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Family size and domestic violence in a high-fertility society

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Abstract

Does family size affect the prevalence of domestic violence? Using nationally representative survey data from Samoa, which has among the world's highest fertility rates, I extend the classic work on child quantity-quality trade-offs to also consider domestic violence. Identification is based on instrumental variable (IV) strategies exploiting three distinct and plausibly exogenous drivers of additional fertility: (1) same-sex sibling pairs in families with two or more children, (2) multiple births (twin), and (3) a female firstborn. I find evidence of a direct causal link between family size and an increased prevalence of intimate partner violence by, on average, 5 percentage points, equivalent to a 13 percent increase from the mean. This significant effect is largely driven by physical or sexual abuse often associated with serious victim injuries. The IV estimates also suggest that larger families tend to have attitudes that condone violent behaviour. The normalisation of violent behaviour in larger families may be linked to a lack of resources available to effectively address and resolve conflicts, ultimately contributing to an increased likelihood of violent incidents. These findings highlight the need for greater awareness of the potential victimisation risks for larger families and the importance of integrated family planning and domestic violence prevention efforts.

Keywords: Family size, domestic violence, instrumental variable
JEL codes: D19, J13, J16, O10

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Family Size and Domestic Violence in a High-Fertility Society

Dyah Pritadrajati*

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Abstract

Does family size affect the prevalence of domestic violence? Using nationally representative survey data from Samoa, which has among the world's highest fertility rates, I extend the classic work on child quantity-quality trade-offs to also consider domestic violence. Identification is based on instrumental variable (IV) strategies exploiting three distinct and plausibly exogenous drivers of additional fertility: (1) same-sex sibling pairs in families with two or more children, (2) multiple births (twin), and (3) a female firstborn. I find evidence of a direct causal link between family size and an increased prevalence of intimate partner violence by, on average, 5 percentage points, equivalent to a 13 percent increase from the mean. This significant effect is largely driven by physical or sexual abuse often associated with serious victim injuries. The IV estimates also suggest that larger families tend to have attitudes that condone violent behaviour. The normalisation of violent behaviour in larger families may be linked to a lack of resources available to effectively address and resolve conflicts, ultimately contributing to an increased likelihood of violent incidents. These findings highlight the need for greater awareness of the potential victimisation risks for larger families and the importance of integrated family planning and domestic violence prevention efforts.

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1 Introduction

The question of how family size impacts a household's socioeconomic status is a complex and long-standing debate. Since the pioneering work of Becker and Lewis (1973), and later Becker and Tomes (1976), numerous studies have investigated the relationship between the quality and quantity of children. Previous research (see Hanushek, 1992; Leibowitz, 1974; Parish & Willis, 1993; Rosenzweig & Wolpin, 1980) overwhelmingly supports the quantity-quality trade-off argument, which suggests that an increase in the number of children leads to a trade-off between the quantity and quality of each child's outcomes. However, early empirical studies focused more on revealing the correlation between family size and children's outcomes, which overlooked that factors such as parental preferences and household characteristics heavily influence both childbearing and child development (Browning, 1992; Haveman and Wolfe,

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1995). This highlights the importance of accounting for omitted-variable bias and reverse causality in estimating the effects of childbearing, as emphasised by Angrist and Evans (1998).

Recent research on child quantity-quality trade-offs has attempted to address the issue of endogeneity in various ways. One common approach involves utilising exogenous variations in family size caused by the natural occurrence of twins to isolate the causal effect of family size on children's quality (see Angrist et al., 2010; Black et al., 2005; Rosenzweig & Wolpin, 1980). Other measures of family size have also been proposed to address endogeneity, such as the gender composition of the first two children (Angrist et al., 2010; Rosenzweig & Wolpin, 2000) or the gender of the first child (Lee, 2007). The instrumental variable (IV) strategies yield varying results in estimating the relationship between family size and child outcomes depending on the instruments used and the country context. For example, by applying twin birth as the instrument, Li et al. (2008) and Rosenzweig and Zhang (2009) find that having an extra child in the family significantly decreases children's educational attainment in China. However, using a combination of twins and sex-composition instruments, Angrist et al. (2010) reveal that having more siblings does not negatively affect child outcomes in Israel. Similarly, using Norway's census data, Black et al. (2005) ascertain that family size effects become negligible when including indicators for birth order or using twin births as an instrument. These findings indicate that the corresponding ordinary least squares (OLS) estimates are likely to be overestimated due to omitted variable bias.

Previous research on children's quantity-quality trade-off has mainly focused on the effect of childbearing on children's health conditions, educational attainment, and labour market outcomes. However, this study aims to expand the discussion by examining the impact on domestic violence, which is often overlooked and understudied in developing countries. Domestic violence has been shown to have a severe negative impact on development outcomes, affecting families and communities, and straining healthcare, social services, and justice systems. Despite this, there is still a lack of studies examining the causal factors contributing to domestic violence, including how family size affects its prevalence. Based on the few available studies on this topic, researchers found a positive correlation between family size and domestic violence (Straus, Gelles and Steinmetz, 1980; Brinkerhoff and Lupri, 1988; Farrington, 1989; Ellsberg *et al.*, 2001). A larger family is considered to be more likely to resort to violence due to the added pressure to provide for multiple children, which can cause immense stress and frustration. (Hoffman, Demo and Edwards, 1994). Violence then becomes not only a possible but also a legitimate response to these pressures.

This study investigates the impact of family size on the prevalence of domestic violence in Samoa, a country with significantly higher rates of domestic violence and total fertility rate (TFR) than the global average. In Samoa, 43 percent of ever-married women aged 15-49 have experienced emotional, physical, or sexual violence committed by their partner, which is higher than the global average of 34 percent. Samoa's average fertility rate is also high at 4.0, compared to the global average of 2.3 and the average rate in lower middle-income countries of 2.6. Several factors, such as the high prevalence of child marriage and low contraceptive method adoption, contribute to Samoa's high total fertility rate. It is common for women in Samoa to have children at a relatively young age, with around 1 in 5 women aged 20 already giving birth to at least one child (United Nations Children's Fund, 2017). Child marriage and early unions are also prevalent in the Pacific, with 1 in 4 women aged 20-24 marrying before the age of 18, which is higher than the average rate in the Asia-Pacific region (United Nations Population Fund, 2021). Additionally, contraceptive adoption rates in the Pacific are significantly lower than the regional average, at only 20-30 percent compared to 60 percent in the Asia-Pacific region (United Nations Population Fund, 2021).

Using the nationally representative survey data from the Multiple Indicator Cluster Surveys (MICS) in Samoa, I examine the effects of having more children on the prevalence of domestic violence. To investigate the causal impact, the study employs an instrumental variable approach that uses three different instruments for family size: (1) same-sex sibling pairs in families with two or more children, (2) multiple births (twin), and (3) a female firstborn. The IV estimation results demonstrate a direct causal link between family size and the prevalence of intimate partner violence. A significant increase of 5 percentage points in the experience of any form of intimate partner violence corresponds to a 13 percent rise from the mean value. This concerning effect is primarily driven by physical or sexual forms of abuse, often associated with serious injuries suffered by the victims. The family size effect is also significant for the experience of intimate partner violence in the last 12 months, with an effect of 3.7 percentage points, about a 12 percent increase from the average value. The results also indicate that larger families tend to have attitudes that condone violent behaviour. This finding may be attributed to a lack of resources available to address and resolve conflicts effectively within the larger family unit.

This paper makes three significant contributions to the literature on this topic. Firstly, to my knowledge, it is among the first study to examine the causal link between childbearing and domestic violence in the Pacific region. Secondly, while previous studies have assumed

that childbearing is an exogenous factor, using the instrumental variable approach allows for a more rigorous causal analysis by treating childbearing as endogenous and exploiting the exogenous variation through three distinct types of instruments. Finally, this paper provides evidence in the context of a high-fertility society, filling a gap in the literature and providing useful evidence for countries with similar circumstances. By shedding light on the relationship between family size and domestic violence, policymakers and researchers can better understand the factors affecting domestic violence. The findings of this causal effect analysis emphasise the need to raise awareness of the increased risk of victimisation associated with larger families and the significance of integrating family planning and domestic violence prevention efforts.

This paper will proceed as follows. Sections 2 and 3 discuss the country's context and economic framework explaining the relationship between family size and domestic violence. Sections 4 and 5 describe the data features and identification strategy utilised in this paper. The empirical findings are presented and discussed in Section 6. It concludes with policy implications in Section 7.

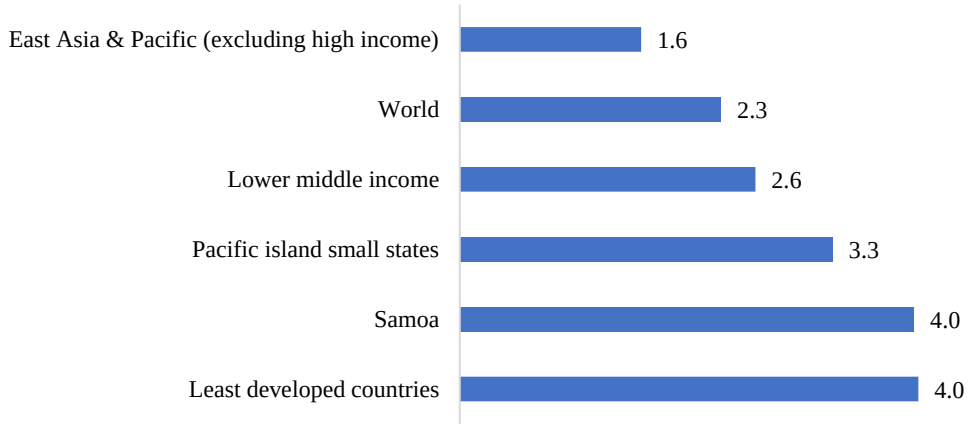
2 Context

Fertility, mortality, and migration are fundamental aspects of demographic statistics and key determinants of population growth and structure. Fertility rates refer to the average number of children born to women of childbearing age (usually defined as ages 15-49) in a given population. Access to healthcare and family planning services, as well as economic and social progress, can all impact fertility rates. A high fertility rate can have positive and negative effects depending on the context. Overpopulation, environmental stress, and higher infant mortality rates can result from high fertility rates in developing countries with scarce resources and underdeveloped healthcare. However, an ageing population and a declining workforce may raise serious economic concerns in countries with low birth rates.

