

# Do Disasters Always Increase Intimate Partner Violence?

Evidence from the 2018 Earthquake  
in Papua New Guinea

*Alyssa Leng*  
*Sharad Tandon*



**WORLD BANK GROUP**

Poverty and Equity Global Practice

June 2024

## Abstract

This paper examines how an earthquake in Papua New Guinea changed people's attitudes about and the prevalence of intimate partner violence. Although there are several reasons why disasters can aggravate intimate partner violence, among men in disaster-affected regions, the acceptability of intimate partner violence declined significantly. There was a smaller and noisier decline in reported incidents of intimate

partner violence, driven by declines among women, who are the least likely to underreport intimate partner violence. The results highlight that the responsibilities of household members and social norms can change in sufficiently turbulent disasters, which can lead to improvements, and that measurement issues need to be better addressed to improve understanding of intimate partner violence.

---

This paper is a product of the Poverty and Equity Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://www.worldbank.org/prwp>. The authors may be contacted at [standon3@worldbank.org](mailto:standon3@worldbank.org) or [alyssa.leng@anu.edu.au](mailto:alyssa.leng@anu.edu.au).

*The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.*

Do Disasters Always Increase Intimate Partner Violence? Evidence from the 2018 Earthquake in  
Papua New Guinea\*

Alyssa Leng<sup>†</sup> and Sharad Tandon<sup>†</sup>

JEL classification: D10; D13; O12; O56

Keywords: Gender-Based Violence; Disaster; Papua New Guinea

---

\*The authors would like to thank Andrew Blackman, Stephen Howes, Rinku Murgai, Jane Sprouster, Stephen Ndegwa, Khwima Nthara, Dhiraj Sharma, and Tara Vishwanath for comments on earlier drafts. The views expressed here are those of the authors and may not be attributed to the World Bank.

<sup>†</sup>Development Policy Centre, the Australian National University, 7 Liversidge St., Canberra ACT 2601, Australia, alyssa.leng@anu.edu.au.

<sup>†</sup>Poverty and Equity Global Practice of the World Bank, 1818 H St. NW, Washington, D.C. 20433, USA, standon3@worldbank.org

## 1. Introduction

A large and growing literature illustrates that intimate partner violence (IPV) is pervasive across the world. Worldwide estimates suggest that 26 percent of women have experienced IPV in their lifetimes, 10 percent of women have experienced IPV in the past year, and that women in all countries and in households of diverse backgrounds experience IPV (e.g., Devries 2013; WHO 2021; etc.). However, the large shares of women experiencing IPV is likely underreported given substantial social desirability biases against honestly reporting IPV experiences for both the perpetrator and the victim (e.g., Fisher 1993; Gregson et al. 2002; Bell and Naugle 2007; etc.), and given potential risks posed to respondents who answer honestly (e.g., Zimmerman 1995; Ellsberg and Heise 2005; etc.).

Although there are several interlinked causes of IPV worldwide,<sup>1</sup> natural disasters have the potential to increase the already high prevalence of IPV across the world (e.g., van Daalen et al. 2022). However, the empirical evidence is far from definitive regarding the impact of disasters on IPV. Of the few settings that have been able to investigate the impact of turbulent natural disasters on IPV, several have estimated imprecise changes that can rule out neither no effect on IPV nor large changes (e.g., Frasier et al. 2004; Fagen et al. 2011; Diaz and Saldarriaga 2023; etc.).<sup>2,3</sup> Furthermore, even evidence on the IPV impacts of changes in economic well-being, which is often a significant component of a disaster, does not uniformly suggest that worse economic outcomes lead to increased IPV.<sup>4</sup> Given the lack of definitive evidence, we need to more fully understand the impacts of different types of disasters over different time frames, along with the mechanisms by which they change the prevalence of IPV, to ensure that disasters do not aggravate the already poor global IPV situation.

Corroborating the empirical ambiguity, we present a simple conceptual framework that empha-

---

<sup>1</sup>For example, see Council of Europe (2019) for a summary of some of the cultural, legal, economic and political factors that underlie the high rates of IPV.

<sup>2</sup>Two settings find that disasters increase the prevalence of IPV, but they also illustrate that other dimensions captured in the survey were also trending differently between disaster and disaster-affected regions (Weitzman and Behrman 2016; Shwefer 2018).

<sup>3</sup>There are two findings in Dias and Saldarriaga (2022). The article finds both that there are little estimated changes in reported IPV following flooding disasters and that droughts increase the prevalence of reported IPV incidents, likely through a negative income shock. The citation above references the former result.

<sup>4</sup>For example, see JPAL (2022) for a summary of the conflicting evidence. Several settings illustrate instances where worse economic outcomes lead to increased IPV (e.g., Gennetian 2003; Gibson-Davis et al. 2005; Kim et al. 2007; Gupta et al. 2013; Haushofer and Shapiro 2016; Hidrobo et al. 2016; Dias and Saldarriaga 2023; etc.). However, several settings also cannot reject the hypothesis of no change in IPV from negative income shocks (e.g., Cools et al. 2020; Cooper et al. 2021; etc.); some settings even find that less economic resources actually reduce the potential for conflict over resources and lead to less IPV (e.g., Macmillan et al. 1999; Heise 2011; Bulte and Lensink 2019; Cullen et al. 2024 etc.); and some settings illustrate that whether IPV increases or decreases can depend on the characteristics of perpetrators and victims (e.g., Hidrobo and Fernald 2013).

sizes that the impact of disasters does not necessarily increase the prevalence of IPV, even if it is assumed that negative economic shocks lead to increased IPV.<sup>5</sup> Specifically, husbands have the potential to engage in IPV if consumption falls below a critical threshold. However, turbulent disasters have the potential to decrease consumption and to change intrahousehold roles and gender norms, which can in turn also change the critical consumption threshold and further affect the prevalence of IPV (e.g., Panda and Agarwal 2005; Heise 2011; Doss 2013; etc.). Whether a disaster increases or decreases the prevalence of IPV in this setting depends on the change in the consumption threshold relative to the change in consumption.

To more fully investigate the relationship between disasters and IPV, we analyze the impact of a devastating earthquake and a series of aftershocks that precipitated a humanitarian and displacement crisis in Papua New Guinea (e.g., Government of PNG et al. 2018; IOM 2018; etc.). The disaster occurred between the third and fourth phase of a nationally representative survey that collected extensive information on IPV. The initial phases of the survey focused on urban areas and then progressively surveyed more rural and remote regions, and comparing the IPV changes after the third phase in the provinces most strongly affected by the disaster to other regions allows us to estimate the immediate impacts. Several robustness checks illustrate that the changes in IPV following the disaster are likely not being driven by substantial differences between urban and more remote populations across provinces or in regional differences in survey implementation.

The data illustrate two primary empirical findings. First, there was a large decline in the acceptability of IPV in the disaster-affected regions in which the vast majority of the deaths occurred and in which virtually all of the internal displacement was concentrated (e.g., Government of PNG et al. 2018; IOM 2018; etc.). The share of men who thought it was acceptable for a husband to beat his wife declined in all five individual scenarios captured, and the total number of scenarios in which a husband is justified to beat his wife reduced by 0.64 more than in the rest of the country. The declines were large in magnitude, where the latter change represents a 19 percent reduction relative to pre-disaster levels in affected regions. However, there was little change in the acceptability of IPV among women in the same regions.

Second, there was a large difference between changes in men's attitudes about IPV and changes in the prevalence of IPV reported by women. Specifically, while attitudes about IPV markedly improved in disaster-affected regions, there was a smaller and less precisely estimated decline in the share of women reporting to have experienced IPV in the past year in the same regions. But

---

<sup>5</sup>As described above, there are several settings where this assumption is empirically refuted.

these overall changes mask significant heterogeneity, where there was no change for women who were most likely to underreport IPV incidents and large and precisely estimated declines in IPV incidents reported by other women. Importantly, there were improvements in IPV attitudes among men regardless of the likelihood of their partners to underreport IPV incidents, consistent with reporting issues driving the heterogeneity in IPV prevalence.

We also investigate the hypothesis that these changes in IPV are the result of a potential change in the role of women in the household. Although specific roles and responsibilities assumed by household members are mostly unobservable, the survey utilized here captures the household member that was responsible for specific decisions, such as who was primarily responsible for deciding how to spend household income and whether to make large purchases. Consistent with the conceptual framework that highlighted the possibility of turbulent disasters impacting intrahousehold roles and social norms, we find that the share of husbands solely responsible for several important decisions declined at the same time as the responsibility of the wife increased.

There are three primary contributions of these empirical results. First, these results illustrate that despite a substantial negative income shock and a rise in food insecurity in disaster-affected regions, turbulent natural disasters can decrease the prevalence of IPV given the many other potential impacts that disasters might have on individuals and households. Although the link between disasters and IPV is not uniform across settings, the majority of results indicate either an increase or a null result.<sup>6</sup> These results illustrate an important possibility in a world in which climate hazards are becoming increasingly prevalent (e.g., Hallegatte 2014).

Second, the large differences between changes in IPV attitudes and reported incidents illustrates the importance of accounting for measurement issues when analyzing IPV. Although the possibility has long since been acknowledged, most quantitative studies analyzing the IPV impacts of disasters, income shocks, and other interventions focus only on incidents directly reported by women.<sup>7</sup> The few studies that address the potential mismeasurement of IPV prevalence have primarily focused on list experiments (e.g., Bulte and Lensink 2019; Cullen 2023; etc.). However, the results here also illustrate that triangulating between IPV incidents reported by victims and hypothetical IPV attitudes of potential perpetrators, the latter of which potentially has a lower amount of underreporting than IPV incidents (e.g., Ellsberg and Heise 2005), is also a potentially rich source of information.

