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Association between women's autonomy and unintended pregnancy in India

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ABSTRACT

Multiple studies from low- and middle-income countries have indicated that women's autonomy can play a key role in reducing unintended pregnancy. Such evidence is scarce in Indian context, where patriarchy prevails, and sociocultural norms limit women's participation in important decisions. Therefore, the primary aim of this study is to examine the association between women's autonomy and unintended pregnancy in India. Data collected as part of the National Family Health Survey-4 conducted in 2015-16 are used for the analysis. Information on a total of 205984 ever-married women was extracted from 699686 women aged 15–49 years. Bivariate logistic regression was used to examine the association of unintended pregnancy with women's autonomy, demographic, socio-economic, and social context variables. Multiple logistic regression was further employed to assess the effect of women's autonomy on unintended pregnancies after controlling various selected background characteristics. The study found that women's autonomy was a significant predictor of unintended pregnancy after adjusting different other covariates. For example, women with higher autonomy had 16% lower adjusted odds of having an unintended pregnancy than women with lower autonomy (OR adj = 0.84; 95% CI: 0.72–0.99). Moreover, other covariates such as age, children ever born, age at marriage, wealth status, and consonance over fertility exert a significant and robust influence over unintended pregnancy. The study recommends that policymakers design programmes to spread awareness about the importance of the decision-making power of women in household settings.

1. Introduction

The definition of unintended pregnancies include pregnancies which are either unwanted or mistimed at the time of conception.[1] Pregnancies are considered 'unwanted' when women do not wish to have further births while a 'mistimed' pregnancy refers to births that occur earlier than the desired time. Unintended pregnancies, in general, can have serious consequences that impose a burden on women, children, and the entire family.[2] Various maternal and child health issues are associated with unwanted pregnancies, including unsafe abortion, low birth weight, and under-utilization of prenatal care.[3] The accurate assessment of pregnancy intentions is thus essential for estimating unmet needs of contraception, understanding fertility behaviours, and their impact on maternal and child health.[4]

Worldwide, some 44% of pregnancies were identified as unintended in 2010–14, approximately 56% of which ended in abortion.[5] The same study reported a global decline in the unintended pregnancy rate from 74 per thousand in 1990-94 to 62 per thousand in 2010–14. In India, of 48.1 million pregnancies reported in 2015, some 54% resulted in live births; 32% in induced abortions, and 14% in miscarriages.[6] The study further reported that the unintended pregnancy rate was estimated to be 70.1 pregnancies per thousand among women aged 15–49 years.

It is expected that highly empowered women can control their fertility behaviour, which in turn can restrict unintended pregnancy.[7] Women's autonomy is one of the indicators of women's empowerment and status. It is more closely associated with their power and agency. The present study have adopted women's autonomy which included decision-making autonomy, movement autonomy, and financial autonomy.[8–10] Improving women's status also enhances their decision-making capacity at all levels in all spheres of life, especially in terms of their sexuality and reproduction.[11]

Substantial research has focused on the role that women's autonomy plays in some fertility-related outcomes, including contraceptive use,[12–14] length of birth intervals,[15] low birth weight,[16] child-rearing,[17] child survival and development,[18,19] and pregnancy care.[9,20] However, the association between women's autonomy and unintended pregnancy

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is still largely unexplored.[21,22] Although some researchers have tried to explore this association in Philippines[21] and Bangladesh[23] and Cambodia,[24] the subject remains highly relevant for future research in developing countries.

To the best of our knowledge, no previous studies have directly assessed the role of women's autonomy with respect to unintended pregnancy in India. The present investigation therefore aims to fill this research gap by exploring the association of women's autonomy with unintended pregnancies among ever-married women across India.

2. Data and methods

2.1. Data

The present study is based on the fourth round of the National Family Health Survey (NFHS-4) conducted during 2015–16. NFHS-4 is a large-scale cross-sectional and a nationally representative survey which provides self-reported information on maternity history, fertility preference, socio-economic and demographic characteristics, contraceptive usage, and autonomy. NFHS-4 adopted a multistage stratified random sampling method for the collection of data. Details of the sample size, design, and sample weights can be obtained from the final report of NFHS-4 [25]. In the survey, a total of 699686 women aged 15–49 years were interviewed. A total of 190898 women had at least one live birth in the last five years, and 32428 women were pregnant at the time of the survey. Among the interviewed women, 16848 had at least one birth in the last five years as well as were pregnant at the time of the survey. As these women had reported on both their reproductive intentions for their last child and their current pregnancy, their responses on their reproductive intentions were recorded for the current pregnancy only.

The selection of the final sub-sample was based on the response of women about their reproductive intentions. A total of 173952 of 190898 women who had a birth in the last five years but were not pregnant at the time of survey reported reproductive intentions related to their latest birth. By comparison, all 32428 women pregnant at the time of the survey provided information on their reproductive intention(s). The final analytical sample size for the current study comprised 205984 ever married women.

