Intimate partner violence and contraceptive use in developing countries: How does the relationship depend on context?

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Contents

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Abstract

BACKGROUND
Reducing domestic violence and increasing contraceptive use are two ways to improve women's health in developing countries. Social scientists debate whether women's experiences of intimate partner violence influence contraceptive use. The empirical evidence evaluating the relationship yields inconsistent results. These contradictory findings might be due to specific regional conditions that moderate the relationship.

METHODS
Using 30 panels of DHS data from 17 developing countries, this study examines the relationship between intimate partner violence and contraceptive use in a cross-national comparison and assesses whether this relationship is moderated by macro contextual factors, including the presence or absence of legal regulations against domestic violence and the national level of female empowerment.

RESULTS
Experience of either physical or sexual violence is associated with an increase in contraceptive use, and is statistically significant in a cross-national setting. The magnitude of the positive relationship between physical and sexual violence and contraceptive use decreases in the presence of legal regulations against domestic violence. The positive association of sexual violence with contraceptive use decreases in contexts with higher levels of women's empowerment. However, there is no change in the positive association between physical violence and contraceptive use in contexts with higher levels of women's empowerment. These results are robust to additional sensitivity tests.

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CONTRIBUTION
This study demonstrates how macro contexts moderate the relationship between intimate partner violence and contraceptive use. The results inform and reconcile previous findings by demonstrating that the positive relationship between women's experience of violence by an intimate partner and contraceptive use can be attenuated when structural conditions change – namely, adoption of legal protections and improved women's empowerment.

1. Introduction

High rates of intimate partner violence (IPV henceforth) and low prevalence of contraceptive use are two core issues that threaten the physical, mental, and reproductive health of women in developing countries (Alkema et al. 2013; Campbell 2002; Ellsberg et al. 2015; Krug et al. 2002). In addition to the causes and consequences of each phenomenon, scholars, policymakers and practitioners increasingly recognize that experiences of IPV can affect women's family planning behaviors (Gee et al. 2009; Maxwell et al. 2015). In order to devise actions and programs that aim to decrease IPV prevalence and increase women's contraceptive uptake, an accurate understanding of the relationship between the two phenomena is needed.

Scholars that examine the association between IPV and contraceptive uptake show mixed evidence and contradictory findings. According to a recent systematic review of twelve studies published from 2005 to 2015 (Maxwell et al. 2015), most findings point to a negative association between the two phenomena, with most explanations proposing that women who experience IPV face significant challenges negotiating the use of contraception. On the other hand, there is another body of research that finds a positive association, arguing that experiences of IPV are associated with higher probabilities of contraceptive use because women seek to avoid childbearing when they and their children are subjected to such risks (Alio et al. 2009; Dalal, Andrews, and Daward 2012; Fanslow et al. 2008; Kidman, Palermo, and Bertrand 2015; Salazar, Valladares, and Hogberg 2011; Williams, Larsen, and McCloskey 2008).

A possible explanation for these disparate and conflicting findings is that most studies evaluate evidence from narrowly defined geographic settings and time points. Consequently, the mixed findings may be a function of substantially different conditions at the macro level that would affect a woman's exposure to IPV and its relationship to contraceptive use. To date, no study has tested whether the relationship depends on broader national contextual factors (Okenwa, Lawoko, and Jansson 2011; Kidman, Palermo, and Bertrand 2015). With such limitation in mind, this study aims to

understand how the relationship between IPV and contraceptive use is moderated by national-level conditions of legal protection and women's empowerment.

In order to study how the national context affects the relationship between the two phenomena, we pool data for 17 different African countries and one Asian country. We investigate how the presence of national laws against domestic violence and the national level of women's empowerment moderate the relationship. These two contextual factors are identified in the literature as crucial moderating conditions influencing the association and magnitude of the relationship between IPV and contraceptive use across different regions (Adjiwanou and N'Bouke 2015; Moursund and Kravdal 2003; Upadhyay et al. 2014).

A common challenge for research on the relationship between IPV and contraception is that the experience of IPV is not randomly distributed among women and could be related to a series of confounding demographic and socioeconomic characteristics that are also associated with the use of contraception. Furthermore, it is possible that women's contraceptive use might lead to domestic violence, and thus the direction of the relationship might actually be the opposite of that which has been primarily stated in the literature. Our analytic strategy takes these endogeneity concerns into account, and addresses them in two ways. We employ stabilized inverse probability weights (IPW) based on a propensity score approach to account for unobserved confounding factors. This reduces the selection bias of experiencing intimate partner violence. We also use an instrumental variable (IV) approach by using a prevalence rate of intimate partner violence measured at the community level to instrument individual experiences of intimate partner violence. In addition, we also explore two confounding mechanisms at the individual level that might explain the association between women's contraceptive use and intimate partner violence, namely an individual woman's desire for children and her level of decision-making autonomy within her household. The robustness of our findings to these varied model refinements reassure us that the relationship we find is not spurious.

Our findings show that two elements of the national context – the presence of legal regulations against domestic violence and higher levels of women's empowerment – moderate the relationship between IPV and contraceptive use. We find that the positive association between both physical and sexual violence and contraceptive use diminishes with the existence of legal regulations against domestic violence. Moreover, we find that, on average, the positive association of sexual violence with contraceptive use diminishes with greater female decision-making power at the national level. Finally, additional analyses demonstrate that the positive relationship between IPV and contraceptive use may work through IPV's negative association with women's preferences for more children. The negative impact of IPV on women's desire for more children when experiencing intimate partner violence appears to explain the positive

relationship with use of contraceptives, substantiating earlier work (Alio et al. 2009; Dalal, Andrews, and Daward 2012; Fanslow et al. 2008; Kidman, Palermo, and Bertrand 2015; Williams, Larsen, and McCloskey 2008).

This research contributes to our understanding of the relationship between IPV and contraceptive use by showing how the broader context matters and moderates this relationship. This finding might help to explain the conflicting evidence that characterizes past research on the subject. Additionally, it supports policy efforts that go beyond individuals and focus on broader societal structures and characteristics that affect the family planning behavior of women who experience intimate partner violence.

2. An unresolved puzzle of intimate partner violence and contraceptive use: The importance of national contexts

Research that explores the association between contraceptive use and intimate partner violence reveals a puzzling and complex relationship: Scholars have found both negative and positive associations between IPV and women's use of contraception. These conflicting results span across research that explores both regional and national contexts, employs a variety of methods and analytic strategies, and utilizes various data sources, such as representative surveys, clinical studies, and qualitative approaches.

While some studies have endeavored to solve this puzzle by refining their analytic strategies or population of interest, we examine whether the broader context moderates the relationship between IPV and contraception, which could explain the disparate findings in the field. We focus on two elements of the legal and social structural contexts that capture women's protection and status at the national level, and explore whether these macro features condition the relationship between IPV and contraceptive use. Before we present our expectations of how these contextual features moderate the relationship, we briefly summarize the two explanations that account for the positive and negative associations.

2.1 A positive and negative association: Fertility preferences and decision-making power

As mentioned before, there is evidence for both a positive and a negative relationship between IPV and contraceptive use. These conflicting empirical findings offer two different explanations.

On the one hand, some scholars have documented positive associations between different forms of IPV (emotional, physical, sexual) and contraceptive use within and across national contexts (Alio et al. 2009; Dalal, Andrews, and Dawad 2012; Fanslow et al. 2008; Kidman, Palermo, and Bertrand 2015; Roberts, Auinger, and Klein 2005; Salazar, Valladares, and Hogberg 2011). The explanation for this positive relationship states that women who experience IPV are more likely to have negative feelings and attitudes towards their spousal relationship and home environment, impacting their family planning behaviors and decreasing their desire for having additional children in a violent and vulnerable setting. Additionally, as Salazar, Valladares, and Hogberg (2011) argue, pregnancy and motherhood increase women's vulnerability and dependency on their violent partners, limiting their exit strategies and potential responses to IPV, as well as decreasing their financial and personal autonomy. Thus, women are expected to respond to these heightened risks by adopting contraception.

On the other hand, researchers have found that intimate partner violence against women is associated with lower probabilities of using contraception (Williams, Larsen, and McCloskey 2008; Stephenson, Koenig, and Ahmed 2006; Stephenson et al. 2008) and a higher likelihood of having unintended pregnancies (Cripe et al. 2008; Miller et al. 2010). This negative association is explained by women's lack of decision-making power in their relationship, which affects their ability to assert or negotiate family planning decisions and control the timing, number, and spacing of their pregnancies (Pallitto, Campbell, and O'Campo 2005). Additionally, abused women face challenges negotiating contraceptive use, especially with regards to male-controlled methods such as condoms (Maxwell et al. 2015) or overt methods of contraception such as female condoms, foams, or jellies (Biddlecom and Fapohunda 1998; Bawah et al. 1999). Fear of violence or suspicion from their partner or spouse may lead women to engage in unprotected sexual intercourse. For instance, Kalichman et al. (1998) found that women "were more likely to perceive that requesting male partners to use condoms would create a potentially violent situation." Husbands may restrict women's access to contraception if they think that their wives have not met preconceived fertility responsibilities (Stephenson, Jadhav, and Hindin 2013). Finally, male partners may purposely sabotage women's use of contraception in order to increase their wives' dependency and assert control over them (Maxwell et al. 2015).

In summary, a positive association is explained by IPV's impact on women's fertility preferences, specifically a negative impact on women's desire for future pregnancies or children; while a negative association is explained by women's lack of decision-making power to negotiate or independently adopt contraceptive use.

2.2 Moderating effects of national legal institutions and women's empowerment level

Scholars stress the importance of taking context into account in order to advance our understanding of the conflicting associations between IPV and contraception (Maxwell et al. 2015). We address this concern by exploring whether two elements of the legal and social structural contexts moderate the relationship between IPV and contraceptive use, while considering the two possible explanations that account for the relationship (women's decision-making power vs. fertility preferences).

