

Intimate Partner Violence Against Women in Kenya

By
Elizabeth Owiti

Research Paper 365

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Abstract

Intimate partner violence is the most prevalent type of violence that women experience and it has significant public health and socioeconomic impacts. Studies of these impacts are limited in developing countries like Kenya, yet for accurate policy advice and resource allocation there is a need for precise empirical data on the determinants of spousal violence. Using the Demographic and Health Survey Data 2003, 2008/09 and 2014, this study used both linear probability and logit models to establish the determinants of various types of spousal violence. In addition, a multivariate probit analysis was carried out to account for potential unobserved heterogeneity among the factors affecting women's exposure to violence. The bivariate relationship between spousal income variation and attitudes towards violence as well as actual exposure to violence showed that 48% (95% CI = 43%–54%) of women earning more than their husband/partner reports acceptance of spousal violence, 41% (95% CI = 36%–47%) report having experienced physical partner violence, while 76% (95% CI = 71%–81%) report having experienced at least one form of partner violence in their lifetime. In terms of multivariate analysis, the absolute level of women's education did not protect them against partner violence, but increased vulnerability, while differential education shows a different picture with women who are more educated than their partners reporting less violence compared to their counterparts with the same or lower education. Conversely, women earning more than their husbands were more vulnerable to partner violence than their counterparts earning less or the same. This showed that compared to the education gap, the income gap threatened the position of men much more. This is in line with the socialization, cultural beliefs and norms of most of the Kenyan patriarchal communities in which the men are expected to be the household heads and financial providers. When this position is challenged, men use violence as an instrument of control. In addition, earning less and having a lower level of education significantly increased women's risk of exposure to physical violence, while intra-household income and education equality was a significant barrier to physical violence, control violence and exposure to at least one type of partner violence. In conclusion, to reduce physical, control or any other type of violence, the government needs to promote girl child education and income parity among men and women with the same level of education. Additionally, reproductive health education and interventions aimed at delaying or eliminating early pregnancies should be strengthened as this will not only improve women's health, but also act as a barrier to spousal violence against women. The government should integrate maternal health services and gender-based violence interventions to support regular screening and treatment of women victims of violence.

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1. Introduction

Intimate partner violence is not only a fundamental violation of human rights but is also a major global economic and public health problem (Duvvury et al., 2013; Garcia-Moreno et al., 2006). It refers to any act or behaviour within an intimate relationship that causes or is likely to cause physical, psychological or sexual harm to those in the relationship and includes aggression, intimidation, sexual coercion, controlling behaviours and psychological abuse, and threats to commit such acts (Krug et al., 2002; Ahmad and Jaleel, 2015).

Kenya is generally a patriarchal society where in most communities and religions, the sociocultural beliefs and practices promote male supremacy; men are considered the pillars of family and society, as powerful, intelligent and the main decision makers within society. These beliefs fuel gender inequality and gender violence as is partially confirmed by the proportion of women who approve spousal violence and those who have actually experienced it. The prevalence of partner violence remains high in Kenya with evidence showing that between 2003 and 2014, 64% (95%, CI = 63%, 65%) of women reported experiencing at least one form of violence within their lifetime. Control behaviors remained the most prevalent form of violence with 61% (95%, CI = 60%, 63%) of women report having experienced it, followed by physical violence at 36% (95%, CI = 35%, 37%), emotional violence at 27% (95%, CI = 26%, 28%), and sexual violence at 13% (95%, CI = 12%, 14%). This is presented in Table A4.

Table 1: Women's exposure to partner violence

	Physical violence	Sexual violence	Emotional violence	Control violence	Any type of IPV
Yes	0.358*** (0.007) (0.345 - 0.371)	0.133*** (0.005) (0.124 - 0.142)	0.268*** (0.006) (0.256 - 0.280)	0.613*** (0.009) (0.595 - 0.631)	0.639*** (0.007) (0.625 - 0.654)
Observations	11,954	11,964	11,971	8,042	11,973

Robust standard errors and confidence intervals in parentheses

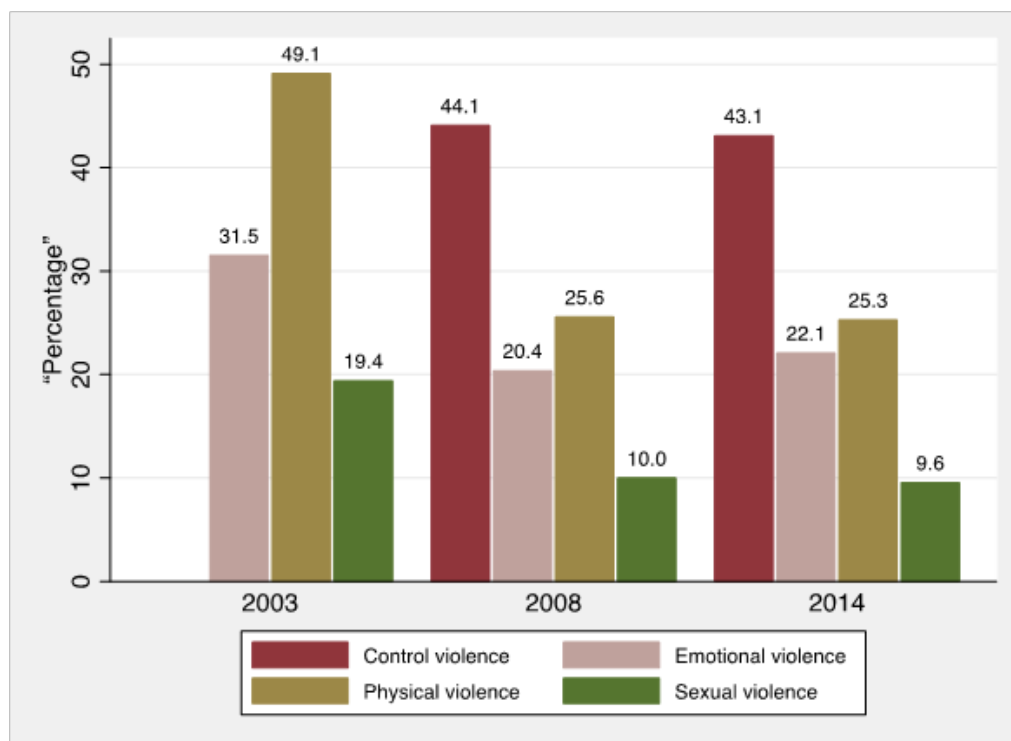
*** p<0.01, ** p<0.05, * p<0.1

The Kenya Demographic and Health Survey (2014) shows that 42% of women approved of wife beating while 45% of the women had experienced physical violence. Furthermore, one in every two women in Kenya aged 15–49 had experienced either physical or sexual violence between 2003 and 2014, there is also a reduction in the percentage of women reporting physical and sexual violence as shown in Figure 1. This study seeks to examine the prevalence and determinants of partner violence against women in Kenya.

Background

Intimate partner violence (IPV) affects women globally and is widely prevalent in all settings among all socioeconomic, religious and cultural groups (Duvvury et al., 2013; Krug et al., 2002; WHO, 2013). Furthermore, it is the most prevalent form of violence perpetrated by men against women and its prevalence varies within and between settings ranging from 13% to 71% (Krug et al., 2002; Garcia-Moreno et al., 2006; Duvvury et al., 2013). Although partner violence occurs among all women, it is more prevalent in younger women of childbearing age (Cannell et al., 2015). Women also perpetrate IPV against men; however, the prevalence of spousal violence against men is higher among men who have sex with men and those who abuse alcohol and drugs (Krug et al., 2002; Garcia-Moreno et al., 2006).

Figure 1: Partner violence trends



Domestic and intimate partner violence against women (IPVAW) is deeply rooted and culturally accepted in most African communities and religions (Jewkes, 2002; Uthman et al., 2009). In fact, in some patriarchal communities the socialization process is such that girls and women are brainwashed to believe that IPV is a normal way of enforcing discipline and is the prerogative of men (Uthman et al., 2009). Hence, if a woman is deemed to have violated or challenged the culturally approved male authority or dominance, then the male spouse or boyfriend is permitted or encouraged to use force or violence to discipline her. In some settings, women are socialized to believe that IPV is

an expression of love. Some studies show that some women in sub-Saharan Africa (SSA) have not only accepted male dominance and the exertion of power through violence, but are more likely to justify IPVAV as a response to women's transgressing gender norms than the men (Uthman et al., 2009; Doku and Asante, 2015). Spousal violence against women therefore is a product of social context with complex and multidimensional risk factors (WHO, 2010; Jewkes, 2002).

Acknowledging the burden of violence against women and children, the Government of Kenya has ratified several international and regional conventions, treaties and human rights standards as well as programmes of action that seek to prevent or eradicate gender inequality and discrimination, including the Convention on the Elimination of All forms of Discrimination against women (CEDAW) and the Maputo Protocol (United Nations, 1979). Furthermore, the government has enacted several laws and regulations to prevent and control various forms of violence against women and children. These include the Sexual Offences Act, 2006 (Republic of Kenya, 2006), the Children's Act 2001, the Penal Code of 2009, Articles 10, 28, 29, 43 and 45 of the Constitution of Kenya of 2010 (Republic of Kenya, 2010), the Prohibition of Female Genital Mutilation Act, 2011, and the National Gender and Equality Commission Act (2011), the Protection Against Domestic Violence Act (PADV) 2015 (Republic of Kenya, 2015) and the National Guidelines on Management of Sexual Violence in Kenya (Republic of Kenya, 2014). However, there is a disconnect between women's experience of intimate partner violence and the existence of legislation. In spite of the existence of policies and institutions mandated to protect women's rights and deal with gender violence, the instances of partner violence against women remain high in Kenya. This study endeavours to bridge this gap by assessing socioeconomic determinants of partner violence against women, providing clear policy recommendations, and disseminating the findings in various meetings to policy makers, academia, implementers and women as well as men to open up discussion of this sensitive issue.

Problem statement

Spousal violence has both short-term and long-term socioeconomic and health consequences, not only for the individual women but also the entire society (Doku and Asante, 2015). Female victims of partner violence tend to experience higher physical, mental and reproductive health problems (Heise and Garcia-Moreno, 2002), and their households incur higher health care and non-health care costs, including psychosocial counselling. Partner violence also reduces women's productivity, resulting in unstable employment and lower income, hence lower general societal welfare and economic growth. In addition, it also affects their children's health and educational outcomes (Duvvury et al., 2013).

Despite all this, the violent experiences of women are still viewed as detached events taking place in the private spheres of relationship conflict, beyond the realm of other family members, legal authorities, policy makers and healthcare providers (WHO, 2013). In several developing countries, Kenya included, spousal violence is shrouded in secrecy and a culture of silence. It is invisible due to shame and stigma, fear of the husband's retaliation, protection of family prestige and privacy, love and affection for

the husband as well as levels of cultural acceptance (Awang and Hariharan, 2011; Ahmad and Jaleel, 2015). In some cases women are blamed for having triggered the spousal violence through their anti-cultural behaviours or lack of discipline/respect for their spouses (Garcia-Moreno et al., 2006; Doku and Asante, 2015).

Women in Kenya continue to experience partner violence, in fact there has been an increase in media coverage of extreme partner physical violence with spouses dismembering or maiming their wives resulting in permanent disability or mortality. In spite of the existence of policies and institutions mandated to protect women's rights and deal with gender violence, the instances of partner violence against women remain high. There is a need for an in-depth understanding of socioeconomic factors that increase women's risk to partner violence, given the limited economic literature in this area. In addition, there is a need for academic and policy discourse on the issue of partner violence and continuous sensitization of policy makers and other institutions to the risks and dangers of spousal violence. This study seeks to determine the prevalence and determinants of spousal violence against women in Kenya, and to disseminate the findings to encourage discourse.

Objectives

The overall aim of this study is to describe the extent and magnitude of intimate partner violence against women in Kenya and estimate its association with health and socioeconomic outcomes using three sets of Kenya Demographic and Health Survey Data. The specific objectives include to:

- i. estimate the prevalence of various types of intimate partner violence in Kenya between 2003 and 2014; and
- ii. identify the determinants of various types of intimate partner violence in Kenya.
- iii. estimate the correlation between the various types of intimate partner violence

Justification

It is generally agreed that education, good health, freedom from violence and oppression are necessary for human development (Beegle et al., 2016). However, more than 40% of Kenyan women experience violence and oppression within their households (KNBS and Macro, 2014). To improve gender parity, Kenya's human development index, economic growth and move towards achieving the Sustainable Development Goals (SDGs), the government needs to put in place effective measures to prevent and mitigate the impact of spousal violence. Economic studies of spousal violence are limited in Kenya; the few studies available use limited data and lumps spousal violence into one variable resulting in a binary intervention variable (Lawoko et al., 2007).

The Government of Kenya has ratified several international and regional conventions, treaties and human rights standards as well as programmes of action that seek to prevent or eradicate gender inequality. It has established several institutions including a Gender Commission and Human Rights Commission, however, the disconnect between Kenyan women's experience of partner violence and the existing legislative and institutional

framework persists. This implies that a concerted multidisciplinary effort is still needed in this area. This study proposes to bridge this gap by providing clear policy guidelines and disseminating the findings in various fora to policy makers, academia, implementers and women as well as men to open up policy discussion. The goal of this study is to identify the prevalence and determinants of partner violence between 2003 and 2014 using nationally representative Demographic and Health Survey (DHS) data on women of reproductive age in Kenya.

This study differs from previous studies in that it defines four types of violence: physical, controlling behaviours, and sexual and emotional abuse. This distinction will enable us to better characterize the extent and nature of spousal violence in Kenya. Furthermore, we use three demographic surveys, the 2003, 2008/09 and 2014 data sets, thereby expanding the population studied and improving the generalizability of the study findings.

The dissemination of this study's findings is expected to increase policy discussions on the impacts of spousal violence on women and the economy as a whole among academia and implementers. This is not only expected to increase the probability of disclosure and reporting of spousal violence by the women victims but also to improve policy makers, community members and employers understanding of the impacts of spousal violence. The findings of this study will also inform and enhance further research in economic studies on partner violence, starting with the identification of data gaps, recommendations on how these gaps can be addressed and clear policy advice to the relevant institutions in the country. Furthermore, they'll also guide advocacy efforts, inform policy formulation and public sector resource allocation and distribution towards mitigating the impact and reducing the incidences of spousal violence, not only in Kenya but in the entire SSA region. Finally, it would guide the design of preventive and response interventions.

Limitations of the study

Although Kenya Demographic and Health Survey data are the best data available, it only provides information for cooperation outcomes, not for internal and external threat points. For example, women are never asked any questions about the extent to which they can accommodate partner violence before seeking divorce, the time of divorce, or factors that led to the separation and divorce. In addition, the KDHS data only capture risk factors such as income inequality, education inequality and wealth status, among other things, but not any information about the activities of each spouse under the non-cooperative equilibrium. More data need to be captured to improve the economic analysis of partner violence.

2. Literature review

Introduction

There are various forms of violence that women experience in their intimate relationships and several attempts have been made to clearly define and classify them, specifically to guide the data collection process and response mechanisms. Sexual violence can be defined in this study as any sexual act, an attempt to obtain a sexual act, unwanted sexual comments or advances, or acts to traffic, or otherwise directed against a person's sexuality using coercion, by an intimate partner (Krug et al., 2002). Furthermore harmful cultural practices such as early forced marriage and female genital mutilation/cutting (FGM/C) are also forms of sexual violence. In addition, female genital mutilation is not only associated with all types of partner violence but lack of adherence to this cultural practice may cause partner violence amongst women in communities who practice it (Salihu et al., 2012).