According to **Figure 1**, the average TFR in Samoa is 4.0, surpassing the global TFR average of 2.3 and the TFR of 2.6 recorded in lower middle-income countries (see Appendix Figure A.1 for a visualisation of changes over time) (United Nations Population Division, 2022). This classifies Samoa as the very high fertility group, characterised by a TFR of 4.0 or higher. In the Pacific, social and religious norms play an important role in suppressing the demand for contraceptives, thus increasing fertility. Married women aged 15-49, in particular,

commonly cite religion as the main reason for not intending to use contraception, followed by the fear of side effects and the desire to have as many children as possible. Furthermore, social norms stigmatising out-of-marriage adolescent sexual behaviour can hinder access to family planning services. There is also often little confidentiality in the health services as everyone knows everyone in the community, which can lead young people to risk ridicule or beatings when seeking contraceptives.

Figure 1: Total fertility rate (births per woman), 2021



Note: Pacific island small states include Fiji, Kiribati, Marshall Islands, Micronesia, Fed. Sts, Nauru, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.

Source: United Nations Population Division, 2022. *World Population Prospects: 2022 Revision*. (https://population.un.org/wpp/)

Children in the Pacific, like those in many other developing countries, are often raised in communities where extended families live in close proximity to one another, with each adult taking turns caring for and nurturing the children. As a result, children benefit from multiple care and protection networks, learning from other relatives and receiving care when their parents cannot meet their immediate needs. Across the Pacific, kinship care and informal adoption are common, with extended family members often stepping in to care for an orphaned child or a child whose parents cannot provide adequate care. Extended families also represent vital safety nets, especially in the absence of a comprehensive social protection system. However, the extended family network is reportedly under increased strain in the Pacific countries, and larger households have been found to make children more vulnerable to poverty. For instance, the poverty rate for households with three or more children in Samoa is double the rate of those with only one child. (Household Income and Expenditure Survey, 2020). When considering the role of the extended family, the impact of family size on domestic violence will have two contradictory effects. The high number of children, including those who are not

biologically related, will increase the pressure on adults to meet their family's needs, which could lead to an increase in domestic violence. However, having extended families living in close proximity could potentially ease the burden by allowing resource sharing between families, thus reducing stress and domestic violence incidents.

Studies conducted in the Pacific have revealed that violence against women is alarmingly widespread, with over 60 percent of women and girls experiencing violence at the hands of an intimate partner or family member. This rate is among the highest incidence of violence against women globally. Domestic violence against women violates their fundamental human rights, restricting their social, political, and economic participation. Moreover, it perpetuates the cycle of violence against the next generation, with children of women who have experienced violence more likely to suffer from emotional and behavioural issues, infant mortality, and becoming violent perpetrators or victims. Children are also victims of domestic violence in the Pacific. Corporal punishment is still widely practised, and children are exposed to relatively high levels of domestic violence, with an average prevalence of 77 percent (United Nations Children's Fund, 2017). The normalisation of violence as a form of punishment and discipline in many households and communities significantly contributes to violence against children. Furthermore, laws in all Pacific countries allow parents, teachers, and caretakers to use physical punishment as a form of "reasonable" discipline or correction, exacerbating the situation. A culture of silence regarding domestic and sexual violence is also a significant contributing factor to the vulnerable position of children, and it acts as a barrier to reporting and intervention.

3 Economic frameworks

The resource dilution theory (Blake, 1981), while primarily utilised to explain the quantity-quality trade-off of children, can offer a useful lens to shed light on the relationship between family size and domestic violence. This theoretical framework posits that as family size increases, the available resources for both parents and children, such as finances, time, and attention, become increasingly scarce. Consequently, this dilution of resources may exacerbate family stressors, such as financial difficulties, marital conflict, and parenting challenges, leading to increased family tension and conflict, which in turn, can escalate to domestic violence (Pagelow, 1981; Browker, 1983; Hoffman, Demo and Edwards, 1994). In the context of domestic violence, an increase in the number of children in a family can also create

significant obstacles for a victim attempting to leave an abusive relationship, which can perpetuate the cycle of violence and harm the entire family (Anderson and Saunders, 2003; Fugate *et al.*, 2005). The victim may feel responsible for the wellbeing and needs of their children, in addition to their own, and may have limited financial resources and social networks to draw upon, which can make leaving the abusive relationship more challenging (Tan-Schriner *et al.*, 1995). Moreover, the victim may have limited time and energy to seek help or plan an escape due to caring for multiple children, adding to the difficulty of leaving the abusive relationship (Capaldi *et al.*, 2012).

To model the relationship between family size and domestic violence using the resource dilution model, I begin with the assumption that there are two goods in the household: a public good that benefits all household members equally, and a private good that benefits only one household member. The private good represents the resources that are available to be used to prevent domestic violence, such as time and money. Let Q be the amount of the public good, X be the number of children in the family, and P be the amount of the private good. Then the household's budget constraint can be represented as:

$$Y = Q + XP \tag{1}$$

where Y represents the total household income. The budget constraint shows that the household's income is divided between the public good and the private good, with the allocation of resources to the private good increasing with the number of children.

Assuming that domestic violence is a form of conflict within the household, the likelihood of domestic violence can be modelled as a function of the allocation of resources to the private good. Let V be the likelihood of domestic violence, and let f be a function that maps the allocation of resources to the private good to the likelihood of domestic violence. Then:

$$V = f(P) \tag{2}$$

where P is the amount of the private good. Using the budget constraint, I can express the amount of the private good for each child as:

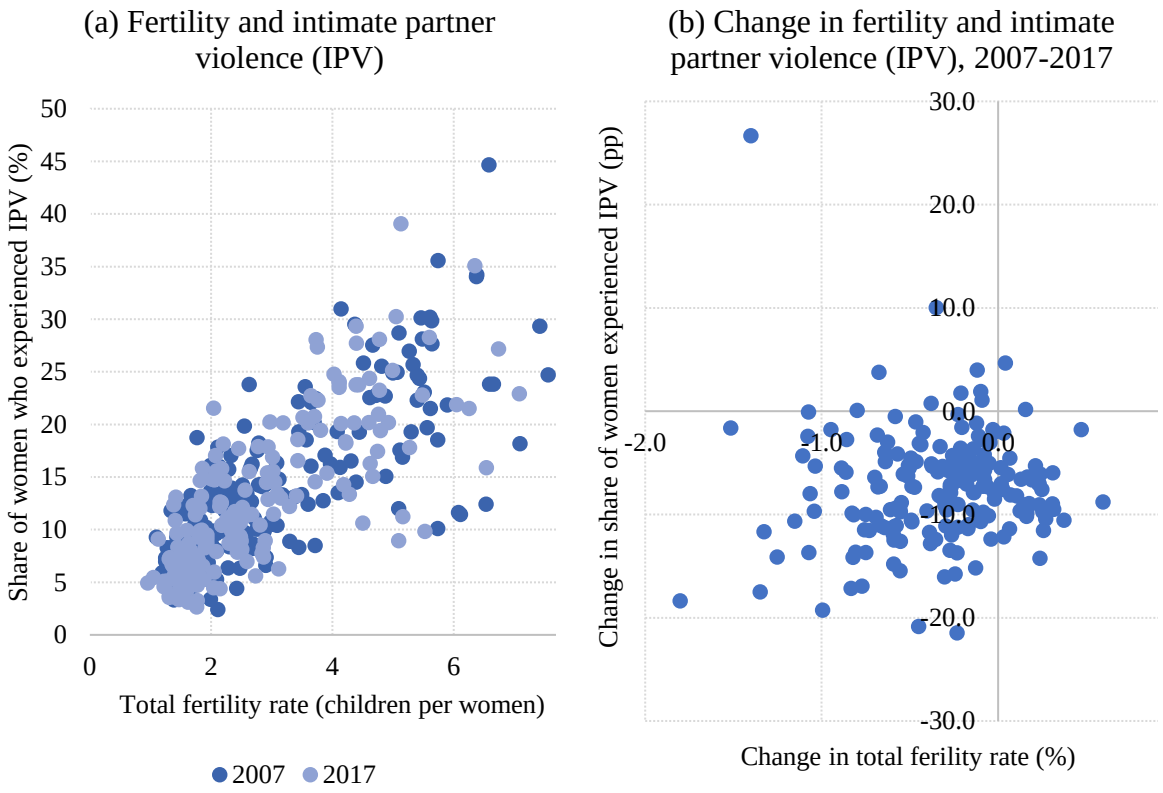
$$P = \frac{Y - Q}{X} \tag{3}$$

Substituting this into the equation for P, then:

$$V = f\left(\frac{Y - Q}{X}\right) \tag{4}$$

This equation shows that the likelihood of domestic violence is a function of the allocation of resources to the private good, which in turn is influenced by the number of children in the family. Specifically, as the number of children increases, the allocation of resources to the private good decreases, which can increase the likelihood of domestic violence.

Figure 2: Fertility and intimate partner violence (IPV)



Source: Institute for Health Metrics and Evaluation (IHME) and United Nations - Population Division (2022). Retrieved from https://www.healthdata.org/ and https://population.un.org/wpp/.

Various studies have shown that children have a substantial impact on domestic violence, with 80 percent of families reporting spousal abuse having children (Fagan, Stewart and Hansen, 1983). **Figure 2** (Panel a) demonstrates a positive correlation between fertility rates and intimate partner violence (IPV) across countries. However, there is also encouraging progress in **Figure 2** (Panel b), where a decrease in fertility rates is accompanied by a decrease in IPV over the ten years between 2007 and 2017. This suggests that efforts to reduce fertility rates may positively impact reducing the prevalence of domestic violence. This positive relationship has also been demonstrated in several studies (Straus, Gelles and Steinmetz, 1980; Brinkerhoff and Lupri, 1988; Farrington, 1989; Ellsberg *et al.*, 2001), with larger families being more likely to resort to violence. This could be attributed to the stress and financial burden associated with supporting numerous children, which can exacerbate tension and ultimately

contribute to domestic violence incidents. Moreover, leaving an abusive relationship can be even more challenging in larger families with more children to care for. In some cases, the abusive partner may also use the presence of children as a means of control, threatening to take custody of them or use them as leverage in negotiations.