2.2. Dependent variable

In NFHS-4, female respondents were asked two different questions about their reproductive intentions for their pregnancy (if the woman was pregnant at the time of the survey) and their latest birth in the last five years. For pregnant women, the first question was: "When you got pregnant, did you want to get pregnant at that time?" while the second question was: "Did you want to have the baby *later on,* or did you *not want* any (more) children?" Women who had at least one child but were not pregnant at the time of the survey were asked about their pregnancy intentions in an essentially similar manner. The first question asked, "When you got pregnant with (NAME), did you want to get pregnant at that time?" The second question was, "Did you want to have a baby *later on*, or did you *not want* any (more) children?" These questions are a powerful indicator of the degree to which couples can successfully control childbearing.[25] In this study, the pregnancy intentions were assessed as a binary variable where women wanted a children 'then' considered as intended and coded as '0' and 'later on or did not want any (more) children' were considered as unintended and coded as '1'.

2.3. Explanatory variables

Female autonomy was used as the primary exposure variable in our study. By adopting the methodology proposed by Jatrana & Pasupuleti,[26] we have created an autonomy index for women based on the information collected on: (i) household decisions, (ii) movement and (iii) finance. Movement autonomy comprises three questions on whether women are allowed to go to market, health facilities, and places outside their own village/community, with three possible responses: "alone," "with someone else," and "not at all." These responses were scored: 2 for 'alone,' 1 for 'with someone else,' and 0 for 'not at all.' Autonomy based on household decisions was derived from the questions of whether women made decisions related to their health care, major household purchases, how to use their husband's earnings, and visits to family or relatives. There were five possible responses to these questions: 'respondent alone,' 'respondent and husband jointly,' 'husband alone,' 'someone else,' and 'others.' These responses were scored as 2 for 'respondent alone,' 1 for 'respondent and husband jointly,' and otherwise 0. Finally, financial autonomy was assessed from the question of whether the respondent had the money for her own use with two possible responses 'yes' or 'no', with a score of 2 if the response was 'yes, ' and otherwise 0. Confirmatory factor analysis derives a single construct behind the various dimensions of women's autonomy,[27] and the index was categorized into terciles (*low = 0, medium = 1, and high = 2*).

Various control variables, such as demographic, economic, and social context, were also included in the analysis. The demographic variables include age in years (*15–24 = 0, 25–34 = 1, and 35–49 = 3*); place of residence (*urban = 0, rural = 1*); total children ever born (*no children = 0, 1 to 2 = 1, and 3 or more = 3*); and age at first marriage (*less than 18 years = 0, equal to or more than 18 years = 1*). The economic variables include woman's education (*no education = 0, primary = 1, secondary = 2, and higher = 3*); husband's education (*no education = 0, primary = 1, secondary = 2, and higher = 3*); wealth index (*poorest = 0, poorer = 1, middle = 2, richer = 3, and richest = 4*); and employment (*Not working = 0, agricultural = 1, and non-agricultural working = 2*). Social context variables include religion (*Hindu = 0, Muslim = 1, Others = 2*); caste (*Others = 0, Scheduled Castes/Scheduled Tribes (SC/ST) = 1, Other Backward Class (OBC) = 2*); ever-used modern contraceptive method (*no = 0, yes = 1*); consonance of fertility preferences (*both want the same = 0, husband wants more = 1, husband wants fewer = 2, and don't know/ missing = 3*); and whether women are the main decision-makers on contraception use (*no = 0, yes = 1)*.

2.4. Statistical analysis

Bivariate analysis was used to examine the strength of an association between unintended pregnancy and selected demographic, economic, and social context covariates. Multiple logistic regression analyses were used to investigate the relationship of unintended pregnancy with women's autonomy after adjusting for selected covariates. While cross-tabulating, the chi-square test was employed to examine the association between dependent and selected independent variables. Since our dependent variable, unintended pregnancy, is a dichotomous variable, binary logistic regression was an appropriate statistical tool in the analysis. The value of the dependent variable was 'one' if the pregnancy was unintended and 'zero' if the pregnancy was intended. Bivariate logistic regression provides the unadjusted odds ratio, i.e., the effect of each independent variable on the dependent variable. Moreover, multiple logistic regression was used to study the influence of selected independent variables on unintended pregnancy. We have set the minimal statistical significance level at $p < 0.05$. The statistical analyses were conducted using Stata 15.1SE for Windows.

2.5. Ethical consideration

The NFHS-4 received ethical clearance from IIPS's Ethical Review Board. The survey agencies that conducted the field survey for the data collection have obtained prior informed consent from the respondents.

3. Results

Table 1 provides descriptive statistics of the sample and bivariate analysis of pregnancy intentions of the respondents with their

Table 1
Descriptive statistics and percent distribution of reproductive intentions of ever-married women by selected background characteristics, India, NFHS-4 (2015-16).

