941*** (0.906 - 0.977)
Religion		
Hindu ®		
Muslim		0.962* (0.924 - 1.001)
Christian		1.089* (0.996 - 1.192)
Other		0.836*** (0.776 - 0.901)
Region		
North ®		
Central		0.888*** (0.851 - 0.926)
East		0.648*** (0.619 - 0.678)
Northeast		0.580*** (0.529 - 0.635)
West		0.873*** (0.835 - 0.914)
South		0.749*** (0.716 - 0.782)
Age of the mother (years)		
15-19 ®		
20-24		0.895*** (0.832 - 0.963)
25-29		0.787*** (0.730 - 0.848)
30-34		0.827*** (0.764 - 0.896)
35+		0.845*** (0.773 - 0.924)
Mother's education level		
No education ®		
Primary		0.997 (0.956 - 1.040)
Secondary		0.922*** (0.889 - 0.955)
Higher		0.772*** (0.731 - 0.816)
BMI of mother		
Thin ®		
Normal		0.797*** (0.773 - 0.820)
Obese		0.740*** (0.709 - 0.773)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.958** (0.920 - 0.997)
Middle		0.928*** (0.889 - 0.970)
Richer		0.940** (0.895 - 0.986)
Richest		0.778*** (0.734 - 0.824)
Constant	0.214*** (0.211 - 0.217)	0.450*** (0.409 - 0.497)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 3.6: Logistic regression for the association between child marriage and small/very small size of the birth of children

Predictor	Small/very size of the birth	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.132*** (1.105 - 1.160)	0.974* (0.946 - 1.003)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		0.984 (0.945 - 1.025)
2-2.9		0.936*** (0.897 - 0.976)
3-3.9		0.938*** (0.899 - 0.978)
4-4.9		0.918*** (0.879 - 0.959)
Sex of child		
Male ®		
Female		1.138*** (1.109 - 1.168)
Place of residence		
Urban ®		
Rural		1.039** (1.002 - 1.076)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.031* (0.999 - 1.063)
Other		0.98 (0.941 - 1.021)
Religion		
Hindu ®		
Muslim		1 (0.962 - 1.040)
Christian		0.998 (0.901 - 1.106)
Other		0.868*** (0.796 - 0.946)
Region		
North ®		
Central		1.266*** (1.209 - 1.325)
East		1.077*** (1.026 - 1.131)
Northeast		1.329*** (1.218 - 1.450)
West		1.079*** (1.023 - 1.139)
South		0.813*** (0.771 - 0.858)
Age of the mother (years)		
15-19 ®		
20-24		0.910** (0.841 - 0.984)
25-29		0.801*** (0.739 - 0.868)
30-34		0.820*** (0.753 - 0.893)
35+		0.836*** (0.762 - 0.916)
Mother's education level		
No education ®		
Primary		0.979 (0.939 - 1.021)
Secondary		0.891*** (0.859 - 0.924)
Higher		0.808*** (0.761 - 0.858)
BMI of mother		
Thin ®		
Normal		0.853*** (0.827 - 0.879)
Obese		0.813*** (0.775 - 0.852)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.934*** (0.899 - 0.971)
Middle		0.928*** (0.888 - 0.970)
Richer		0.950** (0.904 - 0.999)
Richest		0.808*** (0.759 - 0.860)
Constant	0.133*** (0.131 - 0.135)	0.185*** (0.166 - 0.205)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

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Appendix-3B

Association between child marriage and morbidity and mortality of children under-5, 2015-16

Table 3.7: Logistic regression for the association between child marriage and diarrhoea of children