4 Data

The primary dataset used in this study is derived from the Samoa Multiple Indicator Cluster Survey (MICS) conducted in 2019-20. The MICS dataset provides rich and comprehensive information on household and individual demographic characteristics, making it an ideal source for examining the effects of family size on domestic violence. The survey is designed to produce accurate and statistically reliable estimates of key indicators at the national level, for urban and rural areas, and the four regions of the country: Apia Urban Area, North-West Upolu, Rest of Upolu, and Savaii. The survey utilised a multi-stage, stratified cluster sampling approach to select its survey sample. The sampling frame for the survey was based on the 2016 Samoa Census of Population and Housing, which provided a comprehensive list of households across the country. The sample size for the Samoa MICS 2019-20 was 3,675 households (10 percent of the total number of households in the 2016 census, which was 28,880, with an 18 percent adjustment upwards to cater for anticipated non-response).

This paper focuses on domestic violence against women inflicted by their spouse/partner. The survey selected one eligible woman per household sampled—aged between 15-49 who is, or has been, married, or who is, or has been, living with a man in an intimate relationship—to answer questions on violence perpetrated by a current or former husband or cohabiting partner. A total of 1,567 women aged 15-49 years were interviewed for the spousal violence questionnaire, yielding a response rate of 100 percent. Given the sensitive nature of the questions, maintaining confidentiality and adhering to ethical guidelines was crucial. The survey took measures to protect the respondents' identities and ensure their safety by developing a protection protocol/support plan to minimise any potential distress the participants may experience during the interview. The interview will only continue until privacy is ensured with sensibly managed interruptions. The domestic violence module collects information about the prevalence and consequence of violence, spousal controlling and drinking behaviour, help-seeking behaviour, and attitudes towards violence. **Table 1** presents the summary statistics of the sample.

In the context of spousal violence, it is essential to consider the different types of abuse inflicted by a current or former partner. The three primary categories of spousal violence include emotional, physical, and sexual violence. *Emotional violence* entails a systematic pattern of degrading and humiliating conduct that aims to intimidate or harass the victim through threats, verbal abuse, or constant humiliation. To gauge the prevalence of emotional violence, survey questions were designed to inquire if the woman experienced any verbal or physical humiliation in front of other people, whether she was threatened with harm or insulted and belittled. *Physical violence*, meanwhile, involves any conduct that causes bodily pain, harm, or endangers the victim's life and health. The specific acts that were asked about included pushing, throwing objects, smacking, slapping, twisting of the arm, pulling of the hair, punching, kicking, dragging on the floor, strangling, burning, and attacking with a weapon, such as a knife or a firearm. Finally, *sexual violence* refers to any form of abuse of a sexual nature that is abusive, humiliating, degrading, or otherwise infringes upon the victim's dignity. The survey questions regarding sexual violence aimed to determine if the woman was subjected to sexual violence through threats, intimidation, or any violent means, including physical, without her consent.

Table 1: Summary statistics

	Full Sample		By Family Size				
			No Child	One Child	Two Children	Three Children	Four or More Children
	Mean	(Std. Dev.)	Mean				
Age	35.14	(8.17)	35.24	35.01	34.09	34.79	36.18
Education level							
No education (=1; 0=Otherwise)	0.01	(0.12)	0.02	0.02	0.01	0.02	0.02
Primary (=1; 0=Otherwise)	0.03	(0.16)	0.01	0.03	0.01	0.05	0.04
Secondary (=1; 0=Otherwise)	0.70	(0.45)	0.65	0.70	0.68	0.69	0.75
Tertiary (=1; 0=Otherwise)	0.25	(0.43)	0.32	0.25	0.30	0.25	0.20
Urban (=1; 0=Rural)	0.24	(0.42)	0.22	0.21	0.25	0.27	0.25
Underage marriage	0.11	(0.31)	0.07	0.10	0.09	0.11	0.15
Ever married (=1; 0=Cohabit)	0.77	(0.42)	0.61	0.70	0.77	0.82	0.83
Homogamous education (=1; 0=No)	0.62	(0.48)	0.55	0.63	0.67	0.66	0.59
Wealth index quintile							
Poorest (=1; 0=Otherwise)	0.21	(0.4)	0.16	0.17	0.19	0.20	0.28
Second (=1; 0=Otherwise)	0.18	(0.38)	0.16	0.19	0.15	0.20	0.20
Middle (=1; 0=Otherwise)	0.17	(0.37)	0.15	0.19	0.19	0.16	0.18
Fourth (=1; 0=Otherwise)	0.22	(0.41)	0.24	0.24	0.22	0.25	0.18
Richest (=1; 0=Otherwise)	0.21	(0.4)	0.29	0.21	0.25	0.20	0.16
Spousal emotional violence in a lifetime (=1; 0=No)	0.21	(0.4)	0.17	0.23	0.18	0.22	0.22
Spousal emotional violence in the last 12 months (=1; 0=No)	0.17	(0.37)	0.12	0.18	0.14	0.19	0.19
Spousal physical violence in a lifetime (=1; 0=No)	0.27	(0.44)	0.24	0.25	0.27	0.29	0.27
Spousal physical violence in the last 12 months (=1; 0=No)	0.19	(0.38)	0.17	0.17	0.20	0.20	0.18
Spousal sexual violence in lifetime (=1; 0=No)	0.17	(0.37)	0.12	0.14	0.16	0.22	0.18
Spousal sexual violence in the last 12 months (=1; 0=No)	0.15	(0.35)	0.10	0.11	0.13	0.19	0.16
Spousal physical or sexual violence in a lifetime (=1; 0=No)	0.34	(0.47)	0.29	0.30	0.36	0.38	0.34
Spousal physical or sexual violence in the last 12 months (=1; 0=No)	0.27	(0.44)	0.21	0.23	0.29	0.31	0.27
Any spousal violence in a lifetime (=1; 0=No)	0.39	(0.48)	0.32	0.36	0.42	0.42	0.40

Any spousal violence in the last 12 months (=1; 0=No)	0.32	(0.46)	0.25	0.27	0.33	0.36	0.33
Serious injuries due to spousal violence (=1; 0=No)	0.11	(0.3)	0.12	0.09	0.09	0.12	0.11
Controlling spouse (=1; 0=No)	0.80	(0.4)	0.75	0.81	0.82	0.81	0.79
Spouse is sometimes/often drunk (=1; 0=No)	0.49	(0.5)	0.43	0.50	0.48	0.50	0.52
Afraid of spouse (=1; 0=No)	0.20	(0.4)	0.15	0.24	0.20	0.18	0.23
Seek any help (=1; 0=No)	0.25	(0.43)	0.25	0.26	0.23	0.24	0.27
Women's attitude justifying domestic violence (=1; 0=No)	0.38	(0.48)	0.33	0.34	0.41	0.40	0.41
Labour force participation (=1; 0=No)	0.26	(0.44)	0.37	0.29	0.25	0.25	0.21
Egalitarian decision making (=1; 0=No)	0.39	(0.48)	0.37	0.34	0.33	0.46	0.43
No. of children (total)	2.59	(1.75)	0.00	1.00	2.00	3.00	4.81
No. of children (< 5 years old)	0.86	(0.92)	0.00	0.46	0.87	1.09	1.31
No. of children (5-17 years old)	1.73	(1.56)	0.00	0.54	1.13	1.91	3.50
Having same-sex sibling pair (=1; 0=No)	0.35	(0.47)	0.00	0.00	0.44	0.55	0.52
Having multiple births (twin) (=1; 0=No)	0.04	(0.19)	0.00	0.01	0.02	0.04	0.09
Having female firstborn (=1; 0=No)	0.40	(0.48)	0.00	0.49	0.44	0.47	0.42
Observations of ever-married women aged 15-49 years	1,567		185	289	319	328	446

5 Identification strategy

This study employs a quasi-experimental research design based on IV to address the potential endogeneity issue. I use three distinct instruments as exogenous sources of variation of family size: (1) a dummy variable for same-sex sibling pairs in families with two or more children, (2) a dummy variable for multiple births (twin), and (3) a dummy of a female firstborn. These three IVs are well-established in the literature and have been shown to be effective in controlling for endogeneity issues when estimating the impact of family size on various outcomes. This combination of IVs will address potential confounding factors and isolate the causal impact of family size on domestic violence.

The empirical analysis focuses on examining the effect of family size on the prevalence of IPV based on the following structural form specification:

$$V_i = \alpha_0 + \boldsymbol{X_i'\alpha_1} + \beta F_i + \varepsilon_i \quad (5)$$

where V_i refers to the dummy variables of IPV (i.e., ever experienced emotional, physical, sexual, or any of the three forms of violence by their husband/partner). F_i is the number of children who are less than or equal to 17 years old, which is endogenous and is instrumented by the IVs. The specification also controls individual and household characteristics, including age, dummy of education level, underage marriage, marital status, homogamous education, and household wealth index quintile. The regression also controls for region fixed effects to account for unobserved heterogeneity across regions that could affect the results. The estimation is clustered at the enumeration areas to address any potential serial correlation.

