Patterns in age at first marriage and its determinants in India: A historical perspective of last 30 years (1992–2021)

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ARTICLE INFO	ABSTRACT
	Reproductive health and well-being of a woman are associated with factors such as menarche, first marriage, first sex, first birth, and menopause. The beginning of these events also brings about significant changes in women's lives. Despite marrying early being acknowledged as a detrimental and discriminatory socio-cultural global practice, a huge proportion of girls are being married at an early age, often detrimental to maternal and child health. Adding to the current national debate for the revision of the minimum age at marriage for girls from 18 to 21 years it becomes important to understand the past scenario and current situation of age at marriage in India. In this study, first five rounds of the National Family Health Survey (NFHS) have been used as a data source. Cox Proportional Hazard Model, Multiple Classification Analysis (MCA), Kaplan Meier Curve, Life table survival analysis, hierarchical clustered heat map, Multivariate Decomposition Analysis (MDA), and geospatial mapping were used to fulfill the objective of the study. The results showed that almost 65.9% of women got married before reaching the age of 18 years in the year 1992–93 which reduced to 23.2% among women aged 20–24 years in 2019–21. Region, respondent's level of education, caste, religion, wealth, and mass media exposure were significantly associated with the age at first marriage. The hazard of age at marriage declined significantly with higher educational attainment [higher education- AHR:0.37; CI:0.36 to 0.37], improving household wealth [richest wealth- AHR:0.91; CI:0.90 to 0.91], and mass media exposure [AHR:0.96; CI:0.95 to 0.96]. Since, the age at marriage has a substantial impact on fertility pattern and has a strong association with maternal & child health, policies regarding improving the age at marriage and better enforcement of the concerned laws are required to meet the SDG targets.

1. Introduction

Women's reproductive health and well-being have long-term repercussions on their overall health and are associated with factors such as menarche, first marriage, first sex, first birth, and menopause. Furthermore, the timing of the occurrence of these events not only indicates the current health status of a woman but is also linked to various adverse health-related outcomes in the later part of her life (Marphatia, Ambale, & Reid, 2017). Since fertility rates are responsive to changes in the institutional meaning of marriage, scientists believe that a reduction in the time spent within marriage is an important mechanism in reducing total fertility, especially in a country where non-marital fertility is low (Singh et al., 2022). Moreover, age at marriage is a population control measure, and marrying at an early age exposes a woman to an increased fertility span resulting in early pregnancy (Jain

& Kurz, 2007) often acknowledged as a detrimental and discriminatory socio-cultural global practice requiring international attention as a Human Rights concern. Moreover, marriage trends have been partly responsible for declining fertility levels in a number of countries (Kim et al., 2004; Teng, 2008).

Numerous studies across the world have highlighted the important implications of age at marriage for the well-being of the next generation (Field & Ambrus, 2008; Beegle et al., 2001; Majlesi, 2012; Gakidou et al., 2010; Berry & Shotland, 2013). Coale and Tyre have demonstrated that postponing marriage results in lowering childbearing experience with subsequently slowing population growth (Coale& Tyre.,1961). Studies have found that a rising age at marriage reduces the family size (Mitchell R.E., 1969, 1971). Researchers from Bangladesh have found that an increase in the age at marriage leads to a decline in the interval of first birth shortly after marriage (Bruce J., 2003). Although the

mechanisms by which age at first marriage impacts fertility are well understood, they are complex. Additionally, the age at marriage is confounded by factors such as residence, ethnicity and religion (Maitra, 2004). Since a later age at first marriage is viewed as a prerequisite for women's empowerment (Lee-Rife, 2010), the increasing age at marriage has significant association with her market work (Spierings et al., 2010) and equitable attitudes towards gender (Al-Nsour et al., 2009).

Child marriage has been consistently identified as a major bottleneck in efforts taken for global development (Nour, 2006; Wodon et al., 2015). Early marriage places women at risk of early sexual debut and pregnancy resulting in poor health outcomes (Godha, Hotchkiss & Gage., 2013; Raj et al., 2009; UNICEF, 2014). Researchers have found that maternal healthcare use reduces with reducing the age at marriage (Godha et al., 2016; Godha, Hotchkiss, and Gage., 2013; Santhya et al., 2010). It has been linked with several negative outcomes and health-related issues like infant mortality, child mortality, maternal mortality, anemia among children, underutilization of maternal health services, depression, sexually transmitted infection, cervical cancer, malaria, premature birth, unwanted pregnancies, pregnancy termination in later part of the life (Nour, 2009; Raj & Boehmer, 2013, Nasrullah, Muazzam, et al., 2014; Paul & Chouhan, 2019; Paul, 2020; Goli et al., 2015). Child marriage leads to a life of domestic and sexual labor among young girls (Desai & Andrist, 2010). The inability to negotiate access to safe sex and medical care, adverse pregnancy outcome for mothers, poverty, the need of reinforcing social ties and the associated belief in protection are the key drivers of Child marriage across the globe (Nour., 2009). Child marriages in India and neighboring countries are derived from poor economic status (Srinivasan et al., 2015), prestige and child safety (Karim et al., 2016), love, and sexual desire (Sharma et al., 2015).

The inflexible rules have often prevented women from making their own decisions about their lives and the decision to marriage and child marriage has been a social evil in India. By 1927, marrying a girl under the age of 12 years was illegal. Further, the legal age at marriage for women and men was set to 14 and 18 years in 1929 as defined by the child marriage restraint act which was popular as Sarda Act. Afterward, the age at marriage for females was amended in the year 1949 and 1978 and the legal age at marriage was increased to 18 years and 21 years for females and males respectively. Further, The Prohibition of Child Marriage Act, 2006 maintained the same minimum age to marry (Act No. 6 of 2007, 2007). Despite the legal grounds of the minimum age at marrying across countries, five countries including India account for about half of the total child brides in the world where one-third of child brides globally are Indians (UNICEF, 2014). Additionally, almost 1.5 million girls under the age of 18 were married in India has the most child brides in the world. Although considerable progress has been made by the country in reducing the total fertility rate, concurrent population momentum has led India to surpass China to become the world's most populous country by 2023 (UNDESA, 2022).

Evidence suggests that despite a considerable rise in the age at marriage, a significant proportion of adolescents are getting married before the age of 18 years (Nguyen & Wodon, 2012, 2015). In light of the prevalent early marriages and the negative consequences associated, there has been a heated discussion on changing the minimum age at marriage. To improve women and girls' position in society and empower them by giving them more opportunities, there have been several legal amendments to the age at marriage in the country. However, change in the policy can not be given full credit to this decline, since various factors such as education, awareness, and work opportunities could also be at play. Moreover, there has been a current national debate for the revision of the minimum age at marriage for girls from 18 to 21 years. Since, marriage is potentially life long contract with important obligations and responsibilities it is crucial to empower and support adolescents to make informed and healthy decisions regarding their reproductive health. Identifying effective policies remains a priority for improving women and children status. Thus, it becomes important to understand the past scenario and current situation of marriage patterns in India in the light of policies aimed at increasing the age at marriage and major contributing factors determining the change in mean age marriage in the last three decades. Thus, this study aims to understand the trends and patterns in the age at marriage and investigates the factors that have led to these changes over time.

2. Data and methods

The current study included data from all five rounds of the National Family Health Survey (NFHS). The survey is arguably the best nationally representative large-scale, multi-round, and have used different sampling design evolving across survey rounds. The NFHS contains detailed information about the age at occurrence of reproductive events and other information separately for households, women & men of reproductive ages, and kids. The first wave of the NFHS–I, 1992-93 included 89,777 ever-married women aged 13–49 years (IIPS, 1995). The subsequent 2nd, 3rd, 4th and 5th rounds of NFHS were conducted in 1998–99 (International Institute for Population Sciences and ORC Macro, 2000), 2005-06 (International Institute for Population Sciences (IIPS) and Macro International, 2007), 2015-16 (International Institute for Population Sciences (IIPS) and ICF, 2017) and 2019-21(International Institute for Population Sciences (IIPS) and ICF, 2021) respectively. The survey covered almost all states and UTs (except a few states) and women aged 15–49 were considered eligible for the survey. The sample size for the women surveyed was 90,000 in NFHS-II, 124,385 in NFHS-III, 699,686 in NFHS-IV, and 724,115 in NFHS–V. Women aged 15–49 years were included in the study across all survey waves.