Predictors	Diarrhoea	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.037** (1.008 - 1.067)	1.005 (0.973 - 1.038)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		0.969 (0.932 - 1.008)
2-2.9		0.576*** (0.552 - 0.602)
3-3.9		0.388*** (0.369 - 0.407)
4-4.9		0.295*** (0.279 - 0.311)
Sex of child		
Male ®		
Female		0.924*** (0.897 - 0.951)
Place of residence		
Urban ®		
Rural		1.035* (0.996 - 1.077)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward class		1.062*** (1.025 - 1.099)
Other		1.027 (0.981 - 1.075)
Religion		
Hindu ®		
Muslim		1.173*** (1.125 - 1.224)
Christian		1.146** (1.014 - 1.296)
Other		0.965 (0.876 - 1.063)
Region		
North ®		
Central		1.618*** (1.538 - 1.702)
East		1.001 (0.947 - 1.057)
Northeast		0.450*** (0.393 - 0.515)
West		1.023 (0.963 - 1.087)
South		0.768*** (0.723 - 0.817)
Age of the mother (years)		
15-19 ®		
20-24		1.005 (0.925 - 1.092)
25-29		0.946 (0.869 - 1.029)
30-34		0.957 (0.874 - 1.048)
35+		0.944 (0.854 - 1.044)
Mother's education level		
No education ®		
Primary		1.109*** (1.058 - 1.163)
Secondary		1.046** (1.004 - 1.090)
Higher		0.967 (0.906 - 1.032)
BMI of mother		
Thin ®		
Normal		0.940*** (0.908 - 0.972)
Obese		0.985 (0.935 - 1.038)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.967 (0.926 - 1.010)
Middle		0.978 (0.931 - 1.027)
Richer		0.933** (0.883 - 0.987)
Richest		0.841*** (0.786 - 0.901)
Constant	0.100*** (0.0983 - 0.102)	0.154*** (0.137 - 0.172)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 3.8: Logistic regression for the association between child marriage and cough of children

Predictors	Cough	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	0.979 (0.954 - 1.006)	0.987 (0.958 - 1.018)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		1.093*** (1.050 - 1.137)
2-2.9		0.888*** (0.851 - 0.926)
3-3.9		0.780*** (0.747 - 0.815)
4-4.9		0.640*** (0.611 - 0.670)
Sex of child		
Male ®		
Female		0.901*** (0.877 - 0.926)
Place of residence		
Urban ®		
Rural		1.051*** (1.014 - 1.089)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.050*** (1.017 - 1.084)
Other		1.017 (0.976 - 1.060)
Religion		
Hindu ®		
Muslim		1.095*** (1.053 - 1.140)
Christian		1.276*** (1.161 - 1.403)
Other		1.005 (0.923 - 1.094)
Region		
North ®		
Central		1.254*** (1.197 - 1.313)
East		0.986 (0.939 - 1.036)
Northeast		0.924* (0.842 - 1.013)
West		0.828*** (0.783 - 0.875)
South		0.881*** (0.836 - 0.928)
Age of the mother (years)		
15-19 ®		
20-24		0.974 (0.898 - 1.057)
25-29		0.953 (0.877 - 1.036)
30-34		0.941 (0.862 - 1.027)
35+		0.982 (0.892 - 1.080)
Mother's education level		
No education ®		
Primary		1.297*** (1.241 - 1.355)
Secondary		1.254*** (1.207 - 1.303)
Higher		1.233*** (1.163 - 1.308)
BMI of mother		
Thin ®		
Normal		0.957*** (0.927 - 0.988)
Obese		1.164*** (1.111 - 1.218)
Wealth Quintiles of household		
Poorest ®		
Poorer		1.018 (0.977 - 1.060)
Middle		0.98 (0.936 - 1.025)
Richer		0.993 (0.943 - 1.045)
Richest		0.847*** (0.796 - 0.902)
Constant	0.126*** (0.124 - 0.128)	0.124*** (0.111 - 0.138)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 3.9: Logistic regression for the association between child marriage and fever of children