The first element we explore is the presence of national legal actions regarding women's protection against IPV. These legal actions are important tools for governments to protect women from being victims of intimate partner violence. In fact, the number of countries that have gradually been accepting the condemnation of intimate partner violence has been increasing (Pierotti 2013), so that condemnation is slowly becoming a global norm (Meyer et al. 1997). With formal legal actions against domestic violence, partners face higher costs of violence against women due to punishment. Although there is wide variation in the quality, enforcement, and effectiveness of such laws across different countries, we focus here on their presence. Research has found that in countries where there is legislation that specifically addresses domestic violence, women have a higher life expectancy (World Bank Group 2016). There is also evidence that the presence of legislation against domestic violence is associated with a lower probability of domestic violence, independent of its impact on reporting and arrest (Dugan 2003). Furthermore, just making domestic violence an independent criminal offence "can send a message that [it] will not be tolerated by the community" (Minnesota Advocates for Human Rights).

We now turn to the two explanations for the relationship between IPV and contraceptive use. First, following the explanation that posits women's decision-making power as the driving mechanism, research has found that the presence of formal legal protection and advocacy services empowers victims of IPV (Epstein 1999), which can in turn increase their decision-making power and their ability to negotiate contraception. We would thus expect that a negative relationship between IPV and contraceptive use would be attenuated by the presence of such national laws and protective regulations. On the other hand, regarding the explanation that emphasizes fertility preferences, decreasing fear of violent spouses might also lessen the negative impact of IPV on women's feelings and attitudes towards their home environment and future childbearing. Thus, we would expect that the positive relationship between IPV and contraceptive uptake would be mitigated in a context of legal regulations against domestic violence.

We explore the national social context through national levels of female empowerment, which, according to Adjiwanou and N'Bouke (2015), is a feature of the

national environment that can influence the magnitude and direction of the impact of IPV on contraceptive use. As with the legal context, there are different expectations of how this social contextual factor impacts the relationship between IPV and contraceptive use based on its two possible explanations. On the one hand, the explanation that emphasizes women's decision-making power as the driving mechanism argues that high societal levels of female empowerment make it possible for women to control family resources and make decisions concerning their lives and reproductive health, despite their husband/partner's opinion or any societal pressure (Jejeebhoy 1995). Since the decision-making power explanation predicts a negative relationship between IPV and contraceptive use, we would expect that a higher societal level of female empowerment would decrease the magnitude of the negative relationship between IPV and contraceptive use. On the other hand, the explanation that proposes women's fertility preferences as the main mechanism posits that high societal levels of female empowerment will result in better expectations regarding women's family and home environments, since women live in a context where they have a relatively high status within their families and/or better resources and standing to respond to IPV. For instance, Moursund and Kravdal (2003) find that higher female autonomy at the community level is associated with less likelihood of individual desire to stop childbearing. Similarly, according to the review by Upadhyay et al. (2014: 116), "the context in which women live may be more influential than their own specific level of empowerment" in regards to fertility preferences. Considering that the fertility preferences explanation posits a positive relationship between IPV and contraceptive use, it is reasonable to expect that a high societal level of female empowerment would decrease the magnitude of this relationship or narrow the contraceptive use gap between women with and without IPV experiences.

It appears that the legal and social national contexts have seemingly opposite influences on the decision-making power and fertility preference explanations. However, we argue that the expectations for both explanations in fact posit that legal regulations against domestic violence and high levels of female empowerment narrow the gap in family planning behavior between women with and without experiences of IPV. We illustrate these expectations in Table 1.

Rather than examining the hypotheses in regional or local settings, as most previous studies have done, our study seeks to understand whether specific elements of the legal and social contexts moderate the relationship between IPV and contraceptive use across different developing countries. We use survey data that contains information on intimate partner violence and contraceptive use for many different countries, while controlling for some nation-level characteristics that may be related to contraceptive use, such as GDP and national levels of women's education and labor market participation. The results from the cross-national analysis present the general

relationship between our main independent and dependent variables and allow us to understand how contextual features moderate the relationship of interest.

Table 1: **Relationship between IPV and contraceptive use in a cross-national setting**

	Association	Moderation of national context
Explanation 1	Fertility preferences (–)	+
Explanation 2	Decision-making power (+)	–

3. Data, measures, and methods

3.1 Data

This study uses data from the Demographic and Health Surveys (DHS), a group of multi-country nationally representative household surveys conducted in over 90 developing countries. The surveys collect data on fertility, family planning, fertility preferences, mortality, reproductive health, child health, nutrition, HIV/AIDS, and many other topics (Rutstein and Rojas 2006). With funding from bilateral and multilateral organizations and national governments, surveys have been conducted in 5-year phases since 1984. Importantly for this study, most DHS surveys have included an intimate violence partner instrument module since 2003. We only employ the waves that contain a domestic violence module. Only one woman per household receives the domestic violence module. Because domestic violence is such a sensitive topic, all members of staff receive special training to ensure that they understand the purpose of the module, and why special measures are used, so as to protect respondents. Field staff receive additional training on administering the survey (including techniques to ensure absolute privacy during the interviews), how to deal with crisis situations, and how to prepare for the field work (for more details, see "ethical and safety guidelines" by DHS). These procedures ensure confidence in and the validity of the domestic violence measures.

Our data includes 30 panels from 17 African countries and India, surveyed from 2003 to 2016, available in the IPUMS DHS database.[3] We select these panels because they include a domestic violence module. Because India is a highly heterogeneous

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[3] https://www.idhsdata.org/idhs/.

country in regard to family planning behaviors (Mohanty et al. 2016; New et al. 2017), our multivariate analyses are estimated with a regional classification. We divide the country into four different regions based on geographic patterns of fertility decline and contraceptive uptake: High Fertility Belt (Bihar and Jharkhand, Madhya Pradesh and Chhattisgarh, Rajasthan, Orissa and Uttar Pradesh and Uttaranchal), High Fertility East (Nagaland, Manipur, Meghalaya, Arunachal Pradesh, Assam), Low Fertility North-East (Delhi, West Bengal, Sikkim, Himachal Pradesh, Punjab, Haryana, Jammu and Kashmir, Tripura, Mizoram) and Low Fertility South-West (Kerala, Maharashtra, Tamil Nadu, Pondicherry, Goa, Andhra Pradesh, Karnataka, Gujarat). Results are consistent across all models whether we include India's regional classification or one single country.

We restrict our individual-level sample to currently married or in-union women of reproductive age (15–49 years of age) who are fecund, since the use of contraception is dependent on women's demographic and biological characteristics. We exclude never married and formerly married women from our sample because their exposure to the risk of both IPV and contraceptive use is very different from that of women in cohabiting or spousal relationships. In particular, formerly married women have particularly high levels of IPV and very low levels of contraceptive use. Moreover, we only include non-sterilized women, or those whose husband/partner has not been sterilized. Our sample (N = 93,225) only includes women exposed to the risk of pregnancy and thus at risk of contraceptive use. Table 2 shows the distribution of samples by country and year.

Table 2: **Sample size and legal regulation status against domestic violence by sample[a]**

Country/Year	2003	2004	2005	2006	2007	2008	2010	2011	2013	2014	2015	2016	Total
Cameroon	-	-	-	-	-	-	-	1,643	-	-	-	-	1,643
CDR	-	-	-	-	638	-	-	-	1,757	-	-	-	2,395
Ghana	-	-	-	-	-	787	-	-	-	-	-	-	787
India[b]	-	-	23,751	-	-	-	-	-	-	-	-	-	23,751
Ivory Coast	-	-	-	-	-	-	-	2,005	-	-	-	-	2,005
Kenya	1,792	-	-	-	-	2,085	-	-	-	2,175	-	-	6,052
Malawi	-	2,674	-	-	-	-	1,890	-	-	-	-	1,906	6,470
Mali	-	-	-	456	-	-	-	-	-	-	-	-	456
Mozambique	-	-	-	-	-	-	-	1,829	-	-	-	-	1,829
Nigeria	-	-	-	-	-	6,222	-	-	7,947	-	-	-	14,169
Rwanda	-	-	778	-	-	-	1,548	-	-	859	-	-	3,185
Zimbabwe	-	-	1,927	-	-	-	2,245	-	-	-	3,038	-	7,210
Uganda	-	-	-	556	-	-	-	-	-	-	-	-	556
Egypt	-	-	3,155	-	-	-	-	-	-	4,041	-	-	7,196
Tanzania	-	-	-	-	-	-	2,772	-	-	-	2,718	-	5,490
Burkina Faso	-	-	-	-	-	-	4,315	-	-	-	-	-	4,315
Zambia	-	-	-	-	1,542	-	-	-	4,143	-	-	-	5,685
Total	1792	2,674	29,611	1,012	2,180	9,094	12,770	5,477	13,847	7,075	5,756	1,906	93,194

Notes: [a] Cells in green indicate having legal regulations/laws against domestic violence. Red cells indicate the absence of such laws. Numbers in cells indicate sample size.
[b] The Protection of Women from Domestic Violence Act was passed on 13 September 2005 but its enforcement began on 26 October 2006.
Data source: UN Women – Global Database on Violence Against Women; Demographic and Health Survey Program.

3.2 Measures

Our main dependent variable, contraceptive use, is measured as a binary indicator, taking a value of 1 if the woman is currently using a contraceptive method and 0 if not. We are aware that the relationship between intimate partner violence and contraceptive use may differ by type of contraceptive method. For instance, intimate partner violence may have a greater impact on methods that require male cooperation, such as condoms or withdrawal. Additionally, as suggested by Biddlecom and Fapohunda (1998), a

husband's opposition to contraception (including becoming angry or violent about the subject) is an important reason for covert contraceptive use or women's use of contraceptive methods that can be hidden from their husbands, such as injections, implants, IUDs, pills, etc. Bawah et al. (1999) find that women's fear of opposition and reprisal (marital discord, physical abuse and violence) motivates covert use. Women experiencing intimate partner violence may hide their use of contraception from their husbands, choosing covert methods over overt ones. Because of this important caveat, to understand the relationship between intimate partner violence and contraceptive use we further investigate the relationship between IPV and both female/covert methods and male/overt methods of contraception.

