# Gender norms, bargaining power and intimate partner violence

## A case study in Papua New Guinea

Alexander Smith

**Abstract**

Intimate partner violence against women is a global scourge, but it is particularly high in Papua New Guinea (PNG). Policymakers often focus on female economic empowerment as one important mechanism for reducing the prevalence of violence, however this ignores entrenched gender norms which expect male partners to be the primary breadwinners of the household. This paper is the first to compare competing household bargaining and gender norms theories in PNG. Using the 2016-18 Demographic and Health Survey, I find higher levels of household wealth and employment are associated with higher levels of intimate partner physical (and/or sexual) violence against women. Furthermore, I find that women who report earning more cash than their partner experience rates of violence 17.2 percentage points higher than those who did not break this norm. These findings imply that boosting the economic status of women alone is insufficient to reduce intimate partner violence against women in PNG.

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# Gender norms, bargaining power and intimate partner violence: A case study in Papua New Guinea.

## Alexander Smith

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The views expressed in discussion papers are those of the author only.

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# 1 Introduction

Women in Papua New Guinea (PNG) experience amongst the highest rates of intimate partner violence (IPV) globally, however empirical research into the relationship between female status and IPV in PNG is scarce. By focusing on PNG, this paper seeks to add to the global understanding of this relationship by shedding light on where it is most prominent.

Firstly, I investigate the presence of household bargaining by analysing the association between women's status and intimate partner violence (using education, employment and household wealth as explanatory variables). Secondly, the study investigates the presence of gender norms by analysing the association of broken norms and intimate partner violence (using relative education, relative employment and relative earnings as explanatory variables). I measure intimate partner violence using reported instances of physical (and sexual) violence experienced in the last 12 months by female respondents to the PNG 2016-18 Demographic and Health Survey (DHS).

I find higher levels of household wealth and women's employment are associated with higher levels of IPV. I find similar, but weaker relationships between higher education and increased levels of IPV.

I also find that the breaking of gender norms is associated with higher recent intimate partner physical (and/or sexual) violence. Women who report earning more cash than their partner experience rates of intimate partner physical violence 17.2 percentage points (or 38 per cent) higher than those who do not. Women who report being employed in the formal sector while their partner is not, experience rates of violence 9.0 percentage points (or 20 per cent) higher than those who do not. I find similar but weaker relationships for broken norms around other forms of employment, education and IPV. Estimates are stronger for explanatory variables that measure more tangible financial resources (such as earnings, compared to level of education).

I find similar estimates when measuring associations between economic outcomes and emotional violence. Women who report earning more cash than their partner experience rates of violence 20.2 percentage points (or 49 per cent) higher than those who do not. I find comparable estimates when

using lifetime experiences of violence as an explanatory variable (rather than violence experienced in the 12 months prior to the survey).

I argue that gender norms are a significant driver of IPV in PNG. Women with higher status do not experience lower rates of violence, as would be expected if they were able to use this status to 'protect' themselves from their spouse.

I investigate alternative explanations that explain this relationship. One possible explanation is that violent men are likely to have poor employment prospects, thus forcing women to earn more than their partner. However, I find that 'norm-breaking' men and women are older, have higher rates of employment, are more educated and more likely to live in urban areas, as compared to their counterparts in 'norm-observing' couples. Norm-breaking couples also have higher levels of household wealth than norm-observing couples. This implies that my results are not driven by women who are forced to work due their violent male partner's poor employment prospects.

A second explanation is that the effect of norm breaking increases violence for the whole household, not just women. However, I find that neither absolute improvements in status for women, nor breaking norms, are associated with a higher rate of violence experienced by men by their female partners.

A third explanation is that reporting effects may bias the estimates towards women with higher status. While there is consensus that violence is underreported, there is ambiguity around how the magnitude of underreporting changes with respect to household or individual characteristics (Palermo et. al. 2013). Intuitively, women with higher levels of education would be more likely to identify and report instances of violence. However, Agüero & Frisancho (2022) found that higher educated women in Peru were more likely to under report domestic violence, which they speculated was due to the social stigma attached to abuse (p. 1,583).

This paper contributes to a growing body of empirical evidence arguing that entrenched gender norms can increase the prevalence of IPV when women gain economic status, in spite of theorised improvements in bargaining power. Despite PNG recording some of the highest rates of IPV globally, this is the first paper to compare competing household bargaining and gender norms

theories in the country. This paper supports existing qualitative and anthropological literature in PNG, which views gender norms as the prevailing mechanism for understanding the association between female empowerment and IPV. I conclude by arguing that policies that seek to reduce IPV against women purely via economic empowerment may have adverse effects. Instead, policymakers should examine how gender norms interact with economic empowerment and consider pairing efforts to improve the status of women with measures that reshape norms (via education), support women at immediate risk (via the funding of women's shelters) and reduce the transaction costs of separation (via divorce law reform).

## 2 Background

Globally, 27 per cent of ever-partnered women are estimated to have experienced physical and/or sexual violence at the hands of their male partner, with 13 per cent experiencing violence in the 12 months prior to being surveyed. Women in low-income countries report higher rates of lifetime and recent physical and/or sexual violence (Sardinha et al. 2022, p. 803). Policymakers frequently focus on female economic empowerment as a mechanism for reducing intimate partner violence, under the assumption that increasing women's independence enables victims to leave (or credibly threaten to leave) violent relationships. The problem is particularly urgent in PNG, with women experiencing amongst the highest rates globally (Sardinha et al. 2022, p. 809). However, evidence on the relationship between female empowerment and intimate partner violence in developing countries is mixed (Vyas and Watts 2009, p. 577). Two main theories emerge from existing literature, the household bargaining theory and the gender norms (or 'male backlash') theory[1].

A game theorist perspective of the family has existed since the seminal work of Becker (1981) and has since been extended to understand the economic implications of all areas of married life. Farmer and Tiefenthaler (1997) extended the household bargaining model to specifically consider the

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[1] Baranov et al. 2021, p. 3 provides a useful summary of the mechanisms linking violence to cash transfers provided to women, one measure of female economic empowerment.

relationship between economic empowerment and violence. Under conventional bargaining theory, the cooperative family utility function captures the preferences of both individuals and provides each individual with at least as high a level of utility as that which could be achieved outside the marriage. Hence, if the social and or economic prospects of a woman increase, the marginal benefit of the union decreases for the woman. In the model of a non-cooperative family unit presented by Farmer and Tiefenthaler (1997), the possible utility achieved outside the marriage is the woman's 'threat point' and determines the level of violence she will tolerate for a given economic transfer from the man. When this 'threat point' converges with the utility obtained within the union, the man's ability to be violent without consequence decreases.

Empirical evidence for bargaining exists across developed and developing economies. In Ecuador, Hidrobo et al. (2016) used a randomised experiment to determine that cash transfers to women reduced their experience of physical and/or sexual violence by 6 – 7 percentage points. A mixed-method review of 22 cash transfer studies by Buller et al. (2018) found overwhelming, but not universal support for cash transfer schemes reducing the prevalence of IPV. Using a regression discontinuity design comparing school age women during a compulsory schooling reform in Peru, Weitzman (2018) found increasing women's schooling reduced both their recent and longer-term probability of psychological, physical and sexual intimate partner violence. In Canada, Bowlus and Seitz (2006) found that employment reduced the likelihood of violence for women, but only if the employment began before abuse started. In the US, Aizer (2010) found a reduction in the relative wage gap between domestic partners reduced domestic partner violence against women. Aizer highlighted that it is not absolute wages, but potential wages that drive bargaining power, and that labour market improvements increase bargaining power regardless of whether the woman works. A meta-analysis conducted by Eggers del Campo & Steinert (2022) of 19 RCTs across the developing world found increased economic empowerment significantly reduced a pooled measure of emotional, physical and sexual violence (although some individual studies reported increases in IPV).

An alternative theory, often called the 'male backlash', or gender norms

theory proposes that men respond to women who they perceive as undermining their status by employing violence to reassert control. Macmillan and Gartner (1999, p. 949) identify that a wife's economic independence challenges 'culturally prescribed norms of male dominance and female dependence' and that 'violence may be a means of reinstating his authority over his wife'. While the household bargaining theory focuses on bargaining power relative to all outside options[2], the gender norms theory is concerned with relative status within the union, a closed system.

Empirical evidence for the gender norms theory is found in both the developing and developed country context. In India, Dhanaraj & Mahambare (2022) found that women in paid employment face significantly higher levels of partner violence than those solely engaged in domestic work. Dhanaraj & Mahambare also proposed a 'female guilt channel' and found that women with intermediate levels of education are more likely to justify violence against themselves if they are in paid employment (compared to those in domestic work). In Australia, Zhang & Breunig (2021) found that female partners that earnt more than their male spouse experienced a 35 per cent increase in the prevalence of intimate partner violence. Rather than focus on level changes, Zhang & Breunig's approach dealt with the potential non-linearities associated with gender norms, using the threshold when women earn more than 50 per cent of total household income as the treatment variable, while also highlighting that both bargaining and backlash could be present simultaneously.

There is significant qualitative evidence in anthropological literature supporting the dominance of the gender norms theory in PNG. Eves (2019) argues that men in PNG see power relations as a zero-sum game. Eves' field studies revealed that men feel resentful towards women when their status improves, such as 'a feeling that men are being left behind and masculine power eroded' following government policies that provide constitutional recognition of equality and improved access to employment for women (p. 1,375). Eves et al. (2018) identifies that in the PNG Highlands, men often stop contributing

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[2] Measured in absolute terms when assuming that the bargaining power of outside options are fixed.

financially to the household when their wife engages in paid labour, and then demand that their wives give them their incomes. If challenged, men will often respond with violence (Eves et al. 2018, pp. 29-31). Some evidence suggests that the practice of paying a bride price contributes to men's expectation that they acquire full control over their wife. In the Eastern Highlands, a survey by Eves and Titus (2020) found that 70.6 per cent of women agreed with the statement that the 'bride price gives the husband the right to boss his wife'. Zimmer-Tamakoshi (2012) notes that linking the changing status of women to increased gender violence ignores broader social trends that result in 'embattled masculinities' which promote violence against both female and males (p. 82).

While there is substantial qualitative evidence about attitudes towards violence, research on attitudes around women's exit options is far more limited. However, the rate of divorce and separation has increased significantly in the past 50 years, potentially demonstrating that access to, and/or attitudes towards divorce are gradually improving (refer Figure 1).