---

<sup>6</sup>See van Daalen et al. 2022 for a summary of findings across disaster settings.

<sup>7</sup>See van Daalen et al. (2022) for a summary of the IPV measures analyzed in disaster setting and see Tankard and Iyengar (2018) for a summary of IPV measures analyzed when investigating the link between economic shocks and IPV.

Given the difficulty in ever fully overcoming the measurement issue in any single strategy,<sup>8</sup> the use of many improved measurement approaches simultaneously might best identify the level and changes of IPV prevalence.<sup>9</sup>

And third, these results build on work demonstrating the link between the expanded role of women in the household and changes in IPV (e.g., Bulte and Lensink 2019; Bandiera et al. 2020; Cullen et al. 2024; etc.). Given a simultaneous expansion of women’s roles in the household and a decline in acceptability and prevalence of IPV estimated here, these results further illustrate the potential importance of empowering women in the household. Better understanding the implications of empowerment on a wider range of IPV outcomes could potentially lead to scalable interventions that decrease the prevalence of IPV (e.g., Heisse 2011).<sup>10</sup> However, given the empirical evidence is mixed regarding whether IPV improves or worsens,<sup>11</sup> there also needs to be more investigation in how to minimize the possibility of aggravating IPV in the process of improving empowerment.

The rest of the paper is structured as follows. Section 2 presents a conceptual framework illustrating the empirical ambiguity of how disasters might impact IPV; Section 3 presents background information on IPV in PNG and the 2018 earthquake; Section 4 describes the data used in the empirical analysis; Section 5 describes the empirical strategy; Section 6 reports the baseline empirical results; Section 7 explores potential reasons for the decline in reported incidents being different from the improvement in IPV attitudes; Section 8 explores potential mechanisms for the changes in IPV; and Section 9 concludes.

## 2. Conceptual Framework

This section illustrates how the impact of disasters on IPV is complex and empirically ambiguous in a setting in which it is assumed that a decline in economic well-being leads to an increase in the

---

<sup>8</sup>For example, list experiments are limited in the types of things that can be asked and the specificity with which respondents can describe sometimes complicated viewpoints, the results of some of these approaches are highly dependent on the wording of questions and can significantly vary from experiment to experiment, and the inability to identify responses at the individual level limits the ability to further investigate the causes and consequences of sensitive decisions (e.g., Tandon and Vishwanath 2022). As a consequence of some of these challenges, the estimates from list experiments are often not very precise in the few instances that one has the ability to validate the results (e.g., Rosenfield et al. 2015; Kramon and Weghorst 2019; etc.).

<sup>9</sup>This approach is similar to other instances of using several strategies simultaneously to elicit sensitive information from respondents, such as list experiments, endorsement experiments, randomized response design, embedding enumerators in the community to gain trust, and utilizing more anonymous survey modalities (e.g., Glynn 2013; Blair et al. 2013; Blair et al. 2015; Blattman et al. 2016; Tandon and Vishwanath 2022; etc.) Additionally, this approach is also similar to triangulating between objective and subjective welfare measures to more precisely interpret levels and changes in well-being (e.g., Stiglitz et al. 2009; OECD 2013; Krueger and Stone 2014; Tandon 2024; etc.).

<sup>10</sup>A growing body of work illustrates how to best expand women’s empowerment in which the link to IPV is not investigated (e.g., Goldin and Katz 2002; Duflo 2012; Jayachandran 2015; Dhar et al. 2022; etc.).

<sup>11</sup>For example Bulte and Lensink (2019) illustrate a worsening of IPV following an intervention that improves employment of women; and Bandiera et al. (2020) find an improvement in one IPV outcome following an intervention that improved the productive capacity of women and other empowerment dimensions.

likelihood of IPV. Specifically, individuals choose a consumption bundle ( $C_i^1$ ) based on prices  $p$  and wealth  $w_i$  in the initial period; and then a disaster occurs in the second period that reduces consumption by  $\frac{\delta C_i^1}{\delta S} < 0$ . In each period, a husband becomes sufficiently stressed and it becomes possible that he might engage in IPV if the consumption bundle is below a minimum threshold:

$$(1) \quad IPV_i^t = I(C_i^t < \bar{C}_i)$$

where  $I$  is an indicator function equaling one if household consumption is above their minimum bundle  $\bar{C}_i$ .

The individual-specific threshold  $\bar{C}_i$  can be influenced by gender norms, by intrahousehold relationships and responsibilities, and all the other issues that have been illustrated to determine the prevalence of IPV (e.g., Council of Europe 2019). The framework incorporates the two limiting cases in which husbands are always potentially willing to commit IPV regardless of economic factors ( $\bar{C}_i$  larger than any feasible consumption value) and in which there is no level of economic well-being such that a husband will commit an act of IPV ( $\bar{C}_i = 0$ ).

In this simple setting, if disasters only impact the economic well-being of a household, it is necessarily the case that disasters will increase the likelihood of IPV ( $\frac{\delta IPV_i^t}{\delta S} > 0$ ). Specifically, the share of husbands that would change from being unwilling to commit IPV to those that might would be the share in households that had pre-disaster consumption just above the consumption threshold.<sup>12</sup> Depending on the share of such individuals, which further depends on the size of the consumption shock, the actual change in IPV could either be small or large.

However, the above situation critically assumes that the threshold at which a husband might commit acts of IPV does not change ( $\frac{\delta \bar{C}_i}{\delta S} = 0$ ). But if the disaster is sufficiently turbulent that it changes social norms, responsibilities of individual family members, or any of the other factors that are incorporated in the individual-specific consumption threshold, it is possible that the economic threshold at which a husband might commit acts of IPV also changes (e.g.,  $\frac{\delta \bar{C}_i}{\delta S} < 0$ ).<sup>13</sup> And in the case that the consumption threshold declines significantly, the share of husbands that might commit acts of IPV actually can decrease ( $\frac{\delta IPV_i^t}{\delta S} < 0$ ). The key comparison is the magnitude of the change

---

<sup>12</sup>Specifically, all husbands in households with consumption in the first period  $\bar{C}_i + \frac{\delta C_i^1}{\delta S} < C_i^1 < \bar{C}_i - \frac{\delta C_i^1}{\delta S}$  will change from being unwilling to commit an act of IPV to potentially being able to.

<sup>13</sup>For example, in the case of a disaster where women assume new roles and responsibilities in the household, or in a case where there is community trauma from many deaths and fear for safety, the threshold at which a husband might commit IPV might possibly change.



in the consumption threshold relative to the magnitude of the consumption decline.<sup>14</sup>

Thus, even in this special case of how IPV might change following the onset of a disaster, it is still possible that IPV declines. But, as described in the Introduction, there are instances where a change in economic well-being leads either to little change in IPV or to an increase in IPV (e.g., Heise 2011; Bulte and Lensink 2019; etc.), which further emphasizes the possibility that there might be little change in IPV or even a decline following a disaster. Thus, more empirical analysis of disaster settings is needed to better illustrate the degree to which disasters impact IPV and in what direction.

### 3. Background on Intimate Partner Violence in PNG and the 2018 Earthquake

Rates of IPV prevalence in PNG are among the highest in the world (e.g., Sardinha et al., 2022), where 56 percent of women between the ages of 15-49 years have experienced physical violence from the age of 15 and 63 percent of married women experienced any form of spousal violence by a current or former partner (DHS 2019). However, the reported patterns of IPV in the country are puzzling, suggesting that estimates of the prevalence of IPV might be imprecise. For example, reported IPV incidence is higher for more educated and more urban women despite the fact that IPV is more acceptable on average among both less educated and more rural men and women (Baxi et al. 2023; and Mambo 2023).<sup>15</sup>

A full catalog of potential causes of IPV in PNG is out of the scope of this work, but it is important to note there is significant heterogeneity regarding gender norms and practices across the country. There are broad expectations for males to be dominant in society at large and in the home, while females are expected to be subservient domestically (e.g., Rooney et al. 2022), and differences between these assumptions and actual behavior can then contribute to the occurrence of IPV (e.g., Eves 2018; Smith 2024). Additionally, other practices in parts of PNG, such as the payment of bride prices, may also play a part in IPV through men perceiving a greater level of ownership or authority over their wives (e.g., Eves 2019).

While the PNG government has become increasingly aware and active on the issue of IPV,

---

<sup>14</sup>The share of husbands who change from potentially committing acts of IPV to being unwilling to is increasing in the magnitude of the decrease in the consumption threshold ( $\frac{\delta C_i^1}{\delta S}$ ); and the share of husbands that change from unwilling to potentially able to commit IPV increases in the size of the consumption decrease (i.e.,  $\frac{\delta \bar{C}_i^1}{\delta S}$ ). In the case of sufficiently small  $\frac{\delta C_i^1}{\delta S}$  or a sufficiently small number of individuals with first period consumption such that  $\bar{C}_i + \frac{\delta C_i^1}{\delta S} < C_i^1 < \bar{C}_i - \frac{\delta C_i^1}{\delta S}$ , coupled with a sufficiently large  $\frac{\delta \bar{C}_i^1}{\delta S}$  or a sufficiently large number of individuals with initial consumption  $\bar{C}_i - \frac{\delta \bar{C}_i^1}{\delta S} < C_i^1 < \bar{C}_i + \frac{\delta \bar{C}_i^1}{\delta S}$ , there will be a decline in the share of husbands that might potentially engage in acts of IPV.