2.1. Variable description

2.1.1 *Outcome Variable*: Adhering to the objectives, respondents aged 15–49 who were married and responded to questions regarding their age at first marriage were considered eligible for this study. To capture the first age at marriage the respondents were asked the following questions: 1) In what month and year did you get married? 2) When you married your first husband, what was the month and year on that time? 3) How old were you when you first got married? For the current analysis, we used the variable cmc (century month code) (first) who got married to know the exact age of the marriage of the respondent.

2.1.2 *Predictor Variables:* Predictor variables included in the analysis were geographical regions (East, West, North, South, Central, and Northeast), place of residence as rural and urban, religion recoded as Hindu, Muslim, Christian and Others, caste recoded as Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Castes(OBC) and others based on their responses on ethnicity and wealth index (poorest, poorer, middle, richer, and richest). The wealth index was calculated based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics such as the source of drinking water, toilet facilities, and flooring materials and then the distribution was divided into five equal categories, each with 20 percent of the population. Respondents' educational status was recoded as No education, Primary, Secondary, and Higher. Further mass media exposure was coded as "Any mass media" if women responded other than "not at all or not" for any of the questions i) Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all? ii) Do you listen to the radio almost every day, at least once a week, less than once a week, or not at all? iii) Do you watch television almost every day, at least once a week, less than once a week, or not at all? iv) Do you usually go to a cinema hall or theatre to see a movie at least once a month? If the respondent was not exposed to any type (newspaper or magazines, radio, television, cinema hall) of media. Family structure was classified as nuclear and non-nuclear, and prior marital relationship was marked as either No or Yes.

2.2 Statistical Analysis: We used bivariate, Cox Proportional

Hazard Model, Multiple Classification Analysis, Kaplan Meier Curve, Multivariate decomposition analysis, Life table survival analysis, a hierarchical clustered heat map and geospatial mapping, to fulfill the objective of the study. Bivariate analysis was carried out to understand the distribution of age at first marriage by the current age of respondents. In addition, to describe trends in age at first marriage we calculated the median age at marriage of women by their current ages. The median age at marriage was calculated only for those ages where 50% or more of the respondents got married before reaching the lower limit of that age group. Furthermore, the predicted mean age at marriage by various socioeconomic and demographic characteristics was calculated with the help of Multiple Classification Analysis. The MCA convergence model enabled us to estimate the values of the reference category of the dependent variable which was not possible in the Cox proportional hazard model or simple linear regression analyses.

The geospatial map was constructed to demonstrate the change in predicted mean age at first marriage for the last three survey rounds across states. These estimates are adjusted for education, residence, caste, religion and wealth index. Since Life table survival analysis is the only technique that can provide a true probability of an event happening in such cases, so we used the life table failure estimates to know the probability of an individual not being married by single year of age. Kaplan Meier survival method was used to obtain the probability of women being unmarried by a particular age.

Further to see the factors affecting the timing of marriage, we performed Cox Proportional hazard regression analysis. The Cox model is expressed by the *hazard function* denoted by h(t). Briefly, for the current study, the hazard function can be defined as the risk of the first marriage at time t. The equation for the hazard model is given as follows:

$$h(t) = h0(t) \times \exp(b1x1 + b2x2 + \ldots + bpxp)$$

In such a model, the outcome variable is the risk of hazard of experiencing the event of a marriage, and the hazard ratio for each independent variable represents the likelihood of experiencing the event for a particular group compared with the reference group.

Additionally, multivariate decomposition analysis was performed to determine the change in mean age at marriage and the factors that contributed to the change. The goal of the decomposition analysis was to determine the source of the shift in mean marriage age among reproductive-aged women over the last three decades (1992–2021). The multivariate decomposition analysis divides the overall increase in age at marriage over time into the increase caused by differences in women's composition (endowment) between surveys and the increase caused by differences in the effect of the characteristics (coefficient) between surveys.

All the analysis was carried out using Stata statistical software version 16.1 (StataCorp, College Station, TX), ArcGIS & Origin Pro version 9.9.

3. Results

Table 1 presents the sample characteristics of the women in reproductive ages 15–49 years who were married at least once for all rounds of NFHS to date. There has been a decline in the proportion of women of younger ages included in the survey and the proportion of urban respondents increased from the first to fifth survey round. Moreover, there was an improvement in the educational attainment of respondents and their exposure to mass media.

The proportion of respondents by age at first marriage and the median ages by current age group by various survey rounds are shown in Table 2. From NFHS-1 to NFHS–V, there has been a considerable decline in women currently aged 15–19 years marrying at age 15. Similarly, there has been a considerable decline in the proportion of women aged 20–24 and 25–29 years during the survey marrying at younger ages. For instance, the percentage of married women in the age group 20–24 who

Table-1
Distribution of sampled women (weighted) in reproductive ages (15–49 years) by background characteristics.

Background Characteristics	NFHS–I	NFHS-II	NFHS-III	NFHS-IV	NFHS–V
	Sample (%)	Sample (%)	Sample (%)	Sample (%)	Sample (%)
Current Age					
15–19	9098 (10.2)	8275 (9.2)	7133 (7.6)	19,194 (3.8)	15,897 (3)
20–24	17,974 (20.1)	16,583 (18.4)	16,294 (17.3)	78,800 (15.6)	71,356 (13.4)
25–29	17,439 (19.5)	17,960 (19.9)	18,163 (19.3)	1,00,085 (19.8)	1,02,068 (19.1)
30–34	14,665 (16.4)	15,288 (16.9)	16,366 (17.4)	88,867 (17.6)	94,719 (17.7)
35–39	12,461 (13.9)	13,252 (14.7)	14,813 (15.7)	82,729 (16.4)	92,831 (17.4)
40–44	9755 (10.9)	10,646 (11.8)	12,222 (13)	69,863 (13.8)	77,467 (14.5)
45–49	8046 (9.0)	8272 (9.2)	9203 (9.8)	65,737 (13.0)	80,331 (15.0)
Regions					
East	14,440 (16.2)	15,856 (17.6)	14,418 (15.3)	97,228 (19.2)	91,620 (17.1)
West	11,044 (12.4)	10,480 (11.6)	12,107 (12.9)	41,825 (8.3)	55,257 (10.3)
North	20,221 (22.6)	20,745 (23)	17,428 (18.5)	1,02,720 (20.3)	1,04,584 (19.6)
South	16,897 (18.9)	15,965 (17.7)	17,725 (18.8)	64,652 (12.8)	88,520 (16.6)
Central	17,635 (19.7)	16,217 (18,0)	17,699 (18.8)	1,33,558 (26.4)	1,21,389 (22.7)
Northeast	9200 (10.3)	11,014 (12.2)	14,817 (15.7)	65,293 (12.9)	73,300 (13.7)
Residence					
Urban	23,418 (26.2)	23,635 (26.2)	28,860 (30.6)	1,71,555 (34)	1,69,621 (31.7)
Rural	66,019 (73.8)	66,642 (73.8)	65,334 (69.4)	3,33,721 (66.1)	3,65,049 (68.3)
Level of Education					
No Education	54,991 (61.7)	48,227 (53.4)	45,013 (47.8)	1,63,529 (32.4)	1,47,662 (27.6)
Primary	14,578 (16.4)	15,253 (16.9)	14,641 (15.5)	72,416 (14.3)	74,824 (14.0)
Secondary	16,588 (18.6)	19,654 (21.8)	29,163 (31.0)	2,17,596 (43.1)	2,44,461 (45.7)
Higher	3010 (3.4)	7120 (7.9)	5370 (5.7)	51,734 (10.2)	67,723 (12.7)
Caste					
SC	10,813 (12.1)	16,560 (18.5)	17,628 (19.4)	1,02,394 (21.1)	1,16,353 (22.9)
ST	7881 (8.8)	7873 (8.8)	7685 (8.4)	45,229 (9.3)	49,118 (9.7)
OBC	70,742 (79.1)	29,782 (33.2)	37,148 (40.8)	2,19,730 (45.3)	2,30,530 (45.3)
Others		35,416 (39.5)	28,580 (31.5)	1,18,132 (24.3)	1,12,966 (22.2)
Religion					
Hindu	73,321 (82)	73,800 (81.8)	76,782 (81.5)	4,10,974 (81.4)	4,38,248 (82)
Muslim	10,734 (12.0)	11,319 (12.5)	12,318 (13.1)	66,134 (13.1)	69,751 (13.1)
Christian	2135 (2.4)	2286 (2.5)	2088 (2.2)	11,385 (2.3)	11,834 (2.2)
Others	3247 (3.6)	2873 (3.2)	3006 (3.2)	16,576 (3.3)	14,592 (2.7)
Wealth Index					
Poorest	14,234 (15.9)	14,331 (16.4)	12,163 (12.9)	99,500 (19.7)	1,12,731 (21.1)
Poorer	15,370 (17.2)	15,217 (17.5)	14,546 (15.4)	1,07,846 (21.3)	1,17,883 (22.1)
Middle	17,861 (20.0)	17,774 (20.6)	18,193 (19.3)	1,04,329 (20.7)	1,11,480 (20.9)
Richer	21,137 (23.6)	20,503 (22.7)	22,059 (23.4)	98,848 (19.6)	1,02,578 (19.2)
Richest	20,836 (23.3)	22,452 (22.8)	27,233 (28.9)	94,753 (18.8)	89,998 (16.8)