Emotional violence also referred to as psychological violence, is aggression or verbal and non-verbal communication abuse intended to mentally harm, exert fear and exhibit a domineering attitude over another person (Breiding et al., 2015; World Health Organization, 2013). It is well documented in dysfunctional relationships and in many instances it plays second fiddle to physical and sexual partner violence. It manifests itself in a multiplicity of forms including verbal abuse, threats to violence, engendering fear, spousal intimidation and humiliation, destruction of property, enforcement of social isolation and/or exclusion, financial deprivation, neglect and engaging other sexual partners, among other things (Jewkes, 2010). It may result in psychological trauma including anxiety, chronic depression or post-traumatic stress disorder (Breiding et al., 2015), and in most cases may not be perceived as such given its covert and manipulative nature. It normally precedes other forms of violence, increases fear, helplessness, acceptance and vulnerability to other forms of violence as well as increasing the Stockholm syndrome wherein the abused women becomes sympathetic and emotionally attached to the abusive spouse due to emotional blackmail.

Physical violence is the intentional use of physical force with the potential of causing death, disability, injury, or harm (Breiding et al., 2015). A less studied form of intimate partner violence is economic violence (Adams et al., 2008). It is a mechanism used by an abusive spouse to maintain power and control in the relationship (Park, 2015). Economic violence involves the behaviours that control a person's ability to acquire, use, and maintain economic resources, thus threatening his or her economic security and potential for self-sufficiency (Adams et al., 2008: 564). Intimate partner violence

is also known as interpersonal violence, domestic violence, spousal violence, wife battering or wife beating and is often not an isolated act of violence but a pattern of abusive behaviour and control.

Theoretical literature

The welfare of women within a household characterized by domestic violence is influenced by a set of complex social and economic interactions. In recognition of this, a diverse body of theoretical frameworks has been developed in various disciplines to explain the risk factors, causes and consequences of spousal violence (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997; Dutton and Nicholls, 2005; Tauchen et al., 1991). These theories are broadly classified as family violence theories and feminist theories (Anderson, 1997). Family violence theories argue that socio-demographic indicators of structural inequality influence probabilities of domestic violence while feminist theory explains spousal violence as an expression of masculinity, power and male dominance over women in society (Anderson, 1997; Dutton and Nicholls, 2005; Thomson et al., 2015).

The economic theories of spousal violence mainly resort under the marriage market and household bargaining models (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997). These theories encompass both family and feminist theories of violence. Economists argue that violence serves expressive and instrumental purposes to the abuser. In the expressive role, the abuser uses violence to release stress and hence derives direct utility, while as an instrument, the abuser uses violence to control the behaviour of the spouse deriving indirect utility through a woman's modified behaviour (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997; Lundberg and Pollak, 1994).

Economists use two underlying theoretical frameworks, unitary and non-unitary household models, to explain intra-household allocations and their impact on the well-being of household members (Alderman et al., 1995). The unitary models assume that households have common preference utility functions, that is, both spouses are assumed to exhibit altruistic behaviour (Becker, 1974; 1981). In other words, household decisions can be made through a cooperative process in which spouses pool their resources and jointly allocate and share the public goods, hence the cooperative bargaining models leading to Pareto efficient outcomes. These models have failed a number of empirical tests (Thomas, 1990). This has resulted in a growing consensus in the literature that household behaviour cannot be modelled as if members have stable preferences.

Several alternative non-unitary models have been developed seeking to incorporate intra-household dynamics and social realities addressing the gaps in the unitary model, however, there is no consensus on the best way to model household behaviour. Furthermore, household bargaining models may differ depending on the social, economic and cultural contexts in which they are used (Chiappori et al., 2006). The alternative household models include, firstly, collective models, which were developed by Chiappori (1988) and restructured by Chiappori et al. (2006). They recognize individual preferences within the households and allow individual bargaining power to influence household choices and outcomes. These models assume that irrespective of how decisions are made the outcomes are Pareto efficient.

Second are the non-cooperative models. In these models, each individual or spouse earns and expends resources according to own preferences and budget constraints without pooling of income and a Pareto outcome is not guaranteed, (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997).

Third are the cooperative bargaining models. These are similar to collective models and assume that household bargaining outcomes are Pareto efficient. However, they clearly define the process through which optimal outcomes are attained (McElroy and Horney, 1981; Manser and Brown, 1980). These models acknowledge that intra-household interactions are characterized by both cooperation and conflict and that cooperation occurs as long as it makes members better off than non-cooperation. However, individuals' bargaining power is influenced by the strength of their fallback position or "external threat point" or "divorce" where the threat point is dissolving the marriage. McElroy and Horney, 1981, Manser and Brown, 1980; Pollak and Lundberg, 2003 argue that with many small decisions in a marriage divorce may not be a credible threat point as individuals may remain in a marriage but withdraw to their separate spheres. This withdrawal option constitutes the "internal threat point" and spouses will still bargain over jointly shared goods as well as activities.

A few economic theories modelling intra-household bargaining have modelled domestic violence. Tauchen et al. (1991) extend the non-cooperative model of the family to include violence against women and argues that violence serves two roles: it is a source of direct gratification and an instrument to control the victim's behaviour. It enters the husband's utility function directly and indirectly as a function of the wife's behaviour. The men "purchase" violence from women through income transfers, hence the level of resource controlled by each partner, and whether the reservation utility constraint is binding determines the level of violence in equilibrium. Farmer and Tiefenthaler (1997) studied the determinants of violence using a non-cooperative model and found that women's income and financial support outside marriage increases their threat point and hence decreases the level of violence in intact families. In addition to the socioeconomic status acting as fallback position and determining the threat point (Farmer and Tiefenthaler, 1996), when modelling women who return to their abusive relationships after seeking help, it was found that battered women who are not ready for divorce use shelters and other support services to signal to their abusive partners their ability to leave and this changes their threat point. Intra-household allocations within families characterized by partner violence, child abuse and demand for marital counselling result in Pareto inefficient outcomes, (Lundberg and Pollak, 1996) and are best modelled using a non-cooperative model (Farmer and Tiefenthaler, 1997).

In addition to economic theories there is the ecological model, which was first used by Bronfenbrenner (1977) to study human development. Since then, it has been modified and used to study violence against women (Carlson, 1984; WHO, 2010). The ecological model shows how multiple causes of violence interact with various risk factors operating at the individual, relationship, community and societal level (See Table A1). Furthermore, it considers the role of large structural systems that shapes IPVAV. Individual factors include biological and personal characteristics (e.g., age, education and employment), relationship factors characteristics of intimate partners and family members (e.g., age, education and socioeconomic status). Community factors include peer group of family

members, social support, job availability, and the availability of and access to community services. Lastly, societal factors include the larger, macro-level factors such as gender inequality, religious or cultural belief systems, societal norms and economic or social policies that create or sustain gaps and tensions between groups of people (WHO, 2010).

These theoretical studies acknowledge the complexity and multidimensionality of risk factors that predispose women to partner violence and ensure that the individual characteristics of women, their spouse, household and even societal characteristics are included in the theoretical framework (Krug et al., 2002; Jewkes, 2002; WHO, 2010). Spousal violence is a generally systematic and chronic behaviour. However, most women who experience marital violence remain in the relationship with their abusers. Economic and emotional dependence, cultural attitude towards divorced women, preservation of family dignity and protection of children are some of the reasons that explain this reluctance to leave. Economic theory has a limited explanation of the revolving door phenomenon of abused women frequently leaving and returning to abusive marriages (DeRiviere, 2008). However, theoretical and empirical studies, including Attachment Theory, Traumatic Bonding Theory and Stockholm syndrome among others, have been used to explain this behaviour (Finkel, 2007; Doku and Asante, 2015).

This study follows Tauchen et al. (1991), assuming that within marriage there is some level of cooperation, altruistic behaviour and also non-cooperation when bargaining fails. It also assumes the existence of a dominant male who may use violence as a source of gratification and/or as an instrument to control the wife's behaviour.

Empirical literature

In general, the empirical literature shows that the major factors necessary for spousal violence is the unequal position of women in the relationship and society, as well as the normative use of violence in conflicts (Jewkes, 2002).

The determinants of intimate partner violence

Empirical literature highlights various demographic, cultural, socioeconomic, personal background and individual characteristics as factors that influence the risk of partner violence (Krug et al., 2002). Household poverty level and number of children are positively associated with intimate partner violence (Jewkes, 2002; Krug et al., 2002; Ahmad and Jaleel, 2015). Theoretically, IPV is mediated through stress and poverty increases stress. In addition, IPV is not only an expression of male dominance and power over women, but also of male vulnerability stemming from social expectations of manhood that are unattainable due to poverty (Jewkes, 2002). In addition, transgression of gender norms and failure to fulfil cultural stereotypes of a good woman as well as a culture of male dominance and alcohol intake increase a woman's vulnerability to IPV (Anderson, 1997; Jewkes, 2002; Thomson et al., 2015). Financial independence, female empowerment and level of education are ambiguously associated with IPV (Jewkes, 2002), with some literature showing that a higher socioeconomic status cushions women against violence (Krug et al., 2002; Kishor, 2015; Ahmad and Jaleel, 2015) while others

show that it increases the risk. Pregnancy and delivery of an unplanned child, an inability to have a child, and the preference to give birth to a boy are additional partner violence risk factors. Finally, there is also the intergenerational cycling of violence, where male children exposed to domestic violence are more likely to perpetrate violence as adults, while female children are more likely to tolerate and accept spousal abuse as adults (Jewkes, 2002; Krug et al., 2002).

The effects of intimate partner violence

Hidden costs. Spousal violence against women mostly occurs in private home settings, perpetrated by people that the women are often emotionally involved with and economically dependent on (Krug et al., 2002; Ahmad and Jaleel, 2015). Due to this and the culture of most African communities in which violence against women is accepted and family or household conflicts are resolved culturally, spousal violence is normally surrounded by a culture of silence, fear, stigma and helplessness (Ahmad and Jaleel, 2015). Most women do not disclose or report the occurrences of IPV, or seek out the necessary social, legal or health care services (Krug et al., 2002; Ahmad and Jaleel, 2015). This hidden nature makes IPV data collection difficult, resulting in an underestimation of its prevalence and impact. However, population-based studies have revealed that IPV is widespread with varying prevalence across all nations and social classes (Krug et al., 2002). The negative impacts of IPV include physical, reproductive and emotional health, a reduction in investment in human capital development, and direct and indirect microeconomic and macroeconomic costs.

Health impacts. Public health and economic studies have shown that intimate partner violence leads to significant short- and long-term physical, mental and sexual health problems not only for the women but also their children (Heise and Garcia-Moreno, 2002; Krug et al., 2002; Duvvury et al., 2013). Globally, 30% of partnered women have experienced physical and/or sexual violence while in the World Health Organization (WHO) African region, the proportion is 37%. In addition, 38% of all murders of women are perpetrated by an intimate partner and 42% of women physically and/or sexually abused are injured in the process (WHO, 2013).

Microeconomic impacts. The impact of intimate partner violence is directly felt at the individual and household levels. It may results in injuries and emotional distress, leading to an increased demand for health care and social and legal services by the victims, resulting in both direct and indirect individual and household costs. The direct costs include the cost of seeking health care, social and legal services. The indirect costs include lost time due to injuries, a reduction in productivity and incomes, unstable employment, low intra-household bargaining power and a reduction in investment in current and future human and social capital as well as the generation of other forms of violence both now and in the future (Duvvury et al., 2013)

Macroeconomic impacts. Women make up over half of the world's population and yet their contribution to measured economic activities, growth and well-being is below their potential, which has major macroeconomic consequences (OECD, 2008; Elborgh-Woytek et al., 2013). Since partner violence significantly depreciates women's health capital, thereby decreasing the healthy time available for productive work and reducing their productivity, it contributes to the low economic contribution of women.

3. Methodology

Introduction

Regression analysis models in which the outcome variable is qualitative in nature taking two or more discrete values are increasingly being used in medical and social sciences (Gujarati, 2003; Cramer, 2003). These models are referred to as probability models as their objective is to find out the probability of an event of interest occurring (Green, 2003; Cameron and Trivedi, 2005). They differ from regression models in which the outcome is quantitative and the regression objective is to estimate the expected value of the outcome given the independent variables (Gujarati, 2003; Cramer, 2003). The four most commonly used binary outcome regression models are the linear probability model, which is a least squares model, the logit and probit models as well as complementary log-log models (Madala, 2002; Gujarati, 2003; Cameron and Trivedi, 2005; Cameron and Trivedi, 2010).

The linear probability model was the first approach used to fit regression models with a qualitative outcome variable, however, its limitations such as inability to constrain the conditional probability of the outcome variable to lie within the admissible range (0,1), the general lower values of R^2 , and the non-normality and heteroscedasticity of the error term, has limited its use and hence the development of other models (Johnston and DiNardo, 1997; Gujarati, 2003; Cameron and Trivedi, 2005; Green, 2003). The logit and probit are the most commonly used models in econometric applications for these types of studies (Green, 2003). They have similar characteristics except that the former has more weight at the tails (Johnston and DiNardo, 1997; Hosmer and Lemeshow, 2000; Green, 2003). However, due to its flexibility, mathematically easy to use function (Green, 2003) as well as meaningful clinical interpretations, the logit model has become the standard model of analysis in studies with qualitative response variables (Hosmer and Lemeshow, 2000). However, given the advantages of the linear probability model (LPM) (Angrist and Pischke, 2008), its application is gaining ground again as an analytical tool in economics.

Logit and linear probability models assume that exposure to different types of partner violence are mutually exclusive and collectively exhaustive. However, a literature review shows that a single woman may experience two or more types of partner violence simultaneously and there may also be correlation between experiencing the various types of spousal violence. This study uses linear probability, logit and multivariate probit (MVP) models. The multivariate probit model was also used to capture the influence

of the explanatory variables on exposure to different types of partner violence, assess correlations between unobserved disturbances, and the relationships between the various types of partner violence. The study used mvprobit models with 100 draws and a robust cluster to assess the correlations and test their significance. The mvprobit is a Stata user written command (Cappellari and Jenkins, 2003).