Our independent variable, intimate partner violence, is measured separately for physical violence and sexual violence. Our measure is similar to that found in the influential work by Garcia-Moreno et al. (2006). We construct a measure of physical violence based on five questions that consistently appeared in all of the waves of data available to us. These questions asked the respondent whether in the last year she "was slapped or had something thrown at her that could hurt her," "was pushed or shoved," "was hit with a fist or something else that could hurt," "was kicked, dragged, or beaten up," and "was choked or burnt on purpose." While Garcia-Moreno et al. (2006) distinguish intermediate violence (the first two) and severe violence (the latter three), we do not distinguish the severity of the violence and create a dummy variable indicating whether a woman experienced any physical violence by her partner or husband. We also excluded Garcia-Moreno et al.'s (2006) measure of whether the "perpetrator threatened to use or actually used a gun, knife, or other weapon against her," because this question was only asked in some surveys. We believe this exclusion does not influence the validity of our measure because only 288 respondents out of the 18,188 respondents who indicated experiencing IPV reported such extreme violence. The measure of sexual violence experience is based on women's responses to whether they ever experienced sexual violence from partner or husband. We construct a dummy variable where 1 indicates that women had such experiences and 0 that they experienced none. The questions were slightly different in different phases of the DHS survey.

We focus on how the relationship between intimate partner violence and contraceptive use depends on legal and female empowerment contexts. The legal context is operationalized as an index indicating to what extent respondents lived in a country that had laws against domestic violence during that survey year. The data on national actions against domestic violence is drawn from the Global Database on Violence Against Women, which was established by the General Assembly of the United Nations in December 2006 and updated in accordance with the adoption of the 2030 Agenda for Sustainable Development in 2016. This database has been used to

study the global diffusion of legal regulation of domestic violence (Pierotti 2013). By reading all related legal regulation texts, we assign each country by survey year with one of three scores: 0 for countries without any legal regulations against domestic violence, 1 for countries with laws against general domestic violence, and 2 for countries with laws against not only general domestic violence but also specific types of domestic violence, such as sexual violence.[4] Table 3 reports laws against domestic violence by country and year.

Table 3:   Timeline of legal regulation of domestic violence in sample countries

Country/Year	Year of first regulation against domestic violence/IPV	Year of first regulation against specific types of domestic violence/IPV (Sexual violence, child sexual violence, gender inequality in spousal relationship)
Ghana	2005	2007
Kenya	2006	2006
Malawi	2006	2010
Mozambique	2008	
Rwanda	2008	2008
Zimbabwe	2005	2001
Egypt	1998	1999
Tanzania	1998	2008
Zambia	2011	

Source: UN Women- Global Database on Violence Against Women.

Women's empowerment is operationalized as the average level of women's decision-making power within the household summarized at the country level. This measure is constructed by averaging 5 questions asked of the female respondents about their final say on making large household purchases, making household purchases for daily needs, visiting family or relatives, spending their earnings, and their healthcare. For each question, we define "final say by woman alone" as 1, "final say by woman and husband/partner/someone else" as 0.5, and the rest as 0.[5] This initial individual decision-making power is averaged by country and year, given data samples, in order to obtain a country-level indicator of the social context of female empowerment. To better

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[4] To examine the robustness of our main results to this measure, we replicate all analysis based on a dummy variable combining countries with scores 1 and 2. All the results are almost identical.
[5] Some studies, such as Mistry, Galal, and Lu (2009), also recoded "final say by woman and husband/partner/someone else" as 1. We define it as the moderate level of female decision-making power and distinguish it from "final say by woman alone."

present it in our analysis, we multiply the initial value by 100 to obtain the empowerment score at the national level, which ranges from 0 to 100.

Determinants of domestic violence and contraception have been extensively studied. In our empirical analysis we control for a series of confounding individual-level variables. Research shows that women's decision-making power is significantly associated with both intimate partner violence (Koenig et al. 2003; Weitzman 2014) and contraceptive use (Ahmed et al. 2010; Do and Kurimoto 2012) across contexts: women with greater decision-making power or within-family status are less likely to experience intimate partner violence. For this measure, we use the question on whether women make decisions regarding their healthcare by themselves. Additionally, women's attitude towards intimate partner violence may influence the relationship between intimate partner violence and contraceptive use. Thus, we construct a variable based on a series of five items that ask women to share their opinions about the acceptability of intimate partner violence[6]: whether women think husbands are justified in hitting or beating their wives if they (1) go out without telling their husbands, (2) neglect the children, (3) argue with their husbands, (4) refuse to have sex with their husbands, (5) burn the food. For each of these five questions, women answered "yes," "no," or "don't know." We create a three-category variable of women's attitudes towards IPV based on the survey question options. We code women as "agreeing" to IPV if they responded "Yes" to at least one of the 5 questions. We code them as "don't know" if they did not answer "Yes" to any question and responded "don't know" to at least one of them. Consequently, women coded as "Don't agree with IPV" are those who answered "No" to all 5 questions. We treat "Don't know" as one category rather than as a missing value because this answer may not be random. As descriptive statistics show, the proportion of women who do not answer yes or no is very low (3%). On the other hand, for the national-level measure we create a numerical variable representing the proportion of women saying that intimate partner violence is justified in any situation.

Previous studies indicate that religion is an important predictor of both intimate partner violence and contraceptive use (Ellison, Bartkowsk, and Anderson 1999; Iyer 2002; Koenig et al. 2003). Based on the religion classification in the DHS, we measure religion as a categorical variable, comprising Muslim/Islam, Christian, Catholic, Protestant, and Other. Additionally, since pregnancy termination offers an alternative way to deal with unwanted pregnancies, we control for whether women have ever had a pregnancy termination as captured by DHS. Moreover, we control for women's fertility preferences, measured as a binary variable of not wanting more children in the future, since they are potentially related to women's preference for or avoidance of abortion.

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[6] The question text is slightly different across countries and years. There are also other situations that were only surveyed in some areas or years. To keep our measure consistent in a comparative view, we only choose the 5 questions that are available across most countries in our sample.

Additionally, education empowers women and protects them from intimate partner violence (Jewkes 2002), so we include women's educational level as an important covariate. We also include women's occupational status as an indicator of individual-level economic independence and empowerment, which is a protective feature against intimate partner violence (Gage 2005; Raj et al. 2018). In addition, we include wealth quantile of the household and urban residence as two indicators of household socioeconomic status. Moreover, number of living children and number of sons are also important predictors of both intimate partner violence and contraceptive use (Bairagi 2001; Yount, Langsten, and Hill 2004). Meeting gender role expectations, particularly having sons, is associated with fertility control and family stability (Scanzoni 1976). Besides controls for the household and women, the relative status of women vis-à-vis their partner or husband is an important indicator of experiencing intimate partner violence (Aizer 2010; Weitzman 2014). Thus, we also control for the education level and occupation category of male partners.

We also control for a series of country-level characteristics[7] that may be related to the features of the legal regulation and female empowerment contexts. Economic development is a potential driver of social and legal change, so we include the logged GDP per capita at current prices (US dollars) from the database of the United Nations Statistics Division. Female empowerment is also related to women's human capital or labor market participation. We include the country-level average of married women's years in education, which we calculate using DHS data. Labor market participation is defined as the proportion of married or in-union women with non-agricultural and non-domestic jobs. We also include a national-level control for the proportion of women in the national parliament, obtained from the World Bank's Development Indicators (World Bank 2019). Controlling for alternative scenarios for dealing with an abusive spouse is of paramount importance: in countries with high divorce rates it is possible that women may choose to leave an abusive husband rather than take up contraception. We thus calculate national divorce rates using DHS data by dividing the number of divorced/separated women (as classified by DHS) over the total population of women aged 15 to 49 years old. We similarly include the national rate of abortion, calculated from DHS data as the number of women who ever had a pregnancy termination over the total population of women aged 15 to 49. Finally, we also control for the country-level proportion of women who view intimate partner violence as acceptable, which is correlated with the existence of legal regulations against domestic violence. The goal of

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[7] We conduct a country-level regression analysis with the legal regulation score and female empowerment score as dependent variables for our 30 country-year observations. The results indicate that years in education of married (in union) women are correlated with female empowerment, and the national level of viewing IPV as acceptable is correlated with the national legal regulation score.

including these various nation-level controls is to approximate the variation in women's status in different societies.

3.3 Analytical strategy

There are two challenges when studying the relationship between intimate partner violence and contraceptive use. First, the validity of findings based on unadjusted regressions may be threatened by selection bias because women who experience intimate partner violence come from specific social groups, such as low-income families and those with low educational levels. Second, the analyses of the relationship between IPV and contraceptive use need to account for the possibility of the relationship working in the opposite direction to that primarily stated in the literature; that is, contraceptive use leading to physical and sexual violence.

Our main strategy adopts a propensity score approach (Morgan and Winship 2014). Following Li, Zaslavsky, and Landrum (2013) and Robins, Rotnitzky, and Zhao (1995), we adjust the multilevel regressions with weighting based on the propensity score of experiencing intimate partner violence.[8] The propensity score is obtained by probit regressions on the set of covariates potentially related to the experience. After obtaining the propensity scores, we weight each observation by the inverse of the probability of receiving the treatment (i.e., experiencing physical or sexual violence) given the covariates. Very low propensity scores result in extremely large weights. Such large weights can make the estimates unstable because the results may be sensitive to these few extreme cases. To address this issue, we adopt the method of stabilized and trimmed weights (Austin and Stuart 2015; Lee, Lessler, and Stuart 2011; Robins, Hernan, and Brumback 2000). In our case, when calculating inverse probability weights we use the proportion of women experiencing IPV and women not experiencing IPV among the group in the numerator. Finally, we top code the weights above 20 to values of 20.

The stabilized inverse probability weighting procedure creates a synthetic sample of observed covariates independent of intimate partner violence. Conditioning on propensity scores, the selection bias due to observed covariates can be removed, and the influence of IPV on contraceptive use can be estimated with the propensity scores weights. The propensity score method relies on two assumptions. First, the ignorability assumption states that conditional on the observed covariates, the difference in using contraceptive methods is only caused by IPV. This assumption is not testable and can

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[8] Another option is to conduct propensity score matching. We prefer inverse probability weighting (IPW) based on propensity scores because it is a better fit better for a data structure with multiple levels. However, we also conduct propensity score analysis based on 1-to-1 matching. The results are consistent.

only be approximated by including all observed covariates that could possibly influence IPV and contraceptive use. Another assumption is generally called overlap assumption. It states that each individual has a positive probability of receiving each treatment level. This assumption can be tested by plotting the distribution of propensity scores for treatment and control groups and showing whether there is overlap at each propensity score level. Appendix Figure A-1 shows that the propensity score method does not violate the overlap assumption.

