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## Women's Empowerment, Region of Residence, and Contraception among Women in India

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### Abstract

Despite actions taken by the Indian government to improve national, regional, and village-level sexual and reproductive health, 49 million women still have unmet contraceptive needs. Yet, when granted access, women disproportionately elect for irreversible methods such that India has the highest female sterilization rate in the world. Building on these insights, the present study examines associations between women's empowerment (e.g., cooking, shopping, and family-planning autonomy), region (e.g., Hills, North, and East), and use of contraception (i.e., any and type). Data for this study comes from ever-married, reproductive aged women in the 2005 and 2012 waves of the India Human Development Survey (n=38,634). Results from multilevel logistic models showed that higher levels of women's empowerment are associated with greater probability of using contraception, and after disaggregation, relying on female sterilization. Furthermore, region of residence modifies associations such that women residing in the North Central and North are typically less likely to utilize contraception. Across empowerment levels, residents of the West and South consistently have higher levels of contraceptive use. This study highlights the importance of women's empowerment for contraception as well as regional differences in reproductive healthcare access, views of contraception, and long-term impacts of fertility planning programs.

**Keywords:** India, contraception, women's empowerment

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## Introduction

Despite efforts by the Indian government to improve national, regional, and village-level sexual and reproductive health, 49 million women still have an unmet need for contraception (Sully and Murro 2020). Research identifies myriad benefits of women having access to contraceptives including improved health, higher academic achievement, and enhanced quality of life (Ewerling et al. 2021). Long-acting reversible contraceptives (LARCs) offer reliable and low-cost approaches with a near 100 percent effectiveness (e.g., Intrauterine devices, implants, and injectables), and allow women to rapidly reach adequate fertility levels after discontinuation (Joshi, Khadilkar, and Patel 2015). However, the majority of Indian women (77 percent) rely on permanent sterilization rather than reversible options (Sully and Murro 2020). In fact, India has the highest female sterilization rate in the world and is responsible for more than a third of all sterilizations (Singh, Singh, and Singh 2021). Sterilization, albeit rooted in sexism, racism, and eugenics, may also reflect agency among Indian women (Leyser-Whalen and Berenson 2019). Research has examined contraceptive use in India (Kumar et al. 2011), its variation across the nation's regions (Thyagarajan, Reji, and Viswan 2014), and the influence of restrictive social, cultural, and religious norms about women and sexuality (Das et al. 2022). However, less research has investigated the intersecting impacts of women's empowerment and region of residence. Building on existing research, this study examines associations between women's empowerment, region, and contraception.

There is reason to anticipate that contraceptive use (e.g., uses or not) and type (e.g., female sterilization) may vary by level of women's empowerment and region. First, female sterilization historically held and continues to hold a central role in the Indian Family Welfare Program relative to other contraceptive methods (Das et al. 2022). Given stabilizing birth rates at the time of program implementation, the program established national targets of 4.2 million sterilizations in a 12-month span (Bansal, Dwivedi, and Ali 2022). Current data indicate the program was successful at promoting permanent birth control methods (Singh et al. 2021). Second, poor quality of healthcare and limited availability and knowledge about contraceptive options creates an emphasis on female sterilization (Das

et al. 2022). Myths about modern contraceptive methods can affect women's choices of accepting LARCs, which leads them to instead opt for irreversible methods (Blumenberg et al. 2020). Third, reproductive autonomy is limited for women residing in more patriarchal societies such as India, and autonomy is restricted to a greater extent for women from marginalized ethnic, religious, and socioeconomic groups who often have less access to reproductive health information and decision-making (Oliveira, Dias, and Padmadas 2014). To this end, much of the family-planning and fertility decisions in India do not fall onto women despite these choices governing their bodies. Men strongly influence contraceptive decisions, but many of these insights extend from more developed nations like the United States (Borrero et al. 2011; Dudgeon and Inhorn 2004; Littlejohn 2021; Marsiglio 1985).

Drawing on insights from standpoint theory, the present study advances the research literature in three important ways. First, this study highlights the role of women's empowerment in contraceptive utilization. While the research is clear that women benefit educationally, socially, and psychologically when they control their reproductive health (Chatterjee and Dubey 2023; James-Hawkins et al. 2018; Yadav, Sahni, and Jena 2021), we know less about the role of women's empowerment in contraceptive use in India. We focus this study on ever-married, 15–49 year old women who are not currently pregnant. We use a measure of women's empowerment that improves upon existing research by encapsulating women's decision-making (i.e., cooking, purchases, number of children), mobility (i.e., permission to visit health care centers, a friend's place, or the kirana shop), financial resources (i.e., access to cash), and frequency of domestic violence (i.e., over cooking, dowry, or neglect).

Second, this study extends existing research by focusing on two measures of contraception including any use (e.g., yes or no) and then type of contraception disaggregated into female sterilization, another method (e.g., Intrauterine devices, implants, and injectables), or none. Examining multiple measures of contraception provides a more complete picture of inequalities in access to contraception and reproductive healthcare (see e.g., Das et al. 2022). Third, the present study utilizes nationally representative data from a developing nation in the Global South that enables investigating whether associations between women's empowerment and contraception differ by region. The present focus on

India is important because contraceptive use can reflect dynamic gendered interactions and hierarchies that have large implications for women's lives and livelihoods.

## BACKGROUND AND THEORY

### *History of Contraceptives in India*

To explain why contraception may vary by region and level of women's empowerment, we turn to a brief historical overview. One of the first promotions of contraceptives came from the birth control advocacy of colonial India, which became an important event of the country's history of eugenics. Research confirms that the primary aim of the world's first national family planning program was controlling the increasing pressure on natural resources and economic progress due to a surging population (Appleton 2017; Kongawad and Boodeppa 2014). From the 1920s until the country's independence in 1947, many Indian officials held positive views of contraception (Hodges 2010). Contraceptives became normalized in part because citizens took matters into their own hands as colonial management failed to control high rates of poverty, mortality, and illness (Hodges 2010). In fact, the failure of the colonial government to grant demands such as funding contraceptive education programs led to Indian eugenicists taking up projects of contraceptive distribution (Hodges 2010). Although pushing for contraception for different reasons, social reform movements such as the Self-Respect movement from Tamil-speaking areas of the South advocated contraception as a form of both self and sexual freedom (Ganesan 2011)

The Indian government tried a more extensive approach in the 1960s that focused on achieving contraceptive targets rather than clients' services as the main objective of the public providers (Kongawad and Boodeppa 2014). The expectation was that people would visit government operated health facilities for contraceptive services when in need (Kongawad and Boodeppa 2014). Contraceptive targets and cash incentives inflated performance statistics, but due to the lack of popularity of LARCs, the program underwent another shift and began emphasizing sterilization (Pradhan and Ram 2009). The program dealt with a national emergency during 1975–1977 with massive sterilizations carried out in poorly organized

and hazardous ways. Couples electing not to undergo sterilization were threatened with fines and imprisonment, and ultimately, women were incentivized or forced to undergo sterilization sometimes against their will (Singh et al. 2021). Since then, female sterilization has held prominence in the Indian Family and Welfare program and within Indian society. Female sterilization continues to be more common in India than anywhere else worldwide (Misra et al. 2021). Over the seven decades since its launch, the Indian Family Welfare Program has undergone significant transformation in terms of policy, approach, and implementation. The program now seeks in part to promote reproductive health and reduce maternal, infant, and child mortality and morbidity (National Health Mission (NHM) 2021).