<sup>15</sup>These patterns are corroborated by the summary statistics reported in Section 3.

there is still much to be done. A national strategy on IPV was published in 2016 (Government of Papua New Guinea 2016) and a Special Parliamentary Committee on Gender-Based Violence was established in 2020. Recommendations from this process included the establishment of a permanent IPV parliamentary committee, the creation of national and provincial IPV secretariats to roll out the 2016 national strategy, and an increase in funding, staffing and training for law enforcement efforts around IPV (Government of Papua New Guinea 2022).

But in the midst of a national crisis in IPV, there was a devastating earthquake that struck the country early in 2018. A 7.5 magnitude earthquake struck the country on 26 February 2018, with over 270 aftershocks registered in months after the initial event. While the earthquake's epicenter was in Southern Highlands, neighboring provinces including Hela, Western, and Enga were also strongly affected (UNCT 2018; WHO 2018).

More than 500,000 people were affected by the earthquake, with over 34,000 people displaced and an estimated death toll of 100 (ICRC 2018; and World Health Organization 2018). The earthquake caused severe and widespread damage to dwellings, critical infrastructure, and farms (e.g., ICRC 2018). Access to clean water, food and shelter was severely constrained in areas that were consequently considered priority areas in the period following the disaster (e.g., ICRC 2018; WHO 2018). In response to the disaster, the PNG government announced a state of emergency in March 2018 in Hela, Southern Highlands, Western and Enga provinces (UNCT 2018). K450 million was set aside to fund disaster relief and rebuilding efforts by the PNG government, with additional support provided by international donors including Australia and the UN (e.g., DFAT 2018; UN 2018).

However, despite a state of emergency being declared in four provinces, the devastation in Hela and Southern Highlands provinces was especially severe. Hela was the worst-affected region by the Earthquake in terms of deaths and accounted for 60 percent of internal displacement, and Southern Highlands accounted for the second largest number of deaths and virtually the rest of the internal displacement not in Hela province (e.g., Government of Papua New Guinea et al. 2018; IOM 2018); and the food security crisis was reported as being more severe in Hela and Southern Highlands than in the other regions in which a state of emergency was declared (e.g., UNCT 2018). These two provinces, in which the disaster was especially turbulent and severe, are the focus of the rest of the analysis.

#### **4. Data**

As described in the Introduction, the earthquake and its aftershocks struck the country in the

midst of the ongoing 2016-2018 Demographic and Health Survey (DHS). The survey consisted of a household survey, and then separate surveys for eligible men and women in the household. In all households in the survey, all women who were aged 15-49 and who were either usual residents of the household or who spent the night before in the household were eligible to be interviewed; and for every second household in the survey, all men who were aged 15-49 and who were either usual residents of the household or who spent the night before in the household were eligible to complete the men's questionnaire. In total, 16,021 households were surveyed with a common questionnaire, 15,198 women were administered the women's questionnaire,<sup>16</sup> and 7,333 men were administered the men's questionnaire.<sup>17</sup>

The survey is nationally and provincially representative, and can report estimates at the rural and urban levels. The fieldwork was conducted in four waves between October 2016 and December 2018.<sup>18</sup> However, the households interviewed were not randomized across waves. Rather, the survey began in the most urban areas in each province, and then progressively surveyed more rural and remote areas (DHS 2019).<sup>19</sup>

All households to be interviewed were selected prior to the beginning of the survey in 2016, and no households were allowed to be replaced. But data collection was difficult and fieldwork could not be completed in 33 of the 800 census units originally selected in the sample design, reducing the overall sample size from the initial 19,200 households selected to the 16,012 households that were ultimately included in the survey. Reasons for the delays and for not completing work in each census unit include difficulties in handling the terrain in the country, adverse weather, and security issues (e.g., DHS 2019).

Importantly, the disaster did affect the survey. The worst-affected region by many measures- Hela- was not able to field the fourth phase of the survey following the earthquake; and the second worst-affected region - Southern Highlands- delayed interviews in the fourth phase until seven months after the final large aftershock while other provinces were performing interviews continuously over the final phase. Although the disaster affected the timing of the survey in Southern Highlands, as discussed above, the choice of households was not affected.<sup>20</sup> But given the exclusion of Hela from

---

<sup>16</sup>The number of women interviewed in each household varied between one and 10.

<sup>17</sup>The number of men interviewed in each household varied between one and eight.

<sup>18</sup>Phase one was conducted between October 1 and December 9, 2016; phase two was conducted between March and June 2017; phase three was conducted between October and December 2017; and phase four was conducted between April and December 2018.

<sup>19</sup>The survey implementation was also corroborated by informal discussions with the National Statistical Office of Papua New Guinea.

<sup>20</sup>The survey documentation does not provide non-response rates of those initially selected to be interviewed by phase or province. However, we investigate the possibility in the robustness section.

the survey following the disaster, the empirical analysis focuses on the change in IPV prevalence in the Southern Highlands relative to the rest of the country.

In this analysis, we first focus on the men’s survey, which includes a range of questions about the acceptability of intimate partner violence (IPV). The question states “in your opinion, is a husband justified in hitting or beating his wife in the following situations,” and then presents a range of situations. The situations are “if she goes out without telling him,” “if she neglects the children,” “if she argues with him,” “if she refuses to have sex with him,” and “if she burns the food.” And respondents are able to respond “yes,” “no,” or “don’t know.” The question only asks about a hypothetical scenario about a husband and wife and does not ask if the respondent would hit or beat his wife in each situation.

In addition to the men’s survey, we also focus on a subset of the women’s survey that administered a domestic violence module. In a random subset of the households that were selected to be administered the men’s questionnaire, one woman who was eligible for the women’s survey was randomly selected to respond to the added module. The module was only fielded in households in which privacy from other household members could be secured, resulting in a sample of 4,873 women (DHS 2019). The questions about abuse on which we focus are the questions about the incidence of IPV, which are asked only of the 3,945 women in the sample that had either been married or had lived with a man at one point in their lives.

The enumerator began fielding the module with a statement that guaranteed the anonymity of the respondent and that nobody else in the household would be informed of the responses. The extensive module asked whether the respondent’s husband or partner engaged in three different types of emotional abuse (e.g., humiliate or threaten, etc.) and ten different types of physical abuse (e.g., slap or punch, etc.) directed at the respondent.<sup>21</sup> For each type of abuse that the respondent experienced, they were then asked if the abuse happened “often,” “sometimes,” or “not in the past 12 months.” The module further asked additional relevant questions about IPV. Specifically, the module asks whether the respondent is often afraid of her husband or partner, sometimes afraid, or never afraid; and the module further asks the respondent if she had physically harmed her husband or partner at times when he was not harming her.

The respondent in the women’s survey is explicitly told that they are allowed to not answer specific questions if they so choose. However, given the very unique circumstances of PNG and the careful fieldwork ensuring the safety of respondents, the rates of non-response are very low. In each

---

<sup>21</sup>An exhaustive list of types of abuse covered can be provided upon request.

of the 13 individual questions on types of IPV experienced, no more than eight respondents out of the 3,945 refused to answer; and most respondents answered all questions, with only 45 respondents out of 3,945 not answering all the 13 questions on instances of IPV on which the empirical analysis focuses.<sup>22</sup>

As described in the Background Section, the summary statistics illustrate a dire IPV situation in the country.<sup>23</sup> The prevalence of men answering that it is acceptable for a husband to beat their wife varies between 18.1 percent and 61.6 percent of men, depending on the scenario; and the share of men that reported it was acceptable for a husband to beat their wife in *all* scenarios is 10 percent. Although the questionnaire does not ask men about IPV in which they participated, the high share of acceptability illustrates a climate in which IPV is likely common.

The high shares of acceptability of IPV translates into a high share of women who reported experiencing IPV in the past year. The share of women who experienced less severe forms of physical violence captured- pushing, slapping, or twisting an arm- was between 29 and 35 percent; and the share of women who experienced more severe forms of physical violence captured- punching, beating up, choking, or attacking with a knife or a gun- was between 10 and 22 percent. The share of women experiencing sexual violence was also very high, with between 10 and 22 percent of women reporting to have been forced to have intercourse or perform other sex acts in the past year.<sup>24</sup> The share of women who experienced forms of emotional IPV in the past year is also high and varies between 25 and 37 percent of women. As discussed in the background section, 63 percent of women report having experienced at least one IPV incident over the past year, which is much larger than the 10 percent of women globally who reported experiencing IPV in the past year and the 26 percent of women globally who reported experiencing IPV in their lifetimes.

However, as described in the documentation of the survey implementation, Figure 2 illustrates that the DHS progressively reached more and more rural areas over time. The share of the population that was rural in the first three phases, which were conducted before the disaster, was 15 percentage points lower than that in the fourth phase. Figure 2 illustrates that the survey implementation is important for interpreting the resulting estimates, where Figures 2b and 2c illustrate that IPV

---

<sup>22</sup>But because of the small numbers of non-response, there are slight differences in the sample size for different dependent variables. The results report keeping all observations and treating individual non-responses as missing observations. However, all results are qualitatively identical if the sample is restricted to the 3,900 households that had responses recorded for each violence question.

<sup>23</sup>An expanded list of summary statistics for all additional variables used in the analysis is available from the authors upon request.

<sup>24</sup>The categorization of IPV into less severe, severe, and sexual violence is one that was used in the DHS questionnaire (DHS 2019).

attitudes and prevalence were significantly different between rural and urban areas.