Model presentation and assumptions

This study has five binary outcome variables (V_j), which are the four major types of intimate partner violence and their interaction, that is, controlling behaviours, physical violence, emotional violence, sexual violence and their interaction. The outcome variables (V_j), are binary indicators where $j=1,2,\dots,5$ and each treatment variable takes the value of “1” if a woman has experienced a given type of IPV and “0” otherwise. For example, if a woman has experienced physical violence perpetrated either by a current or previous husband then $(V_j)=1$, otherwise $(V_j)=0$.

$$\begin{aligned} (V_1) &= \text{Physical Violence}; & (V_2) &= \text{Sexual Violence}; & (V_3) &= \text{Emotional Violence} \\ (V_4) &= \text{Controlling behaviour} & (V_5) &= \text{All the four types of violence} \end{aligned}$$

To estimate the logistic regression of the various types of IPV (V_{ij}) as a function of the vector of covariates (X),

$$(V_{ij}) = f(X_i; \beta) \tag{1}$$

and

$$(V_{ij}) = \begin{cases} 1, & \text{if a woman has been exposed to a given type of IPV} \\ 0, & \text{if she has not been exposed to any type of IPV} \end{cases}$$

The probability of experiencing IPV for each woman, given the covariates is given by:

$$(V_{ij} = 1|X) = \Lambda(X' \beta) = \frac{e^{X' \beta}}{1 + e^{X' \beta}} \tag{2}$$

Model estimation

The estimation of all binary choice models, except the linear probability model, is based on maximum likelihood methods (Cameron and Trivedi, 2005; Cameron and Trivedi, 2010; Green, 2003). This method yields the values of unknown parameters that

maximize the probability of obtaining the observed set of data (Hosmer and Lemeshow, 2000). To use this method, we modify the likelihood ratio function assuming the observations are independent:

$$l(\beta) = \prod_{i=1}^n \{[\pi(x_i)]^{V_{ij}} [(1 - \pi(x_i))^{1-V_{ij}}]\} \quad (3)$$

where $\pi(x_i) = \Lambda(X' \beta)$

Empirical estimation strategy

To estimate the risk factors for the various types of partner violence and their association with women's socioeconomic outcomes, our baseline model of analysis using the linear probability and logit models is:

$$V_{ij} = \alpha + \beta X'_{ij} + \varepsilon_{ij} \quad (4)$$

where the dependent variable V_{ij} represents a measure of woman i 's exposure to j type of violence, X_{ij} are the independent variables, which includes the woman's, husband/partner's and household characteristics. These include age gap, age at first birth of a child, level of education, decision making, religion, number of births in the last five years, attitude towards violence, witnessing the father beating mother as a child, household wealth, fertility preference (wanting the last child), income variation and education gap between the spouses. Using a linear probability model, in all estimates the predicted values of exposure to violence lie within the expected range [0,1]. We use robust standard errors, which adjusts for clustering at the primary sampling unit level given the nature of the survey data, and report both coefficients and marginal effects of the logit models. Our interest is in the estimation of β the coefficient of the independent variables.

Dependent variable. The dependent variable of interest is exposure to intimate partner violence. Violence is classified into four main categories: controlling behaviours, and physical, sexual and emotional violence, however, their interaction should also be considered. This results in five binary explanatory variables, indicating whether or not a woman has ever experienced any of the various types of violence perpetrated by a current or former husband in the last 12 months preceding the interview, or in their lifetime. For each type of IPV, this study estimates the determinants

of current violence (experienced in the 12 months prior to the survey) and lifetime violence. If a woman answers no to all the questions about physical violence, emotional violence, sexual violence and controlling behaviours then each of the dependent variables will be “0”. If she answers yes to any of the types of violence then that dependent variable will take the value “1”. A series of multivariate linear probability and logit models have been estimated for each of the different types of IPV to establish the relative importance of the various factors in determining intimate partner violence.

Independent and control variables. A spousal education differential is determined, which was established using the variables respondent’s highest educational level and partner’s educational level. Both variables measured the current highest educational attainment of the individuals and were coded equally. The educational gap was calculated by deducting the wife’s education from the husband’s education. The spousal age gap was calculated by deducting the wife’s age from the husband’s age. Income inequality, was captured directly by KDHS using a survey question that asked women to indicate whether the money they earned was more than their husbands/partners earn, less than what they earn, or about the same. Age at first birth of a child, age at first marriage, the respondent’s and spouse’s highest educational achievement were also included, as well as other control variables such as wealth index, respondent witnessing father beating her mother, the woman’s attitude towards partner violence, a polygamous relationship, number of children born within the last five years, religion, decision-making variables generated using principal component analysis (PCA), having lost a child, and preference of the last child.

The household wealth index is a composite measure of socioeconomic status based on the data on household asset ownership, dwelling characteristics, water source, and toilet facility type, among other things, generated by the KDHS using principal component analysis (PCA) (Vyas and Kumaranayake, 2006). The KDHS included questions about who makes household decisions, whether it is the respondent on her own, both respondent and spouse, spouse alone or spouse and others or only other people. The response is either “yes” or “no”. For this study, these responses were classified into two groups: the wife was considered to make decisions if she was either making a decision alone or with others, if the spouse or spouse and others made decisions then she was coded as not making decision. Using the seven decision-making variables, the decision-making index with two components was developed using principal component analysis (Vyas and Kumaranayake, 2006).

Table 2: Variable definitions

Variable	Definition	Measurement
Dependent variables:	If respondent ever experienced any form of:	
1) Physical violence	1) Physical violence	0 = no; 1= yes
2) Sexual violence	2) Sexual violence	0 = no; 1= yes
3) Control violence	3) Control violence	0 = no; 1= yes
4) Emotional violence	4) Emotional violence	0 = no; 1= yes
5) Any type of partner violence	5) Any type of partner violence	
Independent variables:		
Age gap	The difference between the spouses and the wife's current age in years	Years
Age at first birth	Age of the respondent at first birth	Years
Age at first marriage	Age of the respondent at first marriage	Years
Education gap	The difference between the spouses and the wife's highest level of education	1 = Both have same education level 2 = Wife has lower education level 3 = Wife has higher education level
Income inequality	Respondent earns more than husband/partner	1 = Wife earns more 2 = Wife earns less 3 = Both earn same
Educational level	The highest education level attained by mother	0 = none 1 = primary 2 = secondary 3 = tertiary and college
Wealth index	The household wealth status	1 = poorest, 2 = poorer, 3 = middle 4 = richer, 5 = richest
Fertility preference	Wanted last child	0 = wanted later or no more 1 = wanted then
Children less than 5 years	Births in last five years	Number of children
Number of children dead	If respondent has ever lost a child	0 = no; 1= yes
Polygamy	Husband/spouse has other wives	0 = no; 1= yes
Parental violence	Respondent's father ever beat her mother	0 = no; 1= yes
Woman's attitude towards partner violence	Husband justified to beat wife	0 = no; 1= yes

continued next page

Table 2 Continued

Variable	Definition	Measurement
Independent variables:		
Decision making	Decision-making index developed using principle component analysis of 7 decision-making variables including: financial, household expenses, health care access and family visit decisions	Two continuous decision indices generated (PC-dec2 and PC-dec3)
Religion	Respondent's religion	1 = Christian (Catholic and Protestant) 2 = Muslim; 3 = none and other religion
Survey year	Year of survey	1= 2003; 2 = 2008/9 3 = 2014

Data

This study uses pooled, cross-sectional data from the three rounds of the KDHS collected in 2003, 2008/9 and 2014. The KDHS is a cross-sectional nationally representative household sample survey in which women aged 15 to 49 and men aged 15 to 54 were randomly selected from clusters throughout the country (KNBS and Macro, 2014). In 2003 and 2008/09 there were four hundred clusters, however, in 2014, the number of clusters was increased to 1,612. All three KDHS data sets include a female domestic violence module, however, the KDHS 2014 also included a male domestic violence module. In total, 47,718 women aged 15 to 49 were sampled during the three KDHSs, and of these, 17,853 were selected and interviewed for the domestic violence module. The surveys include data on the demographic and socioeconomic background of the women, reproductive health and use of family planning, maternal health care, child care and nutrition, marriage and sexual activity, knowledge of HIV and AIDS, and reports of domestic and intimate partner violence.

The KDHS data are the most nationally representative data capturing spousal violence modules in developing countries. It is randomly collected and confidentiality requirements are adhered to¹ (KNBS and Macro, 2014; Durevall and Lindskog, 2015b). To collect data on spousal violence, the KDHS 2014 used a modified and shortened Conflict Tactics Scale (Strauss, 1990). The specific questions were asked with reference to the current husband and the last husband for women currently married and those not currently married, respectively. Spousal violence was measured using the following set of questions and each of them had a binary “yes” or “no” response: Does/did your (last) husband/partner ever: (a) Push you, shake you, or throw something at you? (b) Slap you? (c) Twist your arm or pull your hair? (d) Punch you with his fist or with something that could hurt you? (e) Kick you or drag you or beat you up? (f) Try to choke you or burn you on purpose? (g) Threaten or attack you with a knife, gun, or other type of weapon? (h) Physically force you to have sexual intercourse even when you did not want to? and

(i) Force you to perform types of other sexual acts you did not want to? A “yes” response to one or more of questions (a) to (g) constitutes evidence of physical violence, while a “yes” response to items (h) or (i) constitutes evidence of sexual violence.

To measure the prevalence of emotional violence, a similar approach was used and women were asked the following questions: Does/did your (last) husband/partner ever: (a) Say or do something to humiliate you in front of others? (b) Threaten to hurt you or harm you or someone close to you? and (c) Insult you or make you feel bad about yourself? Any “yes” response implied experience of emotional violence. Finally, to measure the prevalence of spousal controlling behaviours, the married women were asked if their husband: (i) Is jealous or angry if she communicates with other men (ii) Frequently accuses her of being unfaithful (iii) Does not permit her to see her female friends (iv) Tries to limit her contact with her family (v) Insists on knowing where she is at all times and (vi) Does not trust her with any money. Any “yes” response implied experience of spousal controlling behaviour.

Measurement error. Although the KDHS gives the most comprehensive, randomly collected and nationally representative data on domestic violence, it has some limitations, including recall bias and failure to check back the questionnaires for every survey included in the analysis (Kishor, 2015). Coupled with this is the culture of silence, fear, stigma and helplessness, which may result in systematic under-reporting of incidences of partner violence (Krug et al., 2002; Ahmad and Jaleel, 2015). To minimize this error, the KDHS surveys employ several strategies when collecting the domestic violence module data. The eligible women are selected, informed consent is used, privacy is guaranteed during the interview, translators are avoided in interviews, and appropriate training is provided for the interviewers. Only one randomly selected woman in each household is interviewed about IPV, with no one else aware of the questions. Furthermore, the IPV module questions are asked only if privacy is guaranteed. These are expected to increase the woman’s level of comfort, trust and openness. The domestic violence modules are included towards the end of the interview allowing the interviewer and the woman to build rapport first. In addition, women were free to not respond to any of the questions during the interview.

Item non-response. In addition to measurement error, missing data is also a problem. It happens because of refusal to answer domestic violence questions or when the questions are not asked due to lack of privacy. The overall response rate in the KDHSs is very good, averaging 95%, while responses for the IPV module was higher than 98% and the missing observations on IPV are also very few (Ismayilova and El-Bassel, 2013; Durevall and Lindskog, 2015b). Furthermore, the KDHS data are also weighted to control for disproportionate sampling and non-response. At the same time, the KDHS weights also restore the representativeness of the sample distribution, ensuring that the sample distribution truly reflects the actual country’s population distribution.

Endogeneity problem. The differences in women's exposure to violence may be due to their individual and family characteristics, but also because of the socioeconomic characteristics of the villages/clusters in which they live. A cluster fixed-effects regression was carried out to control for unobserved cluster level heterogeneity. Furthermore, given the nature of the data, there is a possibility of endogeneity between women's exposure to intimate partner violence and their own socioeconomic characteristics. Fakir et al. (2016) show the endogeneity between IPV and autonomy's in Bangladesh. Although the study uses fixed effects analysis to control for cluster level heterogeneity, the outcomes reported are interpreted as correlation between partner violence and various factors and not causation.

Although under-reporting and item non-response may affect the accuracy of the analysis are given measures used in the KDHS data collection, it is clear that under-reporting and non-item response may not be a serious problem in the data. Furthermore, the KDHS remains the only nationally representative data that is commonly used in developing countries (Uthman et al., 2009; Bazargan-Hejazi et al., 2013).

4. Results

Descriptive statistics

The characteristics of the women studied and their households are shown in Table A2. For example, 41% of women sampled were aged between 15 and 24, 55% had primary level of education while only 8% had college and higher levels of education. Furthermore, close to 70% of the women earned less income compared to their spouse's level of income. The average age gap between the spouses is 7 years. In terms of decision-making and educational gap, 61% of women had the same educational level as their spouse, while 41% of the women reported being involved in making decisions about their own health care, large household expenditure and visits by relatives. Furthermore, 59% of the women are married, and 55% report accepting spousal violence under various circumstances.

Using survey analysis with a design-adjusted Rao-Scott F-statistic, the study assessed the association between the women's level of education and their attitudes towards violence as well as actual experience of violence. Table A3 shows a negative and significant association between attitudes towards violence and level of women's education. The majority of women reporting acceptance of partner violence have no formal education and this proportion changes as the women's level of education increases. For example, 73% of Kenyan women aged between 15 and 49 without any formal education accepts spousal violence with a 95% CI of 70%, 76%. However, only 20% of women with higher levels of education (95%, CI = 16%, 23%) accept violence compared to 45% with secondary education (95%, CI = 43%, 47%). The Rao-Scott F-statistic ($F_{(R-S, Pearson)} = 195.50, p < 0.000$) rejects the null hypothesis at $p < 1\%$, hence there is evidence of a bivariate association between women's level of education and acceptance of spousal violence.

In addition, there is a significant and negative association between women's level of education and actual experience of the different types of partner violence. However, unlike the relationship between level of education and attitude toward violence where the relationship is linear, women with primary education report experiencing violence more than any other category of women. From Table A3, 42% (95%, CI = 40%, 44%) of women with a primary level of education reports experiencing physical violence compared to 40% (95%, CI = 36%, 43%) with no formal education, 32% (95%, CI = 30%, 34%) with secondary education and 21% (95%, CI = 17%, 25%) with higher levels of education. The number of observation per type of violence varied due to missing

values. However, the control violence data were only captured during the 2008/09 and 2014 KDHS survey. The design-adjusted Rao-Scott F-statistic ($F_{(R-S, Pearson)} = 12.39, p < 0.000$) is significant at $P < 1\%$ hence we reject the null hypothesis and conclude that there is evidence of a bivariate association between women's level of education and exposure to physical violence. This trend is the same for the association between women's level of education and exposure to all types of violence.

The bivariate relationship between spousal income variation and attitudes towards violence as well as actual exposure to violence is presented in Table A3. It shows that 48% (95% CI = 43%–54%) of women earning more than their husband/partner reports acceptance of spousal violence, 41% (95% CI = 36%–47%) report having experienced physical partner violence, while 76% (95% CI = 71%–81%) report having experienced at least one form of partner violence in their lifetime. Looking at exposure to violence, compared to women earning less and the same as their partners, a larger proportion of women earning more income reports not only acceptance of violence but also actual exposure to violence.

Determinants of partner violence

We compare the association between different socioeconomic characteristics of women and their exposure to partner violence and present the results in Tables A4 to A7. We present three sets of models fitted for each type of partner violence: Model I presents the linear probability model (LPM) results, Model II, the linear fixed-effects model results and Model III, the logit average marginal effects results. The fixed-effects and average marginal results are interpreted as correlation and not causation. In addition, the marginal probabilities and average marginal effects of various interacted variables are presented in Tables A8 to A15.