**Figure 1: Share of women divorced or separated in PNG**
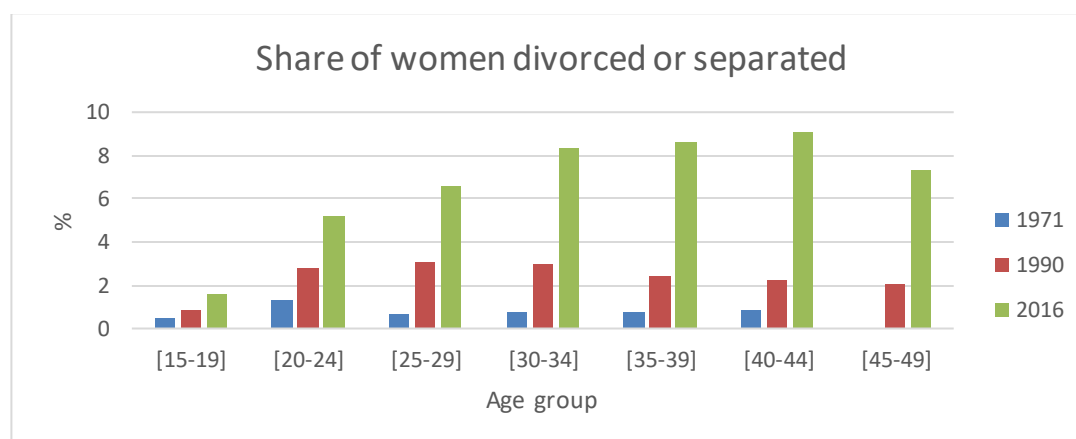


**Notes:** There is no data for the 45-49 age bracket from the 1971 survey. **Source:** UN Population Division (2024)

The PNG 2016-18 DHS reveals that similar numbers of men (73 per cent) and women (72 per cent) consider it justifiable for a male partner to beat his female partner[3]. However, this may be an underestimate, as 49 per cent of women married to men who say they do not think it is justifiable to beat

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[3] For at least one of five reasons: if their wife goes out without telling him, neglects the children, argues with him, refuses to have sex with him and/or burns the food.

women (under one of the five reasons listed), report at least one experience of lifetime intimate partner physical violence.

This paper seeks to add to the global understanding of this pressing issue. This study investigates the presence of household bargaining by analysing the associated change of level changes in status on intimate partner violence and investigates the presence of gender norms by analysing the associated change with broken norms. Both Aizer (2010) and Zhang & Breunig (2021) use predicted income, rather than reported income in their models, recognising that bargaining power is a function of a women's potential, rather than actual income. Using predicted income also controls for endogeneity issues associated with male backlash. As data on incomes is unavailable in PNG, this study employs multiple explanatory variables to help identify the relationship between empowerment and violence against women. My approach is consistent with Weitzman (2014), who used the 2005-06 India DHS to compare household bargaining and gender norms models and came to similar conclusions; that breaking norms around relative education, employment and earnings all led to higher levels of intimate partner violence against women.

# 3   Data

This research uses the PNG Demographic and Health Survey (DHS) 2016-2018[4]. The DHS is a nationally representative survey conducted by ICF, funded by USAID and implemented by the PNG National Statistical Office. The data collection for the Survey took place between October 2016 to December 2018. A total of 17,505 households were selected for the sample, of which 16,021 were successfully interviewed. From the interviewed households, 18,175 women aged 15 – 49 were identified for an individual interview, of which 15,198 completed an interview (a response rate of 84 per cent). In half of the selected households, all men aged 15 – 49 who were usual members of the households or who spent the night before the survey in the households, were

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[4]The Papua New Guinea 2016-18 Demographic and Health Survey can be accessed here: https://dhsprogram.com/publications/publication-fr364-dhs-final-reports.cfm

eligible for individual interviews. For the households identified for the male survey, 9,141 men aged 15 – 49 were identified, of which 7,333 were successfully interviewed (a response rate of 80 per cent).

Interviews were conducted in person by specially trained interviewers, and across all 22 provinces. The women's questionnaire collected information on background characteristics, and a range of health topics including vaccinations, marriage and sexual activity, women's work, birth history and domestic violence. The men's questionnaire collected similar information but was shorter as it did not collect data on maternal and child health or domestic violence. One eligible woman (between 15 – 49) per household in the subsample of households selected for the men's survey was selected for the domestic violence module. The interview was not completed if privacy could not be obtained. 4,873 women completed the module, of which 3,642 were partnered at the time of the survey. Of this group, 2,519 women were partnered to men who completed the men's questionnaire. The models used in this research remove a further handful of observations due to non-completeness. Appendix A includes a table of descriptive statistics[5].

The domestic violence module asks respondents thirteen questions relating to their experience of violence perpetrated by their male partner or husband, including emotional, sexual and physical violence[6]. Respondents identify whether they have experienced violence 'often' in the last 12 months, 'sometimes' in the last 12 months, 'previously' but not in the last 12 months, or 'never'. I mark any respondent who reports 'often' or 'sometimes' to at least one of the thirteen questions, as a having experienced intimate partner violence in the last 12 months.[7] Given education and employment are time variant, capturing only instances of violence in the last 12 months, as opposed to lifetime, reduces the risk of endogeneity and potential reverse causality. Practically, there is little difference between the share of women who have

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[5] Note that the descriptive statistics in Appendix A display weighted figures, totalling 3,371 women.

[6] The full list of domestic violence questions asked of respondents can be found in Appendix B.

[7] I retain partially complete responses, of which there are 28 for questions on physical (and/or) violence, and 3 for questions on emotional violence. I exclude individuals who do not have at least partially completed responses to both emotional and physical/sexual violence questions to ensure that comparison between emotional and physical/sexual estimates use the same sample.

experienced violence between these time horizons. 56 per cent of women in my sample report experiencing intimate partner physical (and/or sexual) violence at least once in their lifetime, while 49 per cent report experiencing intimate partner physical violence in the last 12 months. Separately, 51 per of women in my sample report experiencing intimate partner emotional violence at least once in their lifetime, while 45 per cent report experiencing intimate partner emotional violence in the last 12 months. I separately mark respondents who report any form of emotional violence, and any form of physical (including sexual) violence.

For the household bargaining model, I use the following variables:

- Household wealth quintile (DHS variable HV270) ('wealth quintile')

- Years of education (V133) ('years of education')

- Employment status (formal and/or informal) (V025) ('employment')

- Formal employment status (V716) ('formal sector employment')

- Cash employment status (V741) ('cash employment')

For household wealth, I employ the wealth index calculated by the DHS program based on the number of consumer goods owned by the household[8]. Note that this does not distinguish the wealth of the female respondent with that of the male partner or household. I measure education as the number of years of completed schooling (including tertiary education). The average female respondent has completed approximately 5 years of education. To measure employment, I use a binary variable indicating whether the respondent stated that they were employed, or not. 32 per cent of my sample of women reported being employed. To measure formal sector employment, I use a binary variable indicating whether the respondent stated that they were employed in a formal sector occupation, which I assume as any occupation other than subsistence agriculture and fishery workers (refer to Appendix C for a full list of occupations). Of the 29 occupations listed in the DHS, subsistence agriculture and fishery workers make up 42 per cent of the total number of

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[8] The Principal Component Analysis (PCA) used to construct the wealth index for the 2016-18 PNG DHS can be found here: https://dhsprogram.com/topics/ wealth-index/Wealth-Index-Construction.cfm

employed women. 20 per cent of my sample of 3,642 women reported being formally employed. To measure cash employment, I use a binary variable indicating whether the respondent stated that they earnt cash, or cash and in-kind remuneration, for their work. 16 per cent of employed respondents stated that they earned cash, or cash and in-kind remuneration for their work.

Following the approach taken by Zhang & Breunig (2021), for the gender norms model I construct binary variables indicating when a female respondent breaks a gender norm. In particular, I create binary treatment variables indicating whether the female respondent has more than her male partner of any of the following:

- Cash earnings (V746) ('earnings')

- Years of education (V133 and V715 (alternative is MV133)) ('education')

- Employment status (formal and/or informal) (V025 and V704 (alternative is MV025)) ('employment')

- Formal employment status (V716 and V704 (alternative is MV716)) ('formal sector employment')

- Cash employment status (V741 and MV741) ('cash employment')


The gender norms model requires information on both female respondents and their male partners. The survey captures the demographic and health data of male partners via two methods. Firstly, the survey asks female respondents to report the basic employment and education statistics of their male partner. Secondly, a subset of households was selected to be surveyed for both women and their male partners. Male survey respondents report their characteristics in an interview of their own, covering demographics, education, employment and attitudes towards violence, amongst other health topics. Owing to a larger dataset, I use the male characteristics as described by female respondents, for education, employment status, and formal employment status. I use male responses for cash employment status, as this question is not asked in the female survey. The DHS does not collect data on incomes, other than the nature of remuneration and occupation. Nor are there other public datasets available for matching DHS survey respondents

with income and/or tax data. However, the DHS asks female respondents whether they 'earn more cash than their partner'. I take a positive answer as a broken norm.

I measure age in years (between 15 – 49) (V012). I include a dummy variable for whether the respondent is from a rural area or not (V025).

Across all models, the prevalence of violence experienced in the 12 months prior to the survey decreases with age (Figure 2), and is higher for urban respondents (Figure 3).

**Figure 2: Recent intimate partner physical violence – by age**

Prevalence of recent intimate partner physical violence by age
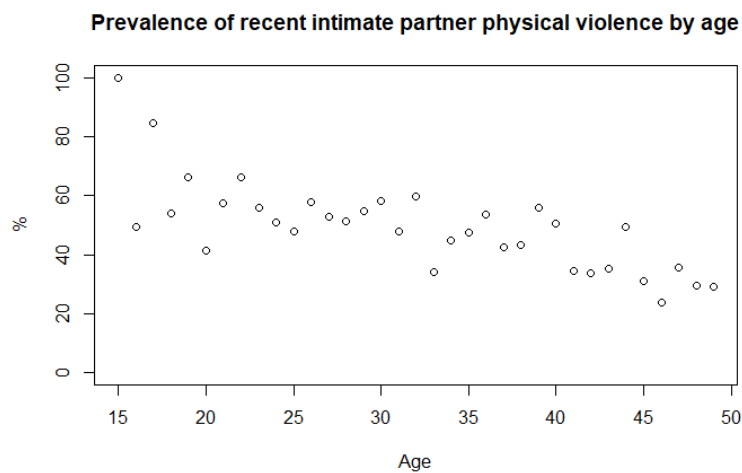
**Figure 3: Recent intimate partner physical violence – by region**

Prevalence of recent intimate partner physical violence by region

Urban (left) / Rural (right)
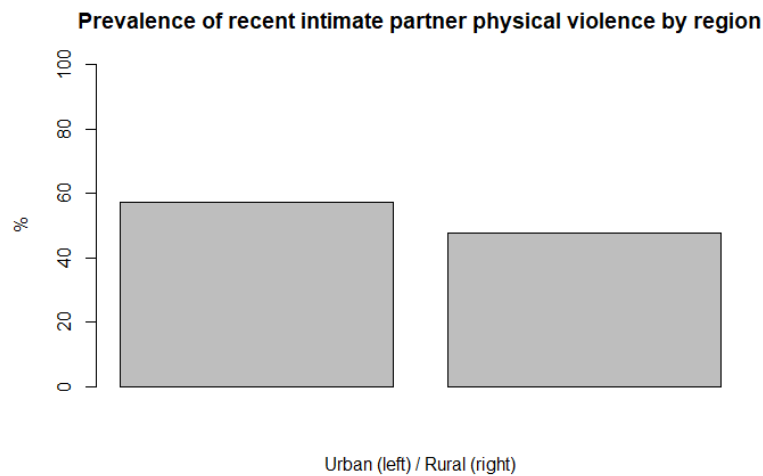
The Survey was conducted during a severe drought, which disproportionately affected parts of Enga Province, Hela Province, Western

Highlands Province, Western Province and Milne Bay Province. Heightened food insecurity in these areas create a risk of spatial heterogeneity. I test the association of being in a drought affected area in Appendix P) (also, refer to 'Comparison of model specifications' section) and find no statistically significant result.