Table-1 (*continued*)

Background Characteristics	NFHS–I	NFHS-II	NFHS-III	NFHS-IV	NFHS–V
	Sample (%)	Sample (%)	Sample (%)	Sample (%)	Sample (%)
Mass Media Exposure					
No	42,274 (47.3)	36,387 (40.3)	24,606 (26.1)	1,03,105 (20.4)	1,27,484 (23.8)
Any	47,112 (52.7)	53,890 (59.7)	69,588 (73.9)	4,02,171 (79.6)	4,07,186 (76.2)
Household Structure					
nuclear			47,747 (50.7)	23,8582 (47.2)	2,50,551 (46.9)
non-nuclear			46,447 (49.3)	2,66,694 (52.8)	2,84,119 (53.1)
Prior Relationship to Husband					
No				4,34,189 (85.9)	4,65,596 (87.1)
Yes				71,087 (14.1)	69,074 (12.9)
Total	89,437 (100)	90,277 (100)	94,194 (100)	5,05,276 (100)	5,34,670 (100)

Note: Total may not add up to N due to missing cases.

got married at 15 years (young adolescents) of age declined by around one-sixth from 1992-93 to 2019-20. There has been an increase in the proportion marrying at higher ages across the survey rounds. Primarily during 1992–93, approximately 66% of women were married before 18 years while during 2019–21 it reduced to 23.2% among women aged 20–24 years. The same declining pattern of marriage was also observed for respondents married by the age of 21 years. Still, during 2019–21 around 32%, 39.3%, 44.9%, 46.9%, and 46.0% of women were married before 18 years among women with current ages 25–29 years, 30–34 years, 35–39years, 40–44 years, and 45–49 years respectively. During the last three decades, there has been a significant increase in the median age at marriage. For women in the age group 20–49 years, the median age of marriage improved from 16.2 years in 1992–93 to 19.2 years in the year 2019–21. Similar patterns were observed in the median age at marriage for women aged 25–49 years.

Kaplan Meier's failure estimates showed that the overall age at first marriage increased over the years (Fig. 1). Women with higher levels of education were more likely to be older when they got married for the first time than women with lower levels of education. Over time, the age at first marriage for women without education or with a primary or secondary level of education shifted to higher ages. Similarly, there has been an upward shift in the age at first marriage over time which increased consistently acorss religion, caste and region.

The Cox proportional hazard model predicting women's risk of first marriage by various demographic characteristics is shown in Appendix table B1. Results showed that factors such as region, education, caste, religion, wealth, and mass media exposure were significantly associated with the age at first marriage. Among all associated factors, education and religion were the most prominent factors which showed the larger variations in age at first marriage. For instance, highly educated women had a 63% lower chance (AHR: 0.37; CI: 0.36–0.37) of lower age at first marriage at a particular age in model 3. Additionally, over the survey period, a significant decline in age at first marriage at a particular age of women was observed in model 3. In comparison to 1992-93 in the period of 2019–21 age at first marriage at a particular age declined by 28% (AHR: 0.72; CI: 0.71–0.72).

The state-specific hierarchical clustered heat map in Appendix Figure A1 indicates the likelihood of the first marriage by exact age. The shorter the height of the dendogram between the two connecting states, the more similar the states were, whereas darker blue and darker red represent the higher and lower likelihood of marriage not yet occurring by a specific age, respectively. During 2005-06, Tripura showed a similar pattern to India, Kerala and Manipur with Euclidian distance less than 0.05, however, during 2019–21, Andhra Pradesh, Madhya Pradesh,

Manipur, and Nagaland showed the closest first marriage trend with Euclidian distance equal to 0.02.

The variation in the predicted mean age at first marriage for the respondents obtained using Multiple classification models is presented in Table 3. We have provided the unadjusted values as well as adjusted values when all socio-economic characteristics are taken into consideration. At the national level predicted mean age at first marriage increased by around 2.5 years from NFHS-1 to NFHS–V. The lowest mean age at marriage was observed among the central region of the country while the highest age at first marriage was observed in the North-Eastern region. The unadjusted and adjusted mean values of age at first marriage were higher in urban areas, among Christians, 'others' caste followed by STs and increased with higher levels of education, higher wealth index, and those with mass media exposure. While their counterparts showed a larger percentage increase in the predicted mean age at marriage over the past 30 years. Notably, the predicted age at first marriage was lower for women who had a prior relationship with their husbands.

State-specific predicted mean age at first marriage among women aged 15–49 years by consecutive survey rounds are depicted in appendix figure A2 (adjusted for education, residence, caste, religion and wealth index). It was evident that Indiawitnessed an upward trend in predicted mean age at marriage from 2005 to 2021; however, the rate of progress is not impressive. During 2005-06 there was only one state whose predicted mean age at first marriage was more than 21 years, whereas in the year 2019–21 6 states were falling in the same age strata.

The decomposition analysis model takes into consideration the differences in characteristics (compositional factors) as well as differences caused by the effect of characteristics (Table 4). The overall multivariate decomposition analysis result showed that about 45% of the overall increase in mean age at marriage from the period 1992 to 2021 was due to the difference in characteristics. Among the compositional factors, an increase in the age at marriage during both surveys was explained mainly by education (35.7%) followed by age (10.2%) and caste (1.6%) respectively. After controlling the effect of compositional factors, 55% of change in mean age marriage was due to the difference in the effect of characteristics. Factors such as wealth, education, caste and mass media showed a significant contribution to the observed change in age at first marriage.

4. Discussion

Since laws concerned with marriage patterns have a special significance in a country from a demographic and developmental view; the authorities are in view of proposing to increase the minimum age at marriage perhaps due to women's & child's health, and women's empowerment perspective. Our study included an in-depth examination of patterns in age at first marriage over three decades from 1992 to 2021. Our findings showed that nearly one-fourth (23.2%) of women currently aged 20–24 (NFHS–V) were married before the legal age of marriage despite India's several national and international commitments. The higher proportion of women marrying before 18 years appears as a bottleneck in national legislation to eliminate child marriage practice. The proportion of women aged 20–24 who married at the age of 15 declined by 26.4% point from 1992-93 to 2019-21. This study also found that women in recent survey rounds had a lower prevalence of child marriage compared to older women from past surveys, reflecting declining trends of child marriage over the period. Postponing first marriage has been feasible to a stronger ability to control reproductive decisions, including decisions about childbearing, improved educational attainment, and improved economic capacities (Population Reference Bureau [PRB], 2007). Initiatives to raise the age at first marriage have been linked with agitations for better women's empowerment since gender equality and women's empowerment gained importance in global population and health discourses following the 1994 Cairo International Conference on Population and Development (UNICEF,

Table 2

Distribution of age at first marriage by exact age in India over the period 1992–2021.