Characteristics	N	Intended (%)	Unintended (%)	Total (%)
Pregnancy Intention[W]				
Intended	185728 (90.2)	-	-	
Unintended	20256 (9.8)	-	-	
Women Autonomy		p-value = 0.002		
Low	16365 (47.4)	89.6	10.4	100
Medium	12158 (35.2)	90.9	9.1	100
High	5990 (17.4)	91.0	9.0	100
Demographic factors				
Age-groups		p-value = 0.000		
15–24 years	71788 (34.9)	91.8	8.2	100
25–34	112274 (54.5)	90.3	9.7	100
35–49	21922 (10.6)	82.7	17.3	100
Residence		p-value = 0.000		
Urban	52070 (25.3)	91.1	8.9	100
Rural	153914 (74.7)	89.8	10.3	100
Total children ever born		p-value = 0.000		
No children (*but pregnant at time of survey*)	12580 (6.1)	94.9	5.1	100
1-2′	126332 (61.3)	92.9	7.1	100
≥3	67072 (32.6)	83.3	16.7	100
Age at first marriage		p-value = 0.000		
Less than 18 years	70008 (34.5)	88.6	11.4	100
18 or more years	132975 (65.5)	91.1	8.9	100
Economic factors				
Woman's education		p-value = 0.000		
No education	57537 (27.9)	87.1	12.9	100
Primary	28326 (13.8)	89.2	10.8	100
Secondary	97321 (47.3)	91.4	8.6	100
Higher	22800 (11.1)	92.9	7.1	100
Husband's education		p-value = 0.000		
No education	5873 (16.4)	88.1	11.9	100
Primary	4890 (13.6)	88.9	11.1	100
Secondary	19765 (55.1)	90.4	9.6	100
Higher	5317 (14.8)	92.9	7.1	100
Wealth Index		p-value = 0.000		
Poorest	49389 (24)	87.2	12.8	100
Poorer	46955 (22.8)	89.0	11.0	100
Middle	41582 (20.2)	90.8	9.2	100
Richer	36151 (17.6)	91.9	8.2	100
Richest	31907 (15.5)	93.0	7.0	100
Occupation		p-value = 0.114		
Not working	27630 (76.9)	90.4	9.6	100
Agricultural	4544 (12.6)	89.8	10.2	100
Non-agriculture	3778 (10.5)	89.6	10.4	100
Social-context factors				
Ever used contraceptive method		p-value = 0.000		
No	93201 (45.3)	90.8	9.3	100
Yes	112783 (54.8)	89.7	10.3	100
Consonance of fertility preferences		p-value = 0.000		
Both want the same	39681 (83.4)	90.5	9.5	100
Husband wants more	4560 (9.6)	84.1	15.9	100
Husband wants fewer	2079 (4.4)	87.9	12.1	100
Don't know/missing	1274 (2.7)	85.5	14.5	100
Women main decision-maker about contraception		p-value = 0.000		
No	71046 (92.3)	90.6	9.4	100
Yes	5933 (7.7)	87.5	12.5	100
Caste		p-value = 0.066		
Others	38933 (19.7)	90.0	10.0	100
SC/ST	78518 (39.8)	90.1	9.9	100
OBC	80007 (40.5)	90.4	9.6	100
Religion		p-value = 0.000		
Hindu	149391 (72.5)	90.6	9.5	100
Muslim	31525 (15.3)	87.9	12.1	100
Others[1]	25068 (12.2)	91.5	8.5	100

Note. *W*- Weighted estimate, 1- Others includes Christian, Sikh, Buddhist/Neo-Buddhist, Jain, Jewish, Parsi/Zoroastrian, and No religion.

demographic, economic, and social context covariates. Some 17% of respondents had higher autonomy, nearly half of the respondents belong to the age group 25–34 years. Some 6% of the respondents were pregnant for the first time, while 33% had three or more children. One-third of women had married before the legal age of 18 years. Respondent's education level was comparatively lower than their husbands. More than half of the respondents have used contraception in their lifetime. In terms of partner fertility preference, almost 84% of couples wanted to have the same number of children. Only 8% of respondents were the main decision-maker regarding contraception use. The results further depict significant bivariate associations between pregnancy intention and various background characteristics. The highest proportion of unintended pregnancies (10.4%) were found in the women with low autonomy. The prevalence of unintended pregnancy was higher among the women who were in the age group 35–49 years, in the poorest wealth quintile, lived in a rural area, had more than three children, married before the age of 18 years, with no education, and had used the contraceptive method in a lifetime.

Table 2 summarises the unadjusted and adjusted odds ratios of unintended pregnancy according to different demographic, economic, and social context covariates. We utilized five models in the analysis, Model-I presents the unadjusted odds ratio for all included variables, and Model-II includes women's autonomy and demographic factors; Model-III includes women's autonomy and economic factors; Model-IV

Table 2
Bivariate and Multiple logistic regression analysis of unintended pregnancy and selected background characteristics, India, NFHS-4 (2015-16).