As one would expect given the literature on the prevalence and causes of IPV worldwide, Figure 2b illustrates that the acceptability of IPV was slightly lower in urban areas than in rural areas, with the difference being between 6 and 9 percentage points lower in urban areas. But as discussed in the background section and contrary to expectations, the reported prevalence of IPV was *higher* in urban areas than in rural areas for nine out of the 10 types of violence experienced in the past year. Although the confidence intervals of the estimates often overlap and only one of the differences is statistically different at conventional significance levels when including individual-level control variables (e.g., education, etc.), the rural-urban differences in reported IPV incidents are far different than the clear patterns presented in the acceptability of IPV in Figure 2b.<sup>25</sup> However, it is difficult to interpret whether these are actual differences in the prevalence of IPV or if they might represent differences between urban and rural areas in the willingness of victims to report the violence they experience.

### Section 5a. Empirical Strategy

As described in the Introduction, we estimate how men’s attitudes about IPV and how the prevalence of IPV incidents reported by women changed following the 2018 earthquake in PNG, which immediately preceded the beginning of the fourth phase of the 2016-2018 DHS. Specifically, we estimate the following difference-in-differences specification:

$$(2) \quad IPV\_Indicator_{itr} = \tau_r + \beta Post_{itr} + \rho Affected_{ir} + \gamma Post_{itr} * Affected_{ir} + \delta X_i + \epsilon_i$$

where *Post* denotes an indicator equaling one if the individual was interviewed after the earthquake in the fourth phase of the survey; *Affected* denotes an indicator equaling one if the household lived in the Southern Highlands Province, which was the region that was most strongly affected by the earthquake that was able to be included in the post-earthquake phase of the survey;<sup>26</sup> *X* denotes individual-level control variables; and *t* denotes month-year, *r* denotes the four broad regions in the country, and *i* denotes individuals.<sup>27</sup>

<sup>25</sup>Estimates of the rural-urban difference in the prevalence of reported IPV incidents in the past year when including all control variables included in the baseline empirical specification are available from the authors upon request.

<sup>26</sup>The other significantly affected province- Hela- was unable to conduct any interviews following the disaster. The results are identical if Hela is entirely dropped from the sample, or if the indicator identifies either households from Southern Highlands or Hela as being affected populations.

<sup>27</sup>Treatment in this case is not staggered and there are only two treatment groups, which are the settings in which the validity of the difference-in-difference estimator has been illustrated to be questionable (e.g., Callaway and

The estimate of  $\gamma$  represents how much larger the share of the population responding "yes" to the IPV indicator increased in disaster-affected regions than in the rest of the country. Importantly, these results are a likely underestimate of the impacts in the worst-affected regions given the omission of the worst-affected areas from the fourth phase of the survey and the delay in interviewing households in the region on which this analysis focuses.

## **Section 5b: Robustness Checks of the Identification Strategy**

As discussed in the Introduction, there are three critical assumptions for  $\gamma$  to identify the arguably causal impact of the earthquake. Specifically, there cannot be substantial differences between urban and more remote populations across provinces, the survey design and implementation needs to be roughly identical across provinces, and the IPV change in the rest of the country need to be a good counterfactual for the change in disaster-affected regions in absence of the earthquake. A variety of robustness checks illustrate that these conditions are likely met and that the results are being driven by the earthquake.

First, we illustrate that the empirical strategy uncovers no significant differences in individual characteristics that would be impossible to be affected by the disaster, where differences in the sampling strategy or in how urban and more remote regions varied by province would result in different samples where such differences would likely be evident. Tables 1 and 2 reports the changes in each individual control variable used in the baseline specification in disaster-affected regions in column (1) following the disaster, the change in the rest of the country in column (3), and reports the difference between the changes in column (5). Table 1 reports the changes for the Men's Survey and Table 2 reports the changes for the Women's Survey.

Consistent with the identification strategy, the results illustrate that there were few differences in the changes between disaster-affected regions. As expected by going from urban to rural and remote areas over time, the estimates illustrate that households are socioeconomically worse off following the earthquake in the fourth phase in both the disaster-affected regions and the rest of the country. However, in the difficult-to-adjust characteristics, there is no difference in the changes between disaster-affected regions and the rest of the country. Of the 38 variables captured in both the Men's and Women's Surveys in Tables 1 and 2, the vast majority are small in magnitude and imprecisely estimated. Only one of the differences in column (5) is statistically significant at the 5

---

Sant'Anna 2020; Goodman-Bacon 2021; Sun and Abraham 2021; Baker et al. 2022; Borusyak et al. forthcoming; etc.).

percent level across Tables 1 and 2, and only two differences are statistically significant at the 10 percent level, which is what would be expected by chance.

Second, further corroborating the conditions required for  $\gamma$  to represent the arguably causal impacts of the earthquake, the identification strategy is able to uncover a pattern independently reported by humanitarian agencies using other data sources at the time of the earthquake- a growing food security crisis arising from the disaster that was worst felt in the Southern Highlands and Hela provinces. The DHS collected the Food Insecurity Experience Scale in the household survey, which is composed of both subjective and objective questions on food access.

Using an identical identification strategy as described in (1) but using the household survey information on food security as the dependent variable, Figure 3 reports the difference-in-differences estimate of the change in food security relative to the rest of the country. As expected by the sampling strategy that reaches more rural and remote households in later phases of the survey, there was a worsening of food access for all households following the earthquake in the fourth phase of the survey across the country. However, there was a substantially larger increase in the share of households reporting poor food access in the regions worst affected by the disaster. There was between a 6 and 15 larger percentage point increase in the share of poor food access in disaster-affected regions for the three objective food security measures (skip meals, run out of food, and going a whole day without food), which represents between 16 and 45 percent of the pre-disaster share of households that reported poor food access across the entire country.<sup>28</sup>

Third, it is possible that the disaster led to changes in survey quality or in the willingness of individuals to respond to the IPV module in earthquake-affected regions, and this change might be driving some of the results and not an actual change the prevalence of IPV. Even though the low rates of non-response reported in the Data section suggest that this is likely not a significant problem, it is possible that the few instances of non-response were concentrated in disaster-affected regions after the earthquake. However, Figure 4 reports estimates of specification (2) using an indicator equaling one if a woman did not respond to the IPV question and illustrates that this is not likely to be the case. All of the estimates are small in magnitude, vary in sign, and are unable to rule out the possibility that there is no difference in the change in non-response in disaster-affected regions

---

<sup>28</sup>Although subjective questions on food security add information about how individuals felt about their experiences with food insecurity, the questions are difficult to interpret given different individuals use different thresholds and different criteria by which to report their subjective experiences, and those experiences might have little to do with actual food consumption (e.g., Stiglitz et al. 2009; Krueger and Stone 2014; Tandon 2024; etc.). Figure 3 illustrates that there was little difference in the change in subjective food security questions in disaster-affected regions relative to the rest of the country, with the magnitude of the difference-in-differences being close to zero and imprecisely estimated.



and the rest of the country.

And fourth, the analysis will also decompose the average changes in IPV acceptability and prevalence across the entire country in ways that illustrate that the changes are likely driven by the disaster and not other potential explanations. In particular, the analysis will illustrate that provincial variation in the share of the total population that is rural are likely not driving the results, and that all results are qualitatively identical when restricting the sample to only individuals living in rural areas; that the main results are driven by strong changes only in disaster-affected regions and that there was little change in any comparison region following the disaster;<sup>29</sup> and, to the degree that is possible, the analysis will illustrate that there is no evidence of differential changes in the baseline results leading up to the disaster.

## **Section 6. Changes in Attitudes about and Prevalence of Gender-Based Violence**

There was a large reduction in the share of men that reported it was acceptable for a husband to beat their wife in disaster-affected regions. Figure 5a presents the difference-in-differences estimate from the baseline empirical specification using the total number of scenarios in which a respondent thought it was acceptable for a husband to beat their wife as the dependent variable. The first estimate is from a sparse specification with no regional fixed effects and no control variables; the second estimate adds regional fixed effects; and the third estimate adds both regional fixed effects and control variables.

In all instances, there was a substantially larger decline in the number of scenarios in which IPV was acceptable in disaster-affected regions than in the rest of the country. In the most complete specification that includes regional fixed effects and control variables, the number of scenarios reported as acceptable declined by 0.64 more in disaster-affected regions than in the rest of the country, which represents a 19.0 percent decrease relative to the pre-disaster average in affected regions. The estimate was qualitatively identical across specifications that add fixed effects and control variables, illustrating that the results are likely not being driven by unexplained factors.

The large decline in the total number of scenarios in which it was acceptable for a husband to beat their wife was composed of a large decline in affirmative responses to each individual scenario captured in the survey. The share of the male population that reported IPV to be acceptable declined by between 13 and 35 percentage points more in disaster-affected regions than in the rest of the

---

<sup>29</sup>Although the acceptability of IPV is higher in rural areas than in urban areas, summary statistics presented in Section 3 illustrate that the magnitude of the difference is not too large. And thus, despite the progressively more rural sample over time, we still find little difference in the acceptability of IPV over the course of the survey because the share of the population that is rural was already very high in the initial phases of the survey (83 percent).

country, which represents between 25 and 59 percent of the pre-disaster shares in disaster-affected regions. Each of these instances were precisely estimated, with four out of the seven estimates statistically significant at the 1 percent level, and the remaining three out of seven estimates statistically significant at the 5 percent level. Furthermore, the baseline results are qualitatively identical when restricting the sample to only the 5,403 men living in rural areas in Figure 5b.

Although there was a large decline in the acceptability of IPV by men, Figure 5c illustrates that there was not a similar change in the acceptability reported by women. The difference-in-differences estimates for women were small in magnitude, varied in signs between specifications, and none of the seven measures were statistically significant at conventional significance levels. Rather, the share of women that reported that IPV was acceptable following the disaster varied between 42 and 53 percent for each of the five scenarios, and was similar in several scenarios to that of men following the disaster.