### *Standpoint Theory and Women's Empowerment*

This study utilizes insights from standpoint theory, which purports that the gendered marginalization of women offers them a unique social position and perspective that better informs the creation of knowledge on sexism, misogyny, and gender inequalities (Collins 2009; Harding and Norberg 2005; Longino 1993). Standpoint theory argues for the importance of situating knowledge within women's lived experiences and realities. Moreover, women occupy varying social statuses that enable them different amounts of agency, opportunity, and resources (Longino 1993). Standpoint theory depicts women's experiences as being formed through intersections of race, class, and gender, and their interactions with people, laws and norms, and institutions (Smith 2005). For instance, women of the Global South may share similarities but experience unique financial situations, education, and power across time and space. Standpoint theory encourages the use of life experiences of marginalized groups as starting points of research and the acquisition of knowledge claims (Swigonski 1994). Examining how the lives of women are governed not on an individual-level but rather by institutional and structural demands can inform transformative social change (Dutt and Grabe 2019; Harding and Norberg 2005).

We rely on standpoint theory to emphasize that the unique social position of marginalized women of reproductive age in India provides an important site of scholarly inquiry. We utilize tenets of standpoint theory to highlight the role of empowerment in women's lives for contraception. Contraceptive

use can represent a site of dynamic gendered interactions that shapes women's lives and livelihoods. For the purposes of this study, women's empowerment is understood as the process by which women acquire the ability to make strategic life choices (Kabeer 1999). More specifically, women's empowerment proceeds through complex interactions including enhanced education, social capital, resources, fertility, mobility, domestic violence, and agency (Santoso et al. 2019). Extending from these conceptualizations, standpoint theory proposes that a group's shared historical and recent experiences are affected by interactions across social institutions and dimensions (Collins 2009). For instance, contraceptive use is likely a shared female experience as an outcome of social and institutional relations within a given time and place (Hekman 1997). Consequently, contraceptive use can represent an outcome of levels of women's empowerment. To exemplify, recent work in the U.S. has shown that if men found condom use to be uncomfortable or did not want to wear one, the automatic assumption and expectation was for women to begin using oral birth control pills (Littlejohn 2021).

An integral component of empowerment is agency or the ability to define and act on one's volition and the freedom to achieve the goals one deems important (Malhotra and Schuler 2005; Sen 1985). Access and control are two important components measured by elements such as labor participation, freedom of mobility, intolerance of domestic violence, authority over expenditures, and decision making (Santoso et al. 2019). Therefore, freedom to go outside the home, the absence of domestic violence, having a say in purchases, and having control over one's reproductive health are examples of measures of women's empowerment (Desai et al. 2022). India largely follows a patriarchal system, where men are seen as the head of the family and women often play the secondary role in a household (Singh et al. 2021). A woman's empowerment, her decision-making, and autonomy likely influences contraceptive use because unequal power relations can restrict free communication about reproductive health decisions, and therefore, access to reproductive health services (Patrikar, Basannar, and Seema Sharma 2014).

### *Region and Contraception in India*

The present study examines whether region modifies associations between women's empowerment and contraception. Indian regions vary in terms of customs, languages, religions, and norms. Each region also has varying gender inequalities in employment, education, and healthcare access. Women in the South typically have more access to education and healthcare than most other regions (Arora 2012). Furthermore, studies have found that states in the Southern and Western regions of India have greater gender equality in comparison to Northern regions. Women's freedom of movement is often low in the North. For example, many women are questioned if they leave the house, and families often disapprove of women leaving the house under their own volition (Gailits et al. 2019). Similarly, women from the Hills have poorer levels of participating in household purchases and are not universally allowed to visit relatives or family members. Moreover, some areas of East India are matrilineal, which generates greater gender parity, but in other areas of the East, women experience subjugation. Overall, the Eastern and Southern regions of India include the greatest number of women with autonomy and decision-making power (Goli and Pou 2014). In the West, there has been an improvement in women's autonomy, which scholars have associated with lower female child mortality rates and a general decline in the child sex ratio (Singh, Hazra, and Ram 2007).

Germane to the present study, the unequal regional distribution of healthcare workers also contributes to varying levels of access to healthcare among states. Tamil Nadu and Kerala (two Southern states) report the highest densities of medical professionals (Karan et al. 2021), which increases healthcare access. The Northern, Central, and Western regions have fewer healthcare workers per person compared to the South, whereas the South and East tend to have a similar density of nurses (Rao, Bhatnagar, and Berman 2012). In addition, exposure to family planning resources is associated with the type of contraceptive used, where women that are aware of various family planning methods have higher likelihoods of utilizing modern (i.e., condoms, oral pills, IUDs) and traditional birth control (Singh et al. 2021). Additionally, maternal and child health services can provide routes to various contraceptive methods conditional on availability and affordability. Issues in supply, cost, and inaccessibility of modern

contraceptives pose a barrier for many women (Khan and Bhatnagar 2015). Overall, studies show that women from lower income households have lower probabilities of adopting contraceptives whereas women who are informed about contraceptives are more likely to utilize them (Bansal et al. 2022; Oliveira et al. 2014).

Permanent methods of birth control such as sterilization seem to dominate the Southern region of India as many women of reproductive age rely on sterilization, possibly due to a less rigid cultural preference for sons relative to other regions, smaller family sizes, and perception of sterilization as a way to gain greater autonomy, freedom of mobility, and economic power (Mejía-Guevara, Cislighi, and Darmstadt 2021; Pallikadavath, Irudaya Rajan, and Wilson 2016; Pradhan and Ram 2009). Similarly, the prevalence of female sterilization has also increased in Western regions of India. Consequently, the West has seen a marked decrease in birth rates and average family size (Dwivedi, Ram, and Reshmi 2007). In the North, there is a pervasive cultural preference for sons, which leads to decreased use of permanent contraceptives (Jayaraman, Mishra, and Arnold 2009). Couples without a son were likely to choose modern or traditional methods of contraception instead of permanent sterilization (Bansal et al. 2022; Oliveira et al. 2014; Pradhan and Ram 2009; Singh et al. 2021). In comparison, the footing of women is higher in select Eastern states owing to the prevalence of a matriarchal system causing female sterilization to be lower than the national average (Pradhan and Ram 2009). Instead, about one-half of women in the Northeast opt for traditional methods such as periodic abstinence and withdrawal (Mejía-Guevara et al. 2021; Oliveira et al. 2014; Singh et al. 2021). The Hills region often has limited access to contraception because of inadequate supply and distribution, creating obstacles for women to obtain contraceptives (Bijalwan and Maithili 2016).