The IV regression is estimated using two-stage least squares (2SLS). In the first stage, the number of children less than or equal to 17 years old, F_i, is regressed on the instruments, which are the exogenous variation of F_i affecting V_i and uncorrelated with ε_i. The first stage of the IV regression is as follows:

$$\widehat{F_i} = \delta_0 + \boldsymbol{X_i'\delta_1} + \boldsymbol{Z_i'\tau} + v_i \quad (6)$$

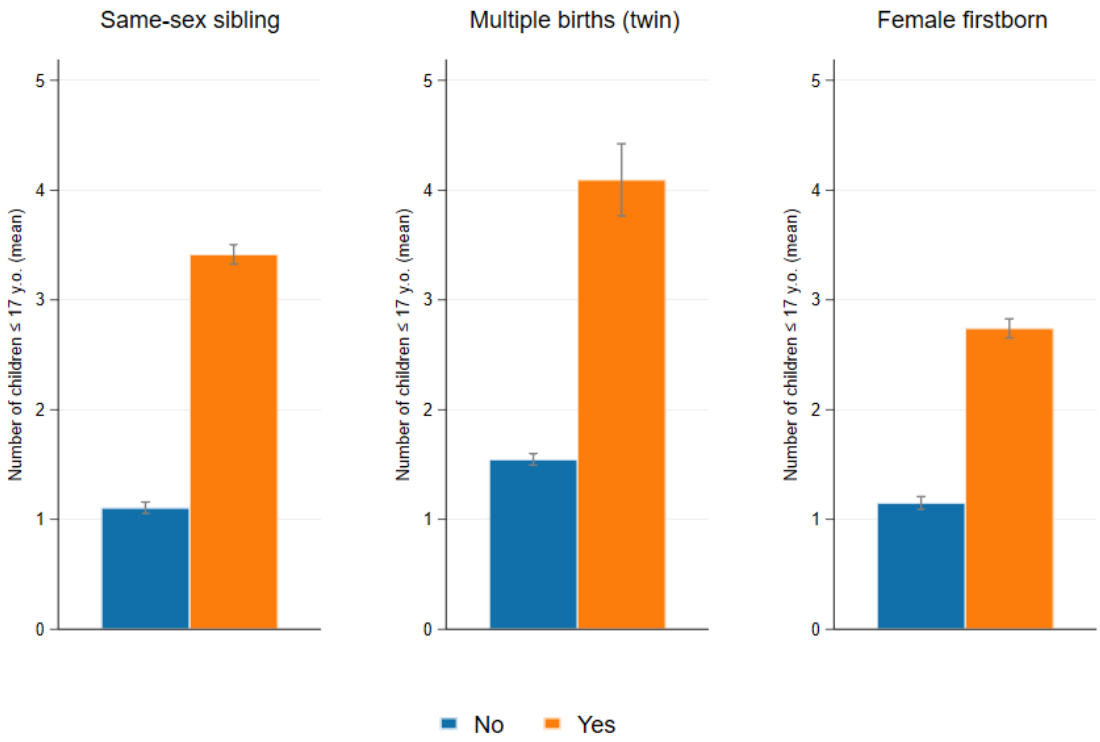
and the second stage is as follows:

$$V_i = \alpha_0 + \boldsymbol{X_i'\alpha_1} + \beta\widehat{F_i} + \varepsilon_i \quad (7)$$

$\boldsymbol{Z_i}$ are the IVs that predict the number of children less than 17 years old in the family. For the instruments to be valid, they should have a strong correlation with the endogenous variable and have no independent effect on the outcome variable, aside from their indirect influence through

the endogenous variable. *Same-sex sibling pair* is considered as a plausibly exogenous variation of family size. Research has shown that parents are significantly more likely to have another child if the first two children are of the same sex, due to their preference for a mixed sibling sex composition (Angrist & Evans, 1998; Ben-Porath & Welch, 1976). *Multiple births*, such as twin births, are also one potential IV that meets these criteria because the occurrence of multiple births is unlikely to depend on family background or parental planning. Rather, twin births are largely determined by chance, making them a plausibly exogenous variation of family size. *Female firstborn* is also associated with larger family size when society has a preference for sons over daughters. If the first child is not a son and the parents would prefer to have at least one son, they are more likely to attempt to have another child (Lee, 2007). A strong preference for sons is commonly seen in the Pacific due to the patriarchal societal structure where daughters are viewed as a source of financial hardship for the family, whereas sons are viewed as a source of benefit. As shown by the stylised correlation in **Figure 3,** there is a strong correlation between the instruments and the endogenous variable.

Figure 3: Correlation between the instruments and endogenous treatment



Nevertheless, each of the three instruments has potential limitations and caveats that may introduce omitted-variable biases. Using *same-sex sibling pairs* as an instrument may face challenges related to household resource sharing. For example, Rosenzweig & Wolpin (2000) suggest that sex composition may influence outcomes due to economies of scale for household resources. Same-sex sibling pairs may improve household efficiencies and reduce household tension, leading to better household outcomes and reduced occurrence of domestic violence. However, this assumes that household resources are shared equally among all family members, which may not always be the case. Moreover, households with same-sex sibling pairs may have a greater sense of kinship or bonding between siblings, which could lead to greater cooperation and sharing of resources. While using *twin births* as an instrument is plausible, it is important to note that the rate of twin births varies based on maternal characteristics such as age and race, and parents may selectively opt for assisted reproduction methods, which may not be entirely random. Additionally, twin births may not be a suitable instrument in cases where child spacing affects violence since there is no space between twins. Furthermore, using *female first born* as an instrument may face challenges related to cultural biases and gender discrimination. The occurrence of the first child being female may exacerbate these gender biases and increase the risk of domestic violence and other negative household outcomes.

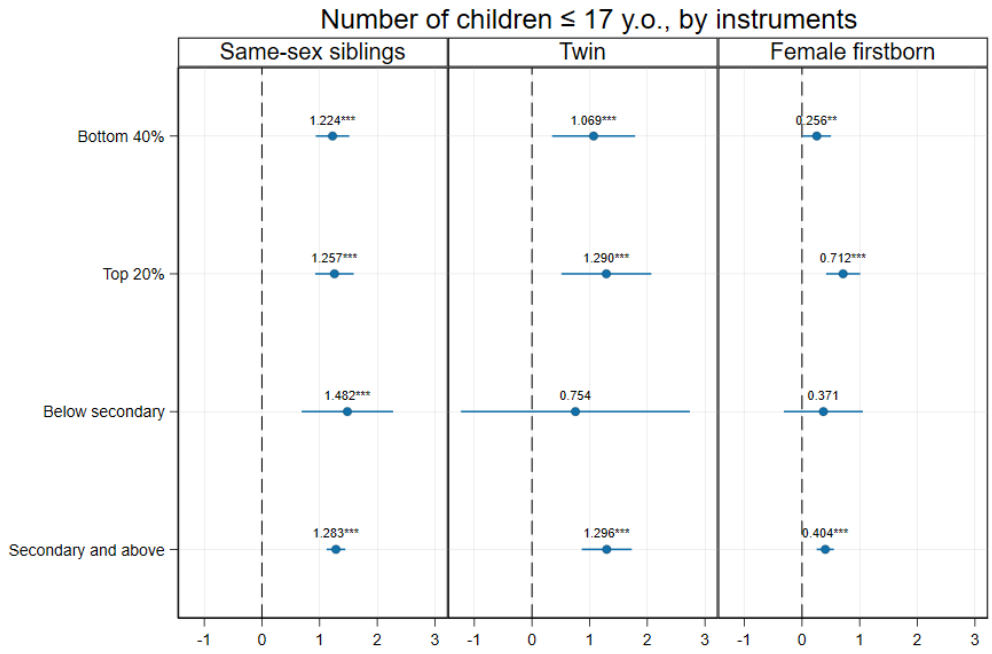
To overcome the potential limitations of the instruments used in the analysis, the regressions establish identification based on conditional instruments while controlling for various demographic and socioeconomic characteristics. Specifically, the analysis includes control variables such as age, education level, under-age marriage, marital status, homogamous education, and household wealth index quintile, which can help to mitigate the impact of omitted variables and improve the robustness of the estimates. Moreover, using multiple instruments can enhance the validity of the analysis and the accuracy of the estimated effects by accounting for potential confounding factors that may impact one instrument but not others. This approach can effectively reduce the possibility of bias due to omitted variables, thereby enhancing the overall validity of the instruments. Additionally, using a combination of IVs can also provide greater statistical power, which can help to identify the causal effects of family size on domestic violence more accurately. Together, these strategies can help overcome the instruments' limitations and improve the validity of the findings.

6 Empirical results and analysis

6.1 First-stage estimates

In order to ensure the instrument relevance condition, I first evaluate the correlation between the endogenous variable and the three potential IVs—same-sex sibling pairs, multiple births (twin), and female firstborn. This analysis is presented in **Table 2**, which illustrates the first-stage estimates of the IV regressions. The results show that each instrument is significant and positively correlated with the endogenous variable, indicating a strong correlation between the two variables. If I use all three instruments together to estimate the endogenous variable, the coefficients and statistical significance of the instruments remain consistent, regardless of whether additional covariates are included in the estimations. First-stage F-statistics of all instruments, individually or in combination, are well above 30, providing compelling evidence for the instruments' relevance and ability to predict the endogenous variable. A strong first-stage IV is essential in minimising the attenuation bias and ensuring the accuracy of the IV estimates. Moreover, the heterogeneity analysis of the first stage estimates based on the household wealth index and female's education level (**Figure 4**) shows point estimates and significance levels which are relatively consistent across subsamples.

Figure 4: First-stage heterogeneity in response to the instrument



Note: Dependent variable is the number of children who are less or equal to 17 years old. Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Covariates controlled include age, dummy of education level, household wealth index, underage marriage, marital status, and homogamous education.

Table 2: First-stage estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: No. of children (≤ 17 y.o.)							
Same-sex siblings	1.445***	1.368***					1.384***	1.310***
	(0.080)	(0.081)					(0.080)	(0.082)
Twin			1.699***	1.621***			1.340***	1.278***
			(0.212)	(0.206)			(0.224)	(0.216)
Female firstborn					0.476***	0.474***	0.408***	0.411***
					(0.081)	(0.080)	(0.075)	(0.074)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204	204	204
Kleibergen-Paap rk Wald F stat	323.66	283.09	64.11	61.68	34.59	35.12	124.68	109.07
Cragg-Donald Wald F-stat	288.37	266.98	59.88	57.12	28.18	29.56	124.76	117.01

Note: Dependent variable is the number of children who are less or equal to 17 years old. Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Covariates controlled include age, dummy of education level, household wealth index, underage marriage, marital status, and homogamous education.

6.2 Main results

Table 3 presents the key findings examining the relationship between family size and the prevalence of any form of female domestic violence perpetrated by intimate partners over a lifetime and within the past 12 months. By utilising three different instruments (Columns 7 and 8), we were able to assess the causal impact of family size on IPV. Using three different instruments simultaneously, the IV regression suggests that the number of children increases the probability of ever experiencing any form of IPV during a lifetime. On average, the likelihood of experiencing lifetime IPV increased by 5 percentage points, equivalent to a 13 percent increase from the average value. The results also highlight a continued causal link between family size and the experience of IPV in the past 12 months, albeit with a smaller effect size of 3.7 percentage points (a 12 percent increase from the mean). This suggests that the number of children may still contribute to shaping the risk of experiencing IPV, even in the more recent past. Although the magnitude of the effect is reduced compared to that observed for lifetime IPV, it remains statistically significant and underscores the importance of considering family structure and dynamics when examining the risk of IPV. The p-value of the overidentification test for the instrumental variable is not statistically significant, indicating no evidence to reject the null hypothesis that the instruments are exogenous.