Spousal violence and different age measures. The association between spousal age gap (husband older than wife) and exposure to partner violence is presented in Table A4. When the spousal age gap between spouses increases by one year, women are 0.8 percentage points less likely to report exposure to sexual violence. This effect is significant at a 5% level. When village-level endogeneity is controlled for, this percentage changes slightly to 0.9 percentage points and remains significant at the 5% level. At the same time, the average marginal effect on probability of exposure to physical violence, and sexual violence associated with one year difference in women's age at first birth, is a 4.3 percentage point and 5.2 percentage point increase, respectively. These effects are significant at a 1% level. Controlling for village-level effects, the average marginal effect of reporting physical violence is slightly lowered to 4.1, with the effect being significant at a 5% level, while the average marginal effects of reporting sexual violence reduces to 4.5 and remains significant at a 1% level. In addition, there is positive association between reporting exposure to control violence and spousal age gap as shown in linear probability and fixed-effects models. These effects are significant at the 10% level. However, the logit average marginal

effects model shows a 2 percentage points negative association, which is significant at a 5% level. Figures A1 and A2 present the margins and average marginal effects of education income inequality and education gap.

Spousal violence and women's level of education. The association between level of education and partner violence is presented in Table A5. A linear probability model shows that women with primary, secondary and higher education report an average 125%, 103% and 101% increased exposure to physical violence, respectively, than those without education after controlling for all independent variables. These effects are significant at a 1% level, 1% level and 5% level, respectively. When village-level fixed effects are controlled for, then women with primary education report an average 138% higher exposure to physical violence than women without education. This effect is significant at the 1% level. Furthermore, women with secondary and higher education report an average 96% and 125%, respectively; more exposure to physical violence and these effects are significant at a 5% level. However, the logit marginal effects are negative and not significant.

Panel B of Table A5 presents the association between sexual violence and women's level of education. Women with primary, secondary and higher education report an average 116%, 115% and 83% more exposure to sexual violence, respectively, than those without education after controlling for all independent variables. These effects are significant at a 1% level. Controlling for village-level fixed effects, women with primary, secondary and higher education report an average 121%, 098% and 097% more exposure to sexual violence, respectively, than those without education. These effects are significant at a 1% level. The linear probability and fixed-effects results are very close, while the logit marginal effects results are different, with the average marginal effects of reporting violence by women with higher education reporting 0.16 less exposure to sexual violence than women with no education. This effect is significant at a 10% level. The association between control violence and the woman's level of education is presented in Panel D of Table A5. Compared to women with no education, the average marginal effects of reporting control violence among women with primary and secondary education are 0.90 and 1.10 higher, respectively, than for women with no education. However, these average marginal effects change to 1.12 and 1.40 if cluster effects are controlled for. These effects are significant at a 1% level. Panel E shows that women with primary education and those with secondary education are 84 and 70 percentage points, respectively, more likely to report exposure to any type of partner violence than women without any education. These effects are significant at a 1% and 5% level, respectively. Furthermore, when cluster effects are controlled for, women with primary and secondary education are 1.01 and 0.85, respectively, more likely to report exposure to any type of partner violence with the effects being significant at the 1% and 5% levels, respectively.

Partner violence and spousal education differential. Panel A of Table A6, presents the association between exposure to partner violence and the education difference between the husband and wife. The reference group is women with the same education as their husbands (parity group). The women whose level of education is lower than their husbands' are 36 percentage points less likely to report exposure to physical violence compared to the parity group. This effect is significant at a 1% level. However, when the cluster effects are controlled for, these women are 24.3 percentage points less likely to report physical violence, and the level of significance changes to 10%. At the same time, women who are more educated than their husbands are 43.8 percentage points less likely to report exposure to violence compared to the parity group. This effect is significant at a 1% level. However, the fixed effects and logit average marginal effect models show that these women are 33.7 and 10.7 percentage points less likely to report physical violence, respectively. These effects are both significant at a 10% level. In Panel B, the women who were more educated than their husbands are 18.2 percentage points less likely to report exposure to sexual violence than the parity group. However, when cluster effects are controlled for, these women are 29.9 percentage points less likely to report exposure to sexual violence. These effects are significant at a 5% level.

Partner violence and spousal income inequality. The association between exposure to partner violence and spousal income inequality is presented in Table A7. The reference group is women earning more than their husbands. On average, earning more income than a husband/partner increases women's probability of reporting exposure to various types of partner violence. In Panel A, women who earn less and those earning the same as their spouses are 17 and 27 percentage points, respectively, less likely to report physical violence than women earning more. These effects are significant at the 5% and 1% level, respectively. When cluster effects are controlled for, women earning less are 15 percentage points less likely to report violence compared to women earning more, with a significance level of 10%. However, the logit average marginal effects model shows that women earning the same as their husbands/partners are 12.9 percentage points less likely to report physical violence compared to their counterparts earning more. Panel C shows that women earning less are 15.3 percentage points less likely to report emotional violence compared to those earning more than their spouses. The effect is significant at a 10% level. Women earning an income equal to their spouses are 25.6 percentage points less likely to report control violence, compared to women earning more, as shown in Panel D. This percentage point reduces to 17.7 when cluster effects are controlled for and the effects remain significant at the 5% level. In Panel E, women earning the same are 19.8 percentage points less likely to report exposure to any type of violence compared to women earning more than their spouses. However, when cluster effects are controlled for, these women are 14.1 percentage points less likely to report exposure to any type of violence. This effect is significant at a 1% and 5% level, respectively.

Partner violence, spousal age and income inequality. Table A8 presents the predicted margins of various types of partner violence when: the woman and husband are of the same age (age gap = 0), the woman is five years younger than her husband (age gap = 5), and when the woman is ten years younger than her husband (age gap = 10). Among women who are the same age as their husbands, 41% report exposure to physical violence, 23% to sexual violence, 60% to control violence and 70% to any type of partner violence. Furthermore, of women who are five years younger than their husbands, 40% report exposure to physical violence, 19% to sexual violence, 30% to control violence and 73% to any type of partner violence. Figure A3 presents this trend as the age gap increases from -20 to 50 years.

The predicted margins of partner violence when spousal age gap and income inequality interact are also presented in Table A8. When spousal age and income inequality interact, then controlling for age gaps and other control variables, women who earn more than their spouses report more exposure to each type of partner violence, followed by women earning less and then women earning the same as their spouses. For example, among women who are the same age as their spouses, 46% who earn more report exposure to physical violence, compared to 42% who earn less, and 33% who earn the same as their husbands. In terms of exposure to control violence, 69% of women earning more report exposure, compared to 62% who earn less and 51% who earn the same as their spouses. At the same time, among women who are 10 years younger than their spouses, 43% who earn more report exposure to physical violence, compared to 40% who earn less and 31% who earn the same as their spouses. The predictive margins presented in Figure A4 shows a decreasing trend of exposure to physical and sexual violence as the age gap between the husband and wife increases, while emotional violence and control violence increase with the spousal age gap given income inequality level. In Table A9 the average marginal effects of spousal violence when age gap and income inequality are allowed to interact are presented. Holding the age gap constant and controlling for all other independent variables, we find that compared to women earning more than their spouses, women who earn the same are less likely to report exposure to each type of violence. This effect is significant at a 5% level for physical violence, control violence and any type of partner violence. Women who are the same age and earn the same as their spouses are 13 percentage points less likely to report exposure to physical violence. This effect is statistically significant at a 5% level. Women who are five years younger than their spouses and who earn the same are 13 percentage points less likely to report physical violence, 18 percentage points less likely to report control violence and 14 percentage points less likely to report exposure to any type of partner violence compared to women earning more. These effects are significant at the 5% level. The predictive margin trends as spousal age gap increases from less than 10 to 45 years, are shown in Figure A5.

Partner violence, woman's age at first birth and education level. The predicted margins of partner violence towards women of different ages at first birth and their level of education are presented in Table A10. The highest proportion of women reporting exposure to partner violence are those who had their first baby at the age of 15, followed by those who first gave birth at age 20. For example, 49% of women who had their first birth at age 15 reported physical violence, compared to 38% who had their first child at age 20, and 29% who had their first child at age 25. The predictive margin trends as age at first birth increases from 10 to 50, are shown in Figure A6. The most prevalent type of violence is control violence followed by physical violence. The proportion of women reporting spousal violence is highest among women who had their first births at age 10. Apart from emotional violence exposure that seems constant irrespective of age at first birth, physical, sexual and control violence reduces as age at first birth increases.

Table A10 also shows the predicted margins of violence when age at first birth and education level interacts. The predicted probability of physical violence for women who married at age 15 and had no education is 28%, for those with primary education it is 51%, for those with secondary education it is 47%, and for those with higher education 51%. The predicted margin for physical violence among women who married at age 20 with no primary education is 53%, for those with primary education 39%, and for those with higher education 37%. For women with no education and who first married at age 25, the probability of exposure to physical violence is 77%, for those with secondary education 24%, for those with secondary education 32%, and for those with higher education it is 24%. Furthermore, for women who had no education and who first married at age 25, the probability of exposure to sexual violence was 47%, for those with primary education 14%, and for those with higher education 7%. In Figure A7 the predictive margins show that for women without education, reporting exposure to each type of violence increases as age at first birth increases. However, women with primary, secondary and higher education are less likely to report different types of spousal violence as the spousal age gap increases.

The average marginal effects of spousal violence when age at first birth and education level are allowed to interact are presented in Table A11 and Figure A8. Compared to women with no education who were married at age 15, women with primary education and those with secondary education and were married at age 15 are 23 percentage points and 19 percentage points more likely to report exposure to physical violence, respectively. These effects are significant at the 1% and 10% levels, respectively. The average marginal effects of reporting physical violence for women with primary, secondary and higher education are 53 percentage points, 45 percentage points and 53 percentage lower than those of women with no education who were married at the age of 25. All these marginal effects are significant at a 1% level. However, the average marginal effects of exposure to sexual violence for women who had their first birth at age 25 is 34 percentage points,

41 percentage points and 42 percentage points lower than those of women with no education. All these marginal effects are significant at the 5% level.

Table A12 shows the predicted margins when income and education inequalities are allowed to interact: when earning more than their spouses 57% of women without education report exposure to physical violence compared to 46% with primary education, 48% with secondary education, and 46% with higher education. Considering emotional violence, 49% of women who earn more than their spouse and have primary education report emotional violence, compared to 41% of women who earn less and have no education and 36% of women earning the same as their spouse and have no education.

The average marginal effects when education and income inequalities are allowed to interact are presented in Table A13. Compared to women with no education who earn more than their spouses, women with secondary education and who earn more are 18 percentage points less likely to report exposure to emotional violence. This average marginal effect is significant at the 10% level. Furthermore, women with secondary education who earn less are 17 percentage points less likely to report emotional violence, compared to their counterparts with no education. This effect is significant at the 10% level. The probability of experiencing sexual violence is 18 percentage points lower for women with higher education and who earn more than their spouses, compared to their counterparts with no education. This average marginal effect is significant at the 5% level. The predicted margins for income inequalities and differential education are presented in Table A14. Compared to women earning less and those earning the same as their spouses, a higher proportion of women earning more reports exposure to all types of partner violence. For example, 44% of women earning more report physical violence, compared to 40% and 32% of women earning less and those earning the same as their spouse. When education gap and income inequality are interacted, 56% of women with the same level of education as their spouse and who earn more report exposure to physical violence, 18% report sexual violence, 43% emotional violence, 72% control violence and 79% report any type of partner violence.

The average marginal effects are shown in Table A15. Compared to women earning more and who have the same level of education as their spouse, women earning less who have the same education as their spouse are 16% less likely to report physical violence and 15% less likely to report sexual violence. These marginal effects are significant at the 5% and 10% levels. Also, women earning less and who have a lower level of education than their spouse report 23% more violence compared to women earning more and who have a lower level of education than their spouse. This marginal effect is significant at the 5% level. Women who earn less and have higher education than their spouse report 29% more violence and 35% more exposure to any type of violence compared to their counterparts earning more than their spouse. Compared to women who earn more and who have the same level of education as their spouse, women earning the same and who have the same level of education as their spouse report 26% less exposure to physical violence, 26% less exposure to control violence and 20% less exposure to any type of partner violence. These marginal effects are significant at the 1%, 5% and 1% levels, respectively.

Multivariate probit model results

Table A16 shows the Wald test results, the correlation matrix and probabilities. The Wald test $\chi^2_{(112)} = 749.10, p < 0.000$ is significant at the 1% level, indicating that the subsets of coefficients of the model are jointly significant and the explanatory power of the factors included in the model are satisfactory. Hence the multivariate probit model fits the data reasonably well. Furthermore, the null hypothesis that exposure to each type of partner violence is independent are rejected. The likelihood ratio results of the models LR $\chi^2_{(6)} = 5.4e + 06, \chi^2 > p < 0.000$ imply that the null hypothesis that the independence between exposure to different types of partner violence $H_0 = \rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$ is rejected at a 1% level of significance, and hence there are significant joint correlations for two estimated coefficients across the equations in the models. The implication is that separate estimation of exposure to various types of partner violence is biased and women's exposure to physical, sexual, emotional and control violence are interdependent.

There are differences in the women's exposure to the various types of partner violence as reflected in the likelihood ratio statistics of the estimated correlation matrix. If considered separately, the ρ -values (ρ_{ij}) show the correlation between each pair of dependent variables (types of spousal violence). ρ_{21} (correlation between exposure to sexual and physical violence), ρ_{31} (correlation between exposure to control and physical violence), and ρ_{41} (correlation between exposure to emotional and physical violence) are positively interdependent and significant at 1% levels of probability. Hence, women who are physically violated are more likely to experience sexual, emotional and control violence. Equally, ρ_{32} (correlation between exposure to control and sexual violence) and ρ_{42} (correlation between exposure to emotional and sexual violence) are also positively correlated and significant at a 1% level, confirming that women who experience sexual violence are more likely to experience emotional and control violence. Furthermore, women reporting control violence are also more likely to report emotional violence (ρ_{43}).

The LPM and logit analysis controls for interactions, while in the MVP model (Table A17) these were excluded since their inclusion resulted in a lack of convergence of the MVP model. These may result in some level of variation in the results. The spousal age gap (husband older than wife) has a negative effect on women's exposure to sexual violence. This is in line with the findings for the LPM, logit and fixed effects models. Secondly, age at first birth has a negative effect on physical and control violence. Additionally, education level has a positive effect on exposure to sexual violence. Compared to women with no education, women with secondary and higher levels of education are more likely to report experiencing control violence. Compared to women who have the same level of education than their husbands, women with higher levels of education are less likely to report physical violence, while women with less education are more likely to report control violence. Income inequality where a woman earns more has a positive effect on exposure to physical and sexual violence.

Table A18 shows the joint marginal probabilities and individual model marginal probabilities. The simulated maximum likelihood (SML) estimation results show that the probability of a woman experiencing physical, sexual, control and emotional violence are 38.7%, 17.4%, 65.3% and 31.1%, respectively, all factors held constant, i.e. controlling

for all independent variables. This indicates that the likelihood of Kenyan women experiencing control violence is very high (65.3%) compared to the probability of physical violence (38.7%), emotional violence (31.1%) and sexual violence (17.4%). The joint probability of spousal violence, that is, the probability of a Kenyan woman experiencing all four types of partner violence simultaneously, or not experiencing any type of partner violence in their lifetime, is also presented. These joint marginal probabilities show that, controlling for all independent variables, 25.7% of Kenyan women have never experienced any form of spousal violence, while 10.1% have experienced all four types of partner violence simultaneously.