Percentage of women who married for the first time by specific exact age and the median age at first marriage by current age

Current Age	NFHS-Rounds	Percentage married by exact age								Number of Women	Median age at first Marriage
		15	16	17	18	19	20	21	25		
15–19	NFHS–I	43.1	na	na	na	na	Na	na	na	9098	a
	NFHS-II	41.0	na	na	na	na	Na	na	na	8275	a
	NFHS-III	11.9	na	na	na	na	Na	na	na	7133	a
	NFHS-IV	2.6	na	na	na	na	Na	na	na	19,194	a
	NFHS–V	1.7	na	na	na	na	Na	na	na	15,897	a
20–24	NFHS–I	31.2	44.3	56.2	65.9	79.1	87.2	na	na	17,974	16.5
	NFHS-II	29.3	42.1	53.8	63.5	77.9	85.5	na	na	16,583	16.7
	NFHS-III	18.2	27.2	36.9	47.4	56.8	64.4	na	na	16,294	18.3
	NFHS-IV	6.5	10.9	17.5	26.6	37.4	47.7	na	na	78,800	a
	NFHS–V	4.8	8.7	14.7	23.2	33.4	43.0	na	na	71,356	a
25–29	NFHS–I	32.4	45.2	56.5	64.7	75.1	80.7	87.0	97.5	17,439	16.4
	NFHS-II	30.2	42.9	53.8	61.9	73.3	79.2	85.8	97.0	17,960	16.7
	NFHS-III	25.4	35.8	46.2	55.4	65.7	72.4	78.6	91.3	18,163	17.4
	NFHS-IV	12.1	18.5	26.4	35.8	45.6	54.5	62.7	83.8	100,084	19.5
	NFHS–V	8.9	14.4	22.1	32.0	42.7	52.5	61.1	82.7	1,02,068	19.7
30–34	NFHS–I	33.6	46.4	58.3	66.1	76.3	81.1	87.1	96.1	14,665	16.3
	NFHS-II	31.6	44.9	56.8	64.8	75.3	80.3	86.4	95.8	15,288	16.4
	NFHS-III	28.5	40.7	51.8	61.2	70.9	76.5	82.0	93.2	16,366	16.8
	NFHS-IV	16.4	24.4	33.5	43.6	53.0	61.4	68.4	85.7	88,867	18.7
	NFHS–V	13.5	20.9	29.6	39.3	49.1	57.8	65.9	86.1	94,719	19.1
35–39	NFHS–I	36.7	49.8	61.9	69.2	78.4	82.7	88.3	96.0	12,461	16.0
	NFHS-II	33.5	46.4	58.3	66.1	76.1	81.1	86.5	95.3	13,252	16.3
	NFHS-III	31.0	43.6	54.8	63.4	73.5	79.1	84.3	93.8	14,813	16.6
	NFHS-IV	17.8	26.1	35.0	45.1	54.6	62.8	69.6	85.6	82,729	18.5
	NFHS–V	15.8	24.4	34.2	44.9	55.0	63.3	70.4	87.5	92,831	18.5
40–44	NFHS–I	40.3	53.8	64.7	72.0	81.1	85.1	90.9	96.9	9755	15.7
	NFHS-II	36.3	49.1	60.1	68.0	77.9	82.8	88.5	96.2	10,646	16.1
	NFHS-III	32.4	44.4	55.6	64.6	74.1	79.8	85.5	94.6	12,222	16.5
	NFHS-IV	19.6	28.1	37.1	46.8	55.6	63.5	70.2	84.9	69,863	18.4
	NFHS–V	17.9	26.7	36.3	46.9	56.8	65.4	72.7	88.6	77,467	18.3
45–49	NFHS–I	44.1	56.7	67.4	73.8	82.6	86.5	91.7	97.4	8046	15.7
	NFHS-II	38.3	51.7	62.0	69.7	78.5	82.5	88.5	95.8	8272	15.9
	NFHS-III	33.0	44.7	55.4	64.2	73.3	79.1	85.1	94.5	9203	16.5
	NFHS-IV	18.0	26.3	34.7	43.7	52.7	60.6	67.1	82.4	65,737	18.7
	NFHS–V	17.3	26.2	35.7	46.0	56.0	64.4	71.2	87.6	80,331	18.4
15–49	NFHS–I	36.0	na	na	na	na	Na	na	na	89,437	a
	NFHS-II	33.2	na	na	na	na	Na	na	na	90,276	a
	NFHS-III	23.9	na	na	na	na	Na	na	na	94,194	a
	NFHS-IV	12.3	na	na	na	na	Na	na	na	505,274	a
	NFHS–V	10.6	na	na	na	na	Na	na	na	5,34,670	a
20–49	NFHS–I	35.2	48.1	59.7	67.7	78.2	83.6	na	na	80,340	16.2
	NFHS-II	32.4	45.4	56.7	65.0	76.2	81.8	na	na	82,001	16.4
	NFHS-III	26.9	37.9	48.6	57.9	67.7	74.0	na	na	87,061	17.2
	NFHS-IV	14.3	21.3	29.6	39.1	48.8	57.5	na	na	486,080	19.1
	NFHS–V	12.4	19.3	27.7	37.6	47.7	56.7	na	na	5,18,773	19.2
25–49	NFHS–I	36.3	49.2	60.7	68.2	77.9	82.6	88.5	96.7	62,366	16.1
	NFHS-II	33.2	46.2	57.5	65.4	75.7	80.8	86.8	96.1	65,418	16.3
	NFHS-III	29.4	41.1	52.0	61.1	70.9	76.8	82.5	93.2	70,767	16.8
	NFHS-IV	16.4	24.2	32.8	42.5	51.9	60.1	67.3	84.5	407,280	18.8
	NFHS–V	14.2	21.9	30.9	41.1	51.3	60.1	67.7	86.3	4,47,417	18.9

Notes: na = Not applicable, a = Median is not calculated because less than 50 percent of women had a birth before reaching the beginning of the age group.

2005).

The reported prevalence of marriage at a particular age was consistent with the previous research findings (Paul, 2020). Rising age at marriage has been attributed to the marital fertility decline by increasing the proportion of never-married women in past studies (Letamo, 1996; Dommaraju, 2012; Yaya et al., 2019; Singh et al., 2022). Past studies have noted that the decline was highest in South Asia (14.8%) followed by Sub-Saharan Africa (14.0 points) (Nguyen & Wodon, 2015). Additionally, countries such as Bangladesh (Kamal, 2011; Kamal et al., 2014; Hossain et al., 2016), Nepal (Aryal, 2007), Pakistan (Javed & Mughal, 2020) and Ghana (Domfe & Oduro, 2018) also went through the considerable decline in child marriage. Although

child marriage has a lot of negative implications on women and their child health such as adolescent pregnancy (Bajracharya et al., 2019), high fertility, multiple unintended or mistimed pregnancies, pregnancy termination(Yaya et al., 2019; Paul, 2018; Nasrullah et al., 2014; Godha et al., 2013; Santhya, 2011; Adhikari et al., 2009; Raj et al., 2009; Nour, 2006) complication during pregnancy (Nour, 2009; Paul, 2018), female sterilization (Raj et al., 2009), preterm birth, low birth weight (Kidman, 2017; Raj, Saggurti, Winter, et al., 2010), morbidity and infant mortality, child mortality, under 5 mortality (Hombrados, 2017; Raj, Saggurti, Winter, et al., 2010), risk of sexually transmitted infections (Campbell, 2002; Clark, 2004; Nour, 2006) & intimate partner violence (Campbell, 2002; Raj et al., 2010), child marriage is still widely
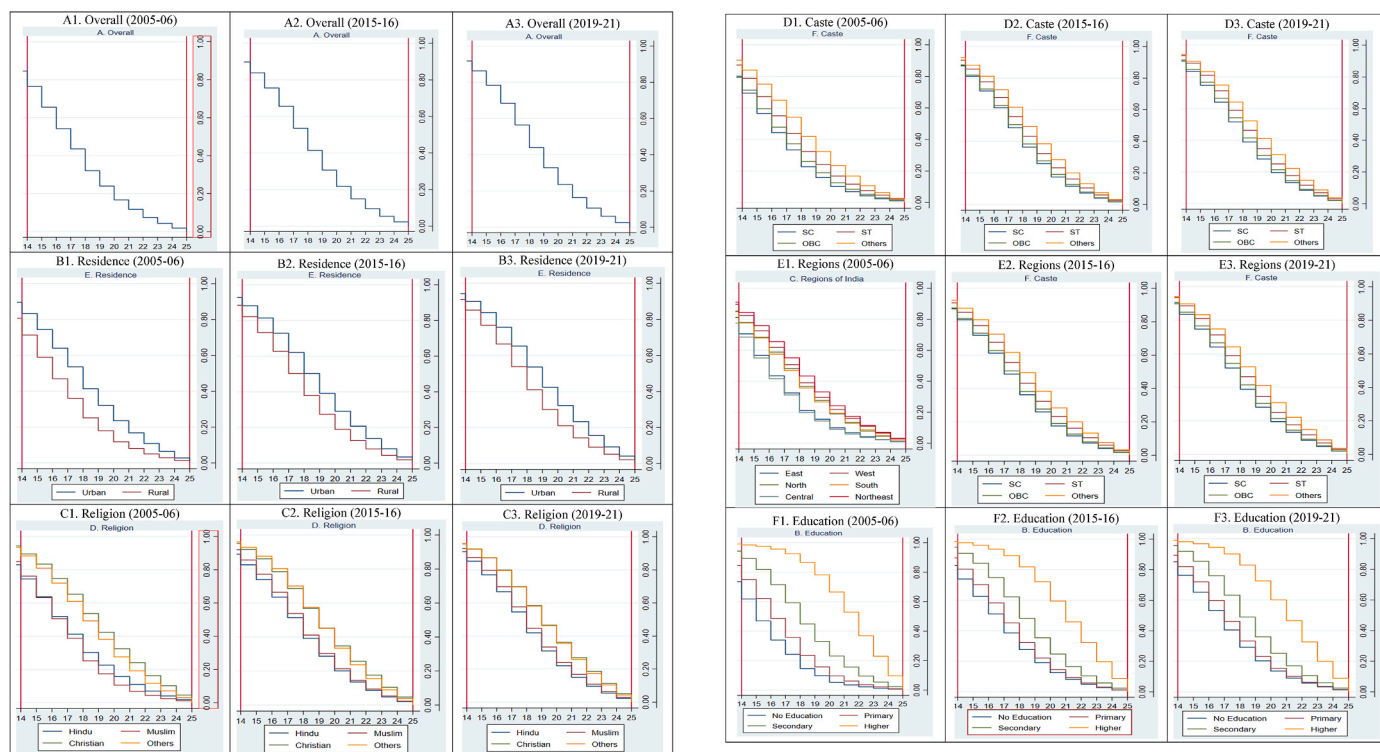
Fig. 1. Kaplan Meier Failure estimates of age at First Marriage in India by background characteristics.