# 4 Empirical strategy

My approach will investigate the relationship between the prevalence of intimate partner violence and measures of female status.

To test the 'bargaining' hypothesis, I will measure female status in absolute terms, disregarding relative levels of human capital between partners. This reflects the characteristics of the household bargaining model presented by Farmer and Tiefenthaler (1997), whereby male spouses cannot unilaterally alter the 'threat point', which is determined by a woman's social and economic capital relative to all potential partners. Measuring status in absolute terms assumes that the bargaining power of potential partners is fixed. Male spouses can however reduce the difference between the threat point and the utility achieved by the woman inside the marriage, by increasing economic transfers or reducing violence.

Equation 1 will measure the relationship between female bargaining power, in absolute terms, and the incidence of intimate partner physical (and/or sexual) violence:

$Equation\ 1: pv_{recent,\ i} = \beta_0 + \beta_1 \cdot status.variable_i + X_i + \epsilon_i$    (1)

Where $pv$ predicts the prevalence of intimate partner physical (and/or sexual) violence in the 12 months prior to being surveyed via a linear probability model. The model will separately regress on the household wealth quintile, woman's years of completed school, (general) employment status, formal sector employment status and cash employment status. The model controls for basic demographic characteristics (X) age and urban/rural status.

To test the 'gender norms' hypothesis, I will measure female status relative to their male partner – specifically, I use binary variables representing when a female respondent has higher levels of status than her partner.

Equation 2 measures the relationship between the breaking of gender norms and the incidence of intimate partner physical (and/or sexual) violence:

$$\textit{Equation } 2: pv_{recent,\ i} = \beta_0 + \beta_1 \cdot break.norm_i + X_i + \epsilon_i \qquad (2)$$

Where $pv$ predicts the prevalence of intimate partner physical violence in the 12 months prior to being surveyed via a linear probability model. The model will separately regress on norm violation binary variables for cash earnings, years of completed school, (general) employment status, formal sector employment status, and cash employment status. The model controls for basic demographic characteristics (X) age and urban/rural status.

My results focus on intimate partner physical (and/or sexual) violence, as opposed to emotional violence, to reduce subjectivity. In general, the estimates for emotional violence are similar to the estimates for physical violence. I report detailed estimates using physical violence, emotional violence or either form of violence as an outcome variable in Appendices D – I. I also test these models using lifetime experience of violence as the dependent variable (refer to Appendix L and Appendix M).

I report results using unweighted regression estimates. Weighted regressions produce similar estimates but with far less precision. Weighted regression results can be found in Appendices J and K. All results are presented using robust standard errors to correct for heteroscedasticity (clustered at the PSU level).

As described above, for three treatment variables within the 'gender norms' regression (male partner's education, employment status, and formal employment status) the DHS provides both a male reported value and a female reported value. A comparison of (unweighted) female responses and male responses show that male respondents report higher education (0.24 years), employment (9%), and formal sector employment (4%), than

reported by the female respondent. I find that using male responses return slightly more conservative estimates while reducing the efficiency of the regressions (owing to fewer observations).

Aizer (2010) and Zhang & Breunig (2021) use predicted income, rather than reported income in their regression models, recognising that bargaining power is a functioning of a women's potential, rather than actual income. Using predicted income also controls for endogeneity issues associated with male backlash. There is no public dataset on incomes to replicate this method in PNG. However, as male backlash is likely to negatively affect women's propensity to seek education, employment and earnings, my estimates are conservative.

To provide accurate estimates using recent violence as the dependent variable, I exclude women who are not currently partnered from my dataset. I find that 'formerly-partnered' women have a higher rate of lifetime intimate partner physical violence (65 per cent) compared to the sample of currently partnered women (56 per cent). This indicates that the sample of currently-partnered women could be biased towards less violent men, making my estimates more conservative.

I present tests of other model specifications to demonstrate the robustness of my model specification, and explore possible competing explanations for the relationship between status and violence in the Results section. I find the estimates I report as statistically significant at the 5 per cent level remain statistically significant when correcting for multiple hypothesis testing using the approach to control for false discovery rate proposed by Benjamini and Hochberg (1995) (refer to Appendix P).

# 5  Results

Figure 4 displays the estimates for recent (last 12 months) intimate partner physical violence[9] under the bargaining model. Overall, I find higher levels of household wealth, general employment, formal sector employment has a

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[9] All measures of physical violence include physical and/or sexual violence.

statistically significant (at 5 per cent level) association with higher levels of intimate partner violence. This implies that improvements in bargaining power is correlated with higher levels of intimate partner physical (and/or sexual) violence. I find similar relationships for cash employment and education, although only significant at the 10 per cent level.

Assuming a linear relationship, and estimated separately, women experience a 1.6 percentage point increase in violence for each increase in wealth quintile. Similarly, women experience a 0.3 percentage point increase for each additional year of school, 4.7 percentage points for being employed, 8.3 percentage points for formal sector employment and 4.0 percentage points for cash employment. Estimates for formal sector employment, general employment and household wealth are significant at the 5 per cent level. Appendix D, Appendix F and Appendix H display the results of regressions for physical violence, emotional violence, and all intimate partner violence.

**Figure 4: Recent intimate partner physical violence – bargaining model**
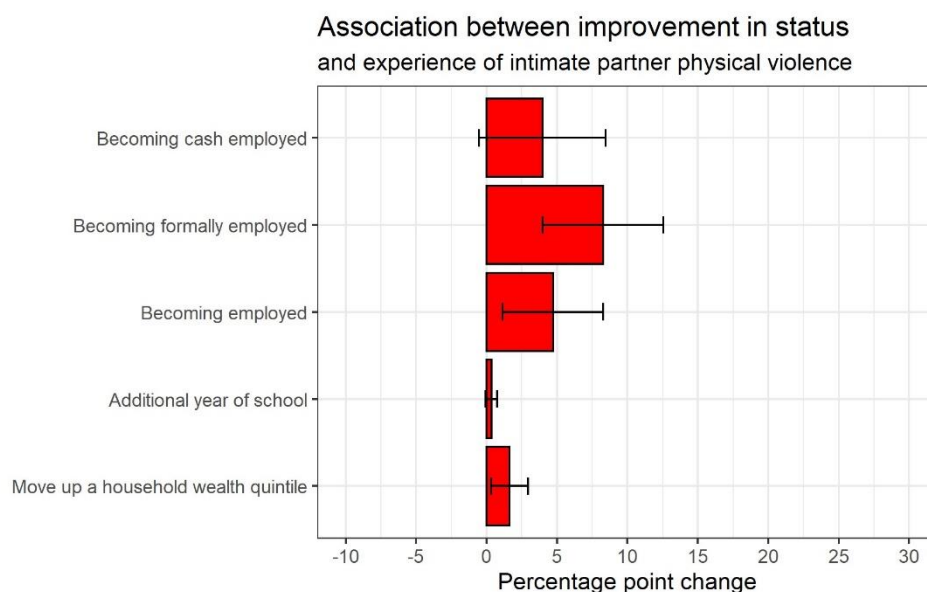


Notes: Bars represent 95 per cent confidence intervals.

Figure 5 displays the estimates for recent (last 12 months) intimate partner physical violence under the gender norms model. Overall, I find the breaking of gender norms around formal sector employment and relative cash earnings is associated with higher levels of intimate partner physical violence. This implies that gender norms are the dominant mechanism between improvements in status and intimate partner violence in PNG. Women with higher status do not

experience lower rates of violence, as would be expected if they were able to use this status to 'protect' themselves from their spouse. Variables for norm breaking in education, (all sector) employment and cash employment are similar, but not statistically significant at the 5 per cent level.

**Figure 5: Recent intimate partner physical violence – gender norms model**
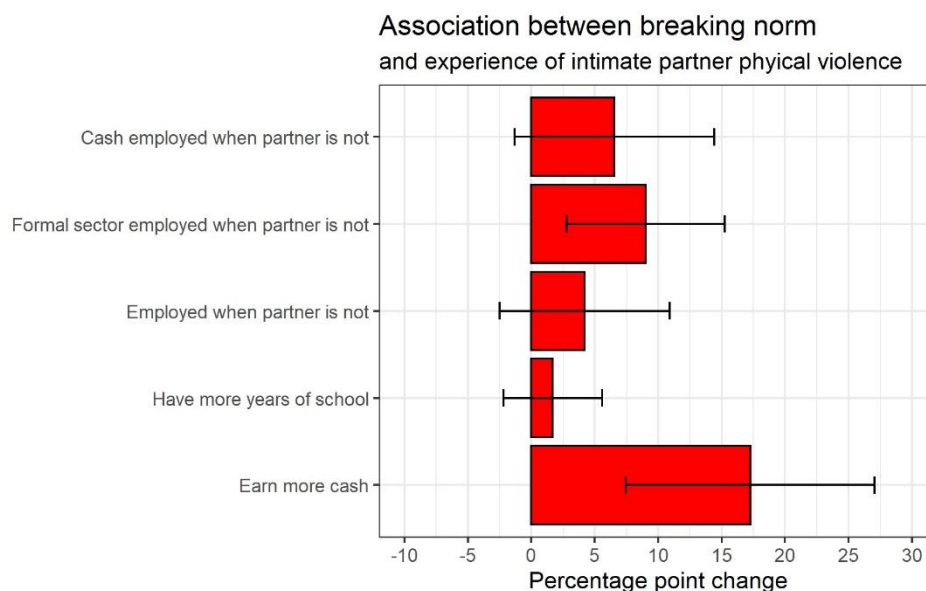


Notes: Bars represent 95 per cent confidence intervals.