Characteristics	Model- I[a]	Model- II[b]	Model- III[c]	Model- IV[d]	Model-V[e]
	UOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Women Autonomy					
Low®	1	1	1	1	1
Medium	0.87*(0.77,0.97)	0.86**(0.77,0.96)	0.89*(0.79,0.99)	0.87(0.7,1.08)	0.86**(0.77,0.97)
High	0.85*(0.72,0.99)	0.85*(0.72,0.99)	0.91(0.81,1.06)	0.70*(0.52,0.92)	0.84*(0.72,0.99)
Demographic factors					
Age-groups					
15–24 years®	1	1			1
25–34	1.20***(1.15,1.26)	0.85*(0.74,0.97)			0.86*(0.75,0.98)
35–49	2.33***(2.18,2.48)	1.17(0.97,1.4)			1.18(0.98,1.43)
Residence					
Urban®	1				1
Rural	1.17***(1.11,1.24)	1.01(0.89,1.15)			0.91(0.78,1.06)
Total children ever born					
No children®	1	1			1
1-2′	1.42***(1.26,1.59)	1.45**(1.11,1.88)			1.46**(1.11,1.91)
≥3	3.68***(3.29,4.12)	4.06***(3.07,5.36)			3.95***(2.96,5.28)
Age at first marriage					
<18 years ®	1	1			1
≥18	0.77***(0.73,0.8)	1.00(0.89,1.11)			1.02(0.91,1.14)
Economic factors					
Woman's education					
No education®	1		1		1
Primary	0.82***(0.77,0.87)		0.91(0.76,1.08)		1.02(0.86,1.22)
Secondary	0.63***(0.61,0.66)		0.77***(0.68,0.89)		1.06(0.92,1.23)
Higher	0.51***(0.47,0.56)		0.80*(0.61,1.05)		1.30(0.99,1.71)
Husband's education					
No education®	1		1		1
Primary	0.93(0.79,1.09)		1.04(0.88,1.23)		1.08(0.91,1.28)
Secondary	0.79***(0.7,0.89)		1.04(0.89,1.20)		1.15(0.99,1.33)
Higher	0.57***(0.47,0.68)		0.91(0.71,1.16)		1.06(0.82,1.38)
Wealth Index					
Poorest®	1		1		1
Poorer	0.84***(0.79,0.88)		0.95(0.83,1.10)		0.96(0.83,1.11)
Middle	0.69***(0.65,0.74)		0.77***(0.67,0.91)		0.79**(0.67,0.93)
Richer	0.60***(0.56,0.65)		0.59***(0.50,0.71)		0.59***(0.49,0.72)
Richest	0.51***(0.47,0.56)		0.62***(0.50,0.76)		0.54***(0.43,0.69)
Occupation					
Not working®	1		1		1
Agricultural	1.08(0.94,1.24)		0.88(0.76,1.02)		0.87(0.75,1.01)
Non-agriculture	1.08(0.93,1.27)		1.15(0.97,1.36)		1.07(0.9,1.27)
Social-context factors					
Ever used contraceptive method					
No®	1			1	1
Yes	1.13***(1.08,1.17)			1.49(0.17,13.12)	1.09(0.98,1.22)
Consonance of fertility preferences					
Both want the same®	1			1	
Husband wants more	1.80***(1.59,2.04)			1.77***(1.35,2.32)	
Husband wants fewer	1.31*(1.02,1.67)			1.36(0.9,2.05)	
Don't know/missing	1.61***(1.25,2.07)			1.88(0.92,3.85)	
Women decision-maker about contraception					
No®	1			1	
Yes	1.38***(1.28,1.50)			0.89(0.63,1.27)	
Caste					
Others®	1			1	1
SC/ST	0.99(0.93,1.06)			1.12(0.85,1.48)	0.72***(0.61,0.85)
OBC	0.95(0.9,1.01)			0.96(0.75,1.24)	0.72***(0.62,0.84)
Religion					
Hindu®	1			1	1
Muslim	1.32***(1.25,1.4)			1.14(0.87,1.5)	1.05(0.9,1.22)
Others	0.89(0.8,1.0)			0.74(0.49,1.12)	0.94(0.73,1.2)

Note. *P < 0.05 **P < 0.01 ***P < 0.001; ®: Reference; UOR-Unadjusted odds ratio; OR- Odds ratio; CI- Confidence Interval; OBC- Other Backward Class, SC/ST-Schedule Caste/Schedule Tribe; [a]Bivariate logistic regression analysis provides unadjusted odds ratio; [b]Adjusted for women's autonomy and demographic variables; [c]Adjusted for women's autonomy and economic variables; [d]Adjusted for women's autonomy and social-context variables; [e]Adjusted for women's autonomy, demographic, economic and social-context variables except for two variables (*consonance over fertility, and main decision-maker of contraception use*).