### *The Current Study*

Drawing on insights from standpoint theory, the present study examines associations among women's empowerment, region of residence, and contraception. This study principally seeks to address two research questions. First, what is the association between women's empowerment and contraception



among Indian women? Second, what role does region play in the association between women's empowerment and contraception? The present study advances the research literature by highlighting the role of women's empowerment in contraceptive utilization; by focusing on two measures of contraception including any use (e.g., yes or no) and then type of contraception; and by utilizing nationally representative data from a developing nation in the Global South. Based on background research and tenets of our theoretical framework, we expect that women's empowerment will be positively associated with contraceptive use, and that region will modify associations due to spatial differences in customs, views of contraception, and access to healthcare. Because the literature is not definitive on whether female sterilization is an outcome of women's bodily autonomy or a relic of eugenics, sexism, and racism, we elect not to specify a directional expectation for our second dependent variable.

## DATA AND METHODS

### *Data*

Data come from the India Human Development Survey I and II (IHDS-I/IHDS-II), which is a nationally representative, multi-topic panel survey designed to complement existing surveys of India. The IHDS-II includes surveys of 42,152 households in 1503 villages and 971 urban neighborhoods collected between 2011–2012. IHDS-II data is mostly reinterviews of respondents from IHDS-I, which included 41,554 households in 1504 villages and 970 urban neighborhoods in 2004–2005. Interviews covered topics including health, socioeconomic status, family planning, and gender relations. Both IHDS-I and IHDS-II interviewed ever-married women of reproductive age between 15–49 (n=38,634) and asked about contraception, family relations, and household characteristics (Desai, Vanneman, and National Council of Applied Economic Research 2019). Because female sterilization is permanent, we excluded second wave observations (i.e., IHDS-II) for respondents who selected sterilization in the first wave (i.e., IHDS-I). The final unweighted sample size was 38,634 observations from 23,966 ever-married women of reproductive age.

### *Dependent Variables*

*Contraceptive Use.* The first dependent variable assessed whether women utilize any contraceptive method, which included oral pill, copper T or IUD, diaphragm/jelly, injectable contraception, condom, female sterilization, male sterilization, periodic abstinence, withdrawal, hysterectomy, or another method. Participants using any contraceptive method were coded as yes=1 at the time of the survey. The reference or zero category includes women who use no form of contraception (none=0). We use this measure as a way to understand general use of contraception across India. Table 1 shows survey-adjusted descriptive statistics for all study variables and identifies that 70 percent of reproductive aged women used some form of contraception. Table 1 also shows that the percentage of women using contraception increased significantly from Wave I (60 percent) to Wave II (75 percent;  $p<.05$ ).

Table 1. Descriptive Statistics for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2012 ( $n=38,634$ ).

<i>Variables</i>	<i>Combined</i>		<i>Wave I</i>		<i>Wave II</i>	
	<i>Mean/%</i>	<i>SD</i>	<i>Mean/%</i>	<i>SD</i>	<i>Mean/%</i>	<i>SD</i>
<b><i>Dependent Variables (yes=1)</i></b>						
<b>Any Contraception Use*</b>	70.11%	—	60.05%	—	74.68%	—
<b>Contraception Type</b>						
Female sterilization*	47.66%	—	39.01%	—	43.31%	—
Another method*	22.44%	—	21.04%	—	31.38%	—
No birth control usage*	29.89%	—	39.95%	—	25.32%	—
<b><i>Independent Variable</i></b>						
<b>Women's Empowerment (range 0–13, 13=more empowered)*</b>	5.09	(2.23)	4.90	(2.29)	5.19	(2.10)
<b><i>Moderating Variable</i></b>						
<b>Region (yes=1)</b>						
Hills	3.34%	—	3.33%	—	3.39%	—
North*	4.96%	—	4.93%	—	6.20%	—
North Central*	24.71%	—	24.75%	—	35.44%	—
Central Plains	13.20%	—	13.14%	—	13.11%	—
East	15.06%	—	15.18%	—	15.82%	—
West*	17.31%	—	16.77%	—	12.35%	—
South*	21.43%	—	21.90%	—	13.69%	—
<b><i>Covariates</i></b>						
Urban (1=yes)*	24.06%	—	24.35%	—	21.97%	—
Age (in years, range 15–49)*	34.93	(8.87)	32.98	(8.11)	35.37	(6.63)
Education (in years, range 0–15)*	4.06	(4.53)	3.83	(4.51)	4.49	(4.58)
<b>Income Quintile (yes=1)</b>						
Poorest	17.24%	—	17.89%	—	17.84%	—
2 <sup>nd</sup> Quintile	19.96%	—	20.09%	—	21.56%	—
Middle	20.54%	—	20.16%	—	19.97%	—
4 <sup>th</sup> Quintile	21.06%	—	20.82%	—	20.67%	—
Richest	21.19%	—	21.04%	—	19.96%	—
<b>Caste/Religious Group (yes=1)</b>						
Forward Caste	19.93%	—	19.65%	—	19.32%	—
Other Backward Class*	36.77%	—	37.33%	—	34.86%	—
Dalit	22.59%	—	22.45%	—	22.59%	—
Adivasi	7.18%	—	7.03%	—	7.62%	—
Muslim*	11.31%	—	11.11%	—	13.80%	—
Christian, Sikh, or Jain*	2.22%	—	2.43%	—	1.81%	—

Note. Means/percentages are presented with standard deviations (*SD*) in parentheses. All statistics are weighted.

\*Means/percentages different across waves at  $p<.05$ .

*Female Sterilization.* The second dependent variable disaggregated contraception into three mutually-exclusive categories that assess whether women rely on (1) female sterilization, (2) another contraceptive method detailed above, or (3) no contraceptive method, which was the reference group for analyses. We examined this measure to better understand whether women’s empowerment factors into the type of contraceptive used. Close to half of participants used female sterilization (48 percent) compared to another method (22 percent;  $p<.05$ ) or no method (30 percent;  $p<.05$ ).