prevalent in India.

After the passage of the Child Marriage Prohibition Act in 2006, there was a dramatic drop in child marriage, from 47.4 percent in 2005–06 to 26.6 percent in 2015–16 among women aged 20–24 years. Despite significant reductions in child marriage, efforts are needed to speed dramatically to fulfill the 2030 SDG target (5.6) objective of ending child marriages. Several previous studies conducted in India and developing countries have documented that child marriage is largely driven by poverty, educational status (Chakravarty, 2018; Dietrich et al., 2018; Hotchkiss et al., 2016; Jain & Kurz, 2007), sociocultural norms (Chowdhury, 2004; Jejeebhoy, 2019; McDougal et al., 2018), dowry demand (Caldwell, Reddy, & Caldwell, 1983), long term discrimination against girls, fear of premarital sex (Verma, Sinha, & Khanna, 2013; Jensen & Thornton, 2003; Arnold et al., 1998).

Although India has witnessed a significant decline in child marriage over the last decade, the change in the median age of marriage is not much. Our study findings showed that the median age at first marriage among women aged 20–49 years increased by approximately 3 years from 1992 to 2021 and has crossed the minimum legal age at marriage. Countries from East and South East Asia have witnessed an increase in the age of marriage for women by a number of years (Jones, 2004). Furthermore, for the first time, the median age at first marriage was 18 years for women aged 20–24 years during 2005–06, whereas the median age at marriage was above the minimum legal age at marriage only after the 2005-06 survey. The rise in the median age at marriage has been attributed to a rise in educational status and career attainment (Saardchom & Lemaire., 2005; Maertens A., 2013). Informing families and communities about the negative effects of child marriage and the recent legislative change regarding the legal age of marriage can be done effectively through the use of mass media (Gage, 2013). Additionally, information through radio and television addressing issues of early marriage empowers parents and their children to fight against the social pressures of early marriage. In a country like India, where marriage embarks on the onset of childbearing, the age at marriage has a significant impact on fertility rates and population growth. Since India's population has been expanding at a rate that is viewed as undesirable for the growth and development of the country, there is an urgent need for population control measures. Analysis indicates that a host of variables such as socioeconomic status and educational status play an important role in determining the age at marriage.

Estimates obtained from multiple classification analyses and the multivariate cox proportional hazard model indicated that factors such as region, education, caste, religion, wealth, and mass media exposure were significantly associated with the age at first marriage. Further, results from multivariate decomposition analysis also indicated that wealth, education, caste and mass media made a significant contribution to the increase in age at marriage. Our findings were backed up by findings from other Indian studies. According to a study by Sanjay Kumar, a one-year increase in a girl's year of schooling was correlated with a 0.36-year increase in her age at marriage, while women in the lower three quantiles of the wealth index had roughly 1.6 years younger age at marriage than those in the richest category (Kumar, 2020). Another study found that women with higher levels of education, non-Hindu women & urban women delayed their marriage and other reproductive events as well (Bloom & Reddy, 1986). Consistent with our findings, past studies have found that the age at marriage has risen slowly mostly because of the decline in child marriages (Desai & Andrist., 2010). Results from a study suggest that raising the age at marriage improved the status of women in terms of education, employment, and better living conditions subsequently impacting the adaptation of family planning methods (Bhatia & Tambe., 2014). Further, this also safeguards child marriage and the health of the mother as well as the child (Bhatia & Tambe., 2014). With the rise in the median age at marriage, the proportion of early marriages declines consequently reducing the number of reproductive years (Mitchell, R.E., 1971). Coale and Tyre have demonstrated that postponing marriage results in a reduction in birth rate and population growth (Coale &Tye., 1961). Studies have demonstrated that with a higher age at marriage, the interval between generations extends (Durch, 1980). The foregoing discussion suggests that a rise in women's age at marriage has several benefits. Previous research has found that adolescent fertility was substantially lower among countries with strict laws regarding the minimum age at

Table 3
Multiple classification analysis estimates of Predicted mean at first marriage among women aged 15–49 years by background characteristics, 1992–2021.