Discussion

Women who earn more than their spouses, on average, report more exposure to violence generally, compared to women earning less or the same. This finding contradicts empirical studies showing a negative association between women's income and exposure to partner violence given that women earning more have higher bargaining power and better outside options, all of which increase the chances of leaving abusive relationships and hence a reduction in their exposure to partner violence. This finding supports other findings (Awang and Hariharan (2011). This may partially be explained by the traditional and cultural belief of many communities in Kenya in which women are valued based on their marital status, and being in a marriage increases a woman's respect and dignity. At the same time being single, separated or divorced is associated with stigma and discrimination. Hence some women, although earning more than their husbands, may choose to stay in violent marriages because their outside option as a function of their culture is worse. However, this finding may support the instrumental theory of violence, in which men use violence as a bargaining tool within the household when their position is threatened.

Contrary to bargaining theory and some empirical literature that higher education and income levels cushions women against violence (Krug et al., 2002; Kishor, 2015; Ahmad and Jaleel, 2015), this study finds a positive and significant association between education and partner violence. Women without education report the lowest level of all forms of partner violence. Education does not protect women against partner violence. However, spousal education gap paints a different picture: women with higher levels of education than their husbands generally report lower exposure to the various type of partner violence compared to women with the same level of education as their spouses. These effects are also significant at different levels. This may imply that husbands may value and respect women with more education than them (Ackerson et al., 2008). However, compared to the parity group, women with educational levels lower than their husband's report lower exposure to physical violence only. This suggests that higher male education shields women from physical violence but no other types of violence. The spousal age gap is only protective against sexual violence and not significantly associated with other types of partner violence. Hence earning less and having a lower level of education significantly increases women's risk of exposure to physical violence. This is not the case for the other types of partner violence. At the same time, intra-household income and education equality is a significant barrier to physical violence, control violence and exposure to at least one type of partner violence.

5. Conclusion and policy recommendations

This study was conducted against the background of a significant increase in spousal violence against women in Kenya, with frequent media reports of extreme physical violation, sometimes resulting in disability and even mortality. It confirms, among other factors, the association between education, relative income and age at first birth with spousal violence. Earning less and having a lower level of education significantly increases women's risk of exposure to physical violence. This is not the case for the other types of partner violence. Simultaneously, intra-household income and education equality are significant barriers to physical violence, control violence and exposure to at least one type of partner violence. Contrary to exposure to physical and sexual violence, which decreases with spousal age gap, emotional violence and control violence increases with spousal age gap. Although control violence is one of the most silent and ignored forms of abuse it is the most prevalent tool of marital abuse. The study shows the need to combine both economic and non-economic policies in addressing partner violence, for example ensuring equitable education and employment opportunities, and also a need to address the cultural norms around patriarchy and its expectations, cultural dynamism given women's economic empowerment, cultural acceptance of violence as a conflict resolution tool and women's own acceptance of violence.

Policy recommendations

Several key policy recommendations have been highlighted in this paper. First, to reduce physical, control and any other type violence, the government needs to promote education for women and income parity for men and women with the same level of qualification. Second, provision of reproductive health interventions targeting girls as young as eight to delay becoming sexually active and prevent early pregnancies should be strengthened as the latter increases the vulnerability of women to partner violence. This will not only increase opportunities for girls and empower women, but also acts as a barrier to spousal violence against women. Reproductive health education should also be offered in primary schools as a significant proportion of women reported having first births between 10 and 15 years. Third, although this study's focus was not to assess coping mechanisms or interventions to prevent and mitigate the impact of spousal violence against women, the study will be incomplete without addressing the gaps in these areas. Most poor women's basic contact with the government is through primary health care like antenatal and post-natal care services, and as such this study recommends the integration of maternal health services and gender-based violence

interventions. Health care facilities need to provide routine gender based violence (GBV) screening and treatment for women as they provide maternal health services. County and national governments should design and implement interventions geared towards improving the coping mechanisms of victims of GBV and mitigate the impact of spousal violence against women. These include establishing rescue shelters where women can seek refuge and receive psychosocial support, and have targeted legal and health care services, among other things. Fourth, although formal education builds women's capacity and partially contributes to changing views on gender roles in society, the sector can also be an avenue through which academic and policy discourse on gender-based violence and the impact thereof can take place. These will sensitize men and society on the need for cultural reorientation and embracing the positive change instead of viewing it as a threat to masculinity and male dominance.

Recommendation for future studies

Marriage is not a safe haven for women as has always been assumed by society and public institutions. In fact, it increases women's vulnerability to partner violence. Contrary to other study findings that women with higher levels of education than their husbands are more likely to experience partner violence given educational inequality threat (Krishnan, 2005), this study finds that education inequality protects women against violence. However, income inequality with women earning more increases the risk of partner violence. There is a need for further research to explain the variation in association between partner violence and women with more education than their husbands and women earning higher income than their husbands.

Notes

1. Only one randomly selected woman or man in each household is interviewed about IPV, with no one else aware of the questions, and the IPV module questions are asked only if privacy is guaranteed.
2. The average marginal effects analysis of a multivariate probit model with 100 draws and robust cluster.

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Annexes

Table A1: Ecological model risk factors for partner violence

Individual	Relationship	Community	Societal
<i>Personal factors that influence individual behaviour</i>	<i>At family level, intimate partners, colleagues and friends</i>	<i>Neighbourhood, social centres, schools and workplaces</i>	<i>Broad factors that influence the risk of violence</i>
Gender, age and education	Family dysfunction	High unemployment	Poverty
A family history of violence	Intergenerational violence	Social isolation of females and family	Economic, social and gender inequalities
Witnessing GBV	Poor parenting practices	Lack of accurate information	Poor social security
Survivor of child abuse or neglect	Parental conflict involving violence	Inadequate care and support services	Masculinity linked to aggression and dominance
HIV status	Disparity in spouse age and educational attainment	Schools and workplaces not addressing sexual and gender based violence (SGBV)	Weak legal and criminal justice system
Inadequate personal income	Masculinity and male/female power differentials	Weak community sanctions against SGBV	Perpetrators not prosecuted
Religious affiliation	Multiple partners/polygamy	Poor safety in public spaces	No legal rights for victims
Unemployment	Association with gang, delinquent or patriarchal peers	Challenging traditional gender roles	Social and cultural norms support violence
Mental health and behavioural problems	Low socioeconomic status	Area of residence (urban, rural, etc.)	Small fire arms
Alcohol and substance abuse	Socioeconomic stress	Blaming the person	Conflict or post-conflict
Sexual orientation	Friction over women's empowerment	Violating confidentiality of the abused	Internal displacement

continued next page

Table A1 Continued

Individual	Relationship	Community	Societal
<i>Personal factors that influence individual behaviour</i>	<i>At family level, intimate partners, colleagues and friends</i>	<i>Neighbourhood, social centres, schools and workplaces</i>	<i>Broad factors that influence the risk of violence</i>
Prostitution	Family honour more important than female health and safety		Refugee camps
Refugee	Orphan-headed households		
Internally displaced	Peer pressure		
Disabilities			
Small fire arms ownership			

Sources: Adapted and modified from Heise and Garcia-Moreno, 2002; Jewkes, Sen and Garcia-Moreno, 2002; Krug et al., 2002;

Table A2: Demographic characteristics of women

Variables	Observations	Proportion	Standard Error	95% confidence interval
Age gap in years	17,853	7.04***	(0.08)	(6.88 - 7.19)
Education level	11,974			
None		0.12***	(0.01)	(0.11 - 0.13)
Primary		0.58***	(0.01)	(0.56 - 0.59)
Secondary		0.24***	(0.01)	(0.22 - 0.25)
Higher		0.07***	(0.00)	(0.06 - 0.08)
Income variation				
Wife earns more		0.15***	(0.01)	(0.14 - 0.17)
Wife earn less		0.69***	(0.01)	(0.67 - 0.72)
Same income		0.15***	(0.01)	(0.13 - 0.17)
Empowered (three decisions)	14,002			
Zero decision		0.22***	(0.01)	0.21 - 0.23
One decision		0.17***	(0.00)	0.16 - 0.18
Two decisions		0.20***	(0.01)	0.19 - 0.21
Three decisions		0.41***	(0.01)	0.39 - 0.42
Religion	11949			
		0.91***	0.00)	(0.90 - 0.92)
		0.07***	(0.00)	(0.06 - 0.08)
		0.02***	(0.00)	(0.02 - 0.03)

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Table A2 Continued

Variables	Observations	Proportion	Standard Error	95% confidence interval
Want child	17,820			
No		0.46***	(0.01)	(0.44 - 0.47)
Yes		0.54***	(0.01)	(0.53 - 0.56)
Wealth	17,853			
Poorest		0.16***	(0.01)	(0.15 - 0.18)
Poor		0.18***	(0.01)	(0.17 - 0.20)
Middle		0.19***	(0.01)	(0.18 - 0.20)
Rich		0.21***	(0.01)	(0.19 - 0.22)
Richest		0.25***	(0.01)	(0.23 - 0.28)
Polygamy	9,708			
No		0.86***	(0.01)	(0.85 - 0.87)
Yes		0.14***	(0.01)	(0.13 - 0.15)
Education gap				
Both have same education	13,871	0.61***	(0.01)	(0.60 - 0.62)
Wife lower		0.29***	(0.01)	(0.28 - 0.30)
Wife higher		0.10***	(0.00)	(0.10 - 0.11)
Spouse education				
No education	13,871	0.10***	(0.01)	(0.08 - 0.11)
Primary education		0.48***	(0.01)	(0.46 - 0.50)
Secondary education		0.32***	(0.01)	(0.30 - 0.33)
Higher education		0.11***	(0.00)	(0.10 - 0.12)
Father beat mother	13,871			
No		0.63***	(0.01)	(0.62 - 0.65)
Yes		0.37***	(0.01)	(0.35 - 0.38)
Wife controls own income use	3,793			
No		0.10***	(0.01)	(0.09 - 0.11)
Yes		0.09***	(0.01)	(0.89 - 0.91)
Wife accepts partner violence				
No		0.45***	(0.01)	(0.44 - 0.47)
Yes		0.55***	(0.01)	(0.53 - 0.56)
Marital status				
Single	17,646	0.30***	(0.01)	(0.29 - 0.31)
Married		0.59***	(0.01)	(0.58 - 0.60)
Widowed/separated		0.11***	(0.00)	(0.10 - 0.12)

continued next page

Table A2 Continued

Variables	Observations	Proportion	Standard Error	95% confidence interval
Age gap	17,853	7.04***	(0.08)	(6.88 - 7.19)
Spouse's age	17,853	38.54***	(0.14)	(38.26 - 38.82)
Age at first birth	12,046	19.20***	(0.05)	(19.10 - 19.29)
Age at first marriage	14,199	19.01***	(0.06)	(18.90 - 19.13)

Standard errors and confidence intervals in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Women's education, income variation and partner violence

Variables	Attitude towards violence	Physical violence	Sexual violence	Emotional violence	Control violence	Any type of partner violence
Women's education, income variation and partner violence						
No education	0.73*** (0.02)	0.40*** (0.02)	0.12*** (0.01)	0.27*** (0.02)	0.58*** (0.03)	0.59*** (0.02)
Primary education	0.61*** (0.01)	0.42*** (0.01)	0.17*** (0.01)	0.31*** (0.01)	0.65*** (0.01)	0.67*** (0.01)
Secondary education	0.45*** (0.01)	0.32*** (0.01)	0.12*** (0.01)	0.27*** (0.01)	0.63*** (0.02)	0.63*** (0.01)
Higher education	0.20*** (0.02)	0.21*** (0.02)	0.09*** (0.01)	0.22*** (0.02)	0.57*** (0.03)	0.56*** (0.02)
Observations	17,646	13,728	13,723	13,730	9,425	13,737
Rao-Scott F-statistic (F(R-S, Pearson)	195.50	30.65	12.39	7.38	5.308	13.25
P (F(R-S, Pearson)	0.000	0.000	0.000	0.000	0.001	0.000
Income variation and partner violence						
Wife earns more	0.48*** (0.03)	0.41*** (0.03)	0.15*** (0.02)	0.38*** (0.03)	0.64*** (0.03)	0.76*** (0.02)
Wife earns less	0.44*** (0.02)	0.37*** (0.01)	0.14*** (0.01)	0.31*** (0.01)	0.65*** (0.02)	0.74*** (0.01)
Both earn same	0.41*** (0.03)	0.33*** (0.03)	0.14*** (0.03)	0.28*** (0.03)	0.53*** (0.03)	0.64*** (0.03)
Observations	3,784	3,787	3,792	3,792	3,793	3,793
Rao-Scott F-statistic (F(R-S, Pearson)	1.51	2.29	0.08	3.84	5.73	7.11
P (F(R-S, Pearson)	0.222	0.102	0.916	0.023	0.003	0.000

Standard errors and confidence intervals in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table A4: Exposure to partner violence and age

	Model I		Model II		Model III	
A: Physical violence						
Age gap	-0.003	(0.004)	-0.003	(0.004)	-0.003	(0.004)
Age at first birth	0.043***	(0.012)	0.041**	(0.018)	-0.019*	(0.010)
Age at first marriage	-0.007	(0.008)	-0.005	(0.010)	-0.007	(0.008)
Constant	-0.350	(0.242)	-0.469	(0.393)		
Observations	1,028		1,028		1,028	
B: Sexual violence						
Age gap	-0.008**	(0.003)	-0.009**	(0.004)	-0.008**	(0.004)
Age at first birth	0.052***	(0.011)	0.045***	(0.014)	-0.007	(0.007)
Age at first marriage	-0.006	(0.005)	-0.011	(0.007)	-0.005	(0.006)
Constant	-0.824***	(0.221)	-0.818***	(0.308)		
Observations	1,029		1,029		1,018	
C: Emotional violence						
Age gap	0.003	(0.004)	0.005	(0.006)	0.002	(0.004)
Age at first birth	0.027	(0.018)	0.027	(0.023)	-0.001	(0.009)
Age at first marriage	-0.005	(0.006)	-0.008	(0.009)	-0.005	(0.007)
Constant	-0.076	(0.368)	-0.428	(0.441)		
Observations	1,029		1,029		1,029	
D: Control violence						
Age gap	0.005	(0.005)	0.009	(0.005)	0.006	(0.005)
Age at first birth	0.022*	(0.012)	0.027*	(0.014)	-0.020**	(0.009)
Age at first marriage	0.007	(0.007)	0.012	(0.009)	0.007	(0.008)
Constant	-0.071	(0.293)	-0.288	(0.312)		
Observations	1,029		1,029		1,029	
E: Any type of IPV						
Age gap	0.005	(0.004)	0.007*	(0.004)	0.006	(0.004)
Age at first birth	0.016	(0.011)	0.019	(0.016)	-0.019**	(0.008)
Age at first marriage	0.004	(0.007)	0.008	(0.008)	0.004	(0.007)
Constant	0.169	(0.248)	-0.057	(0.361)		
Observations	1,029		1,029		1,029	
X controls	Y		Y		Y	
Village fixed effects			Y			

Notes: In panel A the outcome variable of interest is an indicator of whether the woman experienced physical violence. In panel B the outcome variable of interest is an indicator of whether the woman experienced sexual violence. In panel C the outcome variable of interest is an indicator of whether the woman experienced emotional violence. In panel D the outcome variable of interest is an indicator of whether the woman experienced control violence. In panel E the outcome variable of interest is an indicator of whether the woman experienced any type of partner violence. Model I is the linear probability model; Model II is the fixed effects model and Model III is the logit marginal effects model. X controls: Age gap age at first birth, age at first marriage, woman's level of education, income variation, education gap, religion, polygamy, parental violence, woman's attitude towards partner violence, decision making, children younger than 5, number of children dead, wealth status, fertility preference, interaction of education gap and income variation as well as interaction between woman's level of education and age at first birth. X control variables are included in all models. Robust standard errors are in parentheses. Column (II) also includes cluster fixed effects. (*) indicates statistical significance at the 10% level, (**) indicates statistical significance at the 5% level and (***) indicates statistical significance at the 1% level.