### *Key Independent Variable*

*Women’s Empowerment.* Women’s empowerment is our key variable of interest. The measure is an index derived from questions about women’s decision-making, mobility, financial independence, and domestic violence that has been used in existing research (Kruse 2019). We only included items that were asked in both IHDS-I and IHDS-II. Surveyors stated: “Please tell me who in your family decides the following things”: (a) “What to cook on a daily basis,” (b) “Whether to buy an expensive item such as a TV or fridge,” (c) “How many children you have,” (d) “What to do if a child falls sick,” (e) “To whom your children should marry.” For each item, responses were coded as 1 if the respondent makes such decisions (yes=1) and 0 if not. The second set of questions asked: “Do you have to ask permission of your husband or a senior family member to go to”: (f) “the local health center,” (g) “the home of relatives or friends in the neighborhood,” or (h) “the kirana shop.” Responses were coded as 1 if the respondent does not have to ask permission (yes=1). The measure of financial resources is based on whether respondents have (i) “any cash in hand to spend on household expenditures” (yes=1). Questions about domestic violence were introduced with “In your community, is it usual for husbands to beat their wives in each of the following situations”: (j) “If she goes out without telling him,” (k) “If her natal family does not give expected money, jewelry, or other items,” (l) “If she neglects the house or the children,” (m) “If she doesn’t cook food properly,” (n) “If he suspects her of having relations with other men.” Affirmative responses were coded as yes=1. We calculated a sum of respondents to arrive at a range of 0–13 where 13

represents being the most empowered ( $mean=5.09$ ,  $SD=2.23$ ). Average levels of empowerment were significantly higher in IHDS-II ( $mean=5.19$ ,  $SD=2.10$ ) than IHDS-I ( $mean=4.90$ ,  $SD=2.29$ ;  $p<.05$ ).

### *Moderating Variable*

*Region.* Consistent with existing research (Sedai 2021; Sedai et al. 2021; Thorat and Joshi 2020), women's region of residence was categorized into one of seven groups including the (a) Hills (3%), (b) North (5%), (c) North Central (25%), (d) Central Plains (13%), (e) East (15%), (f) West (17%), and (g) South (21%). The Hills served as the reference group in multivariable analyses and included the states of Himachal Pradesh, Jammu and Kashmir, and Uttarakhand. The North consisted of Punjab, Haryana, and Delhi. The North Central included Uttar Pradesh, Jharkhand, and Bihar while Rajasthan, Chhattisgarh, and Madhya Pradesh were categorized as the Central Plains. The East included Northeast, Assam, West Bengal, and Orissa. The West consisted of Gujarat, Maharashtra, and Goa. The South included Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. Of note, this sample excludes small populations living in the island states of Andaman & Nicobar and Lakshadweep. In multivariable analyses, the reference group is respondents that reside in the Hills region (Hills=0).

### *Covariates*

The present study included covariates commonly used in the literature on reproductive health including urban status, age, education level, household income, and caste/religious group. About one-fourth of respondents resided in urban spaces (yes=1). All other respondents reside in non-urban areas and serve as the reference group (non-urban resident=0). Age was measured in years since birth ( $mean=34.93$ ,  $SD=8.87$ ) and ranged from 15–49 years old. Educational attainment was measured by years of education completed and ranged from illiterate=0, 5th class=5, 12th class=12, to 4-year degree=15 ( $mean=4.06$ ,  $SD=4.53$ ). Household income is categorized into quintiles (yes=1). Caste/religious group (yes=1) was categorized as forward caste (19.93%), Hindu other backward classes (36.77%), Dalit (22.59%), Adivasi or Scheduled Tribes (7.18%), Muslim (11.31%), and Christian, Sikh, or Jain (2.22%). The comparison or reference group in multivariable models is the Forward Caste (Forward Caste=0).

### *Analytic Technique*

We utilized two modeling strategies for multivariable analyses to examine our two dependent variables. All models presented utilized sampling weights to correct for unequal probability of selection and nonresponse bias. First, we regressed any contraception on our variables of interest using multilevel binary logistic regression where observations were nested within respondents (Long and Freese 2014). For ease of interpretation, we graphed predicted probabilities of any contraception by level of women's empowerment and then the intersection of empowerment and region of residence (Jann 2014; Mize 2019; Williams 2012). Second, we analyzed the trichotomous measure assessing type of contraception using multilevel multinomial logistic regression (Long and Freese 2014; Williams 2012). For both outcomes, we utilized best practices for assessing whether region moderated associations between women's empowerment and contraception using second difference tests of predictions rather than relying on the significance of an interaction term (Mize 2019; Williams 2012).

### RESULTS

Table 2 reports results from generalized mixed models estimating our two dependent variables. Model 1 estimates the use of any contraception based on women's empowerment, region, and covariates. For the sake of parsimony, we focus results on our key variable of interest. Model 1 shows that a unit increase in women's empowerment is associated with an increase in the odds of using any contraception by a factor of 1.04 ( $SE=.01$ ;  $p<.001$ ). Relative to women who resided in the Hills, women in the North (*Odds ratio* [ $OR$ ]=.38,  $SE=.03$ ;  $p<.001$ ), North Central ( $OR=.24$ ,  $SE=.02$ ;  $p<.001$ ), Central Plains ( $OR=.72$ ,  $SE=.05$ ;  $p<.001$ ), East ( $OR=.72$ ,  $SE=.05$ ;  $p<.001$ ), and South ( $OR=.75$ ,  $SE=.05$ ;  $p<.001$ ) have lower levels of contraceptive use. In contrast, residents of the West have higher odds of using any contraception compared with women in the Hills ( $OR=1.32$ ,  $SE=.10$ ;  $p<.001$ ).

Table 2. Generalized Mixed Models of Contraception Use and Type Regressed on Women's Empowerment, Region, and Covariates in the for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2012 ( $n=38,634$ ).