includes women's autonomy and social context variables; and Model-V includes all variables except two covariates (consonance with respect to fertility, and leading decision-maker of contraception use). We excluded these two variables from the Model-V because of comparatively lesser number of observations. In Model-I, without controlling all other variables, women with higher autonomy have 15% lesser odds of unintended pregnancy than women with low autonomy (UOR = 0.85; 95% CI: 0.72–0.99). Various demographic, economic and social context variables were significantly associated with the unintended pregnancy in the unadjusted model. By comparing the consonance over fertility

preference, if their husbands wanted more children, women reported being 1.8 times more likely to have unwanted pregnancies than couples who wanted the same number of children (UOR = 1.80; 95% CI: 1.59–2.04). In Model-II, when demographic covariates have controlled, the results obtained were similar to Model-I, except for the place of residence and age at first marriage, both of which lost their significant relationship with an unwanted pregnancy. In Model-III (with control for economic variables) and Model-IV (with control for social context variables), women's autonomy was again negatively associated with an unintended pregnancy, albeit with low significance. After adjusting for various covariates in Model-III and Model-IV, variables such as place of residence, age at marriage, husband's education, occupation, contraceptive use, caste, and religion became insignificant.

After controlling for all covariates, in Model-V, women with higher autonomy had significantly lower odds of unintended pregnancy than women with lower autonomy (AOR = 0.84; 95% CI: 0.72–0.99). As expected, in Model-V, the women in the richest group had lower odds of reporting unintended pregnancy compared to the poorest women (AOR = 0.54; 95% CI: 0.43–0.69). However, we were unable to find any significant association between unintended pregnancy and various covariates, such as residence, age at first marriage, women, and their husbands' education, occupation, and religion. Surprisingly, in the final model, we found that women in the 'OBC' category had lower odds of reporting unintended pregnancy as compared to women in the 'Other' category (AOR = 0.54; 95% CI: 0.43–0.69).

4. Discussion

The present study aimed to investigate the association of women's autonomy with their reproductive intentions by unitizing national representative data in India. This study found a negative association between women's autonomy and unintended pregnancy after adjusting for various demographic, economic, and social context-related factors. Furthermore, the study suggests that women's household, financial, and sexual decision-making empowers them to influence their reproductive intentions. In recent time, women's autonomy has appeared as a potential determinant of reproductive health, specifically in the developing world.[28] The understanding of female autonomy and its relationship with reproductive intentions was important in India, where patriarchy prevails, and sociocultural norms limit women's participation in important decisions.[29]

While investigating the influence of female autonomy on unintended pregnancy, multiple studies have revealed inconsistent results.[21–23] Consistent with our findings, study in many settings have shown that women with greater autonomy have lower odds of reporting unintended births or pregnancies.[21,23,30] On the other hand, a study from Nepal reported no signification association between women's autonomy and unintended pregnancy.[22] These contrast results may occur due to differences in the definition of female autonomy.[22] The findings from this study recommend designing interventions that help gain in the autonomy among Indian women, which may reduce unwanted pregnancies and significantly improve maternal and child health outcomes.

We found that various demographic, economic, and social context covariates included in our analysis can influence the reproductive intentions of women. Thus, it is crucial to understand the underlying association between these correlates and unintended pregnancy. The present study found the risk of unintended pregnancy increases with increased women's age and greater number of children. Consistent findings were reported in different Asian countries.[21,23,31] This may be because older women could already have acheived their desired number of children and therefore consider any additional pregnancy as unwanted. Although in contrast, negative associations between age and unintended pregnancy have been reported elsewhere.[32,33] Furthermore, we found a significant relationship between place of residence and unintended pregnancy in bivariate analysis but failed to establish such association in the multivariate analysis.

The bivariate analysis suggests that women with a marital age of 18 years or more had lower chances of unintended pregnancy. A study based on two Indian states, Andhra Pradesh and Madhya Pradesh, reported similar results,[34] and a possible reason could be that early marriage initiates earlier sexual intercourse as well as extending the time-period of pregnancy risk, and lack of knowledge about contraception thus increasing the chance of unintended pregnancy.