Predictors	Fever	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.035*** (1.010 - 1.060)	1.041*** (1.013 - 1.071)
≥18 years ®		
Current age of child (years)		
< 1 ®		
1-1.9		1.156*** (1.115 - 1.199)
2-2.9		0.823*** (0.791 - 0.856)
3-3.9		0.675*** (0.648 - 0.703)
4-4.9		0.558*** (0.534 - 0.583)
Sex of child		
Male ®		
Female		0.914*** (0.891 - 0.937)
Place of residence		
Urban ®		
Rural		1.087*** (1.051 - 1.124)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.078*** (1.046 - 1.111)
Other		1.098*** (1.057 - 1.142)
Religion		
Hindu ®		
Muslim		1.231*** (1.188 - 1.276)
Christian		1.268*** (1.154 - 1.393)
Other		1.014 (0.935 - 1.099)
Region		
North ®		
Central		1.531*** (1.466 - 1.599)
East		1.041* (0.993 - 1.091)
Northeast		0.775*** (0.706 - 0.851)
West		0.96 (0.911 - 1.011)
South		0.841*** (0.799 - 0.884)
Age of the mother (years)		
15-19 ®		
20-24		0.964 (0.894 - 1.040)
25-29		0.993 (0.919 - 1.073)
30-34		0.978 (0.901 - 1.061)
35+		1.02 (0.934 - 1.115)
Mother's education level		
No education ®		
Primary		1.240*** (1.190 - 1.291)
Secondary		1.141*** (1.102 - 1.183)
Higher		1.111*** (1.051 - 1.174)
BMI of mother		
Thin ®		
Normal		0.960*** (0.931 - 0.989)
Obese		1.129*** (1.081 - 1.179)
Wealth Quintiles of household		
Poorest ®		
Poorer		1.071*** (1.031 - 1.112)
Middle		1.088*** (1.043 - 1.135)
Richer		1.072*** (1.022 - 1.125)
Richest		0.912*** (0.860 - 0.967)
Constant	0.147*** (0.145 - 0.150)	0.129*** (0.116 - 0.142)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 3.10: Logistic regression for the association between child marriage and child mortality

Predictors	Child mortality	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.330*** (1.279 - 1.382)	1.036 (0.993 - 1.081)
≥18 years ®		
Sex of child		
Male ®		
Female		0.870*** (0.836 - 0.905)
Place of residence		
Urban ®		
Rural		1.058* (0.999 - 1.121)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.022 (0.976 - 1.070)
Other		0.941* (0.882 - 1.005)
Religion		
Hindu ®		
Muslim		0.977 (0.920 - 1.037)
Christian		0.797** (0.663 - 0.958)
Other		0.977 (0.851 - 1.123)
Region		
North ®		
Central		1.375*** (1.284 - 1.473)
East		0.875*** (0.812 - 0.942)
Northeast		0.969 (0.842 - 1.114)
West		0.748*** (0.683 - 0.820)
South		0.710*** (0.651 - 0.774)
Age of the mother (years)		
15-19 ®		
20-24		0.757*** (0.677 - 0.846)
25-29		0.662*** (0.591 - 0.741)
30-34		0.657*** (0.583 - 0.740)
35+		0.840*** (0.741 - 0.953)
Mother's education level		
No education ®		
Primary		0.992 (0.935 - 1.053)
Secondary		0.794*** (0.752 - 0.838)
Higher		0.624*** (0.562 - 0.693)
BMI of mother		
Thin ®		
Normal		1.054** (1.006 - 1.105)
Obese		1.201*** (1.117 - 1.291)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.886*** (0.839 - 0.935)
Middle		0.809*** (0.758 - 0.863)
Richer		0.651*** (0.602 - 0.705)
Richest		0.480*** (0.432 - 0.533)
Constant	0.0406*** (0.0395 - 0.0417)	0.0887*** (0.0763 - 0.103)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 3.11: Logistic regression for the association between child marriage and Infant mortality

Predictors	Infant mortality	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.298*** (1.247 - 1.352)	1.007 (0.963 - 1.054)
≥18 years ®		
Sex of child		
Male ®		
Female		0.842*** (0.807 - 0.878)
Place of residence		
Urban ®		
Rural		1.077** (1.013 - 1.144)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward class		1.03 (0.982 - 1.081)
Other		0.949 (0.887 - 1.017)
Religion		
Hindu ®		
Muslim		0.967 (0.908 - 1.030)
Christian		0.755*** (0.619 - 0.921)
Other		0.974 (0.843 - 1.126)
Region		
North ®		
Central		1.402*** (1.304 - 1.507)
East		0.905** (0.837 - 0.979)
Northeast		1.004 (0.868 - 1.162)
West		0.738*** (0.670 - 0.812)
South		0.680*** (0.620 - 0.745)
Age of the mother (years)		
15-19 ®		
20-24		0.736*** (0.656 - 0.825)
25-29		0.605*** (0.539 - 0.679)
30-34		0.590*** (0.522 - 0.667)
35+		0.742*** (0.651 - 0.845)
Mother's education level		
No education ®		
Primary		0.994 (0.933 - 1.058)
Secondary		0.820*** (0.775 - 0.868)
Higher		0.656*** (0.588 - 0.731)
BMI of mother		
Thin ®		
Normal		1.063** (1.012 - 1.116)
Obese		1.219*** (1.129 - 1.315)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.908*** (0.857 - 0.962)
Middle		0.839*** (0.784 - 0.898)
Richer		0.679*** (0.625 - 0.738)
Richest		0.511*** (0.458 - 0.570)
Constant	0.0368*** (0.0358 - 0.0378)	0.0815*** (0.0697 - 0.0954)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