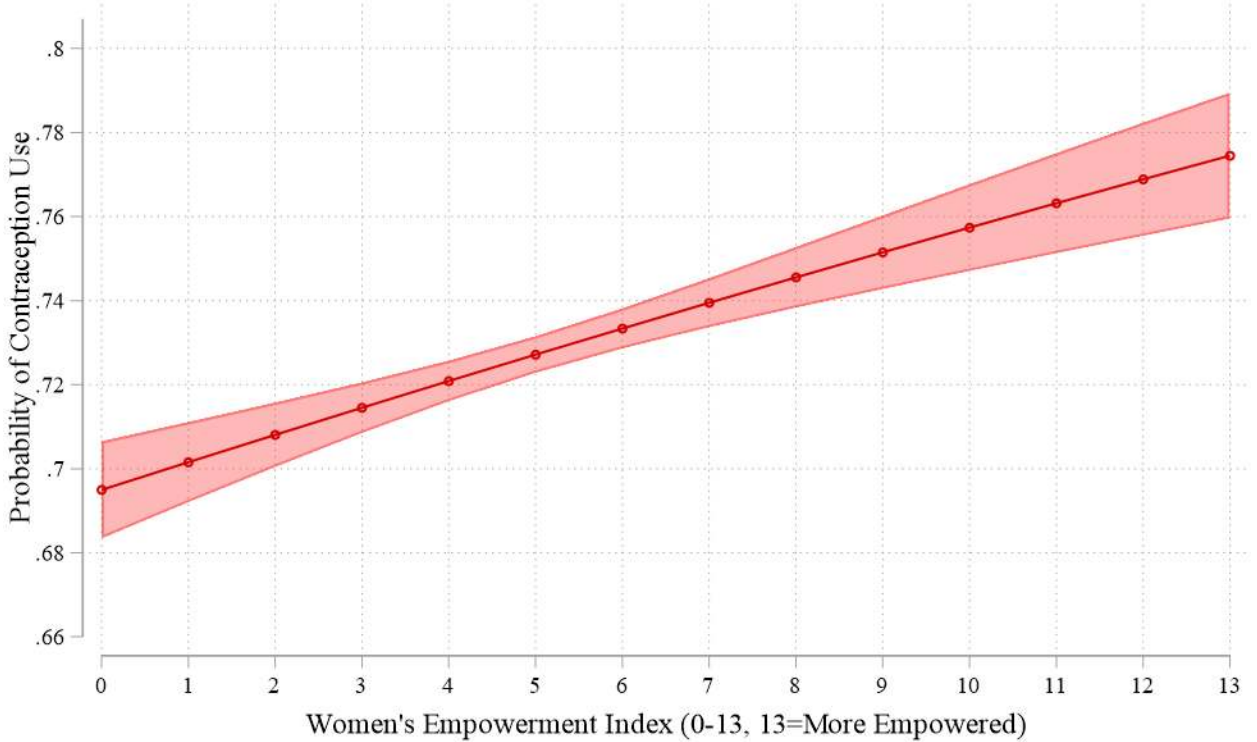
Variables	Contraception Use (ref=none)				Contraception Type (ref=none)							
	Model 1		Model 2		Model 3				Model 4			
	Any Contraception	SE	Any Contraception	SE	Female Sterilization	SE	Another Method	SE	Female Sterilization	SE	Another Method	SE
Women's												
Empowerment	1.04***	(.01)	.91**	(.03)	1.05***	(.01)	1.02**	(.01)	.90**	(.03)	.93*	(.03)
Region (ref=Hills)												
North	.38***	(.03)	.26***	(.05)	.30***	(.03)	.47***	(.04)	.18***	(.04)	.37***	(.07)
North Central	.24***	(.02)	.14***	(.02)	.11***	(.01)	.47***	(.03)	.09***	(.02)	.24***	(.04)
Central Plains	.72***	(.05)	.29***	(.05)	1.01	(.09)	.52***	(.04)	.35***	(.07)	.28***	(.05)
East	.72***	(.05)	.34***	(.06)	.57***	(.05)	.87*	(.06)	.19***	(.04)	.55**	(.10)
West	1.32***	(.10)	.58***	(.11)	3.04***	(.28)	.44***	(.04)	1.24	(.28)	.27***	(.06)
South	.75***	(.05)	.34***	(.06)	1.83***	(.16)	.17***	(.01)	.82	(.17)	.10***	(.02)
Covariates												
Urban (1=yes)	1.20***	(.04)	1.20***	(.04)	1.05	(.05)	1.38***	(.05)	1.05	(.05)	1.38***	(.05)
Age (in years)	1.05***	(.00)	1.05***	(.00)	1.09***	(.00)	1.00	(.00)	1.09***	(.00)	1.00	(.00)
Education (in years)	1.01***	(.00)	1.01***	(.00)	.98***	(.00)	1.06***	(.00)	.98***	(.00)	1.06***	(.00)
Income Quintile (ref=poorest)												
2 <sup>nd</sup> Quintile	1.09	(.05)	1.09	(.05)	1.13*	(.06)	1.03	(.05)	1.13*	(.06)	1.03	(.05)
Middle	1.14**	(.05)	1.15**	(.05)	1.17**	(.06)	1.11*	(.06)	1.17**	(.07)	1.11*	(.06)
4 <sup>th</sup> Quintile	1.14**	(.05)	1.14**	(.05)	1.18**	(.07)	1.08	(.06)	1.18**	(.07)	1.08	(.06)
Richest	1.06	(.05)	1.06	(.05)	1.01	(.06)	1.07	(.06)	1.02	(.06)	1.07	(.06)
Caste/Religious Group (ref=Forward Caste)												
OBC	.95	(.04)	.96	(.04)	1.03	(.05)	.87**	(.04)	1.04	(.05)	.88**	(.04)
Dalit	.96	(.04)	.96	(.04)	1.05	(.06)	.89*	(.04)	1.05	(.06)	.89*	(.05)
Adivasi	.71***	(.04)	.71***	(.05)	.65***	(.05)	.81**	(.06)	.65***	(.05)	.81**	(.06)
Muslim	.47***	(.02)	.47***	(.03)	.29***	(.02)	.75***	(.04)	.29***	(.02)	.76***	(.04)
Christian, Sikh, or Jain	.78**	(.07)	.78**	(.07)	.61***	(.07)	1.11	(.10)	.62***	(.07)	1.11	(.10)
Interactions												
Women's												
Empowerment x												
North	—	—	1.07	(.04)	—	—	—	—	1.10*	(.05)	1.04	(.04)
North Central	—	—	1.12**	(.04)	—	—	—	—	1.06	(.04)	1.14***	(.04)
Central Plains	—	—	1.21***	(.04)	—	—	—	—	1.24***	(.05)	1.14***	(.04)
East	—	—	1.16***	(.04)	—	—	—	—	1.24***	(.05)	1.09**	(.04)
West	—	—	1.17***	(.04)	—	—	—	—	1.19***	(.05)	1.10*	(.04)
South	—	—	1.17***	(.04)	—	—	—	—	1.17***	(.04)	1.11**	(.04)

Note. Odds ratios (OR) and relative risk ratios (RRR) presented with standard errors (SE) in parentheses. OBC=Other Backward Class. All statistics are weighted. Ref=reference/comparison group.

\* $p<.05$ . \*\* $p<.01$ . \*\*\* $p<.001$  (two-tailed tests).

Figure 1 is estimated from Model 1 in Table 2 and illustrates predicted probabilities of using any contraception across the range of women’s empowerment. Figure 1 shows a positive association between women’s empowerment and probability of using contraception such that a unit increase in the empowerment index is associated with approximately a 1 percent increase in the probability of contraception use. At the lowest level of empowerment, the probability of using contraception is about .69 whereas at the highest level of empowerment, the probability increases to nearly .78. In other words, the most empowered women are about 10 percent more likely to use contraception than the least empowered women.

Figure 1. Predicted Probability of Using Any Contraception for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2011–2012 (n=42,211).