Appendix E, Appendix G and Appendix I display the results of regressions for physical violence, emotional violence, and all intimate partner violence.

Strikingly, women who identified that they earnt more cash than their male partners experience rates of physical violence 17.2 percentage points higher than those who did not break this norm. This particular group of norm breakers represents just 3 per cent of the total population.

Per the results in Appendices D - I, my conclusions do not shift when isolating measures of violence to just emotional violence, or measuring both physical and emotional violence, across both the household bargaining and gender norms models. I also find similar results when using lifetime intimate partner physical violence instead of recent physical violence (refer to Appendix L and Appendix M). Across both models, the estimates are stronger for more tangible measures of financial resources. The exception to this is cash employment, which has wider confidence intervals due to using the smaller sample size (as it relies on male-reported values).

A comparison of female and male survey responses on the male partner's characteristics show that male partners report higher levels of education and employment than their female partner report. My estimates do not change significantly when using the male partner's reported education and employment characteristics as explanatory variables.

While the estimates of breaking norms help explain the relationship between increases and status and violence, they do little to account for other forces which drive the concerning rate of violence experienced by women who do not break norms, and/or those with little economic or social status.

## 5.1 Alternative explanation – violent men have poor employment prospects

An alternative explanation for the relationship between broken norms and the prevalence of violence is that violent men are more likely to have poor employment prospects, thus forcing women to earn more than their partner. To test this, this section focuses on the characteristics of the women (and their male partners) who report earning more cash than their male partner, and represent just 3 per cent (101 observations) of the total pool of female respondents. These women are older, more educated, and more likely to be employed than women who do not break this norm ('norm-observing' women) (refer to Figures 6 — 12).

Norm-breaking women are also likely to break other norms – on average, they are more educated than their male partners, and more likely to be employed). Despite having less education and lower rates of employment than their female partners, the male partners of norm-breaking women have higher rates of education and employment than the male partners of norm-observing women. Norm-breaking couples are also older, more urban and wealthier than norm-observing couples. As both members norm-breaking couples have stronger than average employment prospects, it is unlikely that women are seeking employment and earnings (and thus break norms) to make up for the poor earning potential of their male partner.

**Figure 6: Average age by norm breaking and observing categories**



**Average age**
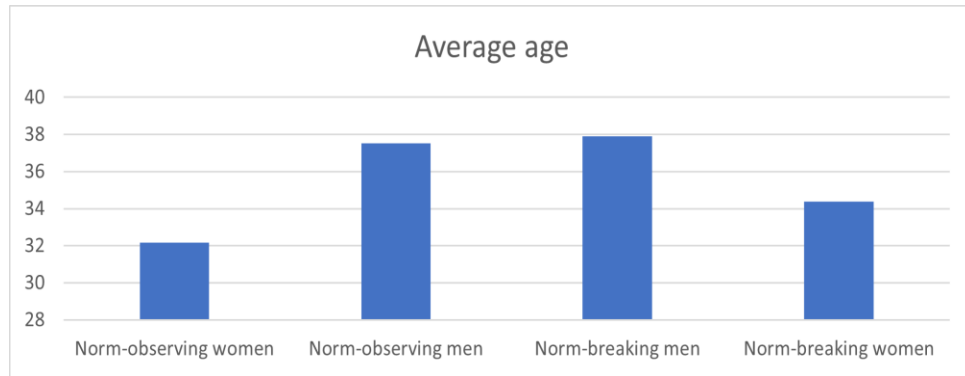
**Figure 7: Share living in rural area by norm breaking and observing categories**



**Share of group living in rural area**
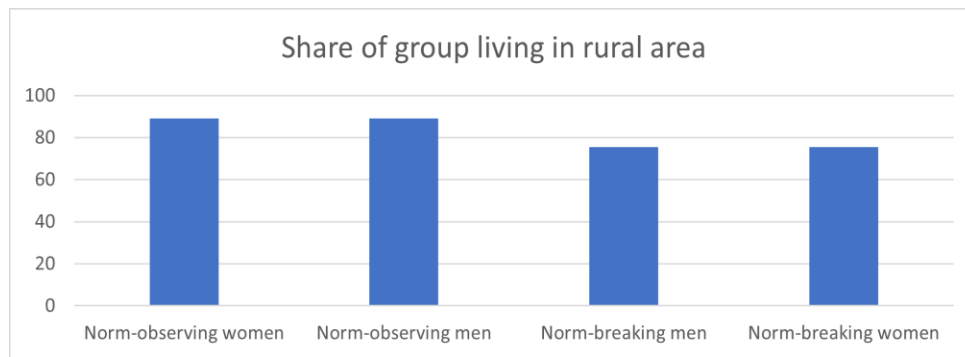
**Figure 8: Share employed by norm breaking and observing categories**



**Share of group employed**
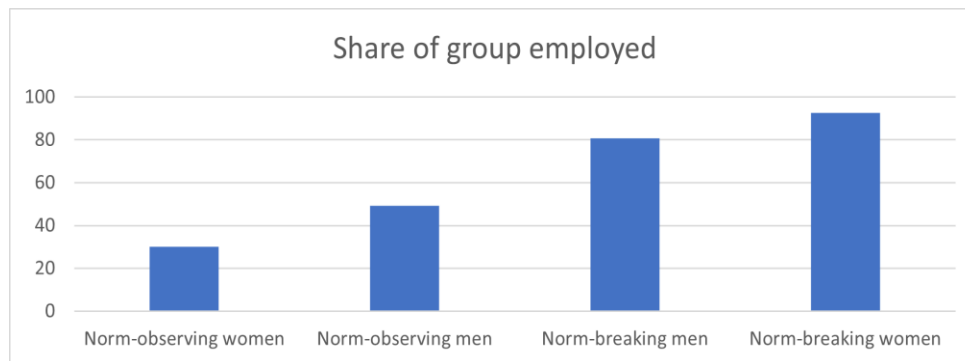
**Figure 9: Share cash employed by norm breaking and observing categories**



Share of group cash employed
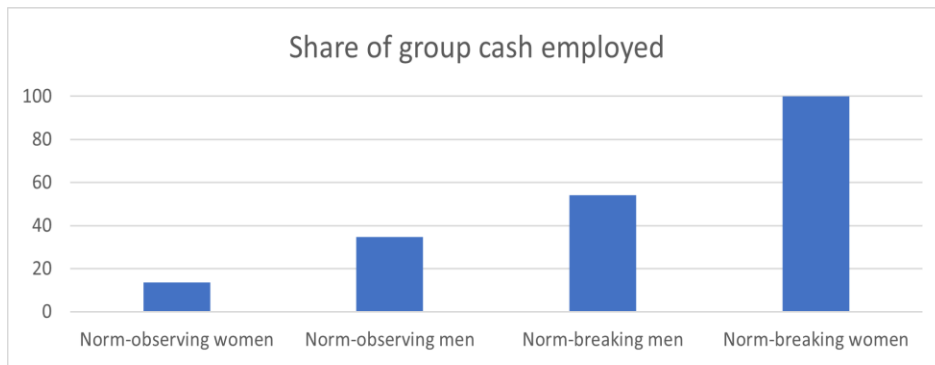
**Figure 10: Share formally employed by norm breaking and observing categories**



Share of group formally employed
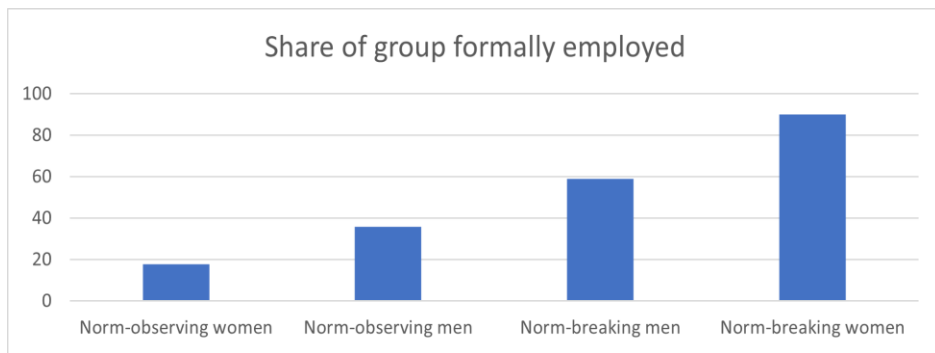
**Figure 11: Average household wealth quintile by norm breaking and observing categories**



Average household wealth quintile
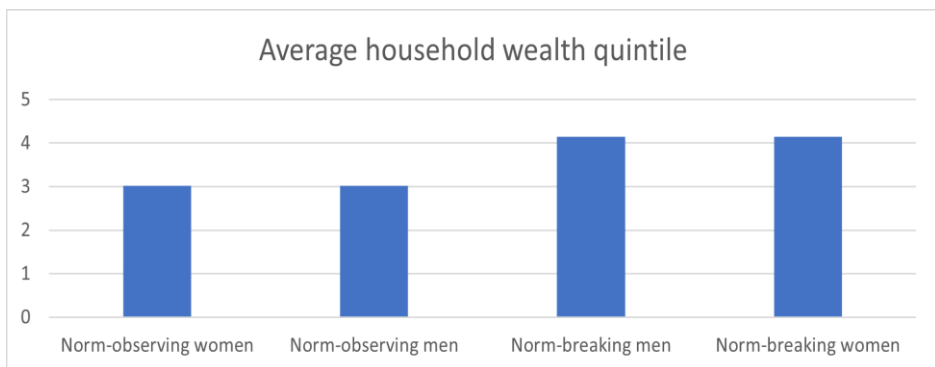
**Figure 12: Average years of education by norm breaking and observing categories**



Average years of education

| Norm-observing women | Norm-observing men | Norm-breaking men | Norm-breaking women |
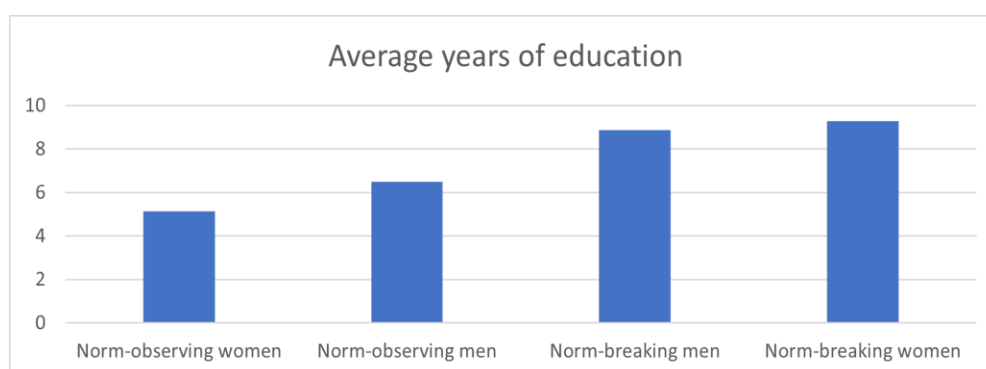
## 5.2    Alternative explanation – reporting effects are biased towards women with higher status

Many studies have identified that measures of intimate partner violence are likely to be subject to underreporting (Aizer 2010, p. 1,850), however there is little consensus on the direction with respect to levels of status (such as employment and education). Intuitively, women with higher levels of education would be more capable of identifying and reporting instances of violence, however this is highly disputed. A study using indirect questioning methods by Agüero & Frisancho (2022) found that higher educated women in Peru were more likely to underreport intimate partner violence, which they speculated was due to the social stigma attached to abuse (p. 1,583). Palermo et al. (2013) identify a range of possible channels of reporting bias, including shame and stigma, financial barriers, perceived impunity for perpetrators, lack of awareness of or access to available services, cultural beliefs, threat of losing children, fear of getting the offender in trouble, fear of retaliation, discrimination in law enforcement settings, belief that violence is normal and distrust of health care workers (p. 603). These channels may be simultaneously present and may cancel each other out to some extent.