Women's socioeconomic status may influence their fertility preferences. This study found that education status of women was negatively associated with unintended pregnancy. The association between educational attainment and unintended pregnancy has been evident in past studies.[35–37] Education can help in empowering women to make decisions related to their sexual and reproductive health. Furthermore, we found that rich women were less likely to have unintended pregnancies than their poor counterparts. These findings are consistent with other studies.[22,35,36] Richer women are expected to be well educated and decision-makers about their fertility behaviour as compared to poor women. The wealth index is an indicator of the economy, occupation and educational status of a household, and their members.[35,38] Still, surprisingly, we did not find any association between women's occupation and unintended pregnancy. A study reported that not working women recorded a high prevalence of unintended pregnancies compared with women working in various occupational categories and explain that working women are more aware of their pregnancies due to their work demands, limited maternity periods, and other disincentives.[32]

The consonance of fertility preference between couples could potentially indicate unintended pregnancy. We found that husband's desire for more children can increase the risk of unintended pregnancy, and these results are supported by a study in southern Ethiopia.[39] Further, women who had used any contraceptive method during her lifetime were more likely to have an unintended pregnancy, mirroring similar results in Ethiopia,[40] and Malawi.[41] It could be hypothesized that the more excellent knowledge a woman has of family planning methods, the more aware she would be of the related benefits. However, a lack of knowledge and misunderstandings on the impact of modern contraceptive methods on health may lead to reluctance in their use, thus increasing the chances of unintended pregnancy.[42] A study on Indian women found that nearly 40% of women had discontinued the use of contraception due to method failure,[34] with the recommendation that misunderstandings of various modern contraceptive methods among both young men and women should be addressed.

According to religion, in bivariate analysis, we found that Muslim women were more likely to have an unintended pregnancy. However, after adjusting for various other covariates, we failed to find any such association in multivariate analysis. In India, according to the NFHS-4 report, the prevalence of contraception use among currently married Muslim women is lower than Hindu women (45% vs 54%). Moreover, the total fertility rate is also higher among Muslim women. Fertility behaviour patterns among Muslim women are a highly debated topic in India. All four rounds of the NFHS have shown that Muslim women mostly prefer the temporary method of contraception over sterilization.[25] Possible contraception failure and a lack of knowledge of its correct use may contribute to their high rate of unintended pregnancy. Some insignificant factors such as occupation, age at marriage, and husband's education were also included in the regression model because, as per the literature available, those factors were important to control for examining the precise association between women's autonomy and unintended pregnancy.

5. Limitations and strengths of the study

Several limitations of the study are worth mentioning. NFHS records responses either for current pregnancy or the pregnancies resulted in live births. The unavailability of information about reproductive intentions for pregnancies that resulted in miscarriages, stillbirths, or

induced abortions may underestimate the level of unintended pregnancy. The recall bias may influence information regarding the intentions about the pregnancy that occurred many years ago. Moreover, their intentions about unwanted pregnancies may also have altered after the child is born and has become a beloved family member. The data were collected during pre-pandemic and COVID-19 may change the perception of individuals which has not been covered in this paper.[43] Besides, the cross-sectional design of the study limits to infer cause-effect designations. Despite these potential limitations, the study has several significant strengths. In particular, the results are based on a large, nationally representative sample, with extensive information collected from women and households. Also, in our study, rather than using different proxies for women's autonomy, we have derived a single index to capture a range of different dimensions of female autonomy.

6. Conclusion

In this study, we found that improvement in women's autonomy can significantly reduce unintended pregnancy in India. Women with higher autonomy can regulate their fertility and can appropriately limit their family size. Moreover, various maternal factors such as increasing age, being a resident of rural areas, low education status, having more than three children, less than 18 years of marital age, poor wealth index, husband's dominance in decisions related to fertility, all can increase the risk of unintended pregnancy. Intriguingly, one of the major findings suggests that if couples lack consonance over fertility, women generally face higher chances of unintended pregnancy. Thus, a holistic approach is needed to make couples understand the importance of having a minimum number of children through education and communication. This study recommends that policymakers should design programs and services which spread awareness about the importance of acknowledging the participation of women in decision-making related to themselves and their household. Moreover, unintended pregnancy is higher among couples in which husbands want more children; therefore, awareness about the importance of fewer children among couples is recommended.

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Availability of data and material

The data set used in the present study is available in public domain which can be downloaded on request from the website: https://dhsprogram.com/data/available-datasets.cfm.

Ethics approval

This study is based on secondary data which is available in public domain. Therefore, ethical approval is not required for conducting this study.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Author's contributions

Mr. Rajan, Mr. Manish, and Ms. Nutan have conceptualized and designed the study. Mr. Manish analysed the data. Mr. Rajan, Mr. Manish, and Ms. Nutan wrote and revised the manuscript. All authors have read and approved the manuscript.

Declaration of competing interest

The authors declare that there is no conflict of interest.