As shown in **Table 3** (Columns 1 to 6), I find that using the same-sex sibling as an instrument produces results similar to those obtained when using all three instruments simultaneously. However, when using only twins or female firstborn as instruments, there is no detectable effect of the number of children on the prevalence of violence at the 5 percent level. It is well-established that the selection of instruments can significantly impact the results of instrumental variable analyses since they capture different sources of exogenous variation and may have varying levels of correlation with the independent variable. Hence, it is crucial to examine the relationship between the first-stage effects impacted by each underlying natural experiment, as well as the connection between the first-stage effects and the extent of variation induced by each instrument. For all specifications in **Table 3**, the standard errors in parentheses suggest that the estimates are precise, with a small margin of error. The magnitude of the coefficients is relatively small, but it is important to note that the instruments used in the regression model are categorical variables, so a one-unit increase in the number of children may not necessarily correspond to a one-unit increase in the probability of experiencing IPV. This is because the relationship between the categorical instrument and the dependent variable is not necessarily linear, and there may be a threshold effect or non-linear relationship.

Table 3: Family size and domestic violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	A. Experienced any IPV (emotional, physical, or sexual) during a lifetime							
Instrument:	Same-sex sibling		Twin		Female first child		Three instruments	
No. of children	0.043***	0.048***	0.035	0.038	0.078	0.079	0.045***	0.050***
	(0.017)	(0.017)	(0.037)	(0.038)	(0.054)	(0.054)	(0.016)	(0.017)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204	204	204
F-stat	3.68	4.24	2.18	3.64	2.41	3.92	3.86	4.29
Overidentification test (p-value)							0.78	0.80
Endogeneity test (p-value)	0.06	0.03	0.57	0.52	0.23	0.22	0.04	0.02
	B. Experienced any IPV (emotional, physical, or sexual) in the last 12 months							
Instrument:	Same-sex sibling		Twin		Female first child		Three instruments	
No. of children	0.022	0.025	0.063*	0.071**	0.089*	0.086*	0.033**	0.037**
	(0.016)	(0.017)	(0.036)	(0.036)	(0.050)	(0.050)	(0.015)	(0.016)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204	204	204
F-stat	2.23	4.58	2.33	4.31	2.46	4.88	2.85	4.88
Overidentification test (p-value)							0.25	0.27
Endogeneity test (p-value)	0.85	0.70	0.21	0.14	0.14	0.15	0.37	0.24

Note: Dependent variable is the prevalence of any forms of female domestic violence (emotional, physical, or sexual) perpetrated by intimate partners, both over a lifetime and within the past 12 months. Covariates controlled include age, dummy of education level, labour force participation, under-age marriage, marital status, egalitarian relationship, homogamous education, and household wealth index. Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4: OLS, reduced form, and 2SLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)
	A. Experienced any IPV (emotional, physical, or sexual) during a lifetime					
	OLS		Reduced form		2SLS	
No. of children	0.015**	0.014**			0.045***	0.050***
	(0.007)	(0.007)			(0.016)	(0.017)
Same-sex siblings			0.060**	0.063***		
			(0.024)	(0.023)		
Twin			0.042	0.043		
			(0.062)	(0.061)		
Female first child			0.034	0.035		
			(0.025)	(0.024)		
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204
F-stat	3.51	3.96	2.87	4.12	3.86	4.29
Overidentification test (p-value)					0.78	0.80
Endogeneity test (p-value)					0.04	0.02
	B. Experienced any IPV (emotional, physical, or sexual) in the last 12 months					
	OLS		Reduced form		2SLS	
No. of children	0.019***	0.019***			0.033**	0.037**
	(0.007)	(0.007)			(0.015)	(0.016)
Same-sex siblings			0.027	0.029		
			(0.024)	(0.023)		
Twin			0.096	0.103*		
			(0.060)	(0.058)		
Female first child			0.039*	0.038*		
			(0.023)	(0.023)		
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204
F-stat	3.82	4.94	2.24	4.63	2.85	4.88
Overidentification test (p-value)					0.25	0.27
Endogeneity test (p-value)					0.37	0.24

Note: Dependent variable is the prevalence of any forms of female domestic violence (emotional, physical, or sexual) perpetrated by intimate partners, both over a lifetime and within the past 12 months. The IV 2SLS estimation uses three instruments, including same-sex siblings, twin, and female first child. Covariates controlled include age, dummy of education level, under-age marriage, marital status, homogamous education, and household wealth index. Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4 displays a comprehensive analysis of the impact of family size on domestic violence, presenting results from OLS, reduced form, and 2SLS models. The OLS estimates in Columns 1 and 2 highlight a significant positive relationship between family size and domestic violence, regardless of the dependent variable and specification used. These findings suggest that an increase in the number of children in a family raises the likelihood of experiencing IPV for women, as indicated by the OLS coefficients, which suggest a rise in the probability of IPV of approximately 1.4 percentage points during lifetime and 1.9 percentage points in the last 12 months for every additional child in the family, all other factors held constant. The reduced form in Columns 3 and 4 estimates the direct effect of the instruments on the outcome variable, without considering the endogenous variable. The results indicate a positive correlation between same-sex siblings and women's experience of IPV during their lifetime. However, no reduced-form relation exists between twin and female firstborn instruments and any outcome variables, with or without covariates. Since the first-stage estimation in **Table 2** shows evidence of strong instruments, the non-significance in the reduced form regression should not be taken as a sufficient condition for the weak instrument.[1] The reduced form regression estimates the total effect of the instruments on the outcome variable, which includes both the direct effect of the instruments and the indirect effect of the instruments through the endogenous variable.[2]

Furthermore, the analysis in **Table 4** reveals that the estimation outcomes obtained through the 2SLS method are larger than those derived from OLS estimation. This discrepancy indicates that OLS estimation may underestimate the true effect of family size on domestic violence, due to potential bias stemming from omitted variables. This occurs when relevant factors that influence the outcome variable are not included in the model, leading to biased estimates of the coefficients. The 2SLS method, on the other hand, utilises IVs to account for the potential endogeneity of the explanatory variable and mitigate omitted variable bias. Therefore, the larger estimates produced by the 2SLS method suggest that this approach provides a more accurate and reliable estimation of the true causal effect of family size on domestic violence. The 2SLS estimate with covariates yields a slightly larger magnitude than when covariates are not included. This result indicates the precision and accuracy of using conditional instruments that account for the covariates. Incorporating covariates into the 2SLS

[1] The significant results in the second stage of IV is due to the part of the instruments that is fitted by the regressor, while in the reduced form, the part of the instrument that is not explained by the regressor also plays a role.
[2] Given that the assignment of treatment may rely on an instrumental variable, the reduced form regression can serve as a method of estimating the intention-to-treat (ITT) effect.

estimation mitigates potential direct relationships between the instruments and outcome variables. By conditioning on relevant covariates, the instruments can be better targeted towards the endogenous variable, thereby reducing the likelihood of biased estimates.

6.3 Additional results and mechanisms

Table 5 displays the 2SLS results examining the relationship between family size and different types of violence, including emotional, physical, sexual, and physical or sexual violence. The results indicate that family size has a statistically significant effect on IPV, which is largely driven by physical or sexual forms of abuse. This finding is particularly concerning since physical or sexual violence is often associated with severe victim injuries, which can have long-lasting physical, emotional, and psychological consequences for the survivor. According to Samoa MICS 2019-20, a concerning 30 percent of women who had undergone physical or sexual violence had experienced serious injury. This statistic highlights the devastating impact of violence against women on their physical wellbeing. Moreover, as shown in **Figure 5**, the likelihood of severe injury significantly increases when physical or sexual violence is accompanied by emotional abuse. In such cases, nearly half of the women who experienced violence suffered serious injury as a result of their partner's actions.

Figure 5: Share of women experiencing serious injury due to physical or sexual violence