Reporting effects may bias my estimates, however existing literature is not clear on the direction or magnitude with respect to status, and several effects may be simultaneously present.

## 5.3 Alternative explanation – conflictual households are more likely to be norm-breaking households

Another explanation is that the effect of norm breaking increases, or is correlated with increased violence for the whole household, not just women. For example, women in conflictual households might have higher motivation to work in the labour force so that they can be outside the home and away from their partners (and thus break norms). To test this, I re-estimate the models with the same explanatory variables, but change the dependent variable to female-reported violence against their male partner in the last 12 months. I find no variable is statistically significant at the 5 per cent level, except for household wealth. Hence improvements in female status are associated with a higher prevalence of violence for women specifically, and not for male partners. Figure 13 below shows the estimates for recent (last 12 months) intimate partner physical violence experienced by men under the household bargaining model, while Figure 14 shows the estimates for recent (last 12 months) intimate partner physical violence experienced by men under the gender norms model.

**Figure 13: Intimate partner physical violence (experienced by male partner) – bargaining model**



Association between improvement in status
and experience of intimate partner phyical violence
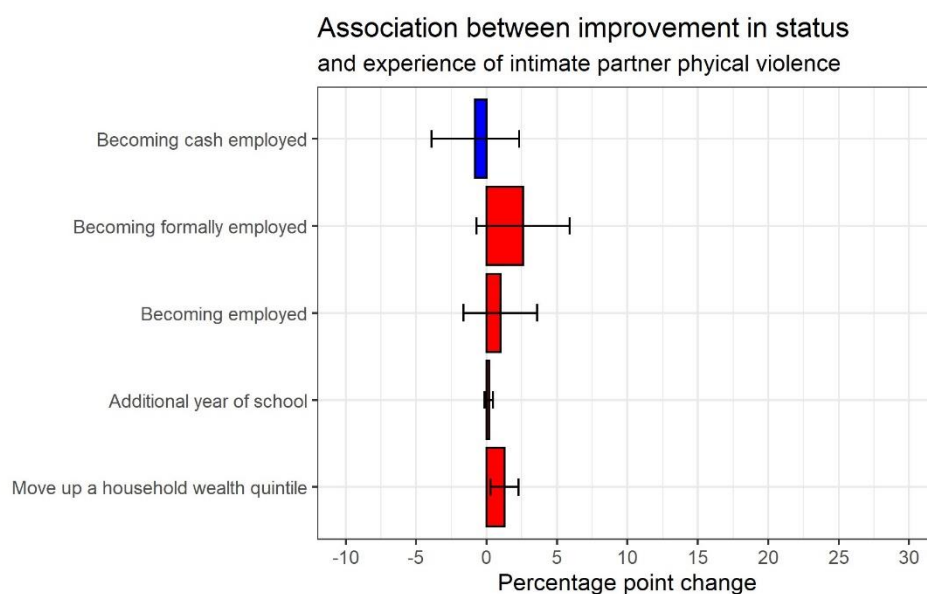
**Figure 14: Intimate partner physical violence (experienced by male partner) – gender norms model**



Association between breaking norm
and experience of intimate partner phyical violence
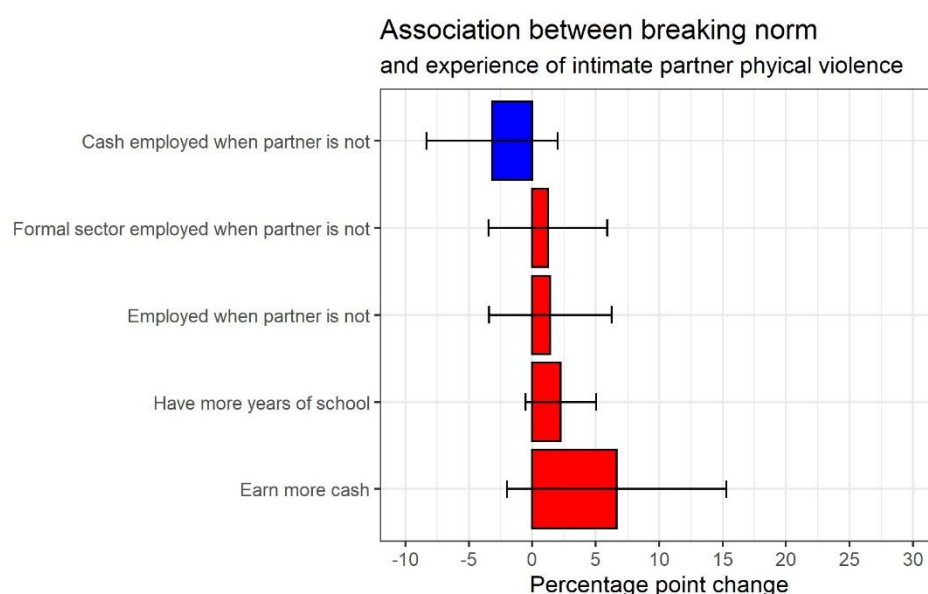
## 5.4    Comparison of model specifications

My results confirm that status and/or norm-breaking do not alone determine the prevalence of intimate partner violence. There are clearly many other determinants, including many beyond the scope of the DHS. A key threat to my identification strategy is the existence of causal pathways for which variables of status and norm-breaking positively covary. To address this, I present a saturated results table (see Appendix P) of eleven model specifications, conditioning on a range of possible explanatory and control variables. In these models, I estimate the associated change of breaking the 'cash earnings norm'. I condition on fixed effects such as age and whether the respondent lives in an urban or rural area. I then condition on:

- wealth quintile ('wealth quintile')

- years of education ('years of education')

- the male partner's years of education (as reported by the female respondent) ('partner education')

- employment status ('employment')

- the male partner's employment status (as reported by the female

respondent) ('partner employment')

- whether the respondent's father ever beat her mother (DHS variable D121) ('violent father')

- the number of children living at home (V202 and V203) ('number of children')

- whether the respondent lived in a drought affected district ('drought')[10]

I find the estimate for breaking the cash earnings norm remains stable and statistically significant across all specifications. While this strengthens the evidence base of my conclusions, saturation does not purge the model of endogeneity of other unobservable variables (of which gender norms is a key variable).

# 6   Discussion and conclusion

This research finds women who violate gender norms by earning more cash than their male partner experience rates of intimate partner physical violence 17.2 percentage points (or 38 per cent) higher than women who do not. Women who earn more cash than their male partner also experience 20.2 percentage points higher rates of emotional violence than those who do not break this norm. Other measures of norm breaking – including differences in formal sector employment status have smaller but similarly statistically significant effects on the rate of physical violence.

I find no explicit evidence of bargaining. Higher absolute levels of employment (particularly formal employment) and household wealth are also positively correlated with violence, opposite to what is hypothesised under the household bargaining theory. As Zhang & Breunig (2021) identifies, this may not mean bargaining is not present, but that the effects of gender norms dominate.

I argue that alternative explanations for the relationship between female status

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[10] Applied to districts with a 4 or 5 rating on the five point scale used to assess impact of drought in food supply in PNG in 2015, by Bourke et al. (2016).

and violence do not explain my estimates. I find norm-breaking couples are made up of men and women who are more educated, more wealthy and more employed than their counterparts in norm-observing couples. This implies that women are not forced to seek employment due to having a violent partner with poor employment prospects. I find that increases in household violence associated with both higher status and norm-breaking is almost entirely experienced by women. Men do not experience a statistically significant increase in intimate partner violence when female status rises. There is some risk that reporting effects may bias the estimates towards women with higher status, however there is little consensus in literature on the channel, direction and magnitude of bias in intimate partner violence reporting. Owing to an inability to address the behavioural effect of women when faced by the threat of violence, and a sample restricted to currently-partnered women, my estimates are likely to be a lower bound.

This paper is the first to compare the household bargaining and gender norms theories in PNG. It supports qualitative evidence that gender norms are dominant in determining the relationship between female status and intimate partner violence. It contributes to a growing body of empirical evidence identifying gender norms as a major constraint on reducing intimate partner violence via economic empowerment. Policies that seek to reduce violence purely via economic empowerment as the primary mechanism may not be optimal and may have adverse impacts. While this study does not test the efficacy of interventions, policymakers should consider how gender norms interact with economic empowerment, informing policies that reduce the transaction costs of separation for female victims of intimate partner violence.

In the last decade, PNG has made reforms that may reduce social, cultural, economic and legal barriers to separation that undermine bargaining power and reinforce harmful gender norms. The DHS took place amongst a series of changes to marital law in PNG. Amendments to the Divorce Act in 2018 strengthened the rights of survivors around the combined assets of the couple, while the 2013 Family Protection Act sought to improve the safety of and access to justice for survivors of domestic violence. While now in statute, these reforms may take many years to become fully effective. The expansion

of social protection programs, including the expansion of services offered to vulnerable women, such as women's shelters, would further help women in need in the short run. The *2016-2025 National Strategy to Prevent and Respond to GBV* identifies the importance of supporting survivors following separation, advocating for 'capacity building programs' that create 'financial independence' to 'help them leave violent situations' (Government of PNG 2016, p. 75). In addition, social norms or behavioural change interventions, including via education may reduce intimate partner violence in the long run, recognising that norms are dynamic. Both the National Strategy, and a recent UN report into family violence in PNG by Gevers & Day (2020) recognise the need for further research to identify effective public policy interventions in PNG. Further research testing the impact of female economic empowerment (such as via cash transfers, alongside behavioural change interventions) would significantly improve our understanding of this pressing issue.