Building this synthetic sample, we use multilevel modeling to examine our hypotheses. Multilevel modeling takes the multilevel structure of the sample into account and is appropriate for elucidating the contextual effects and cross-level moderation effects in relation to individual-level social and demographic factors (Duncan, Jones, and Moon 1998). In our analysis the data has a two-level structure, including country-level and individual-level variables. We start with a hierarchical logit model,

$$ln\left[\frac{P(Y_{ij}=1)}{P(Y_{ij}=0)}\right] = \beta_0 + \beta_1 IPV_{ij} + \boldsymbol{\beta_2 C_j} + \boldsymbol{\beta_3 X_{ij}} + \boldsymbol{B_4 Z_j} + \mu_j + E_{ij}, \tag{1}$$

where $ln[\frac{P(Y_{ij}=1)}{P(Y_{ij}=0)}]$ represents the log odds of using contraception relative to not using it for woman i in country j, IPV_{ij} represents having an experience of intimate partner violence in the last year, $\boldsymbol{C_j}$ represents the legal regulation index and female empowerment scores, $\boldsymbol{X_{ij}}$ is a vector of individual covariates, $\boldsymbol{Z_j}$ is a vector of country-level controls, and μ_j is the country-level random effect.

Given that our focus is on how the relationship depends on contexts, we allow the coefficient β_1 to vary by legal regulation and female empowerment contexts. Hence, we can rewrite equation [1] in the following form:

$$ln\left[\frac{P(Y_{ij}=1)}{P(Y_{ij}=0)}\right] = \beta_0 + \beta_{1j} IPV_{ij} + \boldsymbol{\beta_2 C_j} + \boldsymbol{\beta_3 X_{ij}} + \boldsymbol{B_4 Z_j} + \mu_j + E_{ij} , \tag{2}$$

and

$$\beta_{1j} = \gamma_0 + \boldsymbol{\gamma_{1j} C_{1j}} ,$$

where $\boldsymbol{C_{1j}}$ are the legal and social factors at country level.

4. Results

4.1 Descriptive analysis

Table 4 presents the descriptive statistics of the data. The rate of current use of any contraception is about 53%. One reason for this relatively high rate is that our sample covers the most recent waves, which start from 2003. Around 27% of women in the sample reported having experienced physical violence by their intimate partners in the past year. The rate for sexual violence is lower, at 10%. In terms of the national contexts, only 38% of women in the sample lived in countries with any national laws against domestic violence during the survey year. The social context of female empowerment, measured as the nation-level average of women's decision-making score, is at 12 with a 0 to 100 score range. These contextual nation-level indicators suggest that women in our sample live in countries with low levels of empowerment and insufficient legal protection from domestic violence.

Table 4: **Descriptive statistics of national-level and individual-level characteristics**

Variable	Mean	Std. Dev.	Min	Max
Dependent variable:				
Contraceptive use	0.53	0.50	0	1
Independent variables:				
Physical violence	0.27	0.44	0	1
Sexual violence	0.10	0.30	0	1
National-level variables:				
Legal Regulation Index	0.69	0.92	0	2
Female Empowerment Score	11.98	3.41	4.27	20
Logged GDP per capita	6.89	0.67	5.54	8.17
Percentage of urban women (%)	38.81	11.47	12.32	60.94
Percentage of women viewing IPV as acceptable (%)	46.75	13.64	12.90	93.10
Average women's years in education	6.36	1.75	1.49	9.49
Average partner/husband's years in education	7.66	1.87	1.85	10.43
Percentage of women with non-agricultural and non-domestic jobs (%)	27.26	14.51	5.96	56.86
Divorce rate (%)	2.98	2.78	0.25	9.38
Women's share in national parliament (%)	14.26	11.66	1.8	63.75
Proportion of women experiencing pregnancy termination (%)	17.27	4.55	9.98	29.76
Individual-level controls:				
Accepting IPV				
Not accepting	0.56	0.50	0	1
Accepting	0.43	0.50	0	1
Missing	0.01	0.10	0	1
Decision-making				
Women only	0.21	0.41	0	1
Joint	0.42	0.49	0	1
Partner	0.35	0.48	0	1
Other	0.02	0.14	0	1
Age at the first marriage	18.89	4.16	2	49

Table 4:   (Continued)

Variable	Mean	Std. Dev.	Min	Max
Religion				
Muslin/Islam	0.24	0.43	0	1
Christian	0.14	0.35	0	1
Catholic	0.11	0.32	0	1
Protestant	0.14	0.35	0	1
Other	0.37	0.48	0	1
Women's educational level				
No Education	0.25	0.44	0	1
Primary	0.32	0.47	0	1
Secondary	0.34	0.47	0	1
Higher	0.09	0.28	0	1
Number of children under 5 in the household	1.17	0.96	0	16
Married	0.92	0.26	0	1
Age	30.07	7.67	15	49
Urban residence	0.39	0.49	0	1
Number of living children	2.77	1.96	0	15
Number of sons	1.42	1.29	0	10
Ever experienced pregnancy termination	0.17	0.38	0	1
Wanting more child	0.40	0.49	0	1
Wealth index				
Poorest	0.15	0.36	0	1
Poor	0.17	0.38	0	1
Middle	0.19	0.39	0	1
Rich	0.22	0.42	0	1
Richest	0.26	0.44	0	1
Women's job category				
Not currently working	0.42	0.49	0	1
Professional, technical, or managerial	0.05	0.22	0	1
Clerical or sales	0.15	0.36	0	1
Agricultural	0.27	0.44	0	1
Household, domestic, and services	0.04	0.20	0	1
Skilled and unskilled manual	0.07	0.25	0	1
Other	0.00	0.04	0	1
Husband/partner's job category				
Not currently working	0.02	0.14	0	1
Professional, technical, or managerial	0.12	0.33	0	1
Clerical or sales	0.16	0.36	0	1
Agricultural	0.34	0.47	0	1
Household, domestic, and services	0.08	0.27	0	1
Skilled and unskilled manual	0.28	0.45	0	1
Other	0.00	0.07	0	1
Husband/partner's level of education				
No education	0.18	0.39	0	1
Primary	0.29	0.45	0	1
Secondary	0.40	0.49	0	1
Higher	0.13	0.34	0	1
N	93,194			

Next, we present descriptive and association analyses of intimate partner violence and contraceptive use by country. According to Figure 1, contraceptive prevalence rates vary widely by country and year. For instance, only 16.9% of women in the Mali DHS data (2006) were using contraception at the time of survey, while Egypt, Rwanda, and

Zimbabwe have a prevalence rate of more than 70% contraceptive users in all waves in our sample. Nation-level prevalence rates of physical and sexual violence show similar patterns. In general, countries with low physical violence prevalence rates also have relatively lower sexual violence rates, and vice versa.

Figure 1: **Summary of contraceptive use rates and intimate partner violence prevalence by sample**
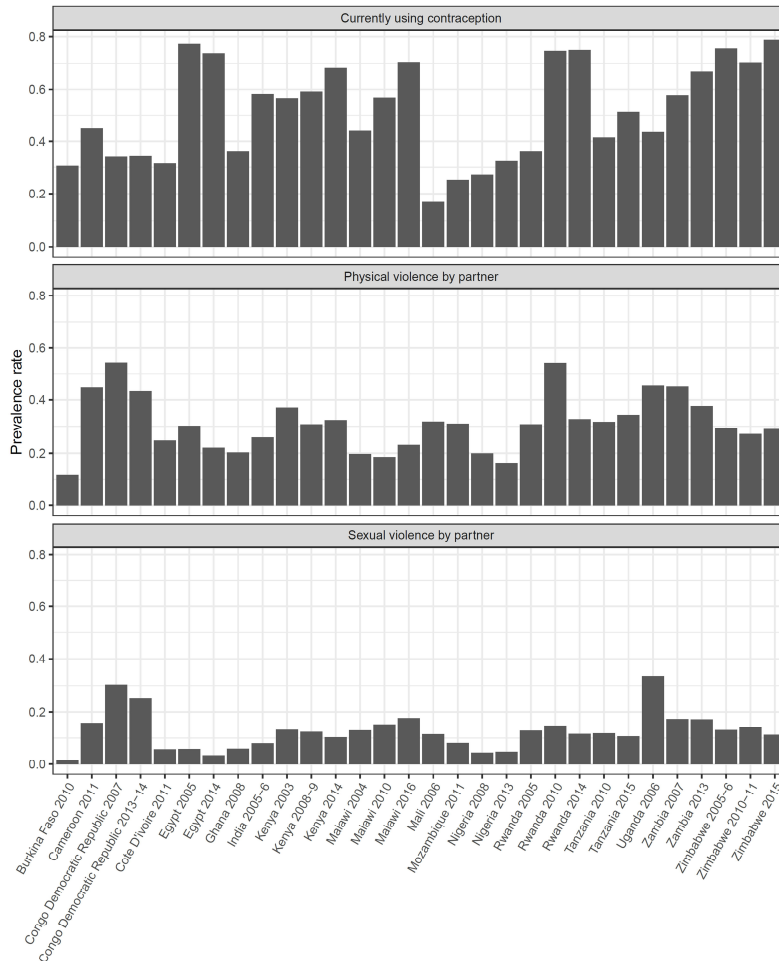
Notes: a. Summary statistics are calculated based on women respondents of domestic violence module in DHS.
Data source: UN Women – Global Database on Violence Against Women; Demographic and Health Survey Program.