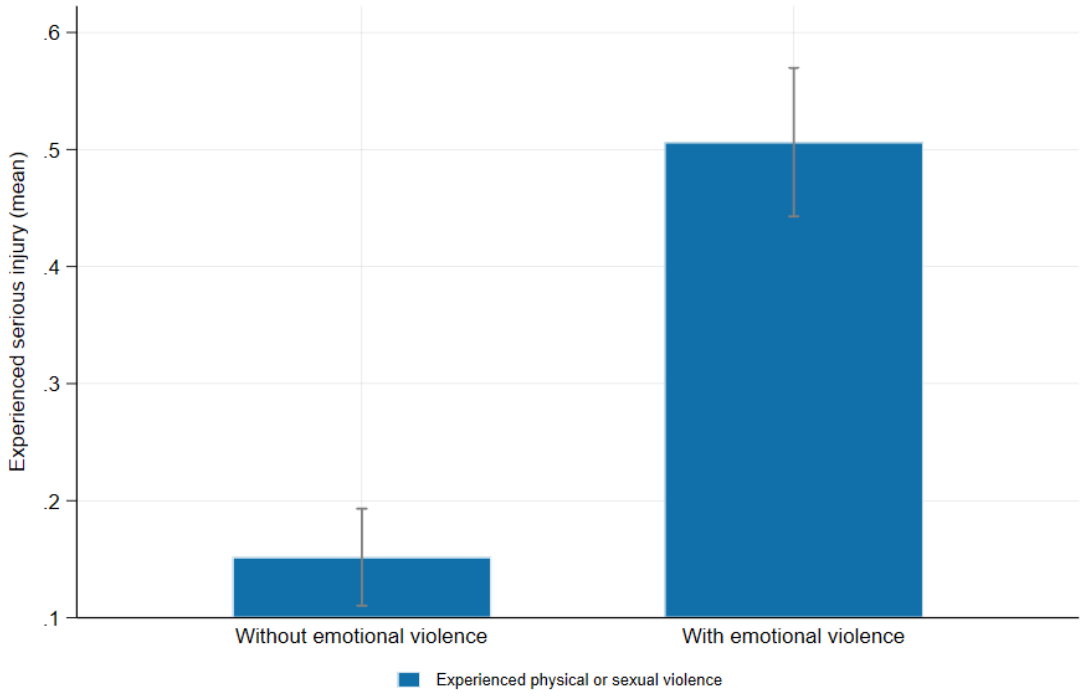


Table 5: 2SLS estimates by types of violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV 2SLS (with three instruments)							
	A. Experienced IPV during a lifetime							
	Emotional		Physical		Sexual		Physical or sexual	
No. of children	0.019	0.022	0.027*	0.033**	0.017	0.017	0.033**	0.038**
	(0.014)	(0.014)	(0.015)	(0.015)	(0.012)	(0.013)	(0.015)	(0.016)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204	204	204
2SLS F-stat	1.26	3.08	2.49	3.93	1.33	4.19	2.97	4.52
Overidentification test (p-value)	0.62	0.62	0.42	0.44	0.60	0.67	0.63	0.59
Endogeneity test (p-value)	0.47	0.36	0.21	0.14	0.78	0.66	0.14	0.09
	B. Experienced IPV in the last 12 months							
	Emotional		Physical		Sexual		Physical or sexual	
No. of children	0.021	0.023*	0.011	0.016	0.012	0.012	0.023*	0.028**
	(0.014)	(0.014)	(0.013)	(0.014)	(0.011)	(0.012)	(0.013)	(0.013)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204	204	204
2SLS F-stat	1.20	2.99	0.89	5.64	1.51	4.18	2.37	5.18
Overidentification test (p-value)	0.28	0.32	0.23	0.27	0.64	0.68	0.67	0.69
Endogeneity test (p-value)	0.55	0.44	0.86	0.67	0.79	0.87	0.51	0.38

Note: Dependent variable is the prevalence of female domestic violence perpetrated by intimate partners by types of violence, both over a lifetime and within the past 12 months. The IV 2SLS estimation uses three instruments, including same-sex siblings, twin, and female first child. Covariates controlled include age, dummy of education level, under-age marriage, marital status, homogamous education, and household wealth index. Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Additional results

	(1)	(2)	(3)	(4)	(5)	(6)
	IV 2SLS (with three instruments)					
	Panel A					
	Afraid of spouse		Serious injury		Seek help	
No. of children	0.019	0.021	0.007	0.010	0.003	0.006
	(0.014)	(0.014)	(0.010)	(0.010)	(0.015)	(0.015)
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204
2SLS F-stat	1.50	4.08	0.45	2.13	1.71	5.73
Overidentification test (p-value)	0.30	0.26	0.66	0.72	0.23	0.22
Endogeneity test (p-value)	0.49	0.38	0.78	0.66	0.98	0.74
	Panel B					
	Women's attitude justifying domestic violence		Female labour force participation		Egalitarian decision making	
No. of children	0.038**	0.037**	-0.043***	-0.042***	0.017	0.012
	(0.017)	(0.018)	(0.014)	(0.014)	(0.017)	(0.017)
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1567	1567	1567	1567	1567	1567
Cluster	204	204	204	204	204	204
2SLS F-stat	11.06	5.58	21.37	18.81	5.47	4.54
Overidentification test (p-value)	0.99	0.99	0.29	0.21	0.33	0.34
Endogeneity test (p-value)	0.16	0.14	0.27	0.15	0.93	0.93
	Panel C					
	Men's attitude justifying domestic violence		Coercive control		Spouse is often drunk	
No. of children	0.015	0.027	0.013	0.013	0.016	0.022
	(0.011)	(0.018)	(0.012)	(0.013)	(0.017)	(0.018)
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1198	1198	1567	1567	1567	1567
Cluster	202	202	204	204	204	204
2SLS F-stat	10.77	3.57	0.78	4.78	1.54	2.70
Overidentification test (p-value)	0.07	0.06	0.98	1.00	0.08	0.09
Endogeneity test (p-value)	0.54	0.55	0.42	0.32	0.73	0.71

Note: Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Covariates controlled include age, dummy of education level, under-age marriage, marital status, homogamous education, and household wealth index.

The number of children a woman has may have a broader impact than just the occurrence of violence, as it can also directly affect some of its consequences. For example, women with more children may be less likely to leave an abusive relationship due to concerns about their children's safety and wellbeing, which can lead to prolonged exposure to violence and increased risk of serious injury. However, on the other hand, having children can also motivate women to seek help or leave an abusive situation to protect their children. Women may feel a greater sense of responsibility to ensure the safety and wellbeing of their children, which can motivate them to take action and seek support. Furthermore, having children may also impact the type of abuse a woman experiences. For example, an abuser may use the children as leverage or threaten to harm them as a way to control and intimidate the woman. This can be particularly traumatic for the woman and impact her willingness to seek help or leave the relationship. The results presented in **Table 6**, Panel A suggest that there is no significant evidence of a causal relationship between the number of children and the consequences of domestic violence experienced by women. Contrary to some prior hypotheses, the study finds no evidence to support the notion that having more children is associated with an increased fear of the spouse, an increased likelihood of experiencing a serious injury, or a greater willingness to seek help.

In addition to examining the direct impact of the number of children on the prevalence of domestic violence, I also explore the potential mediating factors contributing to this phenomenon from both the victim and perpetrator perspectives. The findings in **Table 6,** Panel B and C reveal that the number of children a woman has can increase her attitudes justifying domestic violence[3]. However, no evidence suggests that the number of children impacts men's attitudes justifying domestic violence. The significant positive relationship between the number of children and women's attitudes towards domestic violence suggests that women with more children tend to be more accepting of domestic violence, potentially as a means of resolving conflicts in their relationships. The more children a woman has, the more likely she may feel that her husband's physical violence is justifiable, even in situations that would otherwise be considered unjustifiable. This relationship may reflect cultural or social norms that prioritise the preservation of the family unit over individual rights or safety. Women with

[3] Attitude justifying domestic violence measures the perceptions of women or men towards domestic violence and reflects their beliefs about the circumstances under which their husbands or partners are justified in using violence against them. Specifically, women and men were asked to indicate whether men are justified in hitting or beating women if women went out without informing them, neglected their children, argued with them, refused sex, or burnt the food.

more children may also experience greater stress due to the demands of parenting, financial pressures, and household responsibilities. These stressors can create tension in relationships and may lead to an increased tolerance for violence to resolve conflicts. Moreover, women with more children may be more economically dependent on their partners or spouses and less able to leave an abusive relationship due to financial constraints. This dependence can make them more tolerant of domestic violence as they may feel they have no choice.

The results in **Table 6** also show significant evidence that having more children decreases female labour force participation. In particular, I find that each additional child reduces the likelihood of women being in the labour force by approximately 4 percentage points, equivalent to a 15 percent decrease from the mean value. This implies that having more children can limit women's opportunities to participate in the labour force, potentially due to the increased demands of childcare, which make it difficult for women to balance work and family responsibilities. The decrease in women's participation in the labour force due to more children can have adverse effects, including limiting their financial independence and leaving them economically vulnerable. This can also limit their ability to leave abusive relationships, as they may lack the financial resources to support themselves and their children independently. It is essential to conduct further research to explore how offering support to women with children who aspire to join or remain in the workforce, through initiatives like affordable childcare and flexible work arrangements can increase their participation rates and potentially decrease the prevalence of domestic violence.

As indicated in **Table 6,** the number of children does not seem to directly affect the level of control that the perpetrator has over the victim, the decision-making dynamics in the relationship, or the frequency of alcohol consumption by the perpetrator. Although these outcomes are often linked to increased stress and conflict, which can lead to domestic violence, they may not fully capture the level of stress or conflict in the relationship. Future research could consider utilising measures that could capture this mechanism more accurately. For example, assessments of economic stress, mental health, and substance abuse could provide a more comprehensive understanding of this channel of domestic violence.

Table 7: Family size, child abuse, and neglect

	(1)	(2)	(3)	(4)	(5)	(6)
	IV 2SLS (with three instruments)					
	Panel A					
	Psychological aggression (5-14 y.o.)		Physical punishment (5-14 y.o.)		Any violent discipline (5-14 y.o.)	
No. of children	0.008	0.016*	0.026**	0.028**	0.012*	0.017**
	(0.009)	(0.010)	(0.011)	(0.011)	(0.007)	(0.008)
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1830	1830	1830	1830	1830	1830
Cluster	204	204	204	204	204	204
2SLS F-stat	5.77	6.67	6.49	8.58	4.63	4.53
Overidentification test (p-value)	0.77	0.27	0.13	0.00	0.38	0.05
Endogeneity test (p-value)	0.54	0.84	0.88	0.46	0.70	0.28
	Panel B					
	Attitude justifying child abuse (5-14 y.o.)		Child labour (5-14 y.o.)		Child neglect (2-4 y.o.)	
No. of children	0.025**	0.025**	0.001	0.014	0.007	0.003
	(0.010)	(0.010)	(0.012)	(0.012)	(0.011)	(0.011)
Covariates	No	Yes	No	Yes	No	Yes
Region fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1830	1830	1830	1830	1316	1316
Cluster	204	204	204	204	200	200
2SLS F-stat	4.15	1.99	7.41	9.66	2.42	2.16
Overidentification test (p-value)	0.47	0.52	0.22	0.44	0.02	0.09
Endogeneity test (p-value)	0.99	0.98	0.46	0.55	0.05	0.20

Note: Standard errors clustered at the enumeration areas are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Covariates controlled include children's age, children's sex, and household wealth index.

Apart from exploring violence against women, I also investigate the effects of family size on violence suffered by children, specifically in the form of child abuse and neglect. Similar to the case of IPV, the resource dilution theory suggests that caregivers may be more likely to resort to violent discipline towards their children when they feel frustrated or angry, and that this may be more likely to occur in households with larger numbers of children. This hypothesis is based on the idea that as the number of household members increases, resources become more diluted and are, therefore, less available to each individual. This can lead to feelings of stress, strain, and resource scarcity, which can, in turn, increase the likelihood of violent discipline to control children's behaviour. **Table 7** presents the results of the estimations suggesting that having more children increases the likelihood of violent discipline

by approximately 1.7 percentage points, mainly driven by an increase in the probability of physical punishment[4] rather than psychological aggression[5] towards children. Furthermore, it can be inferred that a larger family size can directly contribute to a more permissive attitude towards child abuse among the primary caretakers. The results show that the likelihood of justifying child abuse increases by approximately 2.5 percentage points with each additional child in a family. However, the findings suggest no evidence of a causal relationship between family size and child labour or neglect.