Figure 6 unpacks the changes in the acceptability of IPV following the disaster across the country. As opposed to only reporting the difference-in-differences estimate in the baseline specification, Figure 6a reports the changes in each region separately for disaster-affected regions, for the entire country, and for several other potential comparison regions.<sup>30</sup> There was a large change only in disaster-affected regions, where there was a decline of approximately 0.86 scenarios in which IPV was acceptable on average. Alternatively, the change in any comparison region was between -0.17 and 0.30, with none of them being statistically significant at conventional significance levels.

Figure 6b illustrates that the baseline difference-in-differences estimate for men is robust to using any other comparison region in the country and that the magnitude of the estimate is qualitatively identical across comparison regions. This also includes the estimate comparing the change in the disaster-affected regions highlighted here to other provinces in which there was a state of emergency declared but which did not face the same challenges (Enga and Western Provinces). This latter pattern suggests that the severity of the crisis, in terms of psychological trauma and in the humanitarian situation, is important to the change in the acceptability of IPV.

There is little evidence that IPV was trending differently in disaster-affected regions prior to the disaster. Data collection prior to the disaster was primarily collected in two months in disaster-

---

<sup>30</sup>The comparison regions include Rest of PNG, which denotes the entire country included in the survey less the Southern Highlands; Other Regions in State of Emergency, which denotes Enga and Western Provinces, where a state of emergency was also declared, but in which the humanitarian disaster was much less severe; Least Affected, which denotes regions aside from provinces that border the four provinces in which a state of emergency was declared; Border Disaster, which denotes provinces that border the four provinces in which a state of emergency was declared; and Similar MPI Profile, which denotes provinces that have the most similar multidimensional poverty rates, as measured by the World Bank's Multidimensional Poverty Measure, to the provinces in which a state of emergency was declared.

affected areas, and data collection following the disaster was also conducted in two months. The top panel of Figure 7 re-estimates the baseline specification but estimates the difference-in-differences in the acceptability of IPV in disaster-affected regions in the first month relative to the second in the pre-disaster period, and then further estimates the difference-in-differences following the disaster relative to the last pre-disaster month.<sup>31</sup>

The magnitude of the differential change leading up to the disaster was small in magnitude and imprecisely estimated in the top panel of Figure 7, and the differential change following the disaster was qualitatively identical to the baseline estimate reported in Figure 5.<sup>32</sup> Although data collection did not occur in each phase of the survey in disaster-affected regions, Figure 7 also shows that there is little evidence that the acceptability of IPV was changing over the course of the survey in the rest of the country. The last panel of Figure 7 reports the change in the average number of scenarios in which IPV was acceptable relative to the first phase, and illustrates that the magnitudes of the changes were small relative to the change in disaster-affected regions and was imprecisely estimated.<sup>33</sup>

Despite the large and precisely estimated decline in the acceptability of IPV among men following the disaster, the change in the prevalence of IPV reported by women was not nearly as precisely estimated. Figure 8a illustrates that there was a 17.4 percentage point decline in the share of women that reported experiencing either emotional or physical IPV in the past year, which would represent 22 percent of the pre-disaster prevalence. This is composed of approximately a 17.4 percent decline in the share of women who experienced emotional IPV and a 17.3 percent decline in the share of women who experienced physical IPV.

However, the estimates are not precisely estimated and none are statistically significant at conventional significance levels. Figures 8b and 8c illustrate a similar pattern, where there was a decline in every type of IPV captured. Only one of the 13 estimates was statistically significant at the 5 percent level and only two additional estimates were statistically significant at the 10 percent level. Although more estimates are statistically significant at conventional significance levels than one might expect by chance, the results are not nearly as strong as for the change in acceptability of IPV.

Combined, the large improvement in attitudes about IPV of men is corroborated by the change

---

<sup>31</sup>The pre-disaster sample in the rest of the country is restricted only to households surveyed in the same months as pre-disaster data collection occurred in disaster-affected regions.

<sup>32</sup>In results not reported, the lack of a change in the pre-period is robust to the time period in which data collection is restricted to in the rest of the country. For example, the results are qualitatively identical when restricting the entire sample- disaster-affected regions and the rest of the country- to only the last two months of data collection prior to the disaster and the first two months of data collection following the disaster.

<sup>33</sup>The p-value of all the coefficients being jointly equal to zero is 0.260.

being restricted to only disaster-affected regions, by the robustness of the results to any comparison region, and at least some evidence that the change in attitudes resulted in a decline in IPV. As discussed in the Introduction, the large decline in the acceptability of IPV is novel and contrasts with several other contexts in which the change in IPV prevalence following a disaster was unable to be statistically discernable from no change. These results also illustrate that the severity of the disaster is important to the baseline empirical pattern, and that other regions in a state of emergency but less badly affected did not have a similar change.

### **Section 7. Why Is the Change in IPV Incidents Reported by Women Less Precise Than the Change in IPV Attitudes of Men?**

We investigate why the change in the prevalence of IPV was less robust and less strong than the change in the acceptability of IPV reported by men. First, one possibility that could explain why the change in the prevalence of IPV was imprecisely estimated and potentially small is the possibility that instances of IPV could be a low-frequency event, and that the potential for IPV decreased even if the actual prevalence did not change. However, we illustrate that the frequency of the event is likely not the sole cause of the difference.

Figure 9a investigates changes in the intensity of IPV among women who experienced IPV in the past year. As described in the Data Section, for respondents that have ever experienced each of the 13 IPV incidents, the respondent is also given the opportunity to answer whether the event occurred either often, sometimes, within the past year, or not within the past year. But when we restrict the sample to the 2,451 women who have experienced IPV in the past year (out of 3,945 total), and analyze the change in the share that experience any of the IPV events often, the estimates are small in magnitude, imprecisely estimated, and change signs between specifications.<sup>34</sup> Thus, even among women that experience multiple IPV incidents each year, there was little change in the severity of the IPV.

Second, it is possible that the time period covered by the questionnaire- one year- is too long and might also capture events from before the disaster, which would contribute to noise in the measure and the less precise estimates. However, this is unlikely to be the case. The surveys in disaster-affected regions were delayed until November and December of 2018, which already is six to seven months after the disaster and limits the time period covered that is prior to the disaster. Additionally illustrating that this is likely not the entire explanation, the food security questions

---

<sup>34</sup>The result is the same when estimated with the full sample of women, where the indicator for experiencing IPV often for the excluded part of the sample is zero.

also have an identical reference period and are able to illustrate a more precise worsening of the food security situation in Figure 3.

And third, it is possible that only a subset of women who experience IPV accurately describe those experiences to enumerators, and that the underreporting is worse than for men who are asked about the acceptability of a hypothetical man committing acts of IPV. Not admitting to abuse suffered in the pre-disaster period would result in no change for underreporting households even if there was a reduction in IPV. This could result in an estimate downward biased to zero and in an estimate that is less precisely estimated.

Figure 9b investigates this hypothesis and estimates the baseline empirical specification separately for women that are potentially more and less likely to report IPV experiences. Specifically, one of the many reasons that women might not report IPV experiences is the fear of additional abuse if other household members suspected that they might have admitted to the abuse that was occurring. It has been shown that women who have more resources and productive capacity can result in a more credible recourse of being able to leave an abusive household, and thus might fear this repercussion less than women who are less able to leave the household (e.g., Agarwal 1997; Hesse 2011; etc.). And reporting patterns in PNG are consistent with the least educated women underreporting IPV incidents. Women who never attended school report fewer instances of IPV despite the fact that the least educated women and men are *more* likely to view instances of IPV being acceptable.<sup>35</sup>

Thus, using a school attainment indicator to proxy for productive capacity, which was fixed long before the earthquake happened for women eligible for the women's survey, we estimate the baseline empirical specification separately for women that never attended school and women that attended at least some primary school or above.<sup>36</sup> The results illustrate a substantial difference in the experiences of the 921 women who had never any school and the 3,024 women who had at least attended some school. There was a 47-percentage point larger decrease in the share of women who experienced any IPV in the past year for women who had attended at least some school than in the rest of the country. The estimate is precise and is nearly three times the baseline estimate for the entire sample in Figure 8a. However, there was no change in the share for women who never attended any school relative to the rest of the country (difference-in-differences estimate of 0.1 percentage points). And all of these patterns extend to both categories of IPV captured by the survey- emotional and

---

<sup>35</sup>Estimates of the difference are available from the authors upon request. And this is similar to the lower instances of IPV reported in rural areas despite IPV being more acceptable in those regions, as reported in Section 4.

<sup>36</sup>This is not to say that all women who never attended school underreport IPV or that all educated women accurately report IPV.

physical abuse.

Further illustrating that these patterns were likely driven by measurement issues and not by men in the least educated households not changing their likelihood of committing acts of IPV, Figure 9c re-estimates the same specifications as Figure 9b but uses the IPV attitudes of men as the dependent variable. The results are in stark contrast to the results reported in Figure 9b. The decline in IPV attitudes was evident for both men who never attended school and for men that did, but the decline was even larger for men who never attended any school. One factor that could contribute to the latter pattern was the fact that the prevalence of poor IPV attitudes was worse among men with no education in the pre-disaster period and thus had the largest share of men who would be able to improve their attitudes about IPV.

Table 3 more concretely estimates the difference in the baseline empirical patterns based on whether the individual ever attended any school. Specifically, the table re-estimates the baseline specification, but interacts the variable of interest ( $Post_{itr} * Affected_{ir}$ ) with an indicator for whether the individual never attended any school.<sup>37</sup> The coefficient on the triple interaction gives an estimate of how much larger the difference-in-differences estimate was for individuals that never attended school. A positive estimate is consistent with the decline in IPV prevalence and attitudes being smaller for the least educated individuals, and a negative estimate is consistent with the decline being even larger.