Variables	NFHS–I		NFHS-II		NFHS-III		NFHS-IV		NFHS–V	
	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates
State Region	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
East	15.38 [15.31 15.44]	16.11 [16.06 16.17]	16.05 [15.99 16.11]	16.83 [16.77 16.88]	16.55 [16.48 16.62]	17.13 [17.07 17.2]	17.53 [17.5 17.56]	18.04 [18.01 18.06]	17.61 [17.59 17.64]	18.09 [18.06 18.12]
West	17.64 [17.57 17.72]	17.09 [17.02 17.15]	17.56 [17.49 17.64]	16.84 [16.77 16.9]	18.45 [18.37 18.52]	17.69 [17.63 17.76]	18.54 [18.5 18.58]	18.25 [18.21 18.29]	18.86 [18.82 18.89]	18.7 [18.67 18.73]
North	16.8 [16.75 16.86]	16.52 [16.47 16.57]	16.91 [16.85 16.96]	16.64 [16.59 16.69]	17.42 [17.36 17.49]	17.14 [17.08 17.19]	18.75 [18.73 18.78]	18.29 [18.26 18.31]	19.44 [19.42 19.47]	19 [18.97 19.02]
South	16.98 [16.92 17.04]	16.74 [16.69 16.8]	17.26 [17.2 17.32]	17.09 [17.03 17.15]	17.75 [17.68 17.81]	17.64 [17.59 17.7]	19.01 [18.97 19.04]	18.71 [18.68 18.74]	18.87 [18.84 18.9]	18.74 [18.71 18.76]
Central	14.71 [14.65 14.77]	15.57 [15.52 15.63]	14.6 [14.54 14.66]	15.36 [15.31 15.42]	15.98 [15.92 16.05]	16.61 [16.55 16.66]	17.32 [17.29 17.34]	17.68 [17.65 17.7]	17.89 [17.86 17.91]	18.24 [18.22 18.26]
Northeast	18.35 [18.27 18.43]	17.29 [17.21 17.37]	18.93 [18.86 19.01]	18.22 [18.14 18.29]	19.06 [18.99 19.13]	18.62 [18.55 18.69]	19.9 [19.86 19.93]	19.43 [19.39 19.46]	19.97 [19.94 20]	19.69 [19.65 19.72]
Residence										
Urban	18 [17.95 18.04]	16.56 [16.51 16.61]	18.36 [18.31 18.41]	16.94 [16.89 16.99]	18.51 [18.47 18.55]	17.48 [17.44 17.52]	19.29 [19.27 19.31]	18.45 [18.42 18.47]	19.75 [19.73 19.77]	18.92 [18.9 18.95]
Rural	15.77 [15.74 15.81]	16.41 [16.39 16.44]	15.99 [15.96 16.03]	16.65 [16.62 16.68]	16.67 [16.63 16.7]	17.38 [17.34 17.41]	17.91 [17.89 17.92]	18.19 [18.18 18.2]	18.36 [18.34 18.37]	18.59 [18.58 18.61]
Highest Education										
No Education	14.91 [14.88 14.94]	15.39 [15.36 15.43]	14.99 [14.95 15.02]	15.59 [15.55 15.63]	15.43 [15.39 15.46]	15.97 [15.93 16.02]	16.83 [16.81 16.84]	17.14 [17.12 17.16]	17.18 [17.16 17.2]	17.41 [17.39 17.43]
Primary	17 [16.94 17.05]	16.62 [16.56 16.67]	16.74 [16.68 16.8]	16.58 [16.53 16.64]	16.69 [16.62 16.75]	16.68 [16.62 16.74]	17.42 [17.39 17.45]	17.49 [17.46 17.52]	17.66 [17.63 17.69]	17.72 [17.69 17.75]
Secondary	18.92 [18.86 18.97]	18.14 [18.09 18.2]	18.47 [18.42 18.51]	17.74 [17.69 17.79]	18.78 [18.74 18.82]	18.26 [18.22 18.31]	18.95 [18.93 18.96]	18.7 [18.68 18.71]	19.1 [19.08 19.11]	18.97 [18.96 18.99]
Higher	22.32 [22.2 22.43]	21.42 [21.3 21.54]	21.6 [21.52 21.68]	20.58 [20.5 20.67]	22.76 [22.68 22.85]	21.93 [21.84 22.02]	22.2 [22.16 22.23]	21.66 [21.62 21.7]	22.31 [22.28 22.34]	21.95 [21.92 21.99]
Caste										
SC	15.09 [15.01 15.17]	16.11 [16.05 16.18]	15.56 [15.49 15.62]	16.41 [16.36 16.47]	16.36 [16.29 16.43]	17.13 [17.07 17.19]	17.69 [17.66 17.71]	18.13 [18.1 18.15]	18.11 [18.08 18.14]	18.51 [18.48 18.53]
ST	16.92 [16.84 16.99]	16.82 [16.75 16.89]	17.19 [17.11 17.27]	16.9 [16.82 16.97]	17.74 [17.67 17.82]	17.49 [17.41 17.57]	18.8 [18.77 18.83]	18.62 [18.59 18.65]	19.21 [19.18 19.23]	19.12 [19.09 19.15]
OBC	16.6 [16.56 16.63]	16.46 [16.43 16.48]	16.06 [16.01 16.11]	16.53 [16.49 16.57]	16.66 [16.62 16.71]	17.12 [17.08 17.16]	17.85 [17.83 17.87]	18.06 [18.04 18.07]	18.3 [18.28 18.32]	18.47 [18.45 18.48]
Others			17.57 [17.53 17.62]	16.97 [16.94 17.01]	18.54 [18.49 18.58]	17.83 [17.78 17.87]	19.11 [19.08 19.14]	18.48 [18.46 18.5]	19.51 [19.48 19.53]	18.84 [18.82 18.87]
Religion										
Hindu	16.1 [16.07 16.13]	16.23 [16.2 16.25]	16.38 [16.35 16.41]	16.57 [16.54 16.59]	17.22 [17.19 17.26]	17.32 [17.29 17.35]	18 [17.99 18.01]	18.1 [18.09 18.12]	18.4 [18.38 18.41]	18.48 [18.46 18.49]
Muslim	16 [15.92 16.08]	16.37 [16.3 16.44]	16.48 [16.4 16.56]	16.64 [16.57 16.7]	16.88 [16.8 16.95]	17.15 [17.08 17.23]	18.39 [18.36 18.42]	18.52 [18.48 18.55]	18.92 [18.89 18.95]	19.31 [19.27 19.34]
Christian	20.04 [19.94 20.15]	18.51 [18.41 18.61]	20.25 [20.14 20.37]	18.4 [18.29 18.51]	19.97 [19.87 20.07]	18.41 [18.31 18.52]	20.42 [20.38 20.47]	19.01 [18.96 19.06]	20.72 [20.68 20.77]	19.53 [19.48 19.58]
Others	18.36 [18.24 18.48]	17.62 [17.52 17.73]	19.02 [18.9 19.15]	17.92 [17.82 18.03]	18.96 [18.83 19.08]	18.24 [18.13 18.35]	19.91 [19.86 19.97]	19.23 [19.17 19.28]	20.19 [20.14 20.24]	19.42 [19.37 19.47]
Wealth Index										
Poorest	14.31 [14.25 14.37]	15.74 [15.68 15.81]	14.71 [14.65 14.78]	16.2 [16.13 16.27]	15.13 [15.06 15.2]	16.89 [16.81 16.97]	17.02 [16.99 17.04]	18.12 [18.09 18.16]	17.71 [17.68 17.73]	18.62 [18.6 18.65]
Poor	14.96 [14.9 15.02]	16.04 [15.98 16.11]	15.1 [15.04 15.16]	16.24 [16.18 16.3]	15.78 [15.72 15.85]	16.91 [16.85 16.98]	17.51 [17.48 17.53]	17.95 [17.92 17.97]	18.02 [18 18.05]	18.44 [18.42 18.47]

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Table 3 (*continued*)

Variables	NFHS–I		NFHS-II		NFHS-III		NFHS-IV		NFHS–V	
	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates	Unadjusted	Adjusted for factors and covariates
State Region	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Middle	15.75 [15.69 15.8]	16.29 [16.24 16.35]	15.99 [15.93 16.04]	16.49 [16.43 16.54]	16.7 [16.64 16.76]	17.2 [17.15 17.26]	18.14 [18.11 18.16]	18.1 [18.08 18.13]	18.49 [18.47 18.52]	18.55 [18.53 18.57]
Richer	16.91 [16.86 16.96]	16.68 [16.63 16.73]	17.25 [17.2 17.3]	16.98 [16.93 17.03]	17.76 [17.71 17.82]	17.58 [17.53 17.63]	18.89 [18.86 18.91]	18.39 [18.37 18.42]	19.21 [19.19 19.24]	18.76 [18.73 18.78]
Richest	18.9 [18.85 18.95]	17.1 [17.03 17.16]	19.23 [19.18 19.28]	17.4 [17.34 17.46]	19.69 [19.64 19.74]	17.96 [17.91 18.02]	20.12 [20.09 20.15]	18.79 [18.76 18.83]	20.46 [20.44 20.49]	19.08 [19.05 19.11]
Mass Media Exposure										
No	15.1 [15.06 15.14]	16.32 [16.28 16.36]	15 [14.96 15.04]	16.54 [16.49 16.58]	15.33 [15.27 15.39]	17.18 [17.12 17.24]	17 [16.97 17.02]	18.15 [18.12 18.18]	17.65 [17.63 17.68]	18.57 [18.54 18.59]
Any	17.5 [17.46 17.53]	16.57 [16.54 16.6]	17.74 [17.71 17.77]	16.86 [16.83 16.89]	17.98 [17.95 18.01]	17.48 [17.46 17.51]	18.67 [18.66 18.69]	18.29 [18.28 18.31]	19.05 [19.03 19.06]	18.71 [18.69 18.72]
Family Structure										
Nuclear					17.34 [17.3 17.37]	17.4 [17.37 17.44]	18.13 [18.11 18.14]	18.24 [18.22 18.25]	18.51 [18.49 18.52]	18.65 [18.63 18.66]
Non-Nuclear					17.62 [17.58 17.66]	17.45 [17.41 17.48]	18.46 [18.44 18.47]	18.28 [18.27 18.3]	18.86 [18.85 18.88]	18.7 [18.68 18.71]
Prior Relationship with husband										
No							18.33 [18.32 18.34]	18.3 [18.29 18.31]	18.74 [18.73 18.75]	18.72 [18.71 18.73]
Yes							18.09 [18.06 18.13]	17.98 [17.95 18.01]	18.32 [18.29 18.35]	18.32 [18.29 18.35]
Total	**16.46 [16.43 16.48]**		**16.73 [16.7 16.76]**		**17.47 [17.44 17.5]**		**18.3 [18.29 18.31]**		**18.69 [18.68 18.7]**	

Table 4
Multivariate decomposition results showing the change in age at first marriage among reproductive-aged women in India, 1992–2021.