6.4 Heterogenous effects

a. Household characteristics

Figure 6 presents the heterogenous effects analysis to examine the relationship between family size and domestic violence, both in a lifetime context and within the last 12 months. The analysis takes into account various demographic characteristics. The aim is to investigate whether different effects exist based on the number of children, the presence of children under 5 years old, and the household wealth index.

The findings reveal that the impact of the number of children on intimate partner violence (IPV) over a lifetime is more pronounced among women who already have children. On average, the presence of an additional child significantly increases the likelihood of domestic violence by 5.5 percentage points. This result suggests that expanding the family size when children are already present has a notable and statistically significant effect on the occurrence of domestic violence. Moreover, the findings indicate that when women have children under the age of 5, having an additional child result in a higher prevalence of intimate partner violence (IPV) over their lifetime. This increase amounts to 10.5 percentage points, which is about 5 percentage points higher than the average effect observed. These results suggest that the presence of extra children diminishes the available resources within the family, leading to heightened tension and stress, ultimately contributing to domestic violence. Particularly, the burden placed on the family is intensified when there are children under 5

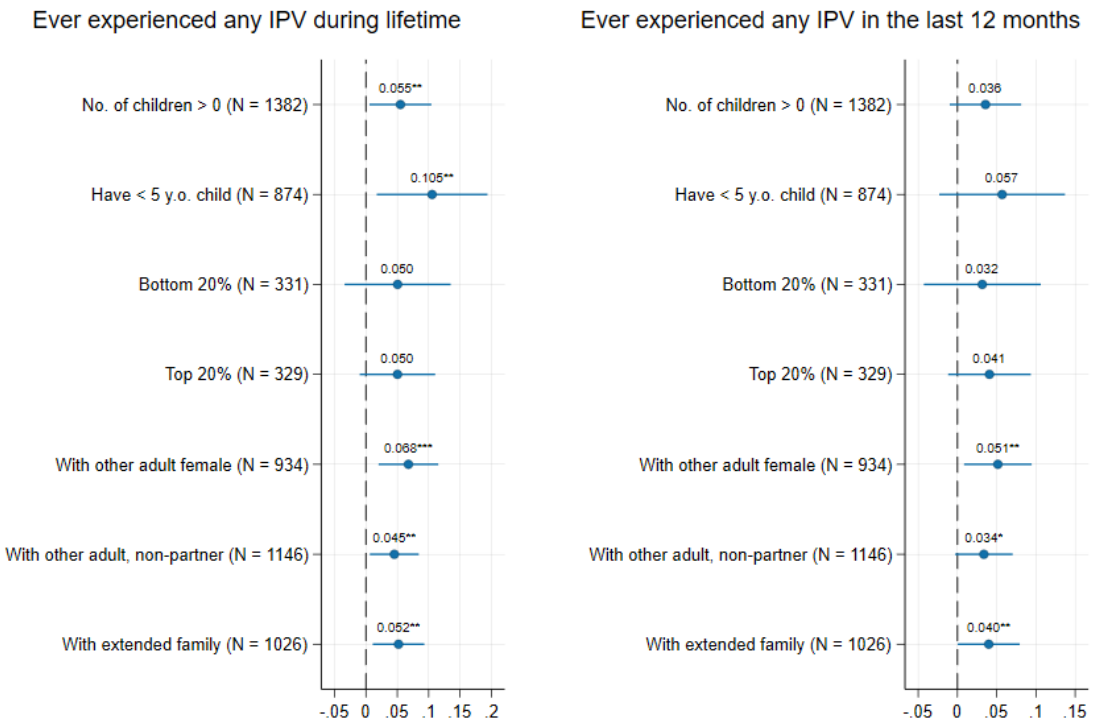
[4] Physical or corporal punishment refers to actions intended to cause physical pain or discomfort but not injury, such as shaking, hitting, slapping on the hand/arm/leg, hitting on the bottom or elsewhere on the body with a hard object, spanking or hitting on the bottom with a bare hand, hitting or slapping on the face, head or ears, and beating over and over as hard as possible.

[5] Psychological aggression includes actions such as shouting, yelling, or screaming at a child, as well as using derogatory or offensive names such as “dumb” or “lazy”.

years old, as they typically require more attention and time from the parents. As a result, the strain on the family's resources and the increased demands of caring for young children can exacerbate existing tensions and contribute to a higher prevalence of IPV.

The heterogeneity analysis based on the household wealth index did not yield any statistically significant findings, although the estimated values were in close proximity to the main results. This lack of significance may be attributed to the limited sample size, which ultimately reduces the statistical power of the analysis. However, despite this limitation, it can tentatively be inferred that the relationship between the number of children and domestic violence remains consistent across different levels of household wealth. In other words, the impact of the number of children on domestic violence does not appear to be influenced by the financial resources available to the household. This finding suggests that the resource dilution theory, which posits that increasing family size reduces the resources available to each family member, applies regardless of the economic circumstances of the household. It is important to note that the lack of statistical significance should be interpreted with caution, and further studies with larger sample sizes are recommended to strengthen the evidence base and provide a more comprehensive understanding of this relationship.

Figure 6: Heterogenous effects of family size on IPV



b. Characteristics of other adult and extended family in the household

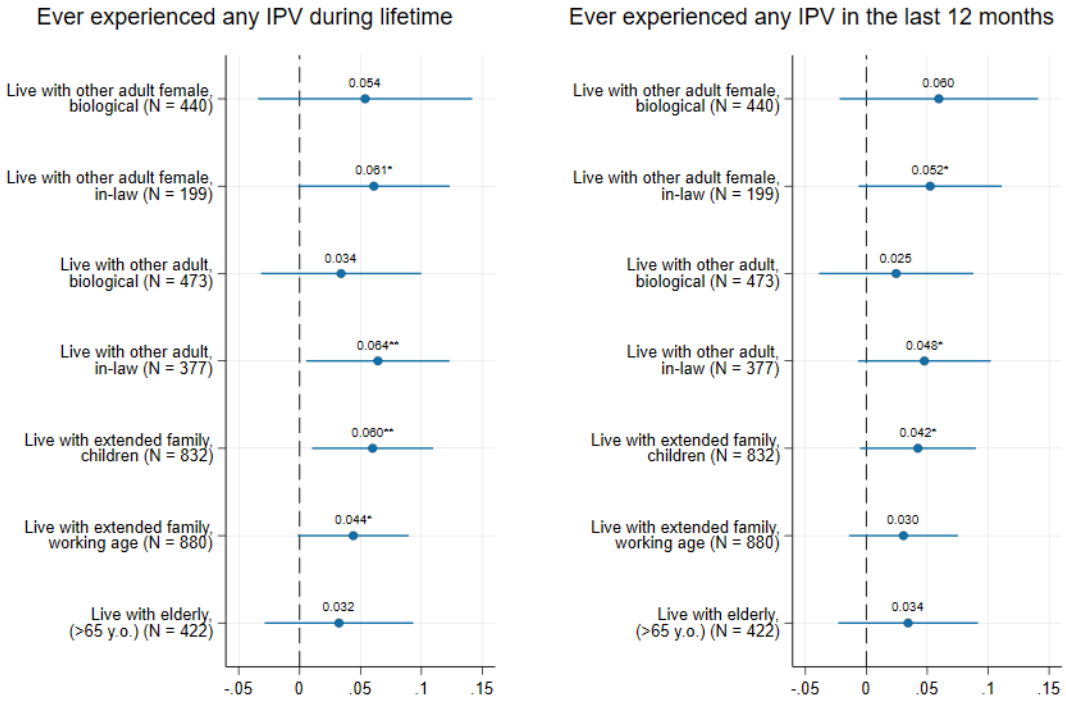
When examining the role of the extended family in relation to domestic violence, the influence of family size can have conflicting outcomes. On one hand, a larger number of individuals residing in the household, whether they are biologically related or not, can escalate the pressure on adults to fulfill their family's demands, potentially resulting in an increase in domestic violence incidents. On the other hand, the proximity of extended families living together can potentially alleviate this burden by enabling the sharing of resources among families, thereby reducing stress and instances of domestic violence.

To analyse the heterogeneity in this context, I examine whether the impact of additional children on the prevalence of domestic violence differs when women cohabit with other adult females, non-partner adults, or other extended family members (see **Figure 6**). Living with another adult female is defined as having a female aged 15 years and above cohabiting with the respondents, irrespective of their relationship to the household head. The findings reveal that when residing with another adult female, the presence of an extra child results in a 6.9 percentage point increase in the IPV over the course of a lifetime, and a 5.3 percentage point increase within the past 12 months. These figures are approximately 2 percentage points higher than the average impact observed. Similarly, when living with other non-partner adults, defined as adults aged 15 years and above without a spousal relationship to the respondents, a significant effect of an additional child is also observed, albeit with little deviation from the average impact. Moreover, if an individual lives with an extended family, which encompasses individuals beyond the nuclear family (i.e., excluding the household head, spouse, and children), the presence of additional children also leads to a higher prevalence of IPV, both over a lifetime and in the past 12 months. However, the results only show a slightly larger effect compared to the average impact, with the difference remaining below 1 percentage point.

The varying impact of additional children on domestic violence prevalence in different household compositions can be attributed to multiple factors. When women cohabit with other adult females, several dynamics contribute to the increased risk of IPV when more children are present. Increased caregiving responsibilities may create a greater burden, leading to higher tensions and a higher likelihood of IPV. Conflicting parenting styles or beliefs between cohabiting women can contribute to disagreements and conflicts, further increasing the risk of domestic violence. In households with cohabiting adult females, the presence of additional children may exacerbate power dynamics and control issues. The responsibility for managing

and disciplining the children might become a source of contention, leading to power struggles and potential abusive behaviours. These dynamics can contribute to the observed increase in IPV prevalence. Similarly, when women live with other non-partner adults or extended family members, the limited emotional and financial resources within the household, coupled with inadequate coping mechanisms, can further heighten the risk of domestic violence. The strain on resources, such as time, money, and emotional support, may contribute to increased stress, frustration, and conflict within the household, thereby increasing the likelihood of IPV.