The estimates in Table 3 corroborate the patterns illustrated in Figure 9. The decline in the prevalence of IPV reported by the least educated women is less strong than that of all other women. The estimates are positive for all three measures, strong in magnitude, and two out of the three measures are statistically significant at the 5 percent level. Consistent with Figure 9c, the decline in the acceptability of IPV among men is even larger for the men that have the least education. All point estimates of the seven measures are negative, five of the seven have a strong magnitude, and two of the seven measures are statistically significant at conventional significance levels (one at the 5 percent level and one at the 10 percent level).

Combined, the results are consistent with there being a large drop in actual IPV prevalence following the disaster and consistent with significant underreporting of IPV incidents in the pre-disaster period by the women who are potentially least likely to admit to experiencing IPV. The large decline in the IPV prevalence substantiates the large improvement of IPV attitudes of men estimated in Section 5. However, there could also be other subsets of the population that are not

---

<sup>37</sup>All lower-order terms, regional fixed effects, and control variables are also included in the specification.

fully admitting to IPV experiences and that the empirical results are capturing only a subset of the changes that are actually occurring.

## **Section 8. Mechanisms for the Decline in IPV**

We also investigate a potential mechanism for the observed changes. In the Introduction, we noted that disasters have the potential to substantially change the tasks needed to be performed by the entire household, which has the potential to change the roles and responsibilities of each household member. Thus, although there are reasons that negative economic shocks and increased stress might worsen IPV attitudes and prevalence, these added roles and responsibilities that women might support might actually improve their importance and standing in the household.

Although most of the intrahousehold roles and responsibilities are difficult to observe in a household survey, we do find evidence of an expanded role for women inside the household. The survey asks women who in the household is primarily responsible for four different decisions- how to spend a husband's income, health decisions for the respondent, large household purchases, and for decisions about visiting other family members. For all four decisions, we re-estimate the baseline specification using indicators equaling one if the husband alone was responsible for the decision and indicators equaling one if the wife was alone responsible for the decision.

Figure 10 illustrates that there was a reduction in the instances in which the husband was solely responsible for each decision. The larger decline in the shares in disaster-affected regions varied between 3 and 16 percentage points, which represents between 9 and 34 percent of the pre-disaster shares in disaster-affected regions; and two of the four estimates are precisely estimated and are statistically significant at conventional significance levels ( $p$ -values of 0.035 and 0.051). Furthermore, the estimates for men being solely responsible for decisions are accompanied by an increase in the share of women who are alone responsible for each decision.

Although we are unable to list all the potential reasons for why IPV attitudes and IPV prevalence declined following the disaster, the results suggest a key pathway- an expanded role for women in a very tumultuous setting. More fully uncovering what these added roles and responsibilities are inside the household in disaster settings, and comparing these added roles to other potential factors that could aggravate IPV, could more fully explain some of these patterns and the instances in which the prevalence of IPV might actually decline in disaster settings.

## **9. Conclusion**

This analysis illustrates that attitudes about IPV substantially improved following a large disaster

in PNG that precipitated a humanitarian disaster and a forced displacement crisis. The analysis also demonstrates that the change in reported prevalence of IPV was not as substantial and was less precisely estimated, and illustrates that one likely explanation is the underreporting of IPV incidents in modules that directly ask women about the incidents that they experience. And lastly, the analysis explores potential mechanisms that explain the decline in attitudes about IPV for the entire population of men and the decline in reported prevalence among a subset of the population of women.

However, there are many avenues that the analysis is unable to explore given data limitations. First, as discussed above, we are not fully able to identify how the roles and responsibilities of women change in the household, and thus we cannot fully identify all the ways in which the disaster might have changed the intrahousehold dynamics that might result in changes to IPV. More detailed survey instruments and combining quantitative household data with some more qualitative discussions could better identify how disasters might change household dynamics. Although more subjective in nature, more detailed questionnaires that inquire why women think their husbands might commit acts of intimate partner violence could help better explain these potential pathways and understand IPV more generally.

Second, these results are relatively short-term results and the data coverage following the disaster limits our ability to more fully investigate the full impacts of the disaster. Whether these changes persist more than seven months following the disaster is unable to be explored here; and we are unable to explore whether data collected even more closely in time to the disaster or whether data collected from regions even more strongly impacted than those analyzed here might have resulted in similar or even stronger findings. But the continuation of a survey in the midst of such disasters are relatively uncommon and these results add additional information relative to other settings where data might be collected long after the disaster ends.

And lastly, these results only investigate how disasters might change IPV. Although some of the results might have implications for what might improve the IPV situation in the country more generally, such as interventions that necessarily expand the roles and responsibilities for women inside the household, the results do not explain how such a dire IPV situation evolved and how to more fully reduce and eliminate IPV in the country.



## References

- Abiona, O., M. Koppensteiner. 2018. "The Impact of Household Shocks on Domestic Violence: Evidence from Tanzania." IZA Discussion Paper No. 11992, IZA Institute of Labor Economics, Bonn, Germany.
- Agarwal, B. 1997. "Bargaining and Gender Relations: Within and Beyond the Household." *Feminist Economics* 3(1), 1-51.
- Baker, A., D. Larcker, and C. Wang. 2022. "How Much Should We Trust Staggered Difference-in-Differences Estimates?" *Journal of Financial Economics* 144 (2), 370-395.
- Bandiera, O., N. Buehren, R. Burgess, M. Goldstein, S. Gulesci, I. Rasul, M. Sulaiman. 2020. "Women's Empowerment in Action: Evidence from a Randomized Control Trial in Africa." *American Economic Journal: Applied Economics* 12 (1), 210-259.
- Baxi, P., D. Naidoo, and S. Tandon. 2024. "How Do Unfair Shares Compare? Benchmarking Well-Being in Papua New Guinea." Working Paper, the World Bank, Washington, D.C., USA.
- Bell, K., and A. Naugle. 2007. "Effects of Social Desirability on Students' Self-Reporting of Partner Abuse Perpetration and Victimization." *Violence and Victims* 22 (2).
- Blair, G., and K. Imai. 2012. "Statistical Analysis of List Experiments." *Political Analysis* 20, 47-77.
- Blair, G., K. Imai, and Y. Zhou. 2015. "Design and Analysis of Randomized Response Technique." *Journal of American Statistical Association* 110 (511), 1304-1319.
- Blattman, C., J. Jamison, T. Koroknay-Palicz, K. Rodrigues, and M. Sheridan. 2016. "Measuring the Measurement Error: a Method to Qualitatively Validate Survey Data." *Journal of Development Economics* 120, 99-112.
- Borusyak, K., X. Jaravel, and J. Spiess. Forthcoming. "Revisiting Event Study Designs: Robust and Efficient Estimation." *Review of Economic Studies*, forthcoming.
- Bulte, E. and R. Lensink. 2019. "Women's empowerment and domestic abuse: Experimental evidence from Vietnam." *European Economic Review* 115, 172-191.
- Calloway, B. and P. Sant'Anna. 2020. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics* 225 (2), 200-230.
- Cools S., M. Flato, and A. Kotsadam. 2020. "Rainfall Shocks and Intimate Partner Violence in Sub-Saharan Africa." *Journal of Peace Research* 57 (3), 377-390 *J. Peace Res.*, 57 (3) (2020), pp. 377-390
- Cooper M., A. Sandler, S. Vitellozzi, Y. Lee, G. Seymour, B. Haile, and C. Azzari. 2021. "Re-Examining the Effects of Drought on Intimate-Partner Violence." *PLoS One* 16e0254346.
- Council of Europe. 2019. "Gender Matters: A Manual on Addressing Gender-Based Violence Affecting Young People." Report, Council of Europe, Strasburg, France.
- Cullen, C. 2023. "Method Matters: The Underreporting of Intimate Partner Violence." *The World Bank Economic Review* 37 (1), 49-73.
- Cullen, C. A. Alik-Lagrange, M. Ngatia, and J. Vaillant. 2024. "The Unintended Impacts of an Intimate Partner Violence Prevention Program: Experimental Evidence from Rwanda." Working Paper, the World Bank, Washington, D.C., USA.
- Davidson, H. 2018. "Papua New Guinea Earthquake: Death Toll Rises as Disease Threat Grows."