Table A5: Partner violence and education level

	Model I		Model II		Model III	
A: Physical violence						
Primary education	1.248***	(0.284)	1.381***	(0.412)	-0.124	(0.082)
Secondary education	1.030***	(0.283)	0.959**	(0.437)	-0.108	(0.097)
Higher education	1.007**	(0.426)	1.246**	(0.588)	-0.125	(0.163)
Constant	-0.350	(0.242)	-0.469	(0.393)		
Observations	1,028		1,028		1,028	
B: Sexual violence						
Primary education	1.164***	(0.241)	1.214***	(0.328)	-0.022	(0.073)
Secondary education	1.154***	(0.269)	0.987***	(0.339)	-0.059	(0.090)
Higher education	0.827***	(0.239)	0.967***	(0.339)	-0.163*	(0.088)
Constant	-0.824***	(0.221)	-0.818***	(0.308)		
C: Emotional violence						
Primary education	0.564	(0.403)	0.744	(0.456)	-0.077	(0.084)
Secondary education	0.261	(0.395)	0.389	(0.480)	-0.167*	(0.094)
Higher education	0.460	(0.494)	0.711	(0.551)	-0.165	(0.133)
Constant	-0.076	(0.368)	-0.428	(0.441)		
D: Control violence						
Primary education	0.902***	(0.335)	1.119***	(0.341)	-0.040	(0.085)
Secondary education	1.070***	(0.366)	1.396***	(0.391)	0.088	(0.095)
Higher education	0.746	(0.501)	1.059*	(0.580)	0.101	(0.127)
Constant	-0.071	(0.293)	-0.288	(0.312)		
E: Any type of IPV violence						
Primary education	0.841***	(0.299)	1.011***	(0.376)	-0.041	(0.083)
Secondary education	0.700**	(0.327)	0.845**	(0.413)	0.044	(0.094)
Higher education	0.471	(0.475)	0.735	(0.588)	0.018	(0.123)
Constant	0.169	(0.248)	-0.057	(0.361)		
Observations	1,029		1,029		1,029	
X controls	Y		Y		Yd	
Village fixed effects			Y			

Notes: In panel A the outcome variable of interest is an indicator of whether the woman experience physical violence. In panel B the outcome variable of interest is an indicator of whether the woman experienced sexual violence. In panel C the outcome variable of interest is an indicator of whether the woman experienced emotional violence. In panel D the outcome variable of interest is an indicator of whether the woman experienced control violence. In panel E the outcome variable of interest is an indicator of whether the woman experienced any type of partner violence. Model I is the linear probability model; Model II is the fixed effects model and Model III is the logit marginal effects model. X controls: Age gap age at first birth, age at first marriage, woman's level of education, income variation, education gap, religion, polygamy, parental violence, woman's attitude towards partner violence, decision making, children younger than 5, number of children dead, wealth status, fertility preference, interaction of education gap and income variation as well as interaction between woman's level of education and age at first birth. X control variables are included in all models. Robust standard errors are in parentheses. Column (II) also includes cluster fixed effects. (*) indicates statistical significance at the 10% level, (**) indicates statistical significance at the 5% level and (***) indicates statistical significance at the 1% level. No education is the reference level of education.

Table A6: Partner violence and education inequality

	Model I		Model II		Model III	
A: Physical violence						
Wife has lower education	-0.360***	(0.097)	-0.243*	(0.133)	0.005	(0.047)
Wife has higher education	-0.438***	(0.150)	-0.337*	(0.175)	-0.107*	(0.062)
Constant	-0.350	(0.242)	-0.469	(0.393)		
Observations	1,028		1,028		1,028	
B: Sexual violence						
Wife has lower education	0.020	(0.095)	-0.087	(0.114)	0.040	(0.042)
Wife has higher education	-0.182**	(0.083)	-0.299**	(0.152)		
Constant	-0.824***	(0.221)	-0.818***	(0.308)		
C: Emotional violence						
Wife has lower education	-0.138	(0.125)	-0.130	(0.158)	0.010	(0.047)
Wife has higher education	-0.349**	(0.158)	-0.140	(0.193)	0.028	(0.065)
Constant	-0.076	(0.368)	-0.428	(0.441)		
D: Control violence						
Wife has lower education	0.033	(0.122)	0.098	(0.124)	0.087*	(0.045)
Wife has higher education	-0.335*	(0.189)	-0.134	(0.202)	-0.067	(0.066)
Constant	-0.071	(0.293)	-0.288	(0.312)		
E: Any type of violence						
Wife has lower education	-0.032	(0.109)	0.043	(0.116)	0.034	(0.039)
Wife has higher education	-0.427**	(0.206)	-0.276*	(0.157)	-0.095	(0.058)
Constant	0.169	(0.248)	-0.057	(0.361)		
Observations	1,029		1,029		1,029	
X controls	Y		Y		Y	
Village fixed effects			Y			

Notes: In panel A the outcome variable of interest is an indicator of whether the woman experienced physical violence. In panel B the outcome variable of interest is an indicator of whether the woman experienced sexual violence. In panel C the outcome variable of interest is an indicator of whether the woman experienced emotional violence. In panel D the outcome variable of interest is an indicator of whether the woman experienced control violence. In panel E the outcome variable of interest is an indicator of whether the woman experienced any type of partner violence. Model I is the linear probability model; Model II is the fixed effects model and Model III is the logit marginal effects model. X controls: Age gap age at first birth, age at first marriage, woman's level of education, income variation, education gap, religion, polygamy, parental violence, woman's attitude towards partner violence, decision making, children younger than 5, number of children dead, interaction of education gap and income variation as well as interaction between woman's level of education and age at first birth. X control variables are included in all models. Robust standard errors are in parentheses. Column (II) also includes cluster fixed effects. (*) indicates statistical significance at the 10% level, (**) indicates statistical significance at the 5% level and (***) indicates statistical significance at the 1% level. Same level of education is the reference.

Table A7: Partner violence and spousal income variation

	Model I		Model II		Model III	
A: Physical						
Wife earns less	-0.170**	(0.071)	-0.149*	(0.088)	-0.038	(0.055)
Both earn same	-0.270***	(0.078)	-0.170	(0.105)	-0.129**	(0.061)
Constant	-0.350	(0.242)	-0.469	(0.393)		
Observations	1,028		1,028		1,028	
B: Sexual						
Wife earns less	-0.009	(0.067)	0.006	(0.088)		
Both earn same	0.020	(0.076)	0.052	(0.099)		
Constant	-0.824***	(0.221)	-0.818***	(0.308)		
C: Emotional						
Wife earns less	-0.153*	(0.088)	-0.059	(0.103)	-0.069	(0.066)
Both earn same	-0.138	(0.116)	0.031	(0.131)	-0.082	(0.084)
Constant	-0.076	(0.368)	-0.428	(0.441)		
D: Control						
Wife earns less	-0.092	(0.077)	-0.051	(0.080)	-0.062	(0.065)
Both earn same	-0.256**	(0.104)	-0.133	(0.100)	-0.177**	(0.081)
Constant	-0.071	(0.293)	-0.288	(0.312)		
E: Any type of partner violence						
Wife earns less	-0.086	(0.058)	-0.040	(0.069)	-0.033	(0.055)
Both earn same	-0.198***	(0.070)	-0.104	(0.089)	-0.141**	(0.068)
Constant	0.169	(0.248)	-0.057	(0.361)		
Observations	1,029		1,029		1,029	
X controls	Y		Y		Y	
Village fixed effects			Y			

Notes: In panel A the outcome variable of interest is an indicator of whether the woman experienced physical violence. In panel B the outcome variable of interest is an indicator of whether the woman experienced sexual violence. In panel C the outcome variable of interest is an indicator of whether the woman experienced emotional violence. In panel D the outcome variable of interest is an indicator of whether the woman experienced control violence. In panel E the outcome variable of interest is an indicator of whether the woman experienced any type of partner violence. Model I is the linear probability model; Model II is the fixed effects model and Model III is the logit marginal effects model. X controls: Age gap age at first birth, age at first marriage, woman's level of education, income variation, education gap, religion, polygamy, parental violence, woman's attitude towards partner violence, decision making, children younger than 5, number of children dead, wealth status, fertility preference, interaction of education gap and income variation as well as interaction between woman's level of education and age at first birth. X control variables are included in all models. Robust standard errors are in parentheses. Column (II) also includes cluster fixed effects. (*) indicates statistical significance at the 10% level, (**) indicates statistical significance at the 5% level and (***) indicates statistical significance at the 1% level. The woman earning more than the spouse is the reference level.

Table A8: Predicted margins when spousal age gap and income inequality interacts

	Physical	Sexual	Emotional	Control	Anyipv
Spousal age gap					
Age gap = 0	0.411*** (0.039)	0.234*** (0.039)	0.290*** (0.040)	0.604*** (0.050)	0.699*** (0.042)
Age gap = 5	0.397*** (0.027)	0.194*** (0.024)	0.303*** (0.027)	0.635*** (0.032)	0.732*** (0.027)
Age gap = 10	0.382*** (0.024)	0.160*** (0.021)	0.317*** (0.026)	0.664*** (0.033)	0.762*** (0.025)
Spousal age gap and income inequality interaction					
Age gap = 0					
Wife earns more	0.459*** (0.056)		0.351*** (0.065)	0.687*** (0.066)	0.754*** (0.059)
Wife earns less	0.424*** (0.043)	0.233*** (0.042)	0.283*** (0.043)	0.622*** (0.055)	0.718*** (0.045)
Both earn same	0.334*** (0.047)	0.218*** (0.047)	0.272*** (0.054)	0.505*** (0.064)	0.602*** (0.057)
Age gap = 5					
Wife earns more	0.445*** (0.051)		0.365*** (0.061)	0.714*** (0.059)	0.782*** (0.052)
Wife earns less	0.409*** (0.031)	0.194*** (0.026)	0.296*** (0.030)	0.653*** (0.035)	0.750*** (0.030)
Both earn same	0.321*** (0.040)	0.181*** (0.039)	0.285*** (0.052)	0.536*** (0.058)	0.639*** (0.046)
Age gap = 10					
Wife earns more	0.432*** (0.051)		0.379*** (0.064)	0.740*** (0.060)	0.807*** (0.050)
Wife earns less	0.395*** (0.027)	0.159*** (0.023)	0.310*** (0.026)	0.683*** (0.031)	0.780*** (0.027)
Both earn same	0.307*** (0.039)	0.148*** (0.038)	0.298*** (0.057)	0.568*** (0.065)	0.675*** (0.047)
Observations	1,030	1,020	1,031	1,031	1,031

Note: dy/dx for factor levels is the discrete change from the base level. The base outcome is women earn more. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Not estimable

Table A9: Average marginal effects when spousal age gap and income inequality interact

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any type of partner violence
Wife earns less					
Age gap = 0	-0.035 (0.055)	0.000 (0.000)	-0.068 (0.064)	-0.065 (0.070)	-0.037 (0.061)
Age gap = 5	-0.036 (0.055)	0.000 (0.000)	-0.069 (0.066)	-0.061 (0.066)	-0.032 (0.057)
Age gap = 10	-0.037 (0.055)	0.000 (0.000)	-0.070 (0.067)	-0.058 (0.062)	-0.027 (0.052)
Both earn same					
Age gap = 0	-0.125** (0.061)	0.000 (0.000)	-0.079 (0.082)	-0.182** (0.084)	-0.153** (0.073)
Age gap = 5	-0.125** (0.061)	0.000 (0.000)	-0.080 (0.083)	-0.178** (0.081)	-0.143** (0.069)
Age gap = 10	-0.124** (0.060)	0.000 (0.000)	-0.081 (0.085)	-0.172** (0.079)	-0.132** (0.065)
Observations	1,030	1,020	1,031	1,031	1,031

Note: dy/dx for factor levels is the discrete change from the base level. The base outcome is women earn more. Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1
Not estimable

Table A10: Predicted margins of age at first birth and education level

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Age at first birth					
Age at first birth = 15	0.486*** (0.050)	0.212*** (0.035)	0.314*** (0.046)	0.731*** (0.047)	0.818*** (0.042)
Age at first birth = 20	0.382*** (0.031)	0.174*** (0.024)	0.306*** (0.029)	0.639*** (0.034)	0.732*** (0.029)
Age at first birth = 25	0.290*** (0.063)	0.154***	0.300*** (0.058)	0.530*** (0.063)	0.616*** (0.063)
Age at first birth and education level interaction					
Age at first birth = 15					
No education	0.277*** (0.082)	0.075* (0.042)	0.283*** (0.106)	0.496*** (0.135)	0.598*** (0.141)
Primary education	0.511*** (0.056)	0.241*** (0.045)	0.354*** (0.058)	0.713*** (0.053)	0.831*** (0.044)
Secondary education	0.470*** (0.077)	0.245*** (0.087)	0.216*** (0.061)	0.829*** (0.064)	0.851*** (0.061)
Higher education	0.505** (0.215)	0.050 (0.042)	0.267 (0.184)	0.781*** (0.150)	0.783*** (0.146)

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Table A10 Continued

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Age at first birth and education level interaction					
Age at 1st birth = 20					
No education	0.527*** (0.084)	0.223*** (0.074)	0.414*** (0.083)	0.653*** (0.089)	0.757*** (0.092)
Primary education	0.366*** (0.041)	0.189*** (0.037)	0.324*** (0.037)	0.593*** (0.037)	0.706*** (0.034)
Secondary education	0.392*** (0.053)	0.138*** (0.033)	0.239*** (0.045)	0.725*** (0.044)	0.789*** (0.039)
Higher education	0.366** (0.141)	0.057 (0.041)	0.235** (0.101)	0.737*** (0.100)	0.759*** (0.093)
Age at first birth = 20					
No education	0.769*** (0.103)	0.484*** (0.156)	0.558*** (0.147)	0.783*** (0.093)	0.869*** (0.097)
Primary education	0.241*** (0.085)	0.145** (0.065)	0.295*** (0.082)	0.461*** (0.079)	0.543*** (0.084)
Secondary education	0.319*** (0.080)	0.071** (0.032)	0.264*** (0.069)	0.591*** (0.074)	0.711*** (0.064)
Higher education	0.245** (0.098)	0.064 (0.046)	0.206*** (0.078)	0.688*** (0.087)	0.733*** (0.078)
Observations	1,030	1,020	1,031	1,031	1,031

Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

Table A11: Average marginal effects when age at first birth and education level interact

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Primary education					
Age at first birth = 15	0.234*** (0.087)	0.166*** (0.056)	0.072 (0.107)	0.216 (0.133)	0.233* (0.135)
Age at first birth = 20	-0.161* (0.091)	-0.034 (0.079)	-0.090 (0.087)	-0.060 (0.086)	-0.051 (0.088)
Age at first birth = 25	-0.529*** (0.123)	-0.338** (0.161)	-0.264 (0.161)	-0.322*** (0.110)	-0.327*** (0.119)
Secondary education					
Age at first birth = 15	0.193* (0.107)	0.171* (0.100)	-0.067 (0.116)	0.333** (0.141)	0.253* (0.143)
Age at first birth = 20	-0.135 (0.103)	-0.085 (0.086)	-0.175* (0.096)	0.073 (0.097)	0.032 (0.099)
Age at first birth = 25	-0.450*** (0.129)	-0.413** (0.162)	-0.294* (0.162)	-0.192 (0.118)	-0.158 (0.117)

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Table A11 Continued

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Higher education					
Age at first birth = 15	0.228 (0.227)	-0.025 (0.060)	-0.016 (0.202)	0.285 (0.190)	0.186 (0.192)
Age at first birth = 20	-0.161 (0.167)	-0.166* (0.090)	-0.179 (0.127)	0.084 (0.129)	0.002 (0.127)
Age at first birth = 25	-0.525*** (0.139)	-0.420** (0.168)	-0.353** (0.162)	-0.095 (0.124)	-0.136 (0.122)
Observations	1,030	1,020	1,031	1,031	1,031

Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

No education is the base outcome.