Table 3.12: Logistic regression for the association between child marriage and neonatal mortality

Predictors	Neonatal mortality	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.267*** (1.209 - 1.328)	0.969 (0.920 - 1.021)
≥18 years ®		
Sex of child		
Male ®		
Female		0.763*** (0.726 - 0.801)
Place of residence		
Urban ®		
Rural		1.113*** (1.038 - 1.194)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.019 (0.964 - 1.077)
Other		0.933* (0.863 - 1.010)
Religion		
Hindu ®		
Muslim		0.957 (0.889 - 1.030)
Christian		0.654*** (0.510 - 0.838)
Other		0.898 (0.757 - 1.066)
Region		
North ®		
Central		1.411*** (1.298 - 1.535)
East		0.976 (0.892 - 1.068)
Northeast		0.935 (0.785 - 1.113)
West		0.748*** (0.670 - 0.836)
South		0.644*** (0.579 - 0.718)
Age of the mother (years)		
15-19 ®		
20-24		0.697*** (0.614 - 0.792)
25-29		0.551*** (0.484 - 0.626)
30-34		0.520*** (0.453 - 0.597)
35+		0.636*** (0.548 - 0.737)
Mother's education level		
No education ®		
Primary		1.053 (0.980 - 1.133)
Secondary		0.877*** (0.821 - 0.937)
Higher		0.734*** (0.649 - 0.830)
BMI of mother		
Thin ®		
Normal		1.094*** (1.033 - 1.158)
Obese		1.285*** (1.177 - 1.403)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.898*** (0.841 - 0.960)
Middle		0.820*** (0.758 - 0.887)
Richer		0.684*** (0.622 - 0.753)
Richest		0.521*** (0.459 - 0.590)
Constant	0.0272*** (0.0263 - 0.0281)	0.0630*** (0.0527 - 0.0754)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$; confidence interval in parenthesis; ® Reference category

Table 3.13: Logistic regression for the association between child marriage and post-neonatal mortality

Predictors	Post neonatal mortality	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age at marriage		
<18 years	1.368*** (1.265 - 1.479)	1.119** (1.027 - 1.220)
≥18 years ®		
Sex of child		
Male ®		
Female		1.119*** (1.032 - 1.213)
Place of residence		
Urban ®		
Rural		0.978 (0.871 - 1.097)
Caste		
Scheduled Caste/Scheduled Tribe ®		
Other backward classes		1.061 (0.966 - 1.165)
Other		1 (0.875 - 1.142)
Religion		
Hindu ®		
Muslim		0.997 (0.884 - 1.124)
Christian		1.029 (0.742 - 1.427)
Other		1.218 (0.933 - 1.588)
Region		
North ®		
Central		1.341*** (1.169 - 1.538)
East		0.729*** (0.626 - 0.849)
Northeast		1.194 (0.922 - 1.547)
West		0.723*** (0.601 - 0.870)
South		0.803** (0.677 - 0.954)
Age of the mother (years)		
15-19 ®		
20-24		0.907 (0.708 - 1.163)
25-29		0.854 (0.665 - 1.097)
30-34		0.906 (0.698 - 1.176)
35+		1.191 (0.909 - 1.560)
Mother's education level		
No education ®		
Primary		0.851*** (0.754 - 0.961)
Secondary		0.691*** (0.619 - 0.771)
Higher		0.479*** (0.382 - 0.601)
BMI of mother		
Thin ®		
Normal		0.976 (0.889 - 1.072)
Obese		1.04 (0.896 - 1.206)
Wealth Quintiles of household		
Poorest ®		
Poorer		0.939 (0.841 - 1.049)
Middle		0.902 (0.792 - 1.027)
Richer		0.681*** (0.579 - 0.802)
Richest		0.504*** (0.406 - 0.627)
Constant	0.00911*** (0.00862 - 0.00961)	0.0157*** (0.0113 - 0.0216)

*** p<0.01, ** p<0.05, * p<0.1; confidence interval in parenthesis; ® Reference category

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