- Report, The Guardian, London, United Kingdom. "[https : www.theguardian.com/world/2018mar15/papua-new – guinea – earthquake – death – toll – rises – disease – threat – grows](https://www.theguardian.com/world/2018mar15/papua-new-guinea-earthquake-death-toll-rises-disease-threat-grows)"
- Devries, K., J. Mak, C. Garcia-Moreno, M. Petzold, J. Child, G. Falder, S. Lim, L. Bacchus, R. Engell, L. Rosenfeld, C. Pallitto, T. Vos, N. Abrahams, and C. Watts. 2013. "The Global Prevalence of Intimate Partner Violence Against Women." *Science* 340 (6140), 1527-1528.
- DFAT. 2018. "Highlands Earthquake Factsheet." Report, Department of Foreign Affairs and Trade, Government of Australia, Canberra, Australia. "<https://www.dfat.gov.au/sites/default/files/png-earthquake-factsheet.pdf>."
- DHS. 2019. "2016-2018 Demographic and Health Survey Report." Report, Demographic and Health Survey, USAID.
- Dhar, D., T. Jain, and S. Jayachandran. 2022. "Reshaping Adolescents' Gender Attitudes: Evidence from a School-Based Experiment in India." *American Economic Review* 112 (3), 899-927.
- Diaz, J., and V. Saldarriaga. 2023. "'A Drop of Love? Rainfall Shocks and Spousal Abuse: Evidence from Rural Peru." *Journal of Health Economics* 89, 102739.
- Doss, C. 2013. "Intrahousehold Bargaining and Resource Allocation in Developing Countries." *World Bank Research Observer* 28 (1), 52-78.
- Duflo, E. 2012. "Women Empowerment and Economic Development." *Journal of Economic Literature* 50 (4), 1051-79.
- Education Cannot Wait. 2019. "After the Quake." Report, Education Cannot Wait, New York, USA. "[https : reliefweb.int/report/papua – new – guinea/after – quake](https://reliefweb.int/report/papua-new-guinea/after-quake)"
- Elsberg, M., and L. Heise. 2005. "Researching Violence Against Women: A Practical Guide for Researchers and Activists." Report, World Health Organization, Geneva. "[https : iris.who.int/bitstream/handle/11060/1](https://iris.who.int/bitstream/handle/11060/1)."
- Epstein, A., E. Bendavid, D. Nash, E. Charlebois, S. Weiser. 2020. "Drought and Intimate Partner Violence Towards Women in 19 Countries in Sub-Saharan Africa During 2011-2018: A Population-Based Study" *PLoS Medicine* 17 (3), Article e1003064.
- Eves, R. 2019. "Full Price, Full Body: Norms, Brideprice and Intimate Partner Violence in the Highlands of Papua New Guinea." *Culture, Health & Sexuality* 21 (12), 1367-1380.
- Eves, R., G. Kouro S. Simiha, and I. Subalik. 2018. "Do No Harm Research: Papua New Guinea." Report, The Australian National University, Canberra, Australia. "[https://dpa.bellschool.anu.edu.au/sites/default/files/2018/03/do\\_no\\_harm\\_png\\_low\\_res.pdf](https://dpa.bellschool.anu.edu.au/sites/default/files/2018/03/do_no_harm_png_low_res.pdf)."
- Fagen J., W. Sorenson, and P. Anderson. 2011. "Why Not the University of New Orleans? Social Disorganization and Sexual Violence Among Internally Displaced Women of Hurricane Katrina." *Journal of Community Health* 36, 721-727.
- Fisher, R. 1993. "Social Desirability Bias and the Validity of Indirect Questioning." *Journal of Consumer Research* 20 (2), 303-315.
- Frasier P., L. Belton, E. Hooten, M. Campbell, B. DeVellis, S. Benedict, C. Carrillo, P. Gonzalez, K. Kelsey, and A. Meier. 2004. "Disaster Down East: Using Participatory Action Research to Explore Intimate Partner Violence in Eastern North Carolina." *Health Education Behavior* 31, 69S-84S.
- Gennetian L. 2003. "Welfare Policies and Domestic Abuse Among Single Mothers: Experimental Evidence from Minnesota." *Violence Against Women* 9, 1171-1190.
- Gibson-Davis C., K. Magnuson, L. Gennetian, G. Duncan. 2005. "Employment and the Risk of

- Domestic Abuse Among Low-Income Women.” *Journal of Marriage and Family* 67, 1149-1168.
- Goldin, C., and L. Katz. 2002. “The Power of the Pill: Oral Contraceptives and Women’s Career and Marriage Decisions.” *Journal of Political Economy* 110 (4): 730–70.
- Glynn, A. 2013. “What Can We Learn with Statistical Truth Serum? Design and Analysis of the List Experiment.” *Public Opinion Quarterly* 77, 159-172.
- Goodman-Bacon, A. 2021. “Difference-in-Differences With Variation in Treatment Timing.” *Journal of Econometrics* 225 (2), 254-277.
- Government of PNG. 2016. “Papua New Guinea National Strategy to Prevent and Respond to Gender Based Violence 2016-2025.” Report, Government of Papua New Guinea, Port Moresby, Papua New Guinea. ”<https://femilipng.org/wp-content/uploads/National-Strategy-to-Prevent-and-Respond-to-IPV.pdf>.”
- Government of Papua New Guinea. 2022. “Special Parliamentary Committee on Gender-Based Violence Report to Parliament.” Report, Government of Papua New Guinea, Port Moresby, Papua New Guinea. ”[https://www.unitedforequalitypng.com/\\_filesugd7f0c06\\_50372501b8b7406b8482e9560dbd21b4.pdf?inc](https://www.unitedforequalitypng.com/_filesugd7f0c06_50372501b8b7406b8482e9560dbd21b4.pdf?inc)”
- Government of PNG, OCHA, and UNCT. 2018. “Highlands Earthquake Situation Report No. 10.” Report, Port Moresby, Papua New Guinea. ”<https://reliefweb.int/report/papua-new-guinea/papua-new-guinea-highlands-earthquake-situation-report-no-10-28-may-2018>”
- Gregson, S., T. Zhuwau, J. Ndlovu, and C. Nyamukapa. 2002. “Methods to Reduce Social Desirability Bias in Sex Surveys in Low-Development Settings: Experience in Zimbabwe.” *Sexually Transmitted Diseases* 29 (10), 568-575.
- Gupta J., K. Falb, H. Lehmann, D. Kpebo, Z. Xuan, M. Hossain, and J. Annan. 2013. “Gender Norms and Economic Empowerment Intervention to Reduce Intimate Partner Violence Against Women in Rural Côte d’Ivoire: A Randomized Controlled Pilot Study.” *BMC International Health and Human Rights* 13(1), Article 46.
- Hallegatte, S. 2014. “Economic Resilience : Definition and Measurement.” Policy Research Working Paper 6852, the World Bank, Washington, DC. ”<http://hdl.handle.net/10986/18341>License : CCBY3.0IGO”
- Haushofer, J., and J. Shapiro. 2016 “The Short-Term Impact of Unconditional Cash Transfers to the Poor: Experimental Evidence from Kenya.” *Quarterly Journal of Economics* 131 (4), 1973-2042.
- Heise, L. 2011. “What Works to Prevent Partner Violence? An Evidence Overview.” London: STRIVE Research Consortium.
- Hidrobo M., and L. Fernald. 2013. “Cash Transfers and Domestic Violence.” *Journal of Health Economics* 32, 304-319.
- Hidrobo M., A. Peterman, and L. Heise. 2016. “The Effect of Cash, Vouchers, and Food Transfers on Intimate Partner Violence: Evidence from a Randomized Experiment in Northern Ecuador.” *American Economic Journal: Applied Economics* 8, 284-303.
- ICRC. 2018. “Papua New Guinea: Earthquake Response Operation Update 2018 (March to May 2018).” Report, International Committee of the Red Cross, Geneva, Switzerland. ”<https://reliefweb.int/report/papua-new-guinea/papua-new-guinea-earthquake-response-operation-update-2018-march-may-2018>.”
- International Organization of Migration. 2018. “Displacement Tracking Matrix Report for Earthquake-Affected Communities Hela, Southern Highlands and Western Provinces.” Report, International Organization of Migration, Port Moresby, Papua New Guinea. ”<https://reliefweb.int/report/papua-new-guinea/displacement-tracking-matrix-report-earthquake-affected-communities>”

hela”

Jayachandran, S. 2015. “The Roots of Gender Inequality in Developing Countries.” *Annual Review of Economics* 7, 63–88.

J-PAL. 2022. “The impacts of economic interventions on intimate partner violence.” J-PAL Policy Insights, Abdul Latif Jameel Poverty Action Lab, Cambridge, Massachusetts.

Abdul Latif Jameel Poverty Action Lab (J-PAL). 2022. “The impacts of economic interventions on intimate partner violence.” J-PAL Policy Insights. Last modified July 2022.

Kim J., C. Watts, J. Hargreaves, L. Ndhlovu, G. Phetla, L. Morison, P. Pronyk. 2007. “Understanding the Impact of a Microfinance-Based Intervention on Women’s Empowerment and the Reduction of Intimate Partner Violence in South Africa.” *American Journal of Public Health* 97, 1794-1802.

Kramon E, and K. Weghorst. 2019. “(Mis) Measuring sensitive attitudes with the list experiment.” *Public Opinion Quarterly* 83,236–263.

Krueger, A., and A. Stone. 2014. Measuring Subjective Well-being: Progress and Challenges. *Science* 346, 42-43.

Macmillan R. and R. Gartner. 1999. “When She Brings Home the Bacon: Labor-Force Participation and the Risk of Spousal Violence Against Women.” *Journal of Marriage and Family* 61, 947-958.

Mambon, K. 2023. “Rethinking Perceptions of Spousal Violence in PNG.” Report, Devpolicy, Development Policy Center, Australian National University, Canberra, Australia. ”<https://devpolicy.org/rethinking-perceptions-of-spousal-violence-in-png-20230222>.”

Organization for Economic Co-operation and Development. 2013. OECD guidelines on measuring subjective well-being. Report, OECD, Paris.

Panda, P., and B. Agarwal. 2005. “Marital Violence, Human Development and Women’s Property Status in India.” *World Development* 33 (5), 823-850.

Rooney, N., M. Forsyth, J. Goa, D. Lawihin, and D. Kuir-Ayius. 2022. “Thinking Incrementally About Policy Interventions on Intimate Partner Violence in Papua New Guinea: Understanding “Popcorn” and “blanket.” *Culture, Health & Sexuality* DOI: 10.1080/13691058.2022.2103736.

Rosenfeld, B., K. Imai, and J. Shapiro. 2015. “An Empirical Validation Study of Popular Survey Methodologies for Sensitive Questions.” *American Journal of Political Science* 60 (3), 783-802.