We next examine how intimate partner violence is related to contraceptive use with logit regression models for each DHS sample controlling all individual-level covariates. Figure 2 plots the coefficients with 95% confidence intervals by sample and type of intimate partner violence. For physical violence, the relationship is positive and statistically significant (p <.05) among the samples from the Democratic Republic of Congo (2013–2014), Egypt (2005), Kenya (2014), Malawi (2004), Nigeria (2013), and Tanzania (2015). Results from Egypt (2014) show a negative and statistically significant relationship. The samples with positive and statistically significant relationship for sexual violence are more rare and include Burkina Faso (2010), India (2005–2006), Rwanda (2005), and Zimbabwe (2010–2011), and there is no sample with a negative and statistically significant relationship. In sum, our association analysis shows that the relationship between intimate partner violence, both physical and sexual, and contraceptive use tends to be positive but relatively weak in most countries.

Figure 2:   **Association between IPV and contraceptive use by country and year**
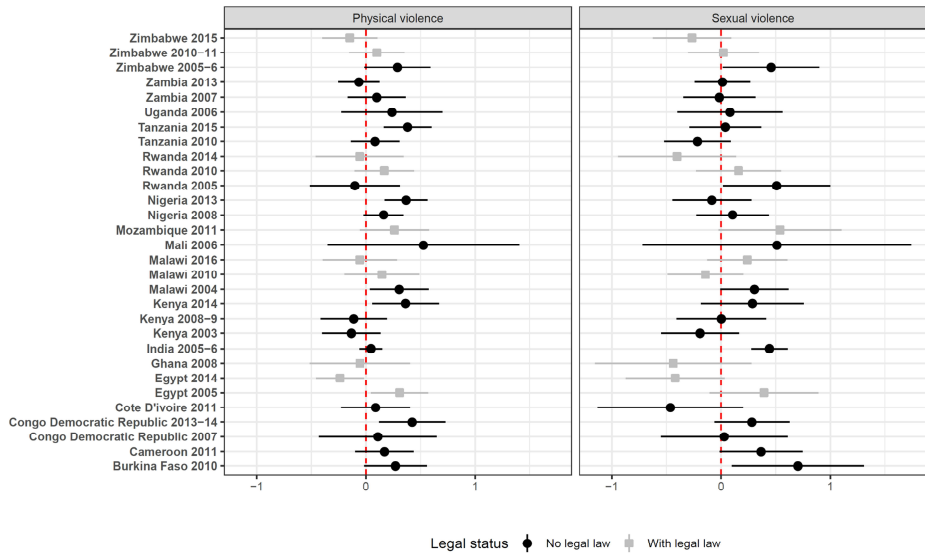
Data source: UN Women – Global Database on Violence Against Women; Demographic and Health Survey Program.

4.2 Intimate partner violence and contraceptive use

The previous analyses give us a first crude glimpse of the association by controlling for individual covariates within each country. In this section we turn to our main findings resulting from the multilevel modeling strategy applying the inverse probability weighting technique. We also conduct a series of robustness checks to test the consistency of our results.

Table 5 presents the main results. Both individual and national covariates are controlled in all models. Model 1a estimates the impact of physical violence on contraceptive use and finds that experiencing physical violence increases the probability of contraceptive use by about 19.8% ($e^{0.181} - 1$). As reported in Model 1b, women who experienced sexual violence were 16.5% ($e^{0.153} - 1$) more likely to use any method of contraception than women with no experience of sexual violence. Both coefficient estimates are statistically significant at a p-value of .05. Additional tests included stratifying the sample by urban and rural status, and results were consistent with the main analysis (Appendix Table A-3).

Table 5: **Multi-level Logit with IPW of contraceptive use on physical and sexual violence and contextual factors**

	Multi-level logit model with IPW	
	Physical violence	Sexual violence
	Model 1a	Model 1b
Variables		
Individual-level		
Physical violence	0.181*	
	(0.047)	
Sexual violence		0.153*
		(0.069)
Control variables		
Nation-level covariates	Yes	Yes
Individual covariates[1]	Yes	Yes
Constant	−3.311	−2.879
	(4.046)	(4.112)
Variance component		
Intercept	1.193	1.159
	(1.906)	(1.821)
Observations	93,194	93,194
Number of countries/regions	20	20

Notes: [a] Robust standard errors in parentheses; b. *** p<01, ** p<0.01, * p<0.05, † p<0.1.
[b] Models include 16 different countries and 4 Indian regions.

Although the IPW method based on propensity scores reduces the selection bias, it is still possible that women's contraceptive use might lead to a higher risk of intimate partner violence. We take two approaches to dealing with this issue. First, we use an instrumental variable approach to examine the effect of intimate partner violence. We instrument individual experience of physical or sexual violence with the community prevalence rate of physical or sexual violence. The effect of intimate partner violence can be estimated consistently and free from asymptotic bias from omitted variables, with the assumption that the community prevalence rate of IPV influences contraceptive use only through women's experiences of intimate partner violence conditional on the covariates in the model. To address the concerns regarding the validity of our instrumental variable, we control for a large set of variables in the IV estimation. First, the community prevalence rate of IPV may be correlated with factors that influence contraceptive use. These factors may include women's attitudes towards intimate partner violence, women's decision-making power in the household, and wanting more children in the future. To address this concern we control for these variables in the estimation. Second, it is possible that macro contexts that affect the community prevalence rate of IPV influence contraceptive use. Such macro contexts may include economic development, the level of women's empowerment, and the divorce rate. Thus, we include a large set of macro variables, which are documented in detail in the Data, Measures, and Methods section.

Although the exclusion restriction assumption is not testable, we argue that after controlling for various contextual and individual characteristics (especially women's attitude towards intimate partner violence), the community prevalence of IPV may not influence individuals' contraceptive use directly. The first stage analysis (Appendix A-4) shows strong correlations between community prevalence rates and individual experiences controlling for both individual and national covariates. The results from the IV approach, presented in Table 6, show statistically significant and positive coefficient estimates, consistent with the results from the IPW approach.[9]

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[9] It should be noted that our IV coefficient estimates are larger than the estimates in the multilevel analysis. One possibility is that the IV method presents results of local average treatment effects (LATE) and may lead to a larger coefficient estimate, especially when population subgroups are heterogeneous in the effect of intimate partner violence. In our case, the IV estimate is the effect of intimate partner violence only for the population whose choice of the treatment was affected by the instrument (those women experiencing intimate partner violence in communities with a high prevalence rate of intimate partner violence who would not have otherwise experienced it). Another possibility is that our instrumental variable in this analysis is invalid. That is, community prevalence rates of intimate partner violence may influence contraceptive use through other channels than women's experiences of intimate partner violence. Hence, we conduct further robustness checks in the following section.

Table 6: **IV estimates of contraceptive use on physical and sexual violence and contextual factors (with community-level IPV prevalence as instrument)**

Variables	Physical violence Model 2a	Sexual violence Model 2b
Individual-level		
Physical violence	0.592***	
	(0.103)	
Sexual violence		0.775***
		(0.181)
Control variables		
Nation-level covariates	Yes	Yes
Individual covariates[1]	Yes	Yes
Constant	15.868***	17.020***
	(3.112)	(2.976)
First-stage results		
Community prevalence of physical violence	0.295***	
	(0.011)	
Community prevalence of sexual violence		0.281***
		(0.016)
Cragg-Donald Wald F-statistic	803.206	668.124
Observations	93,194	93,194
Number of countries/regions	20	20

Notes: [a] Robust standard errors in parentheses; [b] *** p<0.001, ** p<0.01, * p<0.05, † p<0.1.
b Models include 16 different countries and 4 Indian regions.

Table 7: **Multilevel logit models with IPW of contraceptive use on physical and sexual violence and contextual factors: Subsample of women desiring the same or more children than husbands/partners**

Variables	Physical violence Model 3a	Sexual violence Model 3b
Individual-level		
Physical violence	0.132*	
	(0.052)	
Sexual violence		0.119
		(0.088)
Control variables		
Nation-level covariates	Yes	Yes
Individual covariates[1]	Yes	Yes
Constant	−4.153*	−3.702[†]
	(1.926)	(1.960)
Variance component		
Intercept	0.633[†]	0.625[†]
	(0.351)	(0.363)
Observations	58,083	58,083
Number of countries/regions	20	20

Notes: [a] Robust standard errors in parentheses; [b] *** p<01, ** p<0.01, * p<0.05, † p<0.1.
b Models include 16 different countries and 4 Indian regions.

To further test the robustness of our findings we take a second approach to addressing the possibility of reverse direction by examining two possible channels through which family planning adoption may influence intimate partner violence. The first channel is that women's contraceptive use may increase the risk of intimate partner violence if their husbands or partners desire more children. We create a subsample that only includes women whose husband/partner desires the same or less children than them, and replicate the main analysis. If we still find significant results in this subsample it is possible that the confounding explanation of women going against their husband's desire for more children does not drive our main results. Table 7 presents the results from the subsample analysis. For physical violence, the coefficient from the subgroup analysis is consistent with the results with IPW and statistically significant. In terms of sexual violence, the estimate from the subgroup analysis is still positive but no longer statistically significant.

Another possible channel is that husbands' opposition or lack of consent to contraception might lead to marital discord, physical abuse, and violence. For instance, Randolph et al. (2007) argue that contraceptive use may reduce the quality of male partners' sexual experience and hence lead to a higher risk of intimate partner violence. Consequently, we examine the relationship between IPV and different types of contraceptive use, distinguishing female/covert methods of contraception from male/overt methods. If we find a significant relationship between intimate partner violence and female/covert contraceptive use we may reduce the risk that our main results are driven by this explanation. Table 8 presents the coefficient estimates with multinomial logit models with IPW. For physical violence, both models (4a and 5a) show that both female/male and cover/overt contraception increases when women experience physical violence from partners. Similarly, for sexual violence, results based on female/male and cover/overt contraception (Models 4b and 5b) show that sexual violence experiences increase both female and male contraception. This evidence is consistent with our main results.