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References

1 Mosher WD, Jo J, Abma JC, Jones J, Abma JC. Intended and unintended births in the United States: 1982-2010. *Natl Health Stat Rep*. 2012;55(55):1–28.
2 Gipson JD, Koenig MA, Hindin MJ. The effects of unintended pregnancy on infant, child, and parental health: a review of the literature. *Stud Fam Plann*. 2008;39(1):18–38. https://doi.org/10.1111/j.1728-4465.2008.00148.x.
3 Bitto A, Gray RH, Simpson JL, et al. Adverse outcomes of planned and unplanned pregnancies among users of natural family planning: a prospective study. *Am J Publ Health*. 1997;87(3):338–343. https://doi.org/10.2105/AJPH.87.3.338.
4 Klerman LV. The intendedness of pregnancy: a concept in transition. *Matern Child Health J*. 2000;4(3):155–162. https://doi.org/10.1023/A:1009534612388.
5 Bearak J, Popinchalk A, Alkema L, Sedgh G. Global, regional, and subregional trends in unintended pregnancy and its outcomes from 1990 to 2014: estimates from a Bayesian hierarchical model. *Lancet Global Health*. 2018;6(4):e380–e389. https://doi.org/10.1016/S2214-109X(18)30029-9.
6 Singh S, Shekhar C, Acharya R, et al. The incidence of abortion and unintended pregnancy in India, 2015. *Lancet Global Health*. 2018;6(1):e111–e120. https://doi.org/10.1016/S2214-109X(17)30453-9.
7 Eggleston E. Determinants of unintended pregnancy among women in Ecuador. *Int Fam Plann Perspect*. 1999;25(1):27–33. https://doi.org/10.2307/2991899.
8 Becker S, Fonseca-Becker F, Schenck-Yglesias C. Husbands' and wives' reports of women's decision-making power in Western Guatemala and their effects on preventive health behaviors. *Soc Sci Med*. 2006;62(9):2313–2326. https://doi.org/10.1016/j.socscimed.2005.10.006.
9 Bloom SS, Wypij D, Das Gupta M. Dimensions of women's autonomy and the influence on maternal health care utilization in a North Indian city. *Demography*. 2001;38(1):67–78. https://doi.org/10.1353/dem.2001.0001.
10 Ghuman SJ, Lee HJ, Smith HL. Measurement of women's autonomy according to women and their husbands: results from five Asian countries. *Soc Sci Res*. 2006;35(1):1–28. https://doi.org/10.1016/j.ssresearch.2004.06.001.
11 United Nations. In: *Report of the International Conference on Population and Development*. Cairo: United Nations publication; 1995. https://www.un.org/en/development/desa/population/events/pdf/expert/27/SupportingDocuments/A_CONF.171_13_Rev.1.pdf.
12 Saleem S, Bobak M. Women's autonomy, education and contraception use in Pakistan: a national study. *Reprod Health*. 2005;2(1):1–8. https://doi.org/10.1186/1742-4755-2-8.
13 Al Riyami A, Afifi M, Mabry RM. Women's autonomy, education and employment in Oman and their influence on contraceptive use. *Reprod Health Matters*. 2004;12(23):144–154. https://doi.org/10.1016/S0968-8080(04)23113-5.
14 Wondie AG, 239920262110334. *The Association between Unmet Need for Contraception and Unintended Pregnancy Among Reproductive-Age Women in Ethiopia*. vol. 5. 2021. https://doi.org/10.1177/23992026211033436.
15 Upadhyay UD, Hindin MJ. Do higher status and more autonomous women have longer birth intervals? Results from Cebu, Philippines. *Soc Sci Med*. 2005;60(11):2641–2655. https://doi.org/10.1016/j.socscimed.2004.11.032.
16 Chakraborty P, Anderson AK. Maternal autonomy and low birth weight in India. *J Wom Health*. 2011;20(9):1373–1382. https://doi.org/10.1089/jwh.2010.2428.
17 Das Gupta M. Life course perspectives on women's anatomy and health outcomes. *Am Anthropol*. 1995;97(3):481–491.
18 Ghuman SJ. Women's autonomy and child survival: a comparison of Muslims and non-Muslims in four Asian countries. *Demography*. 2003;40(3):419–436. https://doi.org/10.2307/1515153.
19 Shroff M, Griffiths P, Adair L, Suchindran C, Bentley M. Maternal autonomy is inversely related to child stunting in Andhra Pradesh, India. *Matern Child Nutr*. 2009;5(1):64–74. https://doi.org/10.1111/j.1740-8709.2008.00161.x.
20 Woldemicael G, Tenkorang EY. Women's autonomy and maternal health-seeking behavior in Ethiopia. *Matern Child Health J*. 2010;14(6):988–998. https://doi.org/10.1007/s10995-009-0535-5.
21 Abada T, Tenkorang EY. Women's autonomy and unintended pregnancies in the Philippines. *J Biosoc Sci*. 2012;44(6):703–718. https://doi.org/10.1017/S0021932012000120.
22 Adhikari R, Soonthorndhada K, Prasartkul P. Correlates of unintended pregnancy among currently pregnant married women in Nepal. *BMC Int Health Hum Right*. 2009;9(1):1–10. https://doi.org/10.1186/1472-698X-9-17.
23 Rahman M. Women's autonomy and unintended pregnancy among currently pregnant women in Bangladesh. *Matern Child Health J*. 2012;16(6):1206–1214. https://doi.org/10.1007/s10995-011-0897-3.