Table A12: Predicted margins when income inequality and education interact

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Wife earns more					
No education	0.567*** (0.089)	0.238*** (0.079)	0.489*** (0.101)	0.710*** (0.085)	0.789*** (0.087)
Primary education	0.461*** (0.063)	0.204*** (0.054)	0.413*** (0.069)	0.683*** (0.063)	0.763*** (0.057)
Secondary education	0.477*** (0.069)	0.161*** (0.062)	0.314*** (0.078)	0.792*** (0.051)	0.831*** (0.048)
Higher education	0.460*** (0.134)	0.055 (0.051)	0.317** (0.150)	0.802*** (0.088)	0.809*** (0.083)
Wife earns less					
No education	0.527*** (0.081)	0.230*** (0.076)	0.405*** (0.081)	0.661*** (0.087)	0.763*** (0.086)
Primary education	0.388*** (0.035)	0.196*** (0.035)	0.322*** (0.038)	0.615*** (0.039)	0.717*** (0.037)
Secondary education	0.406*** (0.052)	0.158*** (0.041)	0.233*** (0.044)	0.742*** (0.040)	0.802*** (0.036)
Higher education	0.387*** (0.147)	0.055 (0.039)	0.234** (0.105)	0.758*** (0.094)	0.778*** (0.087)
Both earn same					
No education	0.415*** (0.086)	0.202*** (0.071)	0.362*** (0.105)	0.506*** (0.119)	0.634*** (0.113)
Primary education	0.315*** (0.054)	0.199*** (0.059)	0.294*** (0.061)	0.477*** (0.067)	0.600*** (0.052)
Secondary education	0.325*** (0.074)	0.168** (0.066)	0.204*** (0.064)	0.614*** (0.076)	0.694*** (0.061)
Higher education	0.314** (0.144)	0.058 (0.049)	0.211* (0.121)	0.624*** (0.140)	0.659*** (0.124)
Observations	1,030	1,020	1,031	1,031	1,031

Note: dy/dx for factor levels is the discrete change from the base level.

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A13: Average marginal effects when income inequality and education interact

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Primary education					
<i>Income inequality</i>					
Wife earns more	-0.105 (0.076)	-0.035 (0.081)	-0.076 (0.084)	-0.027 (0.078)	-0.026 (0.071)
Wife earns less	-0.138 (0.085)	-0.033 (0.075)	-0.083 (0.085)	-0.046 (0.084)	-0.046 (0.080)
Both earn same	-0.100 (0.089)	-0.003 (0.075)	-0.068 (0.085)	-0.029 (0.098)	-0.034 (0.109)
Secondary education					
<i>Income inequality</i>					
Wife earns more	-0.090 (0.087)	-0.077 (0.100)	-0.176* (0.097)	0.082 (0.084)	0.042 (0.079)
Wife earns less	-0.120 (0.100)	-0.071 (0.094)	-0.172* (0.096)	0.081 (0.094)	0.039 (0.091)
Both earn same	-0.090 (0.099)	-0.034 (0.086)	-0.158* (0.092)	0.108 (0.112)	0.060 (0.119)
Higher education					
<i>Income inequality</i>					
Wife earns more	-0.106 (0.150)	-0.183** (0.083)	-0.172 (0.144)	0.092 (0.107)	0.020 (0.101)
Wife earns less	-0.139 (0.168)	-0.175* (0.093)	-0.171 (0.134)	0.097 (0.124)	0.015 (0.118)
Both earn same	-0.101 (0.156)	-0.144* (0.083)	-0.151 (0.130)	0.119 (0.150)	0.025 (0.153)
Observations	1,030	1,020	1,031	1,031	1,031

Note: dy/dx for factor levels is the discrete change from the base level. No education is the base outcome. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A14: Predictive margin for education and income inequalities

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Education inequality					
Both have equal education	0.400*** (0.030)	0.163*** (0.021)	0.302*** (0.028)	0.630*** (0.033)	0.740*** (0.026)
Wife has lower education	0.406*** (0.042)	0.204*** (0.040)	0.313*** (0.044)	0.716*** (0.041)	0.773*** (0.039)
Wife has higher education	0.292*** (0.054)		0.330*** (0.061)	0.563*** (0.062)	0.645*** (0.058)
Income inequality					
Wife earns more	0.441*** (0.051)		0.370*** (0.061)	0.722*** (0.058)	0.789*** (0.050)
Wife earns less	0.404*** (0.028)	0.179*** (0.023)	0.301*** (0.027)	0.662*** (0.031)	0.758*** (0.027)
Both earn same	0.315*** (0.039)	0.167*** (0.037)	0.290*** (0.053)	0.547*** (0.059)	0.650*** (0.045)

continued next page

Table A14 Continued

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Education and income inequality interaction					
Both have equal education and wife earns more	0.562*** (0.065)	0.179*** (0.051)	0.432*** (0.079)	0.747*** (0.070)	0.841*** (0.049)
Both have equal education and wife earns less	0.399*** (0.036)	0.157*** (0.024)	0.281*** (0.031)	0.650*** (0.035)	0.751*** (0.031)
Both have equal education and both earn same	0.300*** (0.043)	0.171*** (0.038)	0.296*** (0.069)	0.489*** (0.079)	0.642*** (0.050)
Wife has lower education and earns more	0.214*** (0.067)	0.199** (0.082)	0.295*** (0.102)	0.759*** (0.096)	0.783*** (0.096)
Wife has lower education and earns less	0.441*** (0.054)	0.222*** (0.052)	0.326*** (0.055)	0.696*** (0.049)	0.780*** (0.043)
Wife has lower education and both earn same	0.404*** (0.079)	0.139** (0.057)	0.275*** (0.079)	0.761*** (0.081)	0.740*** (0.086)
Wife has higher education and earns more	0.155 (0.119)		0.095 (0.111)	0.400** (0.163)	0.393* (0.200)
Wife has higher education and earns less	0.343*** (0.062)	0.244*** (0.063)	0.384*** (0.076)	0.649*** (0.070)	0.746*** (0.061)
Wife has higher education and both earn same	0.196* (0.119)	0.222* (0.121)	0.288** (0.133)	0.349** (0.142)	0.434*** (0.129)
Observations	1,030	1,020	1,031	1,031	1,031

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A15: Average marginal effect for education and income inequalities

Variables	Physical violence	Sexual violence	Emotional violence	Control violence	Any partner violence
Wife earns less					
Education gap					
Both have equal education	-0.163** (0.073)	-0.022 (0.061)	-0.151* (0.086)	-0.097 (0.080)	-0.090 (0.058)
Wife has lower education	0.227** (0.088)	0.023 (0.099)	0.031 (0.119)	-0.063 (0.104)	-0.003 (0.104)
Wife has higher education	0.187 (0.117)		0.289** (0.135)	0.249 (0.168)	0.353* (0.203)
Both earn equal income					
Education gap					
Both have equal education	-0.263*** (0.079)	-0.008 (0.066)	-0.136 (0.112)	-0.257** (0.104)	-0.199*** (0.071)
Wife has lower education	0.190* (0.101)	-0.060 (0.098)	-0.020 (0.127)	0.002 (0.126)	-0.043 (0.132)
Wife has higher education	0.040 (0.169)		0.193 (0.174)	-0.050 (0.210)	0.041 (0.233)
Observations	1,030	1,020	1,031	1,031	1,031

Note: dy/dx for factor levels is the discrete change from the base level. Wife earns more is the base outcome. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A16: Overall fitness, probabilities and correlation matrix of IPV experience from MVP model

Variable	Physical violence	Sexual violence	Control violence	Emotional violence
Predicted probability	0.383	0.172	0.652	0.311
Joint probabilities (violence)	0.101			
Joint probabilities (no violence)	0.257			
Correlation matrix of IPV				
	ρ_1	ρ_2	ρ_3	ρ_4
ρ_1	1			
ρ_2	0.609*** (0.068)	1		
ρ_3	0.463*** (0.056)	0.422*** (0.072)	1	
ρ_4	0.660*** (0.050)	0.625*** (0.064)	0.495*** (0.066)	1
Likelihood ratio test: All correlation coefficients set to zero (no endogeneity)				
$\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$		$\chi^2_{(6)} = 5.4e + 06$; Prob > $\chi^2 = 0.000^{***}$		
Number of draws	100			
Number of observations	1,030			
Log likelihood	-268145			
Wald ($\chi^2_{(112)}$)	749.10			
Prob > χ^2	0.000***			

Notes titles: Robust standard analysis in parentheses; *** p<0.01, ** p<0.05, * p<0.1

ρ_{21} is the p(sexual = 1; physical = 1); ρ_{31} is the p(control = 1; physical = 1); ρ_{41} is the p(emotional = 1; physical = 1); ρ_{32} is the p(control = 1; sexual = 1); ρ_{42} is the p(emotional = 1; sexual = 1); ρ_{43} is the p(control = 1; emotional = 1)

Table A17: Multivariate probit model

Variable	Physical	Sexual	Control	Emotional
Age gap	-0.007 (0.011)	-0.029** (0.013)	0.014 (0.013)	0.009 (0.012)
Age at first birth	-0.047* (0.227)	-0.009 (0.268)	-0.050** (0.237)	0.006 (0.237)
Age at first marriage	-0.03 (0.295)	-0.029 (0.352)	0.015 (0.276)	-0.023 (0.282)
Education level				
Primary	-0.009 (0.227)	0.211 (0.268)	0.193 (0.237)	-0.077 (0.237)
Secondary	0.026 (0.295)	-0.108 (0.352)	0.535* (0.276)	-0.354 (0.282)
Higher	-0.080 (0.412)	-0.418 (0.492)	0.774** (0.360)	-0.391 (0.365)

continued next page

Table A17 Continued

Variable	Physical	Sexual	Control	Emotional
Income gap				
Wife less income	-0.085 (0.174)	0.004 (0.214)	-0.149 (0.196)	-0.174 (0.195)
Both same	-0.382* (0.200)	-0.041 (0.258)	-0.504** (0.240)	-0.221 (0.263)
Household wealth				
Poorer	0.027 (0.235)	-0.143 (0.224)	0.355 (0.216)	0.139 (0.223)
Middle	0.400 (0.259)	0.352 (0.220)	0.179 (0.238)	-0.282 (0.210)
Rich	0.399 (0.264)	0.347 (0.290)	0.198 (0.249)	0.234 (0.248)
Richest	-0.164 (0.232)	0.145 (0.342)	0.037 (0.225)	-0.080 (0.259)
Education gap				
Wife low	-0.016 (0.141)	0.124 (0.172)	0.224* (0.131)	0.038 (0.148)
Wife high	-0.394* (0.217)	0.117 (0.211)	-0.207 (0.178)	0.071 (0.199)
Constant	0.513 -0.442	-1.003* -0.528	0.336 -0.495	-0.453 -0.535

Notes titles: Robust standard analysis in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A18: Marginal analysis of multivariate probit for spousal violence²

Variable	Observation	Mean	Std. Dev	Min	Max
Joint probabilities¹					
Probability (all IPV = 0)	1,031	0.257	0.135	0.011	0.684
Probability (all IPV = 1)	1,031	0.101	0.101	0.001	0.649
Marginal probabilities					
Physical violence	1,031	0.383	0.207	0.013	0.946
Sexual violence	1,031	0.172	0.150	0.001	0.775
Control violence	1,031	0.652	0.140	0.218	0.956
Emotional violence	1,031	0.311	0.164	0.026	0.929
Linear predictions of each model					
Physical violence (xbm1)	1,031	-0.345	0.623	-2.233	1.605
Sexual violence (xbm2)	1,031	-1.136	0.658	-2.976	0.754
Control violence (xbm3)	1,031	0.423	0.406	-0.778	1.701
Emotional violence (xbm4)	1,031	-0.546	0.499	-1.949	1.467
Standard errors of linear predictions of each model					
Physical violence (stdpm1)	1,031	0.298	0.062	0.160	0.674
Sexual violence (stdpm2)	1,031	0.352	0.071	0.198	0.790
Control violence (stdpm3)	1,031	0.301	0.067	0.186	0.879
Emotional violence (stdpm4)	1,031	0.303	0.057	0.167	0.658

1 Probability (all IPV = 0) and Probability (all IPV = 1) represents the joint probabilities of a woman experiencing none of the four types of partner violence and experiencing all four types of partner violence, respectively.