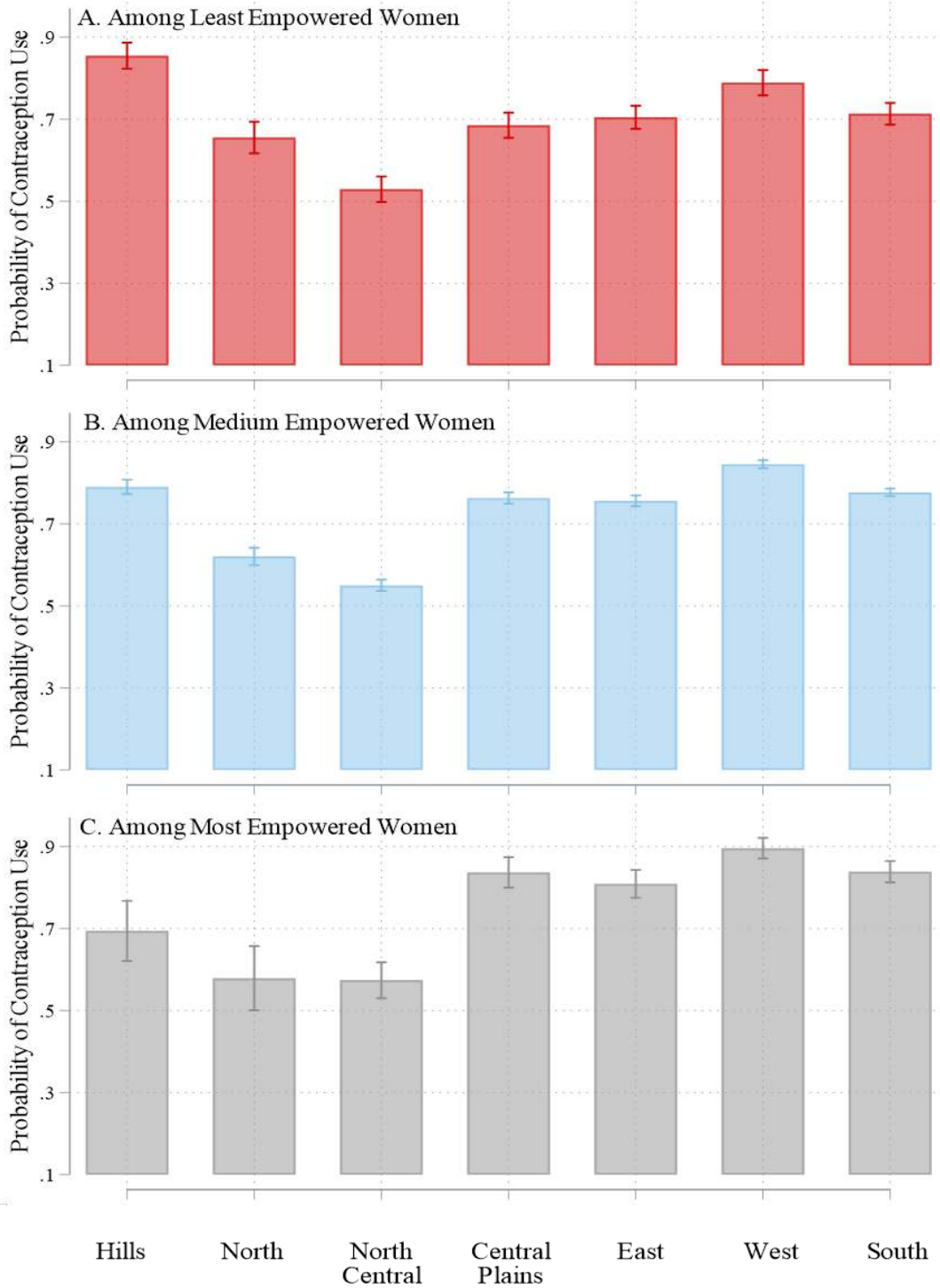
Note: Fully-adjusted estimates derive from Model 1 in Table 2.

Model 2 in Table 2 addresses whether region modifies the association between women’s empowerment and use of contraception. Figure 2 aids in interpreting the interaction term in Model 2, and



identifies the probabilities of using any form of contraception across the seven regions of India separated by empowerment levels of least empowered (i.e., when empowerment is 0), medium empowered (i.e., when empowerment is 6), and most empowered (i.e., when empowerment is 13). Across the three levels, the North and North Central regions are consistently least likely to use any contraception. For both regions, the probability of any contraception remains mostly stable across empowerment levels. Among the least empowered women, women from the Hills have higher probabilities of using contraception, but the probability declines at the highest levels of empowerment. Women in the Western region are consistently most likely to use any form of contraception regardless of empowerment level while for the East and South, as empowerment levels increase, contraceptive use increases too.

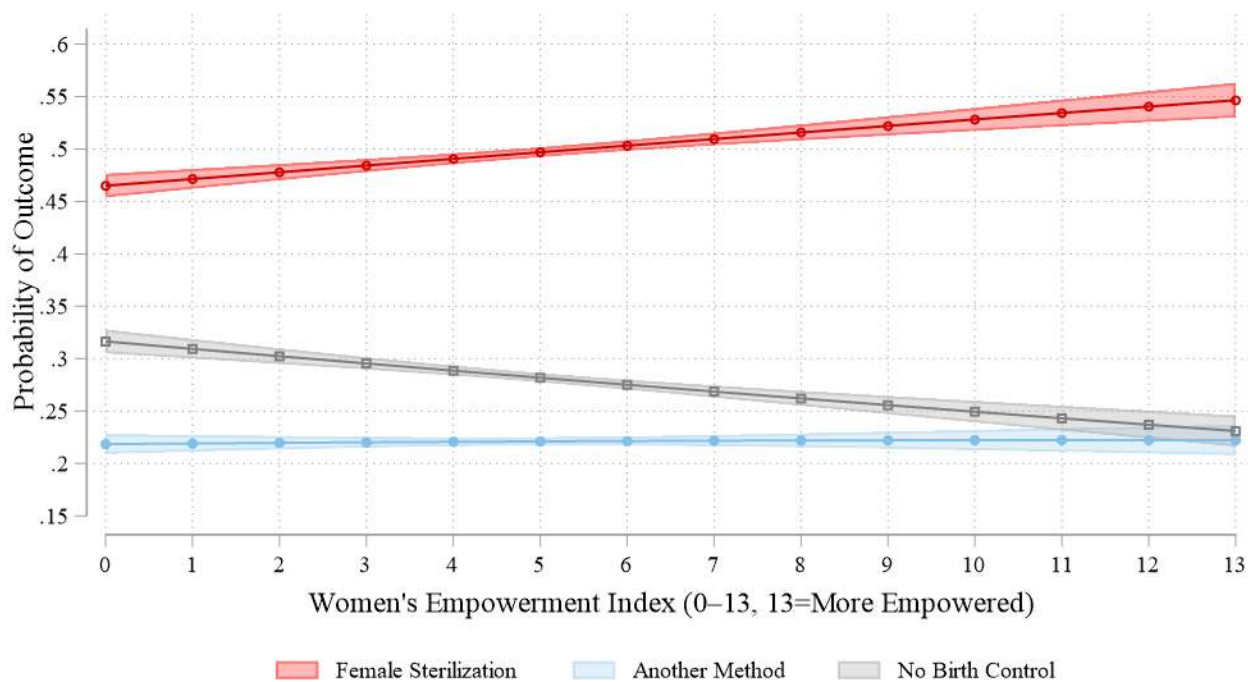
Figure 2: Predicted Probability of Using Any Contraception across Regions for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2011–2012.