Table 8: **Multinomial logit models with IPW of contraceptive use on physical and sexual violence and contextual factors, by type of contraception**

Panel A: Female and male contraception

Variables	Physical violence Model 4a		Sexual violence Model 4b	
	Female method vs. not using	Male method vs. not using	Female method vs. not using	Male method vs. not using
Individual-level				
Physical violence	0.199***	0.138***		
	(0.021)	(0.032)		
Sexual violence			0.140***	0.209***
			(0.040)	(0.059)
Control variables				
Nation-level covariates	Yes	Yes	Yes	Yes
Individual covariates[1]	Yes	Yes	Yes	Yes
Country/region dummies	Yes	Yes	Yes	Yes
Constant	32.706***	−16.220	33.952***	−18.630[†]
	(5.316)	(10.399)	(5.111)	(10.012)
Observations	93,194	93,194	93,194	93,194
Number of countries/regions	20	20	20	20

Panel B: Covert and overt contraception

Variables	Physical violence Model 5a		Sexual violence Model 5b	
	Covert methods vs. not using	Overt methods vs. not using	Covert methods vs. not using	Overt methods vs. not using
Individual-level				
Physical violence	0.217***	0.144**		
	(0.023)	(0.023)		
Sexual violence			0.154***	0.151***
			(0.044)	(0.043)
Control variables				
Nation-level covariates	Yes	Yes	Yes	Yes
Individual covariates[1]	Yes	Yes	Yes	Yes
Country/region dummies	Yes	Yes	Yes	Yes
Constant	52.098***	11.705[†]	53.251***	12.722*
	(6.182)	(6.039)	(5.940)	(5.813)
Observations	93,194	93,194	93,194	93,194
Number of countries/regions	20	20	20	20

Notes: [a] Robust standard errors in parentheses; b. *** p<01, ** p<0.01, * p<0.05, † p<0.1.
[b] Models include 16 different countries and 4 Indian regions.

4.3 How does the relationship depend on national legal and female empowerment contexts?

Models 6a and 6b in Table 9 present the IPW-based estimates by adding the cross-level interactions between the nation-level contextual factors and intimate partner violence. We find differences by type of violence in the way that the national context moderates the main relationship. As reported in Model 6a, the results indicate that the coefficient of physical violence decreases by 0.076 ($e^{-.079} - 1$) with the existence of legal

regulation of domestic violence (legal regulation score = 1) and by 0.146 ($e^{-0.158} - 1$) with the existence of legal regulation of domestic violence and of specific types of family violence (legal regulation score = 2). The coefficient estimate is statistically significant at a *p*-value of 0.1. Although the coefficient estimate of the interaction term between physical violence and female empowerment is still negative, the magnitude (−0.01) is relatively small and not statistically significant. Model 6b presents the results for sexual violence, revealing negative and statistically significant interaction terms. In other words, in contexts of national action against domestic violence and high levels of female empowerment, the magnitude of the positive relationship between sexual violence and contraceptive use decreases. We present the predicted probabilities of contraceptive use in Figure 3 by type of intimate partner violence and type of national context based on Table 9.

**Table 9:** **Multi-level logit models with IPW of contraceptive use with cross-level interactions**

	Physical violence Model 6a	Sexual violence Model 6b
Variables		
Individual-level		
Physical violence	0.244***	
	(0.104)	
Sexual violence		0.593*
		(0.243)
Nation-level		
Legal regulation index	0.208*	0.207*
	(0.092)	(0.098)
Female empowerment score	0.068†	0.071*
	(0.035)	(0.036)
Cross-level interactions		
Physical Violence* Legal Regulation Index	−0.079†	
	(0.040)	
Physical Violence*Female Empowerment Score	−0.001	
	(0.007)	
Sexual Violence* Legal Regulation Index		−0.115*
		(0.056)
Sexual Violence*Female Empowerment Score		−0.030†
		(0.017)
Control variables		
Nation-level covariates	Yes	Yes
Individual covariates[1]	Yes	Yes
Constant	−3.297	−2.919
	(4.092)	(4.123)
Variance component		
Intercept	1.193	1.159
	(1.906)	(1.821)
Observations	93,194	93,194
Number of countries/regions	20	20

Notes: [a] Robust standard errors in parentheses; b. *** p<01, ** p<0.01, * p<0.05, † p<0.1.
[b] Models include 16 different countries and 4 Indian regions.

Figure 3: **Predicted probabilities of using contraception by IPV experiences and national context**

Panel A: Legal regulation
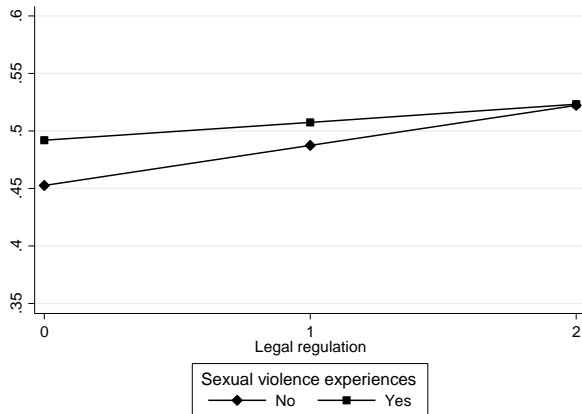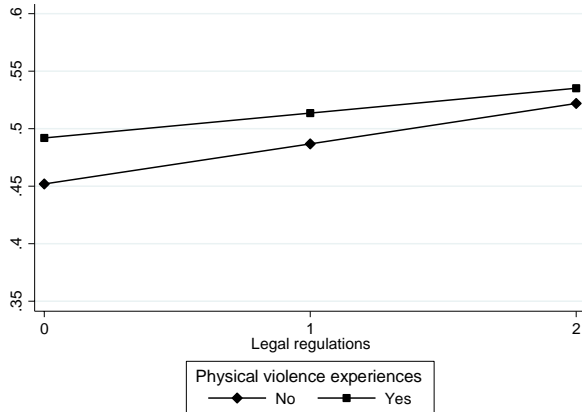
Figure 3:   (Continued)

Panel B: Female empowerment

Physical violence experiences
No   Yes

Sexual violence experiences
No   Yes
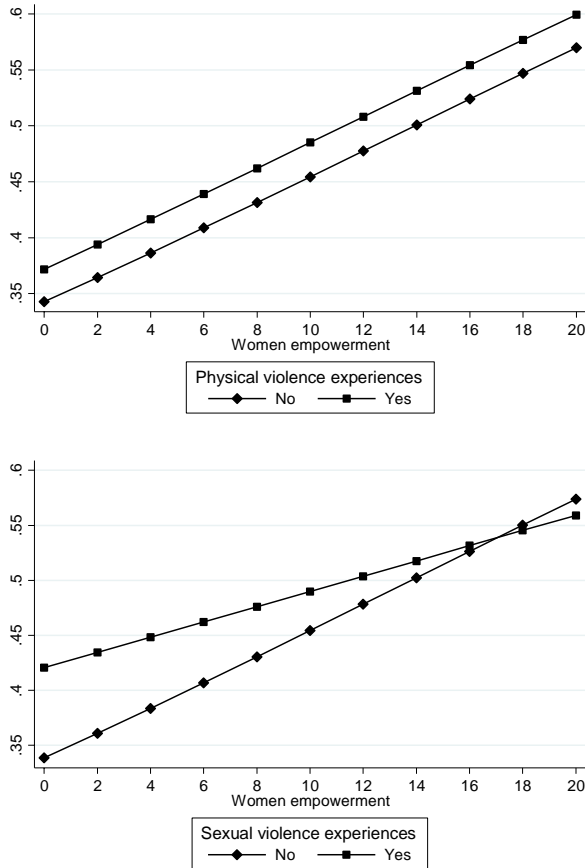
Note: Predicted probabilities are calculated based on Models 6a and 6b in Table 7. Plots represent the marginal effects of cross-level interaction terms.

In sum, our combined results from IPW-adjusted regression analysis suggest that experiences of IPV are associated with an increase in the probability of using contraception. When we explore the role of the national context we find that the presence of legal regulations against domestic violence decreases the magnitude of the positive relationship between both physical and sexual violence and contraceptive use,

and that a higher level of female empowerment decreases the magnitude of the positive relationship between sexual violence and contraceptive use.

4.4 Robustness check

Our analysis supports for the fertility preference explanation. In other words, it is likely that experiences of IPV increase contraceptive use by having a negative impact on women's feelings and attitudes towards future childbearing, thus increasing their use of contraception (Alio et al. 2009). An additional step of the analysis explores this explanation. We directly examine whether intimate partner violence shapes women's fertility preferences by conducting multi-level regression analyses with our dependent variable defined as whether the respondent wants any more children. Models 7a and 7b in Table 10 present the coefficient estimates of multilevel logit models with controlling covariates. Women who experienced either physical or sexual violence in the past year are 19.2% ($e^{0.176} - 1$) or 11.4% ($e^{0.108} - 1$) more likely to say they do not want any more children in the future. These results suggest that experiences of IPV negatively impact women's attitudes towards future childbearing, which is consistent with the explanation that highlights fertility preferences as the driving mechanism for the relationship between IPV and contraceptive use.

Table 10:   Multi-level logit models of not wanting more children on physical and sexual violence

Variables	Physical violence Model 7a	Sexual violence Model 7b
Individual-level		
Physical violence	0.176***	
	(0.039)	
Sexual violence		0.108*
		(0.042)
Control variables		
Nation-level covariates	Yes	Yes
Individual covariates	Yes	Yes
Constant	−10.762***	−11.003***
	(2.191)	(2.220)
Covariance		
Intercept	2.448*	2.527*
	(1.014)	(1.033)
Observations	93,194	93,194
Number of countries/regions	20	20

Notes: [a] Robust standard errors in parentheses; b. *** p<01, ** p<0.01, * p<0.05, † p<0.1.
[b] Models include 16 different countries and 4 Indian regions.

5. Discussion and conclusion

Research that investigates the relationship between contraceptive use and intimate partner violence has yielded conflicting results that emphasize different explanations for the association between IPV and contraceptive use. Our study explores whether social and legal national contextual features moderate the relationship between contraceptive use and IPV across 17 developing countries.