Figure A1: Predictive margins of education level, income inequality and education gap

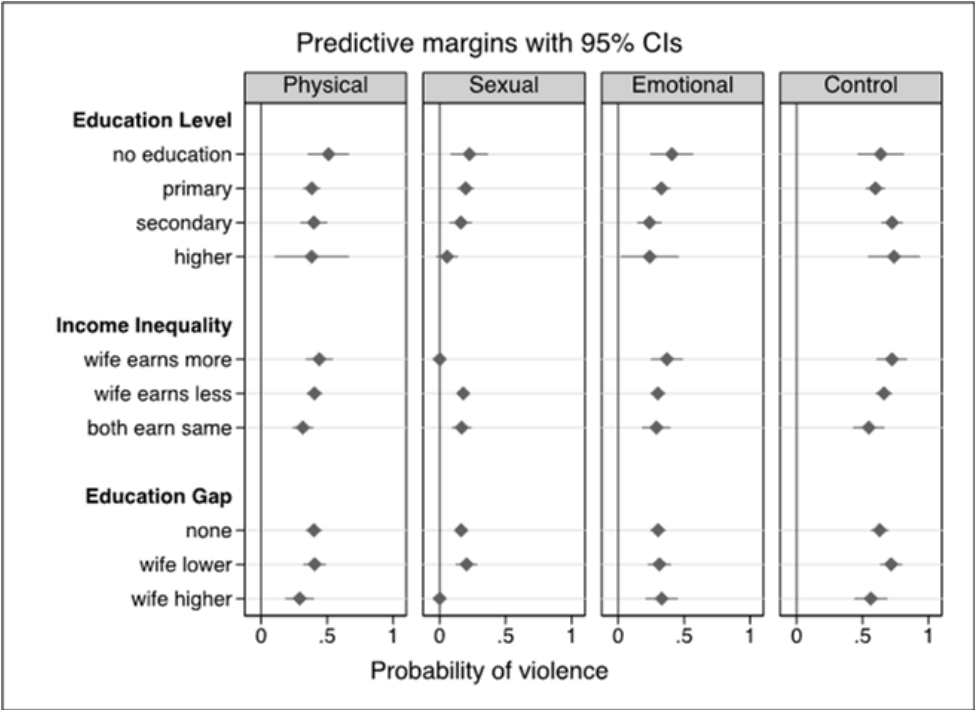


Figure A2: Average marginal effects for education, income inequality and education gap

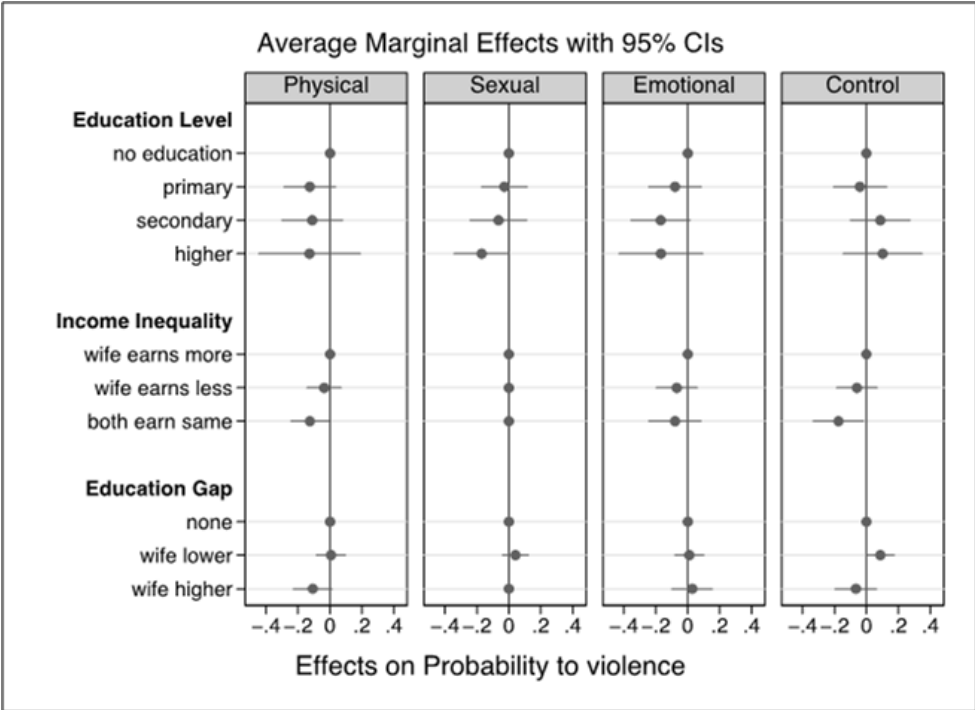


Figure A3: Predictive margins for spousal age gap

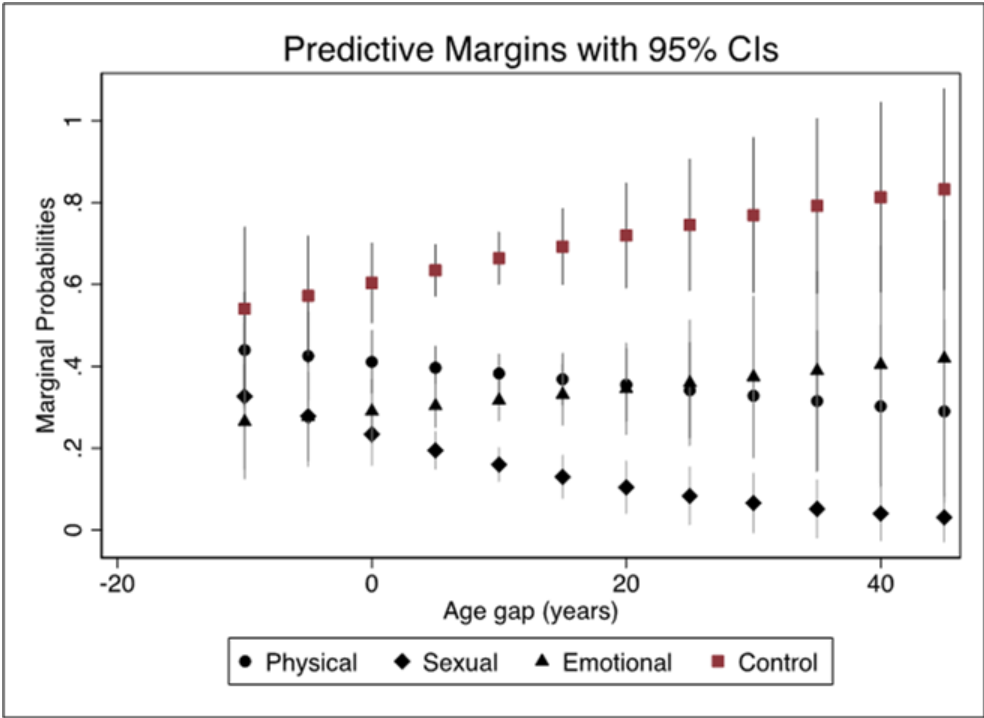


Figure A4: Predictive margins for income inequality and age gap

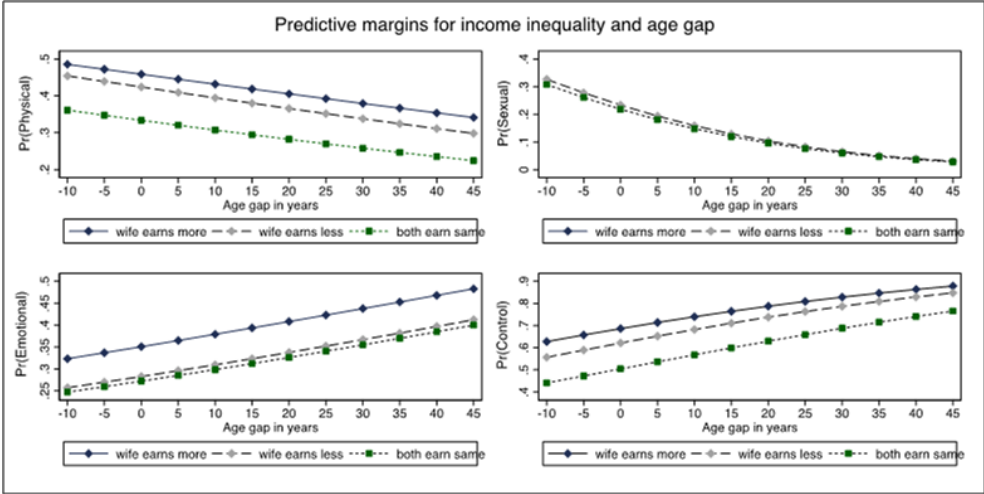


Figure A5: Average marginal effects for income inequality and spousal age gap

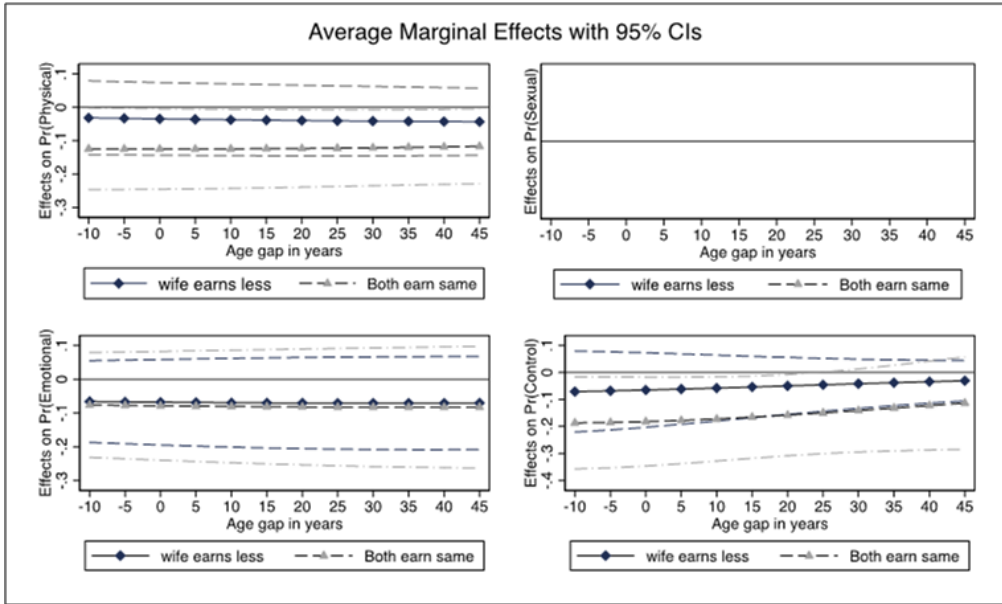


Figure A6: Predictive margins at first birth

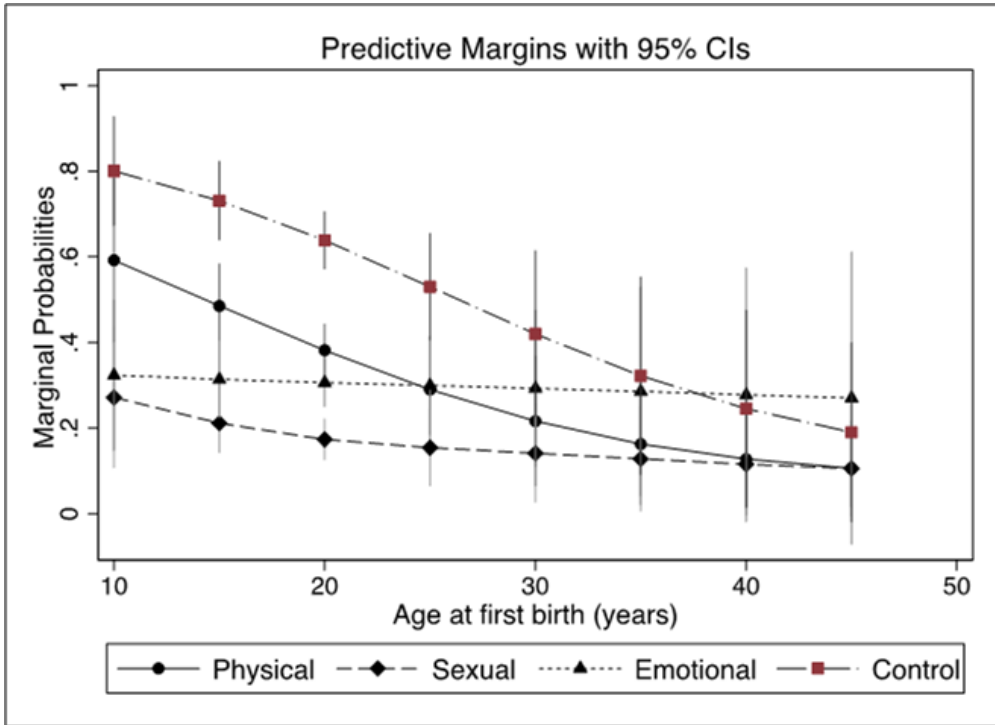
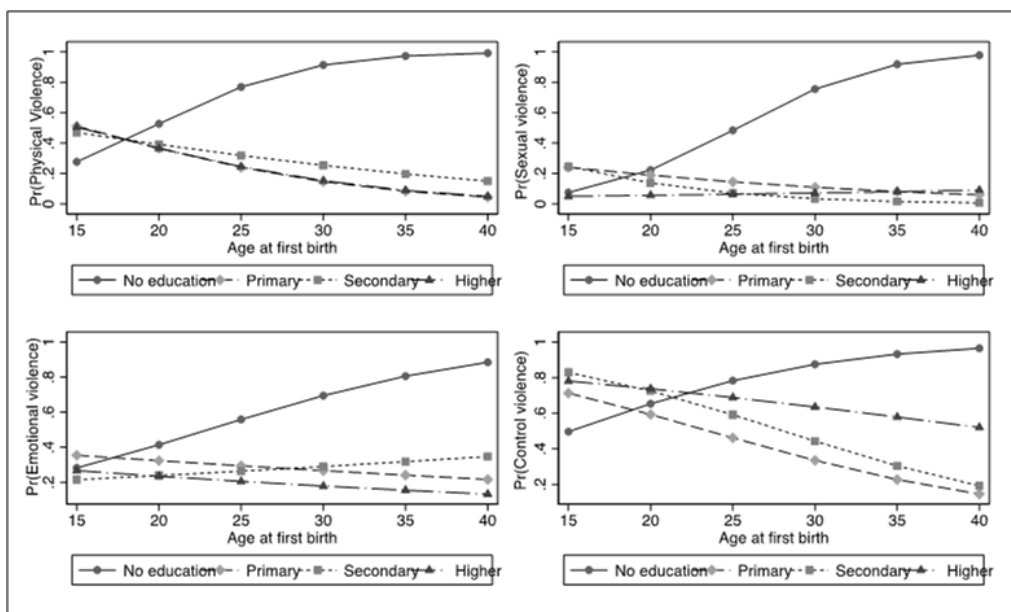
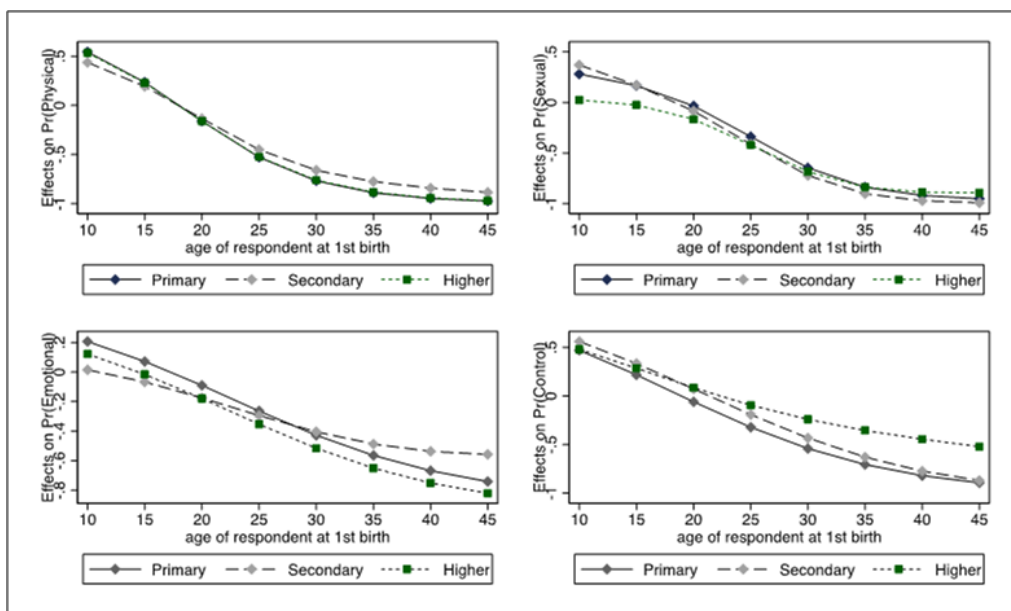


Figure A7: Predictive margins for education level and age at first birth**Figure A8: Average marginal effects for education level and age at first birth**

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