Note: Fully-adjusted estimates derive from Model 2 in Table 2 (n=42,211).

Model 3 in Table 2 regresses the three-category contraceptive type on variables of interest. Consistent with the first two models, results show that higher levels of women's empowerment are associated with greater odds of female sterilization (*Relative risk ratios* [RRR]=1.05, *SE*=.01;  $p<.001$ ) and any other method of birth control (RRR=1.02, *SE*=.01;  $p<.01$ ). Moreover, Model 3 in Table 2 shows that women in the North, North Central, and East are less likely to elect for female sterilization or another method of birth control relative to women in the Hills. In contrast, Central Plains residents have lower odds of another method of birth control than Hills residents by a factor of .52 (*SE*=.04;  $p<.001$ ). Patterns diverge for women in the West and South such that they have greater odds of female sterilization and lower odds of any other birth control method. To present the associations graphically, Figure 3 depicts patterns of female sterilization, other methods of contraception, and no form of birth control across women's empowerment. Overall, as empowerment increases, the use of female sterilization also increases. Contrarily, no use of birth control has a negative relationship with women's level of empowerment while the probability of using another method remains mostly stable.

Figure 3. Predicted Probability of Contraception Types for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2011–2012 (n=42,211).



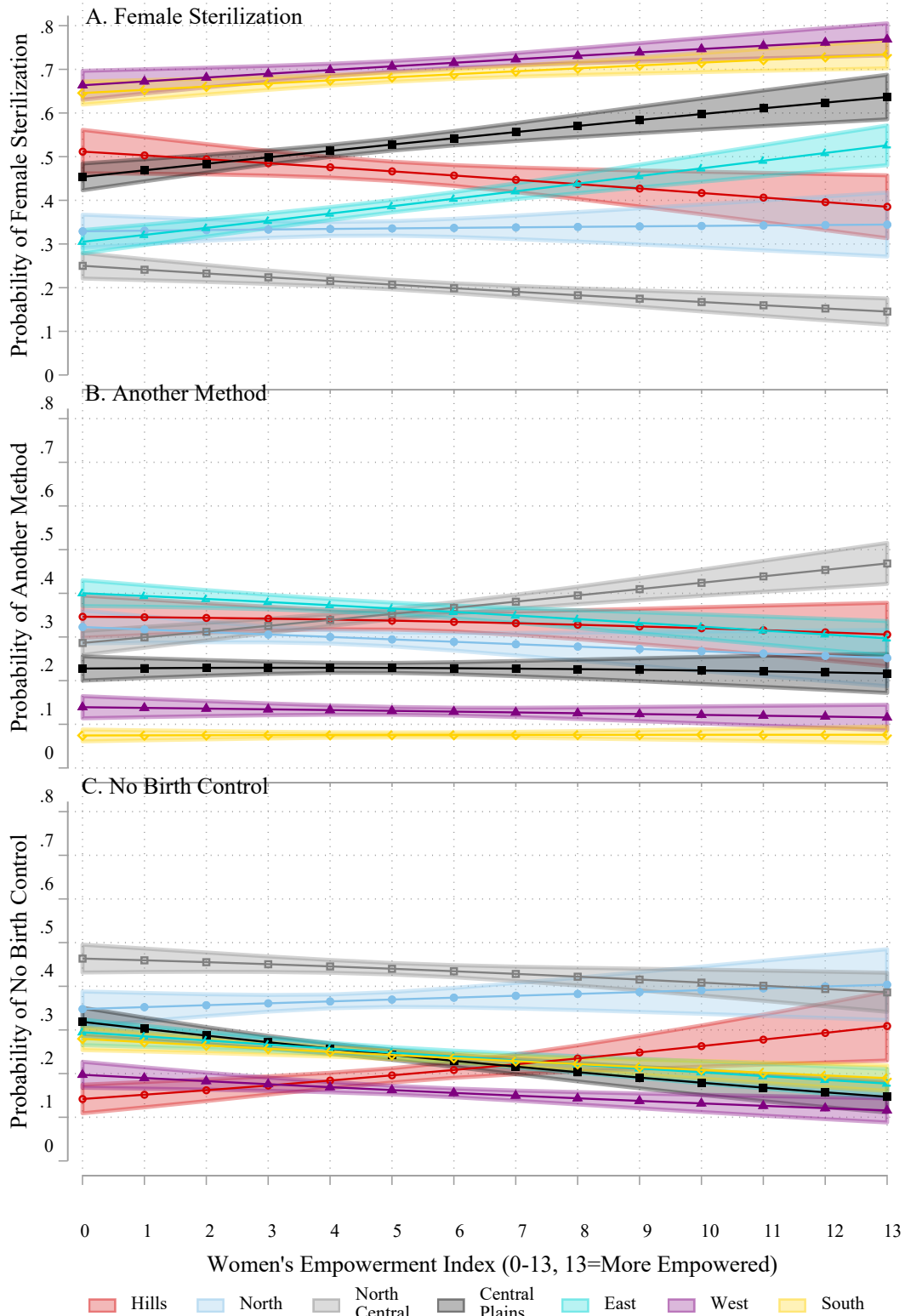
Note: Fully-adjusted estimates derive from Model 3 in Table 2.

Figure 4 extends from Model 4 in Table 2 that examines whether region modifies associations between women’s empowerment and contraceptive type. Figure 4 presents the probabilities of using female sterilization, another method, or no birth control all levels of the empowerment index by region. Figure 4A portrays positive associations between empowerment levels and female sterilization for the West, South, Central Plains, and East regions. The West and South are significantly more likely than other regions to use female sterilization possibly owing to the greater success in family planning efforts within these regions, a greater family size preference, a smaller gender preference, and the perception of sterilization as an acquisition of autonomy (Dwivedi et al. 2007; Mejía-Guevara et al. 2021). The North, North Central, and Hills are less likely to use female sterilization even as empowerment levels increase. In fact, the probability of Hills residents using female sterilization decreases as women’s empowerment

increases. These results may be due to influences of a son preference, strong patriarchal norms, and less access to healthcare (Bijalwan and Maithili 2016; Jayaraman et al. 2009).