24 Rizvi F, Williams J, Hoban E. Factors influencing unintended pregnancies amongst adolescent girls and young women in Cambodia. *Int J Environ Res Publ Health*. 2019; 16:4006. https://doi.org/10.3390/IJERPH16204006, 2019;16(20):4006.

25 International Institute for Population Sciences (IIPS) and ICF. *National Family Health Survey (NFHS-4), 2015-16*. India Mumbai IIPS; 2017:1–192. https://doi.org/10.1093/aje/kwm120. Published online.

26 Jatrana S, Pasupuleti SSR. Women's autonomy, education and birth intervals in India: visiting the less familiar. *Asian Popul Stud*. 2015;11(2):172–190. https://doi.org/10.1080/17441730.2015.1050083.

27 Agarwala R, Lynch SM. Refining the measurement of women's autonomy: an international application of a multi-dimensional construct. *Soc Forces*. 2006;84(4): 2077–2098. https://doi.org/10.1353/sof.2006.0079.

28 Rossouw L, Ross H. Understanding period poverty: socio-economic inequalities in menstrual hygiene management in eight low- and middle-income countries, 2021, Vol 18, Page 2571 *Int J Environ Res Publ Health*. 2021;18(5):2571. https://doi.org/10.3390/IJERPH18052571.

29 Jejeebhoy SJ, Sathar ZA. Womens Autonomy in India and Pakistan - the Influence of Religion and Region.

30 Merga J, Wirtu D, Bekuma TT, Regasa MT. Unintended pregnancy and the factors among currently pregnant married youths in Western Oromia, Ethiopia: a mixed method. *PLoS One*. 2021;16(11), e0259262. https://doi.org/10.1371/JOURNAL.PONE.0259262.

31 Sarder A, Islam SMS, Maniruzzaman, Talukder A, Ahammed B. Prevalence of unintended pregnancy and its associated factors: evidence from six south Asian countries. *PLoS One*. 2021;16(2), e0245923. https://doi.org/10.1371/JOURNAL.PONE.0245923.

32 Ameyaw EK, Budu E, Sambah F, et al. Prevalence and determinants of unintended pregnancy in sub-Saharan Africa. *PLoS One*. 2019;14(8):1–16. https://doi.org/10.1371/journal.pone.0220970.

33 Nyarko SH. Unintended pregnancy among pregnant women in Ghana: prevalence and predictors. *J Pregnancy*. 2019;2019. https://doi.org/10.1155/2019/2920491.

34 Santhya KG, Jejeebhoy SJ, Ghosh S. *Early Marriage and Sexual and Reproductive Health Risks: Experiences of Young Women and Men in Andhra Pradesh and Madhya Pradesh*. India; 2008. http://www.popcouncil.org/asia/india.html. Accessed August 4, 2020.

35 Sarder A, Mohammed S, Islam S, Talukder A. *Prevalence of Unintended Pregnancy and its Associated Factors : Evidence from Six South Asian Countries*. 2021:1–13. https://doi.org/10.1371/journal.pone.0245923. Published online.

36 Dixit P, Ram F, Dwivedi LK. Determinants of unwanted pregnancies in India using matched case-control designs. *BMC Pregnancy Childbirth*. 2012;12(1):1. https://doi.org/10.1186/1471-2393-12-84.

37 Dutta M, Shekhar C, Prashad L. Level, trend and correlates of mistimed and unwanted pregnancies among currently pregnant ever married women in India. *PLoS One*. 2015;10(12):1–11. https://doi.org/10.1371/journal.pone.0144400.

38 Rutstein SO, Johnson K. The DHS wealth index. http://www.measuredhs.comorbycontacting; 2004. Accessed August 6, 2020.

39 Hamdela B, mariam A G, Tilahun T. Unwanted pregnancy and associated factors among pregnant married women in Hosanna town, Southern Ethiopia. *PLoS One*. 2012;7(6). https://doi.org/10.1371/journal.pone.0039074.

40 Tebekaw Y, Aemro B, Teller C. *Prevalence and Determinants of Unintended Childbirth in Ethiopia*. 2014. https://doi.org/10.1186/1471-2393-14-326.

41 Palamuleni ME, Adebowale AS. Prevalence and determinants of unintended pregnancies in Malawi. *Etude la Popul Africaine*. 2014;28(1):551–563. https://doi.org/10.11564/28-1-507.

42 Grindlay K, Dako-Gyeke P, Ngo TD, et al. *Contraceptive Use and Unintended Pregnancy Among Young Women and Men in Accra*. Ghana. 2018. https://doi.org/10.1371/journal.pone.0201663. Published online.

43 Roberts LR, Solomon S, Renati SJ, Montgomery S. Exploring mental health during the initial COVID-19 lockdown in Mumbai: serendipity for some women, 2021, Vol 18, Page 12542 *Int J Environ Res Publ Health*. 2021;18(23), 12542. https://doi.org/10.3390/IJERPH182312542.