# 7    Appendices

## A    Descriptive statistics

Table 1: Descriptive Statistics

| Characteristic | Percentage who have experienced physical (and/or sexual) violence since the age of 15 | Percentage who have experienced physical (and/or sexual) violence in the last 12 months | Number of women |
|---|---|---|---|
| **Age group** | | | |
| 15-19 | 65.0 | 65.0 | 107 |
| 20-24 | 61.9 | 54.8 | 635 |
| 25-29 | 60.4 | 52.9 | 640 |
| 30-34 | 56.6 | 50.9 | 632 |
| 35-39 | 57.9 | 48.6 | 577 |
| 40-44 | 50.1 | 41.2 | 466 |
| 45-49 | 41.9 | 29.7 | 314 |
| **Residence** | | | |
| Urban | 63.1 | 57.2 | 375 |
| Rural | 55.7 | 47.7 | 2,996 |
| **Province** | | | |
| Western | 49.9 | 44.8 | 79 |
| Gulf | 50.6 | 43.4 | 58 |
| Central | 52.5 | 44.8 | 136 |
| NCD | 56.3 | 45.0 | 85 |
| Milne Bay | 51.8 | 43.5 | 184 |
| Northern | 46.8 | 40.1 | 112 |
| S. Highlands | 49.9 | 41.7 | 226 |
| Enga | 56.0 | 48.0 | 101 |
| W. Highlands | 54.9 | 45.4 | 157 |
| Chimbu | 56.3 | 49.1 | 167 |
| E. Highlands | 55.8 | 49.0 | 310 |
| Morobe | 67.8 | 64.5 | 371 |
| Madang | 50.1 | 45.0 | 257 |
| E. Sepik | 55.1 | 48.1 | 188 |
| W. Sepik | 52.4 | 38.7 | 127 |
| Manus | 62.9 | 55.5 | 33 |
| New Ireland | 68.7 | 46.3 | 88 |
| E. New Britain | 53.4 | 44.4 | 124 |
| W. New Britain | 51.5 | 41.2 | 118 |
| AR Bougainville | 50.5 | 48.1 | 103 |
| Hela | 75.6 | 67.9 | 189 |
| Jikawa | 58.8 | 47.5 | 159 |
| **Employment** | | | |
| Not employed | 56.1 | 48.6 | 2,305 |
| Employed | 57.5 | 49.0 | 1,066 |
| **Education** | | | |
| Nil | 52.1 | 43.6 | 976 |
| Primary | 55.9 | 48.3 | 1,562 |
| Secondary | 61.3 | 54.0 | 672 |
| Higher | 69.0 | 62.5 | 161 |
| **Wealth quintile** | | | |
| Lowest | 53.9 | 45.8 | 644 |
| Second | 51.9 | 45.4 | 668 |
| Third | 57.3 | 47.9 | 677 |
| Fourth | 57.1 | 48.1 | 638 |
| Highest | 61.8 | 55.5 | 744 |
| **Total** | 56.5 | 48.7 | 3,371 |

# B  Questions asked of female respondents

Questions relating to emotional violence: have you...

- ever been humiliated by husband/partner? (D103A)

- ever been threatened with harm by husband/partner? (D103B)

- ever been insulted or made to feel bad by husband/partner? (D103C)

Questions relating to physical violence: have you...

- ever been pushed, shook or had something thrown by husband/partner? (D105A)

- ever been slapped by husband/partner? (D105B)

- ever been punched with fist or hit by something harmful by husband/partner? (D105C)

- ever been kicked or dragged by husband/partner? (D105D)

- ever been strangled or burnt by husband/partner? (D105E)

- ever been threatened with knife/gun or other weapon by husband/partner? (D105F)

- ever been physically forced into unwanted sex by husband/partner? (D105H)

- ever been forced into other unwanted sexual acts by husband/partner? (D105I)

- ever had arm twisted or hair pulled by husband/partner? (D105J)

# C List of occupations

Table 2: List of occupations in DHS

| Value | Label | Formal sector occupation | Share of sample |
|---|---|---|---|
| 0 | not working and didn't work in last 12 months | N | 65.6% |
| 11 | legislators and senior officials | Y | 0.1% |
| 12 | company and corporate managers | Y | 0.0% |
| 13 | general managers (small businesses) | Y | 0.3% |
| 21 | physical, mathematical, and engineering science professionals | Y | 0.0% |
| 22 | life science and health professionals | Y | 0.3% |
| 23 | teaching professionals | Y | 2.7% |
| 24 | other professionals | Y | 0.3% |
| 31 | physical science and engineering associate professionals | Y | 0.1% |
| 32 | life science and health associate professionals | Y | 0.3% |
| 33 | teaching associate professionals | Y | 0.2% |
| 34 | other associate professionals | Y | 0.5% |
| 41 | office clerks | Y | 0.6% |
| 42 | customer service clerks | Y | 1.1% |
| 51 | personal and protective services workers | Y | 0.4% |
| 52 | sales-workers, demonstrators and models | Y | 4.1% |
| 61 | market - oriented skilled agricultural, animal and fishery workers | Y | 1.1% |
| 62 | subsistence agricultural and fishery workers | N | 14.5% |
| 71 | extraction and building trades workers | Y | 0.0% |
| 72 | metal and machinery trades workers | Y | 0.0% |
| 73 | precision, handicraft, printing and related workers | Y | 0.0% |
| 74 | other craft and related trades workers | Y | 0.1% |
| 81 | stationary-plant and related operators | Y | 0.0% |
| 82 | machine operators and assemblers | Y | 0.1% |
| 83 | drivers and mobile machinery operators | Y | 0.0% |
| 91 | sales and services elementary occupations | Y | 6.7% |
| 92 | agricultural, fishery and related labourers | Y | 0.5% |
| 93 | labourers in mining construction, manufacturing and transport | Y | 0.3% |
| 96 | other | Y | 0.0% |
| 99998 | don't know | N | 0.0% |

# D    Baseline results - Recent physical violence: household bargaining model

Table 3: Likelihood of intimate partner physical (and/or sexual) violence (recent) - household bargaining models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.016** | | | | |
| | (0.007) | | | | |
| years of education | | 0.003* | | | |
| | | (0.002) | | | |
| employment | | | 0.047*** | | |
| | | | (0.018) | | |
| formal sector employment | | | | 0.083*** | |
| | | | | (0.022) | |
| cash employment | | | | | 0.040* |
| | | | | | (0.023) |
| age | −0.009*** | −0.008*** | −0.009*** | −0.009*** | −0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.082*** | −0.098*** | −0.103*** | −0.085*** | −0.102*** |
| | (0.023) | (0.022) | (0.021) | (0.022) | (0.021) |
| Constant | 0.752*** | 0.789*** | 0.805*** | 0.792*** | 0.811*** |
| | (0.047) | (0.043) | (0.038) | (0.038) | (0.038) |
| Observations | 3,642 | 3,634 | 3,642 | 3,642 | 3,642 |
| $R^2$ | 0.027 | 0.026 | 0.027 | 0.029 | 0.026 |
| Adjusted $R^2$ | 0.026 | 0.025 | 0.026 | 0.029 | 0.025 |
| Residual Std. Error | 0.492 (df = 3638) | 0.492 (df = 3630) | 0.492 (df = 3638) | 0.492 (df = 3638) | 0.492 (df = 3638) |
| F Statistic | 33.288*** (df = 3; 3631) | 32.352*** (df = 3; 3623) | 36.672*** (df = 3; 3631) | 36.672*** (df = 3; 3631) | 32.350*** (df = 3; 3631) |

*Note:*                                                                                             $^*$p<0.1;  $^{**}$p<0.05;  $^{***}$p<0.01

# E  Baseline results - Recent physical violence: gender norms models

Table 4: Likelihood of intimate partner physical (and/or sexual) violence (recent) - gender norms models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.172***<br>(0.050) | | | | |
| education | | 0.017<br>(0.020) | | | |
| employment | | | 0.042<br>(0.034) | | |
| formal sector employment | | | | 0.090***<br>(0.032) | |
| cash employment | | | | | 0.065<br>(0.040) |
| age | −0.008***<br>(0.001) | −0.008***<br>(0.001) | −0.008***<br>(0.001) | −0.008***<br>(0.001) | −0.008***<br>(0.001) |
| rural | −0.103***<br>(0.021) | −0.104***<br>(0.021) | −0.108***<br>(0.021) | −0.106***<br>(0.021) | −0.143***<br>(0.026) |
| Constant | 0.813***<br>(0.038) | 0.814***<br>(0.039) | 0.817***<br>(0.038) | 0.814***<br>(0.037) | 0.841***<br>(0.050) |
| Observations | 3,642 | 3,537 | 3,642 | 3,642 | 2,419 |
| $R^2$ | 0.028 | 0.025 | 0.026 | 0.027 | 0.027 |
| Adjusted $R^2$ | 0.028 | 0.024 | 0.025 | 0.027 | 0.026 |
| Residual Std. Error | 0.492 (df = 3638) | 0.492 (df = 3533) | 0.492 (df = 3638) | 0.492 (df = 3638) | 0.492 (df = 2415) |
| F Statistic | 35.336*** (df = 3; 3638) | 30.447*** (df = 3; 3533) | 31.846*** (df = 3; 3638) | 34.104*** (df = 3; 3638) | 22.691*** (df = 3; 2415) |

*Note:*

$^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01

# F Recent emotional violence: household bargaining models

Table 5: Likelihood of intimate partner emotional violence (recent) - household bargaining models

|  | Dependent variable: | | | | |
|---|---|---|---|---|---|
|  | ev | | | | |
|  | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.017**<br>(0.006) | | | | |
| years of education | | 0.001<br>(0.002) | | | |
| employment | | | 0.057***<br>(0.018) | | |
| formal sector employment | | | | 0.068***<br>(0.021) | |
| cash employment | | | | | 0.028<br>(0.023) |
| age | −0.006***<br>(0.001) | −0.005***<br>(0.001) | −0.006***<br>(0.001) | −0.006***<br>(0.001) | −0.005***<br>(0.001) |
| rural | −0.099***<br>(0.024) | −0.123***<br>(0.022) | −0.117***<br>(0.020) | −0.107***<br>(0.022) | −0.120***<br>(0.021) |
| Constant | 0.623***<br>(0.047) | 0.680***<br>(0.042) | 0.674***<br>(0.038) | 0.669***<br>(0.038) | 0.685***<br>(0.038) |
| Observations | 3,642 | 3,634 | 3,642 | 3,642 | 3,642 |
| $R^2$ | 0.019 | 0.018 | 0.021 | 0.021 | 0.018 |
| Adjusted $R^2$ | 0.019 | 0.017 | 0.020 | 0.020 | 0.017 |
| Residual Std. Error | 0.488 (df = 3638) | 0.489 (df = 3630) | 0.488 (df = 3638) | 0.488 (df = 3638) | 0.489 (df = 3638) |
| F Statistic | 24.097*** (df = 3; 3638) | 22.530*** (df = 3; 3630) | 25.708*** (df = 3; 3638) | 25.704*** (df = 3; 3638) | 22.574*** (df = 3; 3638) |