Background Characteristics	Due to difference in Characteristics (E)				Due to difference in Coefficients (C)			
	Coef.	SE	P-value	Percent Contribution	Coef.	SE	P-value	Percent Contribution
Age				10.2				45.3
15–19								
20–24	0.089	0.002	0.000	−4.0	0.092	0.011	0.000	4.1
25–29	0.015	0.000	0.000	−0.7	0.181	0.012	0.000	8.2
30–34	0.024	0.000	0.000	1.1	0.194	0.010	0.000	8.7
35–39	0.080	0.001	0.000	3.6	0.193	0.009	0.000	8.7
40–44	0.075	0.001	0.000	3.4	0.162	0.007	0.000	7.3
45–49	0.150	0.002	0.000	6.8	0.181	0.006	0.000	8.2
Education				**35.7**				**−15.9**
No Education								
Primary	0.015	0.001	0.000	−0.7	0.136	0.007	0.000	−6.1
Secondary	0.468	0.004	0.000	21.2	0.174	0.008	0.000	−7.8
Higher	0.336	0.002	0.000	15.2	0.042	0.003	0.000	−1.9
Mass Media				**0.9**				**−11.1**
No								
Any	0.021	0.003	0.000	0.9	−0.245	0.050	0.000	−11.1
Caste				**1.6**				**−10.7**
SC								
ST	0.040	0.001	0.000	1.8	−0.013	0.007	0.048	−0.6
Others	0.005	0.002	0.025	−0.2	0.223	0.030	0.000	−10.1
Religion				**−0.3**				**−1.3**
Hindu								
Muslim	0.007	0.000	0.000	−0.3	0.078	0.004	0.000	3.5
Christian	0.000	0.000	0.000	0.0	−0.083	0.004	0.000	−3.7
Others	0.001	0.000	0.000	0.0	0.023	0.003	0.000	−1.0
Wealth Index				**−1.5**				**−32.5**
Poorest								
Poorer	0.013	0.001	0.000	−0.6	0.090	0.007	0.000	−4.1
Middle	0.003	0.000	0.000	−0.1	0.142	0.009	0.000	−6.4
Richer	0.001	0.001	0.222	0.0	0.219	0.011	0.000	−9.9
Richest	0.019	0.002	0.000	−0.9	0.268	0.015	0.000	−12.1
Residence				**−0.8**				**−11.6**
Urban								
Rural	0.019	0.001	0.000	−0.8	0.257	0.059	0.000	−11.6
State Regions				**−0.6**				**8.7**
East								
West	0.011	0.000	0.000	−0.5	0.051	0.006	0.000	−2.3
North	0.027	0.001	0.000	−1.2	0.123	0.010	0.000	5.5
South	0.008	0.000	0.000	−0.4	0.034	0.008	0.000	−1.5
Central	0.003	0.001	0.000	0.2	0.123	0.008	0.000	5.5
Northeast	0.029	0.000	0.000	1.3	0.032	0.006	0.000	1.5
Constant					1.858	0.1065	0.000	**84.0**
Total				**45.0**				**55.0**

marriage. Further, thorough investigations suggest that the median age at marriage is lower among respondents from the lower wealth quintile, without higher education, and socially-disadvantaged groups. This finding is in accordance with a study from Iran where the age at marriage is very less (Momeni, 1972).

Historically, the age at marriage has been substantially higher for Christians. Results obtained from MCA analysis showed that Christians and Other castes & STs in India have higher age at marriage and in line with our findings, studies have reported caste (Sheela & Audinarayana., 2003) and religion (Saardchom & Lemaire., 2005) to play a pivotal role in influencing the age at marriage in India and other countries (Klugman et al., 2014; Anandalakshmy, S., 1994). Since marriage behavior is influenced by culture, norms and practices, people from different religions have different perspectives which are reflected in marriage patterns. Studies have shown that upper caste people tended to marry their daughters early (Kapadia, K. M. 1966) in view of protecting women from the danger of rape or seduction and that a young girl can be easily taught the ways of the new family and adjust (Toward Equality, 1974). Postponing marriages till families accumulate dowry might have increased the age at which women marry (Schlegel, 1993).

Our findings revealed a wide diversity in age at marriage across different regions in the country in line with existing literature (Bhagat R. B. 1993). Additionally, over the decades, most of the states had a median age at marriage of more than 18 years. In India, Srinivasan et al. (2015) reported that child marriage was less common in areas with better macroeconomic conditions, such as improved facilities and infrastructure, education, and low levels of poverty. Another study revealed that child marriage is strongly influenced by geographical characteristics which further leads to wide inter and intra-state heterogeneity in the level of child marriage (McDougal et al., 2020). Researchers discuss that this diversity is mostly because of geographical variation in gender roles, and ideologies that shape the age at marriage in India (Jejeebhoy & Sathar, 2001; Singh, 2005; Cislaghi et al., 2020). Further, when compared to northern parts, southern parts have less severe patriarchy, and southern women generally have more autonomy and independence than their northern counterparts in a variety of areas of their lives and thus higher age at marriage (Dyson & Moore, 1983; Jejeebhoy, 2001; Mandelbaum, 1986). Strong political will, unwavering dedication, and the determination of succeeding governments to strengthen programming initiatives have greatly assisted in bringing about significant changes in the marital and fertility behaviors in these communities, especially in states like Tamil Nadu (Srinivasan, 1996). Studies have also reported that interventions aimed at decreasing school dropouts (Rasmussen et al., 2021) and enhancement of girls' own human capital and opportunities are one of the most compelling ways to improve the age at marriage (Malhotra & Elnakib, 2021).

5. Conclusions

To conclude, this study highlights that strong policy implementation and program management are needed in an attempt to improve women's status, especially for women from socially disadvantaged strata. Targeting the education sector through cash or in-kind support might address the interventions aimed at improving the age at marriage. Further, the findings call for the formulation and strict implementation of laws regarding the age at marriage. Since, age at marriage has a strong association with fertility and maternal and child health, policies regarding increasing the age at marriage are essential to meet the SDG targets (5.6). From the policy perspective, to reduce the proportion of women marrying at an early age, better enforcement of the law regarding the legal age at marriage and campaigns are required.

6. Limitations

Despite the rich data and the sample being representative of the population, our study has several limitations such as i) The cause-effect theory could not be established since the data comes from a cross-sectional survey. ii) Retrospective reporting of months and years of age at first marriage may lead to recall bias which leads to age mis-reporting and digit preference, especially among older and less educated respondents. However, marriage holds great importance in Indian society, which may minimize this concern. iii) Because the median pertains to the respondent's past experience, it is not of current as it should be for many analytical purposes iv) Due to data availability issues and the recent establishment of states, state-specific analysis was only conducted for the recent three survey rounds.

Financial disclosure statement

No funding was received for the present study.

Author's statement

The authors declare that they do not have any conflict of interest.

Appendix

Author's contribution

MS and CS contributed in conceptualizing the study. MS is responsible for the analysis. MS, NS and CS contributed to the interpretation of the data, wrote the manuscript and critically revised all versions of the manuscript and approved the final version.

Declaration of competing interest

The authors declare that they have no competing interest.