Results from our cross-national pooled sample using stabilized inverse probability weights based on propensity scores reveal a positive relationship between physical and sexual violence from intimate partners and contraceptive use. These results are robust to the inclusion of important covariates that are associated with contraceptive uptake, such as parity, women's education and occupation, religion, urban residence, household wealth, and women's decision-making power. A series of additional analyses, including an instrumental variable approach and two potential channels of reverse direction, suggest the general robustness of our empirical evidence, which points to a positive relationship between IPV and contraceptive use. Furthermore, an exploration of the role of national contextual factors reveals that the presence of national regulations against IPV and a higher level of female empowerment decrease the magnitude of the positive relationship between IPV and contraceptive use, thus highlighting that context affects how the relationship works.

Our findings speak directly to the existing debate regarding the complex relationship between contraceptive use and intimate partner violence. First, we find a positive relationship between use of contraception and experiences of physical and sexual violence across multiple years and national contexts, which improves on association analyses constrained to just one temporal or spatial setting (O'Hara et al. 2013, Dalal, Andrews, and Dawad 2012, Pallitto and O'Campo 2004). Previous studies that found a positive association between contraception and experiences of violence, argued that IPV negatively impacts women's attitudes and feelings towards their spousal relationship and/or home environment, thus decreasing any desire for future childbearing (Alio et al. 2009; Dalal, Andrews, and Dawad 2012; Salazar, Valladares, and Hogberg 2011). While these studies did not explicitly test for this mechanism, we indeed find evidence of a negative impact of IPV on women's future fertility preferences and expectations, lending empirical support to the framework and theoretical argument.

Nonetheless, our most important contribution lies in the examination of the role played by the broader national context. We find that these broad societal factors moderate the relationship between experiences of IPV and the use of contraception. Our analysis shows that the magnitude of the positive relationship between IPV and contraceptive use decreases in a context of legal and social protections for women.

Therefore, the role played by the national context has implications for our understanding of the disconcerting presence of contrary and opposite findings in the literature. As we reveal in this study, elements of women's social and legal contexts moderate the relationship between contraception and domestic violence, potentially even changing its direction. It is thus fundamental that we take these features into account when we study the relationship between the two phenomena.

This study is not without limitations. First, despite the DHS's careful planning around the sensitive nature of the domestic violence module, we are aware that there might be self-censoring/reporting bias of intimate partner violence. Moreover, research suggests that in contexts where experiences of IPV are widespread the stigma attached to it is reduced, which can lead to biased underreporting (Stephenson et al. 2008). Our national- and individual-level controls for whether women view intimate partner violence as acceptable are subject to the same limitations. Research has found that contextual information significantly impacts how women answer these questions (Tsai et al. 2017), as does survey design (Yount et al. 2011). In particular, DHS questions have been found to underrepresent the proportions of people who condone IPV (Schuler, Lenzi, and Yount 2011). Second, an aggregate measure of decision-making power does not entirely capture the nuances of the environment or the culture regarding women's autonomy, gender equity, and other gender-normative roles. Future studies should incorporate more national measures of women's status to understand this relationship. Third, there is likely an important variation in the quality and enforcement of national laws against domestic violence across countries, which is not reflected in our data. Similarly, the existence of national legal protections does not necessarily reflect the actual protection of women. Even though research has stated that the mere existence of such regulations has an effect on women's health (World Bank 2016) and can affect communities' perception of violence against women (Minnesota Advocacy for Human Rights 2003), future research should incorporate better measures of the enforcement, effectiveness, and general quality of such protective laws. Fourth, it is possible that the national legal context – the existence of laws against domestic violence – is not randomly distributed across countries, but is associated with other elements that affect women's contraceptive uptake. We could not find a valid instrument to control for this source of endogeneity and acknowledge this limitation. Finally, while we recognize that India is a highly heterogeneous country in its social contexts and fertility behaviors, we opted against a state-level analysis because our key independent variable, legal regulation of domestic violence, was measured at the national level. We instead identified four regions based on geographic patterns of fertility decline and contraceptive use, which, while not perfect, capture some of that heterogeneity.

Despite these limitations, our work sheds light on the way in which the legal and social national contexts moderate the relationship between IPV and contraceptive use.

We call for researchers to consider how elements of women's broader social contexts condition their contraceptive behavior when suffering domestic violence. Finally, our study's implications for policy highlight the importance of going beyond individual-based interventions to likewise take action at the national or broader societal level, in which certain features such as formal legal regulations and other factors that lead to women's empowerment also influence and change abused women's feelings, attitudes, and behaviors regarding family planning.

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Appendix: Supplement results of propensity scores

Table A-1: Balance test after inverse probability weighting: Physical violence as treatment

	Standardized difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Nation-level covariates				
Legal Regulation Index	0.11	0.01	1.02	1.00
Female Empowerment Score	0.07	0.01	0.91	1.01
Percentage of women viewing IPV as acceptable	0.24	0.00	1.22	1.02
Divorce rate (%)	0.19	0.01	1.20	1.00
Women's share in national parliament (%)	0.16	0.01	1.45	1.00
Percentage of women with pregnancy termination (%)	0.17	−0.01	1.19	1.00
Average women's years in education	0.00	−0.01	0.76	1.01
Average partner/husband's years in education	−0.02	0.01	1.07	0.98
Percentage of urban women (%)	−0.06	−0.02	0.95	1.00
Percentage of women with non-agricultural and non-domestic jobs (%)	−0.19	0.01	0.80	1.01
Logged GDP per capita	−0.11	0.00	0.83	1.02
Individual-level covariates				
Decision-making (reference: Women only)				
Joint	−0.09	0.00	0.97	1.00
Partner	−0.02	−0.01	0.99	1.00
Other	−0.02	0.00	0.88	1.01
Accepting IPV as justified (reference: Do not agree)				
Agree	0.34	−0.01	1.04	1.00
Don't know	−0.02	0.00	0.84	0.98
Age at the first marriage	−0.23	0.01	0.76	1.00
Religion (reference: Muslin/Islam)				
Christian	−0.06	0.02	0.89	1.04
Catholic	0.10	0.01	1.25	1.02
Protestant	0.17	0.00	1.41	1.01
Other	0.02	−0.02	1.01	0.99
Women's educational level (reference: No education)				
Primary	0.24	0.01	1.17	1.01
Secondary	−0.10	0.00	0.93	1.00
Higher	−0.29	0.01	0.34	1.02

Table A-1:   (Continued)

	Standardized difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Children under 5 years old in the household	0.10	0.01	0.99	0.96
Marital status	−0.12	−0.01	1.43	1.02
Age	0.04	0.02	0.92	1.00
Age squared	0.02	0.02	0.94	1.03
Urban residence	−0.09	0.00	0.96	1.00
Children living	0.22	0.01	1.00	0.87
Number of sons	0.17	0.01	1.07	0.93
Not wanting more children	0.10	0.00	1.04	1.00
Ever experienced pregnancy termination	0.17	0.01	1.33	1.01
Wealth ((ref: Poorest)				
Poor	0.11	−0.01	1.19	0.99
Middle	0.07	0.00	1.12	1.00
Rich	0.01	0.01	1.01	1.01
Richest	−0.27	0.00	0.71	1.01
Women's job category (reference: Not currently working)				
Professional, technical, or managerial	−0.14	0.01	0.53	1.04
Clerical or sales	−0.03	0.01	0.95	1.01
Agricultural	0.20	0.00	1.21	1.00
Household, domestic, and services	0.05	0.00	1.27	1.02
Skilled and unskilled manual	0.03	0.00	1.12	1.00
Other	0.01	0.00	1.31	0.89
Women's job category (reference: Not currently working)				
Professional, technical, or managerial	−0.18	0.00	0.63	1.01
Clerical or sales	−0.11	0.00	0.80	0.99
Agricultural	0.11	0.00	1.08	1.00
Household, domestic, and services	0.00	0.00	0.99	1.01
Skilled and unskilled manual	0.09	0.00	1.09	1.00
Other	0.01	0.00	1.18	0.98
Husband/partner's educational level (reference: No education)				
Primary	0.21	0.00	1.19	1.00
Secondary	0.00	0.00	1.00	1.00
Higher	−0.26	0.00	0.51	1.01
Observations	**93,194**			

Table A-2:   Balance test after inverse probability weighting: Sexual violence as treatment

	Standardized difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Nation-level covariates				
Legal Regulation Index	0.12	0.01	1.02	1.00
Female Empowerment Score	0.05	0.00	1.05	1.00
Percentage of women viewing IPV as acceptable	0.17	0.00	1.67	1.01
Divorce rate (%)	0.33	0.01	1.21	1.00
Women's share in national parliament (%)	0.13	0.01	1.17	1.02
Percentage of women with pregnancy termination (%)	0.04	0.00	1.18	1.00
Average women's years in education	−0.03	0.00	0.64	1.00
Average partner/husband's years in education	−0.03	0.00	0.96	0.99
Percentage of urban women (%)	−0.24	0.00	1.09	1.01
Percentage of women with non-agricultural and non-domestic jobs (%)	−0.20	−0.01	0.71	0.99
Logged GDP per capita	−0.31	−0.01	0.91	1.00
Individual-level Covariates				
Decision-making (reference: Women only)				
Joint	−0.19	0.02	0.91	1.01
Partner	0.04	−0.02	1.02	0.98
Other	0.03	−0.01	1.21	0.95
Accepting IPV as justified (reference: Do not agree)				
Agree	0.33	0.01	1.01	1.00
Don't know	−0.04	−0.02	0.69	0.86
Age at first marriage	−0.24	0.02	0.77	1.10
Religion (reference: Muslin/Islam)	−0.02	0.01	0.95	1.01
Christian	0.11	0.01	1.28	1.02
Catholic	0.23	0.01	1.51	1.01
Protestant	0.00	−0.01	1.00	1.00
Other	−0.02	0.01	0.95	1.01
Women's educational level (reference: No education)				
Primary	0.32	−0.01	1.17	0.99
Secondary	−0.11	0.01	0.92	1.00
Higher	−0.25	0.01	0.36	1.02
Children under 5 years old in the household	0.09	0.01	0.99	1.02
Marital status	−0.12	−0.01	1.42	1.04

Table A-2: (Continued)