*Note:* $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

# G    Recent emotional violence: gender norms models

Table 6: Likelihood of intimate partner emotional violence (recent) - gender norms models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | ev | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.202*** | | | | |
| | (0.050) | | | | |
| education | | 0.023 | | | |
| | | (0.019) | | | |
| employment | | | 0.042 | | |
| | | | (0.033) | | |
| formal sector employment | | | | 0.083*** | |
| | | | | (0.033) | |
| cash employment | | | | | 0.046 |
| | | | | | (0.039) |
| age | −0.006*** | −0.005*** | −0.005*** | −0.005*** | −0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.117*** | −0.127*** | −0.124*** | −0.122*** | −0.149*** |
| | (0.021) | (0.021) | (0.021) | (0.021) | (0.027) |
| Constant | 0.684*** | 0.690*** | 0.689*** | 0.687*** | 0.686*** |
| | (0.038) | (0.039) | (0.038) | (0.038) | (0.050) |
| Observations | 3,642 | 3,537 | 3,642 | 3,642 | 2,419 |
| $R^2$ | 0.022 | 0.018 | 0.018 | 0.020 | 0.018 |
| Adjusted $R^2$ | 0.022 | 0.018 | 0.018 | 0.019 | 0.017 |
| Residual Std. Error | 0.488 (df = 3638) | 0.489 (df = 3533) | 0.489 (df = 3638) | 0.488 (df = 3638) | 0.489 (df = 2415) |
| F Statistic | 27.682*** (df = 3; 3638) | 22.152*** (df = 3; 3533) | 22.621*** (df = 3; 3638) | 24.456*** (df = 3; 3638) | 14.800*** (df = 3; 2415) |

*Note:*                                                                                     *p<0.1; **p<0.05; ***p<0.01

# H Recent violence: household bargaining models

Table 7: Likelihood of intimate partner domestic violence (recent) - household bargaining models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | dv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.024*** | | | | |
| | (0.007) | | | | |
| years of education | | 0.005** | | | |
| | | (0.002) | | | |
| employment | | | 0.055*** | | |
| | | | (0.018) | | |
| formal sector employment | | | | 0.079*** | |
| | | | | (0.021) | |
| cash employment | | | | | 0.038* |
| | | | | | (0.023) |
| age | −0.008*** | −0.007*** | −0.008*** | −0.008*** | −0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.089*** | −0.114*** | −0.122*** | −0.106*** | −0.123*** |
| | (0.023) | (0.021) | (0.021) | (0.022) | (0.021) |
| Constant | 0.786*** | 0.838*** | 0.869*** | 0.859*** | 0.877*** |
| | (0.046) | (0.041) | (0.037) | (0.037) | (0.037) |
| Observations | 3,642 | 3,634 | 3,642 | 3,642 | 3,642 |
| $R^2$ | 0.029 | 0.027 | 0.028 | 0.029 | 0.026 |
| Adjusted $R^2$ | 0.028 | 0.026 | 0.027 | 0.028 | 0.025 |
| Residual Std. Error | 0.492 (df = 3638) | 0.492 (df = 3630) | 0.492 (df = 3638) | 0.491 (df = 3638) | 0.492 (df = 3638) |
| F Statistic | 35.753*** (df = 3; 3638) | 33.586*** (df = 3; 3630) | 34.886*** (df = 3; 3638) | 36.347*** (df = 3; 3638) | 32.323*** (df = 3; 3638) |

*Note:*             *p<0.1; **p<0.05; ***p<0.01

# I  Recent violence: gender norms models

Table 8: Likelihood of intimate partner domestic violence (recent) - gender norms models

|  | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
|  | dv | | | | |
|  | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.200*** | | | | |
|  | (0.046) | | | | |
| education | | 0.027 | | | |
|  | | (0.020) | | | |
| employment | | | 0.041 | | |
|  | | | (0.033) | | |
| formal sector employment | | | | 0.078** | |
|  | | | | (0.030) | |
| cash employment | | | | | 0.041 |
|  | | | | | (0.040) |
| age | −0.008*** | −0.008*** | −0.008*** | −0.008*** | −0.007*** |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.122*** | −0.126*** | −0.129*** | −0.127*** | −0.166*** |
|  | (0.021) | (0.021) | (0.021) | (0.021) | (0.026) |
| Constant | 0.878*** | 0.879*** | 0.883*** | 0.882*** | 0.900*** |
|  | (0.037) | (0.038) | (0.037) | (0.037) | (0.049) |
| Observations | 3,642 | 3,537 | 3,642 | 3,642 | 2,419 |
| $R^2$ | 0.029 | 0.025 | 0.026 | 0.027 | 0.027 |
| Adjusted $R^2$ | 0.029 | 0.025 | 0.025 | 0.026 | 0.026 |
| Residual Std. Error | 0.491 (df = 3638) | 0.493 (df = 3533) | 0.492 (df = 3638) | 0.492 (df = 3638) | 0.492 (df = 2415) |
| F Statistic | 36.748*** (df = 3; 3638) | 30.760*** (df = 3; 3533) | 31.773*** (df = 3; 3638) | 33.328*** (df = 3; 3638) | 22.296*** (df = 3; 2415) |

*Note:* $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

# J  Recent physical violence: household bargaining models (weighted)

Table 9: Likelihood of intimate partner physical (and/or sexual) violence (recent) - household bargaining models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.018 | | | | |
| | (0.014) | | | | |
| years of education | | 0.006 | | | |
| | | (0.007) | | | |
| employment | | | 0.019 | | |
| | | | (0.029) | | |
| formal sector employment | | | | 0.073** | |
| | | | | (0.028) | |
| cash employment | | | | | 0.008 |
| | | | | | (0.032) |
| age | −0.008*** | −0.008*** | −0.008*** | −0.009*** | −0.008*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.089* | −0.100** | −0.117*** | −0.100** | −0.118*** |
| | (0.051) | (0.050) | (0.039) | (0.041) | (0.040) |
| Constant | 0.772*** | 0.796*** | 0.843*** | 0.826*** | 0.847*** |
| | (0.091) | (0.090) | (0.055) | (0.055) | (0.056) |
| Observations | 3,642 | 3,634 | 3,642 | 3,642 | 3,642 |
| Log Likelihood | −3,302.942 | −3,293.459 | −3,306.438 | −3,301.498 | −3,306.955 |
| Akaike Inf. Crit. | 6,613.883 | 6,594.918 | 6,620.876 | 6,610.996 | 6,621.909 |
| *Note:* | | | | *$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$* | |

# K    Recent physical violence: gender norms models (weighted)

Table 10: Likelihood of intimate partner physical (and/or sexual) violence (recent) - gender norms models

|  | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
|  | pv | | | | |
|  | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.113 | | | | |
|  | (0.075) | | | | |
| education | | −0.002 | | | |
|  | | (0.027) | | | |
| employment | | | 0.0002 | | |
|  | | | (0.044) | | |
| formal sector employment | | | | 0.050 | |
|  | | | | (0.038) | |
| cash employment | | | | | 0.054 |
|  | | | | | (0.056) |
| age | −0.008*** | −0.009*** | −0.008*** | −0.008*** | −0.006** |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.003) |
| rural | −0.116*** | −0.117*** | −0.119*** | −0.119*** | −0.169*** |
|  | (0.040) | (0.040) | (0.039) | (0.039) | (0.047) |
| Constant | 0.845*** | 0.863*** | 0.848*** | 0.846*** | 0.803*** |
|  | (0.055) | (0.056) | (0.055) | (0.055) | (0.094) |
| Observations | 3,642 | 3,537 | 3,642 | 3,642 | 2,419 |
| Log Likelihood | −3,305.026 | −3,203.883 | −3,307.012 | −3,305.870 | −2,153.379 |
| Akaike Inf. Crit. | 6,618.052 | 6,415.766 | 6,622.023 | 6,619.740 | 4,314.758 |
| *Note:* | | | | *p<0.1; | **p<0.05; ***p<0.01 |

# L  Lifetime physical violence: household bargaining models

Table 11: Likelihood of intimate partner physical (and/or sexual) violence (lifetime) - household bargaining models

| | Dependent variable: | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.022*** | | | | |
| | (0.007) | | | | |
| years of education | | 0.005** | | | |
| | | (0.002) | | | |
| employment | | | 0.043** | | |
| | | | (0.018) | | |
| formal sector employment | | | | 0.081*** | |
| | | | | (0.021) | |
| cash employment | | | | | 0.051** |
| | | | | | (0.023) |
| age | −0.005*** | −0.005*** | −0.005*** | −0.005*** | −0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.041* | −0.062*** | −0.073*** | −0.055*** | −0.069*** |
| | (0.023) | (0.022) | (0.021) | (0.022) | (0.021) |
| Constant | 0.683*** | 0.730*** | 0.763*** | 0.749*** | 0.765*** |
| | (0.048) | (0.044) | (0.040) | (0.040) | (0.040) |
| Observations | 3,642 | 3,634 | 3,642 | 3,642 | 3,642 |
| $R^2$ | 0.014 | 0.013 | 0.012 | 0.015 | 0.012 |
| Adjusted $R^2$ | 0.013 | 0.012 | 0.012 | 0.014 | 0.011 |
| Residual Std. Error | 0.495 (df = 3638) | 0.495 (df = 3630) | 0.495 (df = 3638) | 0.494 (df = 3638) | 0.495 (df = 3638) |
| F Statistic | 17.841*** (df = 3; 3638) | 15.361*** (df = 3; 3630) | 15.157*** (df = 3; 3638) | 18.183*** (df = 3; 3638) | 14.904*** (df = 3; 3638) |

*Note:*                                                                $^*$p<0.1;  $^{**}$p<0.05;  $^{***}$p<0.01

# M Lifetime physical violence: gender norms models

Table 12: Likelihood of intimate partner physical (and/or sexual) violence (lifetime) - gender norms models