Data availability

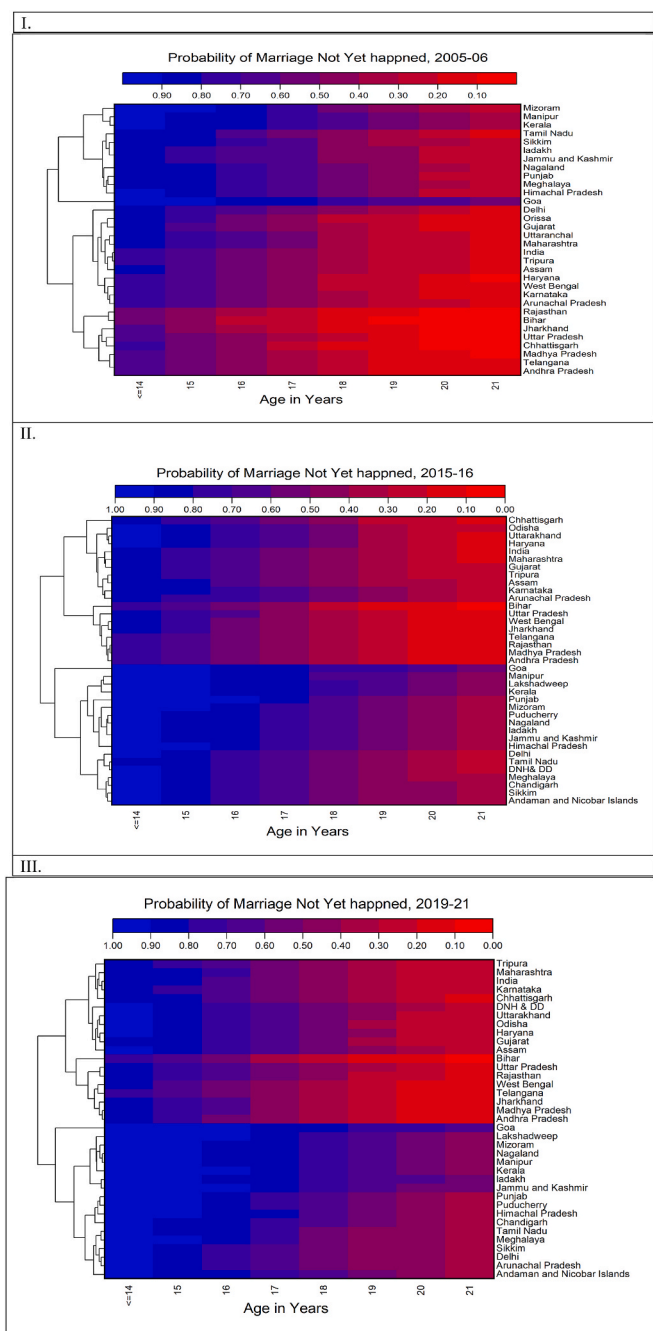Data will be made available on request.

Fig. A1. State and some specific demographic characteristics wise hierarchical clustered heat map of probability of marriage not yet happened by age among women aged 15–49 years.

Table B1
Cox Proportional Hazard Model predicting women risk of first marriage by various demographic characteristics, Pooled NFHS data 1992–2020.

Characteristics	AHR [95% CI]		
Individual Characteristics	Model 1	Model 2	Model 3
Current Age			
15-19(Ref)			
20–24	0.58*** [0.58,0.59]	0.59*** [0.58,0.59]	0.61*** [0.60,0.62]
25–29	0.46*** [0.45,0.46]	0.47*** [0.47,0.48]	0.50*** [0.50,0.51]
30–34	0.42*** [0.42,0.43]	0.45*** [0.44,0.45]	0.48*** [0.47,0.48]
35–39	0.40*** [0.40,0.41]	0.43*** [0.42,0.43]	0.46*** [0.46,0.47]
40–44	0.40*** [0.40,0.41]	0.43*** [0.43,0.43]	0.47*** [0.47,0.48]
45–49	0.36*** [0.35,0.36]	0.38*** [0.37,0.38]	0.42*** [0.42,0.43]

Table B1 (*continued*)

Characteristics	AHR [95% CI]		
Individual Characteristics	Model 1	Model 2	Model 3
Education			
No Education(Ref)			
Primary	0.83*** [0.82,0.83]	0.84*** [0.83,0.84]	0.86*** [0.85,0.86]
Secondary	0.57*** [0.57,0.57]	0.59*** [0.58,0.59]	0.63*** [0.62,0.63]
Higher	0.34*** [0.33,0.34]	0.34*** [0.33,0.34]	0.37*** [0.36,0.37]
Mass Media Exposure			
No(Ref)			
Any	0.93*** [0.92,0.93]	0.93*** [0.93,0.94]	0.96*** [0.95,0.96]
Household Characteristics			
Residence			
Urban(Ref)			
Rural		1.04*** [1.04,1.04]	1.05*** [1.05,1.06]
Caste			
SC (Ref)			
ST		0.88*** [0.87,0.88]	0.88*** [0.87,0.88]
Others		0.99 [0.99,1.00]	0.98*** [0.97,0.98]
Religion			
Hindu(Ref)			
Muslim		0.84*** [0.84,0.85]	0.86*** [0.86,0.87]
Christian		0.81*** [0.81,0.82]	0.80*** [0.79,0.80]
Others		0.80*** [0.80,0.81]	0.80*** [0.80,0.81]
Wealth Index			
Poorest(Ref)			
Poor		1.08*** [1.07,1.09]	1.06*** [1.05,1.06]
Middle			1.03*** [1.02,1.04]
Richer		0.96** [0.94,0.97]	0.97*** [0.96,0.98]
Richest		0.92* [0.90,0.93]	0.91*** [0.90,0.91]
State Regions			
East(Ref)			
West		0.89*** [0.88,0.90]	0.88*** [0.87,0.88]
North		0.86*** [0.85,0.87]	0.87*** [0.86,0.87]
South		0.89*** [0.89,0.90]	0.88*** [0.87,0.89]
Central		1.02*** [1.02,1.03]	1.05*** [1.04,1.06]
Northeast		0.72*** [0.72,0.73]	0.70*** [0.70,0.71]
Year of Survey			
1992-93(Ref)			
1998–99			0.99 [0.98,1.00]
2005–06			0.94*** [0.93,0.94]
2015–16			0.74*** [0.73,0.74]
2019–21			0.72*** [0.71,0.72]
Log Likelihood	−17211856	−16481549	−16473283

Note: *p < 0.05, **p < 0.01, ***p < 0.001, AHR: Adjusted hazard ratio, CI: Confidence Interval.
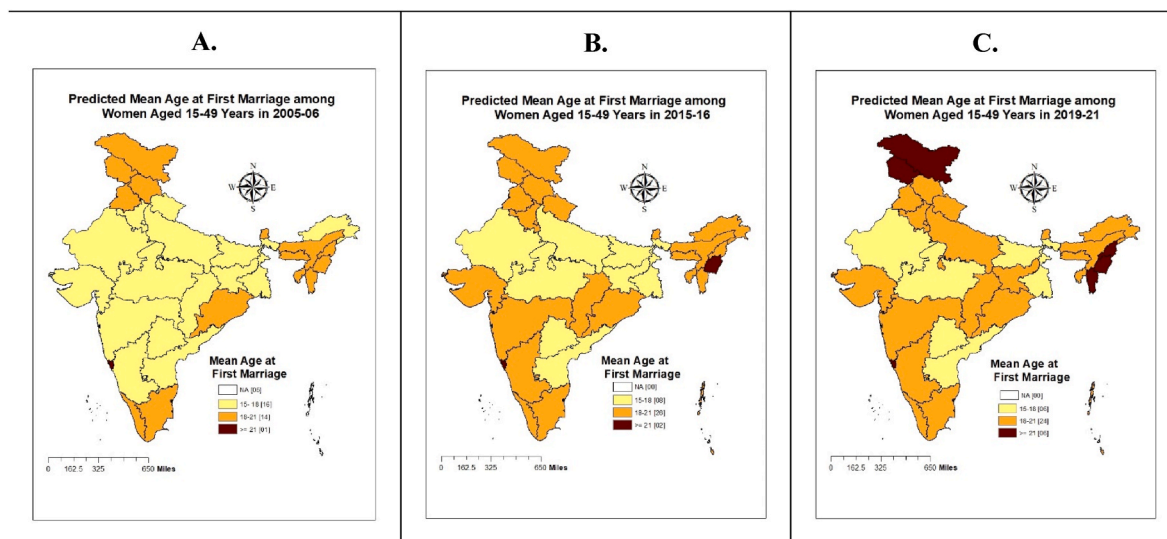
Notes: A, B and C are predicted mean age first marriage estimates for the year 2005-06, 2015-16 and 2019-21 respectively, Estimates are adjusted for education, residence, caste, religion and wealth index.

Fig. A2. State specific predicted mean age at First Marriage among women aged 15–49 years by survey rounds.

Notes: A, B and C are predicted mean age first marriage estimates for the year 2005–06, 2015-16 and 2019-21 respectively, Estimates are adjusted for education, residence, caste, religion and wealth index.

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