	Standardized difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Women's educational level (reference: No education)				
Age	−0.06	0.01	0.95	1.02
Urban residence	−0.06	0.01	0.92	1.02
Children alive	−0.18	−0.01	0.89	1.00
Number of sons	0.14	0.01	1.03	0.95
Not wanting more children	0.03	−0.01	1.01	1.00
Ever experienced pregnancy termination	0.15	0.01	1.25	1.01
Wealth (reference: Poorest)				
Poor	0.11	−0.01	1.20	0.99
Middle	0.09	0.00	1.14	1.00
Rich	−0.03	0.01	0.96	1.01
Richest	−0.27	0.00	0.69	1.00
Women's job category (reference: Not currently working)				
Professional, technical, or managerial	−0.10	0.00	0.63	0.99
Clerical or sales	−0.03	−0.02	0.95	0.96
Agricultural	0.26	0.00	1.23	1.00
Household, domestic, and services	0.04	0.00	1.21	1.01
Skilled and unskilled manual	0.02	−0.02	1.06	0.94
Other	0.03	0.00	1.83	0.91
Women's job category (reference: Not currently working)				
Professional, technical, or managerial	−0.16	0.00	0.66	1.00
Clerical or sales	−0.08	0.00	0.84	1.00
Agricultural	0.16	0.00	1.10	1.00
Household, domestic, and services	−0.05	0.00	0.86	1.01
Skilled and unskilled manual	0.01	0.00	1.01	1.00
Other	0.03	−0.02	1.57	0.76
Husband/partner educational level (reference: No education)				
Primary	0.24	0.01	1.19	1.01
Secondary	0.00	0.00	1.00	1.00
Higher	−0.22	0.01	0.55	1.02
Observations	**93,194**			

Figure A-1:   Comparison of propensity scores of women with/without experiences of IPV

Panel A: Physical violence
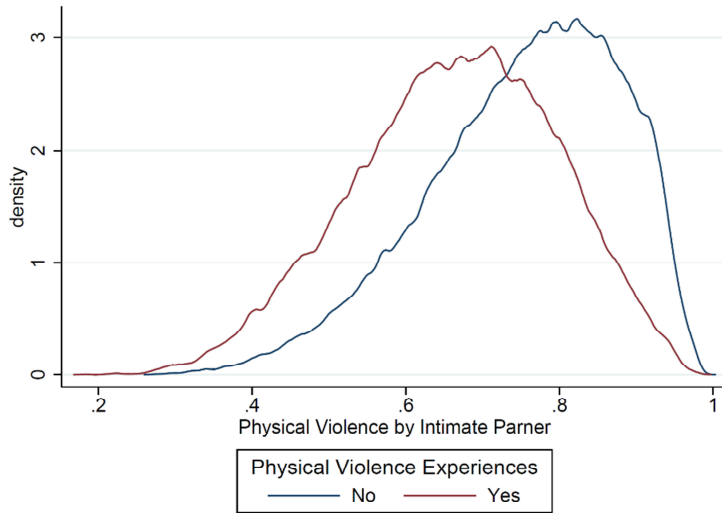
Panel B: Sexual violence
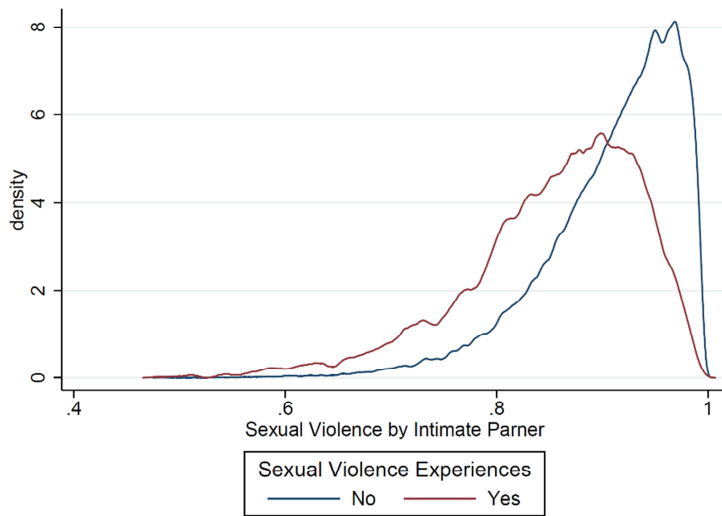
Table A-3: Multi-level logit with IPW of contraceptive use on physical and sexual violence and contextual factors by rural and urban area

	Urban area		Rural area	
	Physical violence Model 1a	Sexual violence Model 1a	Physical violence Model 1b	Sexual violence Model 1b
Variables				
Individual-level				
Physical violence	0.154**		0.202***	
	(0.058)		(0.052)	
Sexual violence		0.087		0.195**
		(0.115)		(0.061)
Control variables				
Nation-level covariates	Yes	Yes	Yes	Yes
Individual covariates[1]	Yes	Yes	Yes	Yes
Constant	–3.802***	–3.186*	–4.561*	–4.594*
	(1.146)	(1.314)	(2.243)	(2.212)
Variance component				
Intercept	0.338*	0.384+	0.922	0.848
	(0.165)	(0.201)	(0.676)	(0.596)
Observations	36,172	36,172	57,022	57,022
Number of countries/regions	20	20	20	20

Notes: [a] Robust standard errors in parentheses; b. *** p<01, ** p<0.01, * p<0.05, † p<0.1.
[b] Models include 16 different countries and 4 Indian regions.

Table A-4: First-stage regression results for IV regressions

	Physical violence	Sexual violence
Variables		
Community prevalence of physical violence	0.295***	
	(0.011)	
Community prevalence of sexual violence		0.281***
		(0.016)
Legal Regulation Index	–0.015	–0.001
	(0.013)	(0.008)
Female Empowerment Score	0.000	0.002
	(0.004)	(0.003)
Percentage of women viewing IPV as acceptable	–0.210	0.000
	(0.203)	(0.129)
Divorce rate (%)	–0.002	–0.001
	(0.005)	(0.003)

Table A-4: (Continued)

Variables	Physical violence	Sexual violence
Women's share in national parliament (%)	0.001	0.000
	(0.003)	(0.002)
Percentage of women with pregnancy termination (%)	−0.935	0.054
	(1.629)	(1.018)
Average women's years in education	−0.025	−0.006
	(0.021)	(0.013)
Average partner/husband's years in education	−0.031	−0.009
	(0.061)	(0.036)
Percentage of urban women (%)	−0.008	0.014
	(0.164)	(0.105)
Percentage of women with non-agricultural and non-domestic jobs (%)	0.109	−0.015
	(0.273)	(0.172)
Logged GDP per capita	−0.015	0.002
	(0.056)	(0.035)
Decision-making (reference: Women only)		
Joint	−0.004	−0.001
	(0.004)	(0.004)
Partner	−0.003	−0.005
	(0.005)	(0.004)
Other	0.005	−0.009
	(0.013)	(0.008)
Not wanting more children	−0.002	−0.004
	(0.004)	(0.004)
Ever experienced pregnancy termination	0.001	0.001
	(0.004)	(0.003)
Accepting IPV as justified (reference: Agree)		
Do not agree	−0.004	0.000
	(0.003)	(0.003)
Don't know	−0.005	−0.012
	(0.016)	(0.013)
Age at first marriage	0.000	0.000
	(0.001)	(0.000)

Table A-4:   (Continued)

Variables	Physical violence	Sexual violence
Religion (reference: Muslin/Islam)		
Christian	0.001	0.003
	(0.008)	(0.006)
Catholic	−0.005	0.002
	(0.008)	(0.007)
Protestant	−0.005	0.003
	(0.009)	(0.007)
Other	−0.006	−0.001
	(0.007)	(0.007)
Women's educational level (reference: No education)		
Primary	0.002	−0.005
	(0.005)	(0.004)
Secondary	0.002	−0.002
	(0.006)	(0.005)
Higher	0.010	−0.004
	(0.012)	(0.010)
Number of children under 5 in the household	0.003	0.001
	(0.002)	(0.002)
Married	0.001	−0.004
	(0.006)	(0.005)
Age	0.000	−0.001
	(0.002)	(0.002)
Age squared	0.000	0.000
	(0.000)	(0.000)
Urban residence	−0.005	−0.002
	(0.005)	(0.004)
Number of living children	0.000	0.001
	(0.002)	(0.001)
Number of sons	−0.001	0.000
	(0.002)	(0.002)

Table A-4: (Continued)

Variables	Physical violence	Sexual violence
Wealth Index (reference: Poorest)		
Poor	0.001	−0.001
	(0.005)	(0.004)
Middle	0.004	0.001
	(0.005)	(0.004)
Rich	0.008	0.003
	(0.006)	(0.005)
Richest	0.010	0.004
	(0.008)	(0.006)
Women's job category (reference: Not currently working)		
Professional, technical, or managerial	0.003	−0.005
	(0.011)	(0.009)
Clerical or sales	−0.002	−0.008[†]
	(0.006)	(0.005)
Agricultural	0.001	−0.005
	(0.005)	(0.004)
Household, domestic, and services	0.002	−0.004
	(0.009)	(0.006)
Skilled and unskilled manual	−0.000	−0.009[†]
	(0.007)	(0.005)
Other	−0.030	−0.011
	(0.035)	(0.023)
Husband/partner's job category (reference: Not currently working)		
Professional, technical, or managerial	−0.005	−0.003
	(0.014)	(0.009)
Clerical or sales	−0.005	−0.002
	(0.013)	(0.009)
Agricultural	−0.006	−0.003
	(0.012)	(0.008)
Household, domestic, and services	−0.001	0.000
	(0.013)	(0.009)
Skilled and unskilled manual	−0.003	−0.002
	(0.012)	(0.008)
Other	−0.011	−0.021
	(0.027)	(0.013)

Table A-4:   (Continued)

Variables	Physical violence	Sexual violence
Husband/partner's educational level (reference: No education)		
Primary	0.004	0.004
	(0.006)	(0.005)
Secondary	0.005	0.003
	(0.006)	(0.005)
Higher	0.003	0.003
	(0.009)	(0.008)
Constant	0.945	0.116
	(0.971)	(0.604)
Observations	93,194	93,194

Note: a. Robust standard errors in parentheses*** p<0.001, ** p<0.01, * p<0.05, † p<0.1;
b. The models are adjusted by the inverse probability treatment weights.