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.160*** | | | | |
| | (0.045) | | | | |
| education | | 0.022 | | | |
| | | (0.020) | | | |
| employment | | | 0.027 | | |
| | | | (0.033) | | |
| formal sector employment | | | | 0.071** | |
| | | | | (0.031) | |
| cash employment | | | | | 0.077* |
| | | | | | (0.040) |
| age | −0.005*** | −0.005*** | −0.005*** | −0.005*** | −0.005*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.07*** | −0.075*** | −0.078*** | −0.076*** | −0.117*** |
| | (0.021) | (0.021) | (0.021) | (0.021) | (0.026) |
| Constant | 0.770*** | 0.770*** | 0.775*** | 0.772*** | 0.788*** |
| | (0.039) | (0.041) | (0.039) | (0.039) | (0.050) |
| Observations | 3,642 | 3,537 | 3,642 | 3,642 | 2,419 |
| $R^2$ | 0.013 | 0.011 | 0.011 | 0.012 | 0.014 |
| Adjusted $R^2$ | 0.013 | 0.010 | 0.010 | 0.011 | 0.013 |
| Residual Std. Error | 0.495 (df = 3638) | 0.496 (df = 3533) | 0.495 (df = 3638) | 0.495 (df = 3638) | 0.495 (df = 2415) |
| F Statistic | 16.567*** (df = 3; 3638) | 13.065*** (df = 3; 3533) | 13.364*** (df = 3; 3638) | 14.843*** (df = 3; 3638) | 11.748*** (df = 3; 2415) |

*Note:* *p<0.1; **p<0.05; ***p<0.01

# N   Recent violence perpetrated by women: household bargaining models

Table 13: Likelihood of intimate partner physical (and/or sexual) violence (recent) - household bargaining models

| | | | | | |
|---|---|---|---|---|---|
| | | | *Dependent variable:* | | |
| | | | pv | | |
| | (1) | (2) | (3) | (4) | (5) |
| wealth quintile | 0.013** | | | | |
| | (0.005) | | | | |
| years of education | | 0.002 | | | |
| | | (0.002) | | | |
| employment | | | 0.010 | | |
| | | | (0.013) | | |
| formal sector employment | | | | 0.026 | |
| | | | | (0.017) | |
| cash employment | | | | | −0.008 |
| | | | | | (0.016) |
| age | −0.003*** | −0.003*** | −0.003*** | −0.003*** | −0.003*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | −0.065*** | −0.081*** | −0.086***5 | −0.079*** | −0.088*** |
| | (0.020) | (0.018) | (0.017) | (0.018) | (0.018) |
| Constant | 0.288*** | 0.323*** | 0.337*** | 0.332*** | 0.342*** |
| | (0.036) | (0.032) | (0.029) | (0.029) | (0.029) |
| Observations | 3,636 | 3,628 | 3,636 | 3,636 | 3,636 |
| $R^2$ | 0.015 | 0.013 | 0.013 | 0.014 | 0.013 |
| Adjusted $R^2$ | 0.014 | 0.012 | 0.012 | 0.013 | 0.012 |
| Residual Std. Error | 0.371 (df = 3632) | 0.371 (df = 3624) | 0.371 (df = 3632) | 0.371 (df = 3632) | 0.371 (df = 3632) |
| F Statistic | 18.221*** (df = 3; 3632) | 16.149*** (df = 3; 3624) | 16.299*** (df = 3; 3632) | 17.027*** (df = 3; 3632) | 16.191*** (df = 3; 3632) |

*Note:*                                                                                                              $^{*}$p<0.1;  $^{**}$p<0.05;  $^{***}$p<0.01

# O   Recent violence perpetrated by women: gender norms models

Table 14: Likelihood of intimate partner physical (and/or sexual) violence (recent) – gender norms models

| | Dependent variable: | | | | |
|---|---|---|---|---|---|
| | pv | | | | |
| | (1) | (2) | (3) | (4) | (5) |
| earnings | 0.066 (0.044) | | | | |
| education | | 0.022 (0.014) | | | |
| employment | | | 0.014 (0.025) | | |
| formal sector employment | | | | 0.012 (0.024) | |
| cash employment | | | | | −0.032 (0.026) |
| age | −0.003*** (0.001) | −0.003*** (0.001) | −0.003*** (0.001) | −0.003*** (0.001) | −0.003*** (0.001) |
| rural | −0.084*** (0.017) | −0.087*** (0.018) | −0.086*** (0.017) | −0.086*** (0.017) | −0.099*** (0.023) |
| Constant | 0.338*** (0.029) | 0.332*** (0.029) | 0.339*** (0.029) | 0.340*** (0.029) | 0.355*** (0.039) |
| Observations | 3,636 | 3,531 | 3,636 | 3,636 | 2,415 |
| $R^2$ | 0.014 | 0.014 | 0.013 | 0.013 | 0.014 |
| Adjusted $R^2$ | 0.013 | 0.013 | 0.012 | 0.012 | 0.013 |
| Residual Std. Error | 0.371 (df = 3632) | 0.370 (df = 3527) | 0.371 (df = 3632) | 0.371 (df = 3632) | 0.373 (df = 2411) |
| F Statistic | 17.164*** (df = 3; 3632) | 16.168*** (df = 3; 3527) | 16.228*** (df = 3; 3632) | 16.203*** (df = 3; 3632) | 11.505*** (df = 3; 2411) |

*Note:*                                                                                          $^{*}$p<0.1;  $^{**}$p<0.05;  $^{***}$p<0.01

# P   Comparison of model specifications for 'earnings'

Table 15: Likelihood of intimate partner physical (and/or sexual) violence (recent) - comparison of specifications

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Dependent variable:* pv | | | | | |
| earnings | 0.186*** | 0.197*** | 0.172*** | 0.162*** | 0.160*** | 0.178*** | 0.159*** | 0.158*** | 0.146*** | 0.145*** | 0.145*** |
| | (0.049) | (0.049) | (0.050) | (0.051) | (0.051) | (0.051) | (0.052) | (0.052) | (0.052) | (0.052) | (0.052) |
| age | | −0.008*** | −0.008*** | −0.009*** | −0.009*** | −0.009*** | −0.009*** | −0.009*** | −0.009*** | −0.008*** | −0.008*** |
| | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| rural | | | −0.103*** | −0.079*** | −0.078*** | −0.076*** | −0.075*** | −0.076*** | −0.081*** | −0.080*** | −0.080*** |
| | | | (0.021) | (0.023) | (0.023) | (0.024) | (0.024) | (0.024) | (0.023) | (0.023) | (0.023) |
| wealth quintile | | | | 0.014** | 0.013* | 0.013* | 0.012 | 0.013* | 0.012 | 0.011 | 0.011 |
| | | | | (0.007) | (0.007) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| years of education | | | | | 0.001 | 0.0003 | −0.0002 | −0.0002 | −0.001 | −0.001 | −0.001 |
| | | | | | (0.002) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| partner education | | | | | | −0.001 | −0.001 | −0.001 | −0.0004 | −0.001 | −0.001 |
| | | | | | | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| employment | | | | | | | 0.036* | 0.041** | 0.043** | 0.045** | 0.043** |
| | | | | | | | (0.019) | (0.020) | (0.020) | (0.020) | (0.020) |
| partner employment | | | | | | | | −0.015 | −0.017 | −0.017 | −0.017 |
| | | | | | | | | (0.019) | (0.019) | (0.019) | (0.019) |
| violent father | | | | | | | | | 0.116*** | 0.115*** | 0.115*** |
| | | | | | | | | | (0.016) | (0.016) | (0.016) |
| number of children | | | | | | | | | | −0.010* | −0.010* |
| | | | | | | | | | | (0.005) | (0.005) |
| drought | | | | | | | | | | | 0.013 |
| | | | | | | | | | | | (0.031) |
| Constant | 0.457*** | 0.729*** | 0.813*** | 0.754*** | 0.753*** | 0.762*** | 0.759*** | 0.763*** | 0.718*** | 0.723*** | 0.721*** |
| | (0.008) | (0.033) | (0.038) | (0.046) | (0.048) | (0.049) | (0.049) | (0.049) | (0.050) | (0.050) | (0.050) |
| Observations | 3,642 | 3,642 | 3,642 | 3,642 | 3,634 | 3,537 | 3,537 | 3,537 | 3,517 | 3,517 | 3,517 |
| $R^2$ | 0.004 | 0.022 | 0.028 | 0.029 | 0.030 | 0.030 | 0.031 | 0.031 | 0.045 | 0.046 | 0.046 |
| Adjusted $R^2$ | 0.003 | 0.021 | 0.028 | 0.028 | 0.028 | 0.028 | 0.029 | 0.029 | 0.042 | 0.043 | 0.043 |
| Residual Std. Error | 0.498 (df = 3640) | 0.493 (df = 3639) | 0.492 (df = 3638) | 0.492 (df = 3637) | 0.492 (df = 3628) | 0.492 (df = 3530) | 0.491 (df = 3529) | 0.491 (df = 3528) | 0.488 (df = 3507) | 0.488 (df = 3506) | 0.488 (df = 3505) |
| F Statistic | 13.624*** (df = 1; 3640) | 40.321*** (df = 2; 3639) | 35.460*** (df = 3; 3638) | 27.777*** (df = 4; 3637) | 22.298*** (df = 5; 3628) | 18.081*** (df = 6; 3530) | 16.100*** (df = 7; 3529) | 14.181*** (df = 8; 3528) | 18.316*** (df = 9; 3507) | 16.848*** (df = 10; 3506) | 15.334*** (df = 11; 3505) |

*Note:* $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01

# Q   Multiple hypothesis testing

Tables 16 and 17 presents adjusted p-values for explanatory variables for recent intimate partner physical violence models, using the Benjamini and Hochberg false discovery rate (1995). I find variables that were significant at the 5 per cent level prior to correction, remain significant after correction.

Table 16: Adjusted p-values for household bargaining models

| Explanatory variable | p-value | Adjusted p-value |
|---|---|---|
| years of education | 0.10220 | 0.10220 |
| cash employment | 0.08386 | 0.10220 |
| wealth quintile | 0.01487 | 0.02478 |
| employment | 0.00970 | 0.02424 |
| formal sector employment | 0.00015 | 0.00077 |

Table 17: Adjusted p-values for gender norms models

| Explanatory variable | p-value | Adjusted p-value |
|---|---|---|
| education | 0.39385 | 0.39385 |
| employment | 0.21964 | 0.27455 |
| cash employment | 0.10250 | 0.17083 |
| formal sector employment | 0.00455 | 0.01136 |
| earnings | 0.00057 | 0.00290 |

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