Figure 7: Heterogenous effects, by characteristics of other adult and extended family



In order to gain a deeper understanding of the results, I conducted further analysis by disaggregating the sample based on the characteristics of other adults and extended families involved in the households. **Figure 7** presents the disaggregation of the presence of other adult women and other non-partner adults based on their relationship with the women respondents, whether they are biological relatives or in-laws. However, it is crucial to recognize the constraints inherent in the survey design, as it solely captures data regarding the connection between each individual and the head of the household. This limitation poses a challenge in accurately identifying the relationship between the female respondents and other adults in the household. To maintain the integrity of the variables, I narrowed down the observations to instances where the female respondent was either the spouse or child of the household head, resulting in a smaller sample size. The results indicate that the significant effect observed

among women living with other adult females, as shown in **Figure 6**, is primarily driven by those females who cohabit with female in-laws. Similarly, for the findings related to other non-partner adults, the significant effect is primarily influenced by the presence of non-partner adults who are in-laws. Additionally, **Figure 7** presents the results pertaining to the extended family, which were further categorised by age groups: children, working-age individuals, and the elderly. The findings indicate that the significant effect observed in **Figure 6** stems predominantly from females who live with extended family members who are children (under the age of 15).

The findings align with the previously mentioned potential explanation, which suggests that conflicting parenting styles or beliefs among cohabiting women can lead to disagreements and conflicts, thereby increasing the risk of domestic violence. Notably, power struggles are more likely to arise when women cohabit with female in-laws. Furthermore, in households where there are already children, whether they are biological or extended family members, the arrival of an additional child amplifies the strain placed on the family. This is due to the increased attention and time that children typically demand from their parents. Consequently, this heightened burden on the family can contribute to an elevated risk of domestic violence. This analysis offers valuable insights into the specific relationships and dynamics within households of varying compositions, shedding light on the factors that drive the observed effects of additional children on the prevalence of domestic violence. By examining the characteristics of other adults and extended family members, we gain a better understanding of the nuanced factors that contribute to the varying impact of additional children in different contexts. Such knowledge can inform the development of targeted interventions and support systems that address the specific challenges faced by different types of households, ultimately promoting healthier and safer family environments.

7 Conclusion

This paper seeks to uncover the relationship between family size and the prevalence of domestic violence. According to theoretical predictions derived from the resource dilution theory, having children is associated with reduced resources leading to a higher likelihood of domestic violence due to stress, frustration, and a lower likelihood of resolution. The OLS estimation results reveal a positive correlation between the number of children and the prevalence of domestic violence against women. However, the OLS estimates are potentially

biased due to the endogeneity of family size. Therefore, instrumental variable (IV) strategies are used to identify a direct causal link between family size and an increased prevalence of intimate partner violence. The IV estimates suggest that there is, on average, a 5-percentage point increase in domestic violence, equivalent to a 13 percent increase from the mean value, directly attributable to family size. The IV estimate is larger than the OLS estimate, indicating an underestimation of the true effect of family size on domestic violence.

Further analysis indicates that the significant effect on intimate partner violence is primarily driven by physical or sexual forms of abuse, which are often associated with serious injuries to the victim. Additionally, the IV estimates indicate that larger families tend to have attitudes that condone violent behaviour. The normalisation of violent behaviour in larger families may be linked to a lack of resources available to effectively address and resolve conflicts, ultimately contributing to an increased likelihood of violent incidents occurring. Having more children in a family is linked to a decrease in the likelihood of women being in the labour force by 4 percentage points, a 15 percent reduction from the average value. This can lead to harmful effects such as limited financial independence, leaving them vulnerable to abusive relationships, which requires further research. It is also observed that the presence of other household members is a significant factor in determining the impact of family size on domestic violence. Consistent with the resource dilution theory, this suggests that when more people live in the same household, there is a higher likelihood of resource contestation, leading to increased stress and, subsequently, domestic violence.

Drawing on the results of this study, it is imperative to adopt a comprehensive approach to domestic violence prevention, which involves a combination of family planning, economic empowerment, and addressing social norms. One crucial aspect of this approach is promoting access to and adoption of contraception, which can help individuals plan their families and avoid unintended pregnancies. This, in turn, can reduce the stress and financial burden associated with larger families and lower the risk of domestic violence. Another important intervention is facilitating women's participation in the workforce through measures such as affordable childcare and flexible work arrangements. By increasing women's financial independence, these initiatives can potentially reduce their vulnerability to domestic violence and enhance their overall wellbeing. Furthermore, it is essential to recognise the role of social norms in perpetuating domestic violence. Addressing these norms can be challenging, but changing attitudes and behaviours that contribute to this issue is crucial. This may involve

promoting gender equality and challenging stereotypes about gender roles, as well as promoting healthy communication and conflict-resolution skills.

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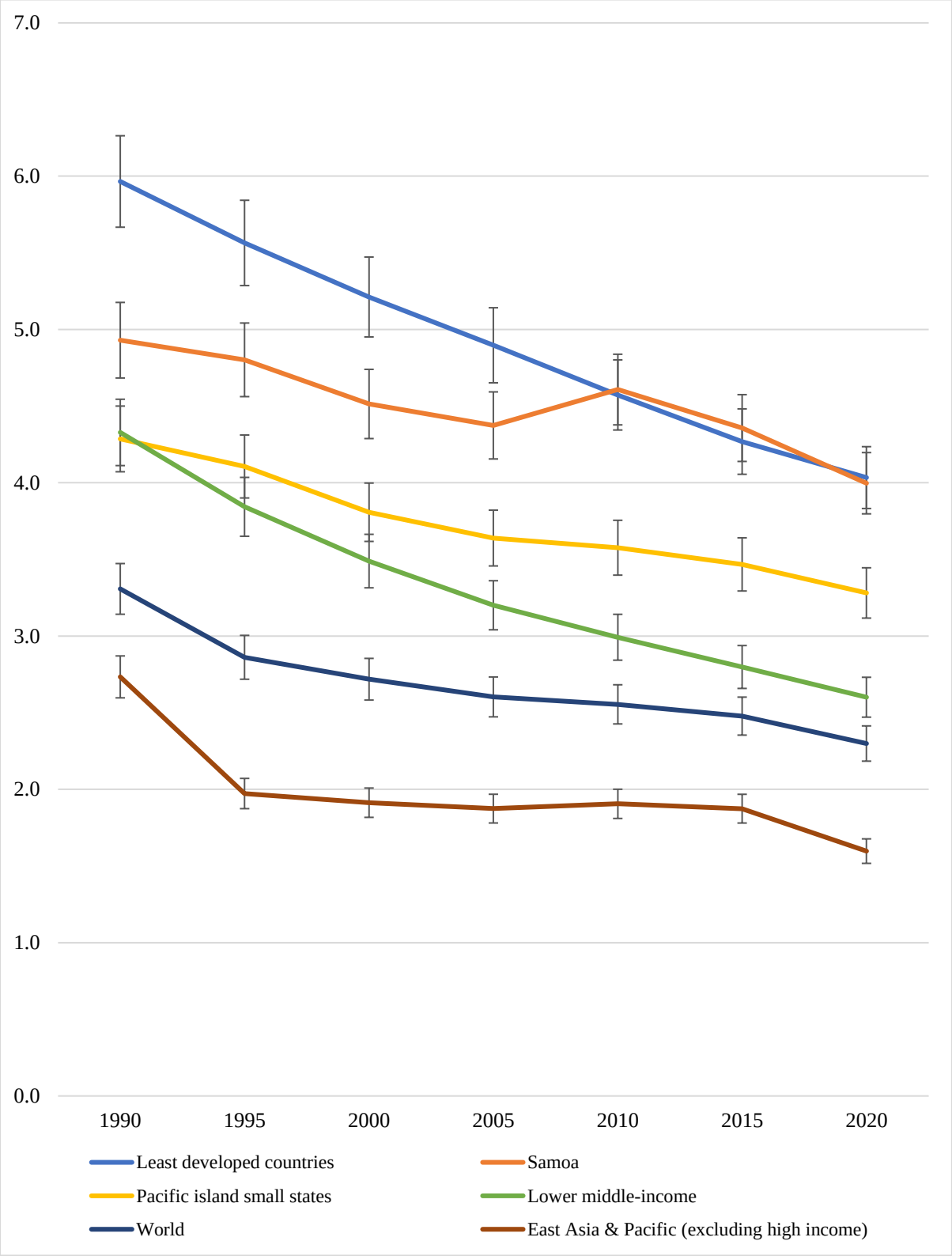
Appendix

Table A.1: Types of domestic violence

Outcome	Description	Unit
Emotional violence	Woman aged 15-49 is categorised to have ever experienced emotional violence from their spouse if she responded "Yes" to any of the following questions: Did your (last) (husband/partner) ever… a. Say or do something to humiliate you in front of others? b. Threaten to hurt or harm you or someone you care about? c. Insult you or make you feel bad about yourself?	Dummy [Yes=1; 0=otherwise]
Physical violence	Woman ages 15-49 is categorised to have ever experienced physical violence from their spouse if she responded "Yes" to any of the following questions: 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, drag you, or beat you up? f. Try to choke you or burn you on purpose? g. Threaten or attack you with a knife, something sharp or other weapons?	Dummy [Yes=1; 0=otherwise]
Sexual violence	Woman aged 15-49 is categorised to have ever experienced sexual violence from their spouse if she responded "Yes" to any of the following questions: Did your (last) (husband/partner) ever… a. Physically force you to have sexual intercourse with him when you did not want to? b. Physically force you to perform any other sexual acts you did not want to? c. Force you with threats or in any other way to perform sexual acts you did not want to?	Dummy [Yes=1; 0=otherwise]
Any form of domestic violence	Woman aged 15-49 years who have experienced any specified acts of physical, sexual, or emotional violence committed by their current husband/partner.	Dummy [Yes=1; 0=otherwise]

Figure A.1: Total Fertility Rate, Births per Woman



Note: Pacific island small states include Fiji, Kiribati, the Marshall Islands, Federated States of Micronesia,Nauru, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.

Source: United Nations Population Division, 2022. Retrieved from https://population.un.org/wpp/.