Figure 4B only shows a positive association between using another method of birth control and empowerment levels for the North Central region. In contrast, the North, Hills, and East regions experience a decline in using another method as empowerment increases. Patterns differ for the West and South, which are the regions least likely to use another method of contraception across all levels of empowerment. In Figure 4C, all regions show a general decrease in not using birth control as empowerment increases with exception to the Hills and the North. In these areas, a lack of access and inadequate supply of contraceptives may pose obstacles for women (Bijalwan and Maithili 2016; Khan and Bhatnagar 2015). On average, across empowerment, use of no birth control is highest in the North and North Central.

Figure 4: Predicted Probability of Contraception Types for Eligible Women in Waves I and II of the India Human Development Survey Panel, 2005 and 2012 (n=38,634).



Note: Fully-adjusted estimates derive from Model 4 in Table 2.

## DISCUSSION

The present study examined associations among women's empowerment and contraception as well as whether region of residence moderated relationships. Based on background research and tenets of our theoretical framework, we expected that women's empowerment would be positively associated with contraceptive use. We anticipated that dimensions such as autonomy, education, income level, healthcare access, and awareness would impact contraceptive use for women as a byproduct of women's empowerment (Appleton 2022; Asaolu et al. 2017). Findings indicated that as the level of women's empowerment increased there was a positive relation in the increase of using any method of contraception. These findings propose that contraceptive use is an outcome of women's empowerment, which extends previous studies observing the intersection of women's empowerment and use of contraceptives within and outside of India (Malhotra and Schuler 2005; Patrikar et al. 2014; Yaya et al. 2018).

Our findings are informed by standpoint theory, which highlights how women's social locations at the intersection of class, gender, race, and power can better inform understandings of gender inequality (Harding and Norberg 2005; Longino 1993). Social location on the margins can be measures of empowerment itself (i.e., freedom of mobility, decision-making, control over reproductive health) that then dictate intrapersonal and social relations. That is to say, the amount of control a woman holds in regards to her reproductive health can dictate the level of authority she perceives, which in turn affects interpersonal, intrapersonal, and institutional interactions. Because cultures influence the social positioning of women (Harding and Norberg 2005), and cultures within India vary by region, the social positioning of women also vary by region.

We also expected that region would modify associations due to areal differences in customs, views of contraception, and access to healthcare. Past research has contributed invaluable insights into the association between region and contraception, but less of that research disaggregates regions to discern potential spatial variation (Jayaraman et al. 2009; Kumar et al. 2011). In the years after India's Family and Welfare program, research has examined contraceptive use across the country. This interest has

yielded studies to generally arrive at a simple, yet insightful finding: the type of contraception used by women varies by region in part because of regional differences in gender equity, though past research is limited in its use of dated data or self-reported surveys that are subject to recall bias (Ewerling et al. 2021; Misra et al. 2021; Thyagarajan et al. 2014). Moreover, because women's empowerment is not uniform across India, contraceptive use also varies by region (Patrikar et al. 2014; Singh et al. 2021).

Contraception use differed by region in part because of variability in the measures of empowerment (Singh et al. 2007). Since the type of contraception maps onto empowerment, female sterilization also differs by region. Generally, female sterilization is the highest, and the use of another method the lowest, among regions of the West and South regardless of the level of women's empowerment. This may be because women from the South find sterilization to be empowering and the cultural preferences for sons is lower, which reduces the likelihood of using a reversible method (Pallikadavath et al. 2016; Pradhan and Ram 2009). While recently in the West, there has been an increase in the usage of female sterilizations because advocates have promoted it to a great extent (Dwivedi et al. 2007). Similarly, in the Central Plains, as empowerment increases, the use of sterilization increases, use of another method is regionally one of the lowest, and the use of no birth control declines. This could be explained by the history of eugenics and the strong role sterilization continues to play in India (Das et al. 2022) such that, even as women become more empowered, they continue to perceive sterilization as one of their only options of contraception.

We found that in the East, only the use of sterilization increases as empowerment increases. Recall that agency was one of the components of empowerment. Thus, it is possible that as women gain empowerment, they focus more on their own goals and ambitions. In this case, women from Eastern India may want to focus more on other aspects of their lives rather than having kids, so they opt for permanent methods (Malhotra and Schuler 2005; Sen 1985). For the North Central region, as empowerment increases, the use of sterilization and use of no birth control decreases, but the use of another method increases. In the North Central region, there is a low density of healthcare workers (Rao et al. 2012), which may explain fewer sterilization procedures. Instead, as women gain empowerment and are more



likely to use contraception (Malhotra and Schuler 2005; Patrikar et al. 2014; Yaya et al. 2018), they opt for reversible methods that can be bought from a pharmacy rather than choosing a procedure where a medical professional is needed. The Northern region of India offers an interesting trend as we see only the use of no birth control increasing as women's empowerment increases. Finally, in the North where the preference for male children is high (Jayaraman et al. 2009), women of higher empowerment may elect not to use any method of birth control such that it increases the chances of pregnancy and the possibility of having a boy. At higher empowerment levels, there may be fewer financial concerns in raising many children, and selective-sex abortion is more available due to the access and affordability of ultrasound and abortion services (Jha et al. 2011).

Despite offering important contributions to the literature, this study has limitations. First, the study uses the IHDS data, which comes from the years 2005–2006 and 2011–2012. Given the present time, the date of collection of the statistics could be seen as outdated. However, Wave III of the IHDS is currently being conducted in the field and is expected soon. Still, our use of the IHDS improves upon existing research given its nationally representative design. Second, focusing only on ever-married women may restrict our ability to identify how empowerment affects contraception. Women who do not get married may be unique in some aspects relative to ever-married women. In patriarchal societies, it is more common for a married woman (including those divorced or widowed) to experience greater empowerment than single women (Rawat 2014). Contrarily, never-married women may be so empowered that they reject the option of marriage altogether. Third, our measure of women's empowerment could be strengthened in future studies by incorporating questions that resonate more contemporarily. With increasing female literacy rates, larger non-governmental organizational presence, and a greater Western influence, questions regarding the freedom to leave one's house alone or having a say in what to cook may have meant something different in 2005 or 2011 versus now.

## CONCLUSION

The present study identified that contraceptive usage and type differs by empowerment levels across regions of India. While female sterilization has a historical link to sexism, racism, and eugenics, it

may also reflect an expression of women's empowerment among Indian women (Leyser-Whalen and Berenson 2019). While contraceptive use could purely be seen as a preventative measure for unintended pregnancies, it is also integral for gender equality. Women with access to contraceptives experience improved health, higher educational attainment, and a better quality of life (Ewerling et al. 2021). To this end, it is important that medical providers fully advise women about all available contraceptive options and possible side effects so that they can exercise informed choices over their reproductive health and find a method that fits their preference and needs. Ultimately, sexual and reproductive health equity is attainable only when women of all backgrounds are given the voice, resources, and support they need to make decisions. Sterilization may offer women greater reproductive autonomy, but only if women are making informed, uncoerced decisions.

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