Sardinha, L., M. Mahue-Giroux, H. Stockl, S. Meyer, and C. Garcia-Moreno. 2022. “Global, Regional, and National Prevalence Estimates of Physical or Sexual, or Both, Intimate Partner Violence Against Women in 2018.” *The Lancet* 399 (10327), 803-813.

Smith, A. 2024. “The Paradox of Empowerment: Gender Norms and Intimate Partner Violence in PNG.” Report, Devpolicy, Canberra, Australia. ”<https://devpolicy.org/the-paradox-of-empowerment-gender-norms-and-intimate-partner-violence-in-png-20240222>.”

Stark, L., and A. Ager. 2011. “A Systematic Review of Prevalence Studies of Gender-Based Violence in Complex Emergencies.” *Trauma Violence Abuse* 12, 127-134.

Stiglitz J, Sen A, Fitoussi J. 2009. Report of the Commission on the Measurement of Economic Performance and Social Progress. (accessed January 2023) [http : www.stiglitz-sen-fitoussi.fr/documents/rapp](http://www.stiglitz-sen-fitoussi.fr/documents/rapp)

Sun, L. and S. Abraham. 2021. “Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects.” *Journal of Econometrics* 225 (2), 175-199.

Tandon, S. 2024. “How Difficult is it to Interpret Subjective Well-being Questions During Crises?”

Evidence from the Onset of Conflict in Yemen.” *Oxford Economic Papers* 76 (3).

Tandon, S., and T. Vishwanath. 2022. ”Capturing Sensitive Information from Difficult-to-Reach Populations: Evidence from a Novel Internet-Based Survey in Yemen.” World Bank Policy Research Working Paper WPS10179, the World Bank, Washington, D.C.

Tankard, M., and R. Iyengar. 2018. ”Economic Policies and Intimate Partner Violence Prevention: Emerging Complexities in the Literature.” *Journal of Interpersonal Violence* 33 (21), 3367-3387.

UNCT. 2018. ”Papua New Guinea: Earthquakes- February 2018.” Report, UNCT, Port Moresby, Papua New Guinea. ”[https : reliefweb.int/disastereq – 2018 – 000020 – png.](https://reliefweb.int/disastereq-2018-000020-png)”

van Daalen, K., S. Kallesoe, F. Davey, S. Dada, L. Jung, L. Singh, R. Issa, C. Emilian, I. Kuhn, I. Keygnaert, and M. Nilsson. 2022. ”Extreme Events and Gender-Based Violence: A Mixed-Methods Systematic Review.” *The Lancet Planetary Health* 6 (6) E504-E523.

Weitzman, A. and J. Behrman. 2016. ”Disaster, Disruption to Family Life, and Intimate Partner Violence: The Case of the 2010 Earthquake in Haiti.” *Sociological Science* 3, 167-189.

WHO. 2018. ”Papua New Guinea Earthquake Situation Report No. 2.” Report, World Health Organization, Geneva, Switzerland. ”[https://www.who.int/docs/default-source/wpro---documents/emergencies/png-earthquake20180328-png-quake-sitrep2.pdf?sfvrsn=48ace0bf\\_0.](https://www.who.int/docs/default-source/wpro---documents/emergencies/png-earthquake20180328-png-quake-sitrep2.pdf?sfvrsn=48ace0bf_0)”

WHO. 2021. ”Violence Against Women Prevalence Estimates, 2018.” Report, World Health Organization, Geneva. ”[https : www.who.int/publications/iitem/9789240022256](https://www.who.int/publications/iitem/9789240022256)”

Zimmerman K. ”Plates in a Basket Will Rattle: Domestic Violence in Cambodia, a Summary.” Phnom Penh, Cambodia: Project Against Domestic Violence; 1995.

**Table 1. Changes in Difficult-to-Adjust Household Characteristics Following the Disaster- Men's Survey**

	Change Following Earthquake in Disaster-Affected Regions		Change Following Earthquake in the Rest of the Country		Difference in Differences	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Indicator- Never Attended Primary	0.108	(0.085)	0.083***	(0.030)	0.025	(0.089)
Indicator- At Least Started Primary	0.061	(0.077)	0.102***	(0.031)	-0.041	(0.082)
Indicator- At Least Started Secondary	-0.176***	(0.057)	-0.145***	(0.023)	-0.031	(0.060)
Indicator- At Least Started Above Secondary	0.007	(0.032)	-0.040***	(0.012)	0.048	(0.033)
Years Schooling	-1.327	(0.797)	-1.638***	(0.321)	0.311	(0.848)
Indicator- Incomplete Primary (highest)	0.041	(0.066)	0.105***	(0.030)	-0.064	(0.071)
Indicator- Completed Primary (highest)	0.020	(0.030)	-0.002	(0.016)	0.023	(0.034)
Indicator- Incomplete Secondary (highest)	-0.164***	(0.048)	-0.098***	(0.017)	-0.066	(0.051)
Indicator- Completed Secondary (highest)	-0.012	(0.043)	-0.047***	(0.014)	0.035	(0.045)
Age of Head of Household	-2.817	(1.948)	-1.814**	(0.719)	-1.003	(2.050)
Indicator- Male-Headed Household	0.060	(0.050)	0.025*	(0.014)	0.035	(0.051)
Indicator- Illiterate	0.106	(0.088)	0.100***	(0.030)	0.006	(0.092)
Indicator- Partially Literate	0.045	(0.057)	0.118***	(0.023)	-0.073	(0.060)
Indicator- Can Read Sentence	-0.206**	(0.082)	-0.224***	(0.037)	0.018	(0.089)
Indicator- Other Literacy	0.056	(0.040)	0.007	(0.005)	0.049	(0.040)
Number of Children Born	0.060	(0.348)	0.308**	(0.124)	-0.248	(0.365)
Indicator- Rural	0.133	(0.089)	0.143***	(0.025)	-0.009	(0.091)
Share of Members Eligible Men's Survey	0.040	(0.032)	-0.013	(0.018)	0.053	(0.037)
Indicator- Head of Household	0.163*	(0.097)	0.114***	(0.025)	0.049	(0.099)

Notes: Figures report the changes in difficult-to-adjust individual characteristics in the Men's Survey following the disaster separately for disaster-affected regions and the rest of the country. The table further reports the difference between the first and third columns, and represents how much more did the variable increase in disaster-affected regions than in the rest of the country. There are 281 observations from disaster-affected regions- 109 from before the disaster and 172 after; and there are 7051 observations for the rest of the country- 5,558 from before the disaster and 1,493 after. Standard errors are clustered at the PSU level and reported for each estimate. \*\*\* denotes statistical significance at the one percent level; \*\* denotes statistical significance at the 5 percent level; and \* denotes statistical significance at the 10 percent level.

**Table 2. Changes in Difficult-to-Adjust Household Characteristics Following the Disaster- Women’s Survey**

	Change Following Earthquake in Disaster-Affected Regions		Change Following Earthquake in the Rest of the Country		Difference in Differences	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Indicator- Never Attended Primary	0.258***	(0.089)	0.122***	(0.043)	0.136	(0.097)
Indicator- At Least Started Primary	-0.123	(0.100)	0.022	(0.046)	-0.145	(0.108)
Indicator- At Least Started Secondary	-0.095*	(0.056)	-0.099***	(0.025)	0.004	(0.060)
Indicator- At Least Started Above Secondary	-0.041	(0.036)	-0.045***	(0.017)	0.005	(0.039)
Years Schooling	0.377	(2.558)	-1.674***	(0.396)	2.051	(2.550)
Indicator- Incomplete Primary (highest)	-0.048	(0.099)	0.059	(0.038)	-0.107	(0.104)
Indicator- Completed Primary (highest)	-0.074*	(0.042)	-0.037**	(0.017)	-0.038	(0.045)
Indicator- Incomplete Secondary (highest)	-0.104*	(0.055)	-0.077***	(0.021)	-0.026	(0.058)
Indicator- Completed Secondary (highest)	0.009	(0.009)	-0.021*	(0.012)	0.030**	(0.015)
Age of Head of Household	-0.021	(3.130)	-2.261***	(0.665)	2.241	(3.153)
Indicator- Male-Headed Household	-0.037	(0.079)	0.029	(0.025)	-0.067	(0.081)
Indicator- Illiterate	0.300***	(0.081)	0.128***	(0.040)	0.172*	(0.090)
Indicator- Partially Literate	-0.094	(0.075)	0.051**	(0.025)	-0.144*	(0.078)
Indicator- Can Read Sentence	-0.210**	(0.096)	-0.179***	(0.039)	-0.030	(0.102)
Indicator- Other Literacy	0.004	(0.004)	0.001	(0.005)	0.002	(0.006)
Number of Children Born	0.265	(0.436)	0.469***	(0.171)	-0.204	(0.462)
Indicator- Rural	0.069	(0.055)	0.123***	(0.022)	-0.055	(0.058)
Share of Members Eligible Women's Survey	-0.009	(0.031)	-0.019***	(0.007)	0.010	(0.031)
Indicator- Head of Household	0.052	(0.071)	0.003	(0.020)	0.049	(0.073)

Notes: Figures report the changes in difficult-to-adjust individual characteristics in the Women’s Survey following the disaster separately for disaster-affected regions and the rest of the country. The table further reports the difference between the first and third columns, and represents how much more did the variable increase in disaster-affected regions than in the rest of the country. There are 170 observations from disaster-affected regions- 61 from before the disaster and 109 after; and there are 3,785 observations for the rest of the country- 2,863 from before the disaster and 922 after. Standard errors are clustered at the PSU level and reported for each estimate. \*\*\* denotes statistical significance at the one percent level; \*\* denotes statistical significance at the 5 percent level; and \* denotes statistical significance at the 10 percent level.

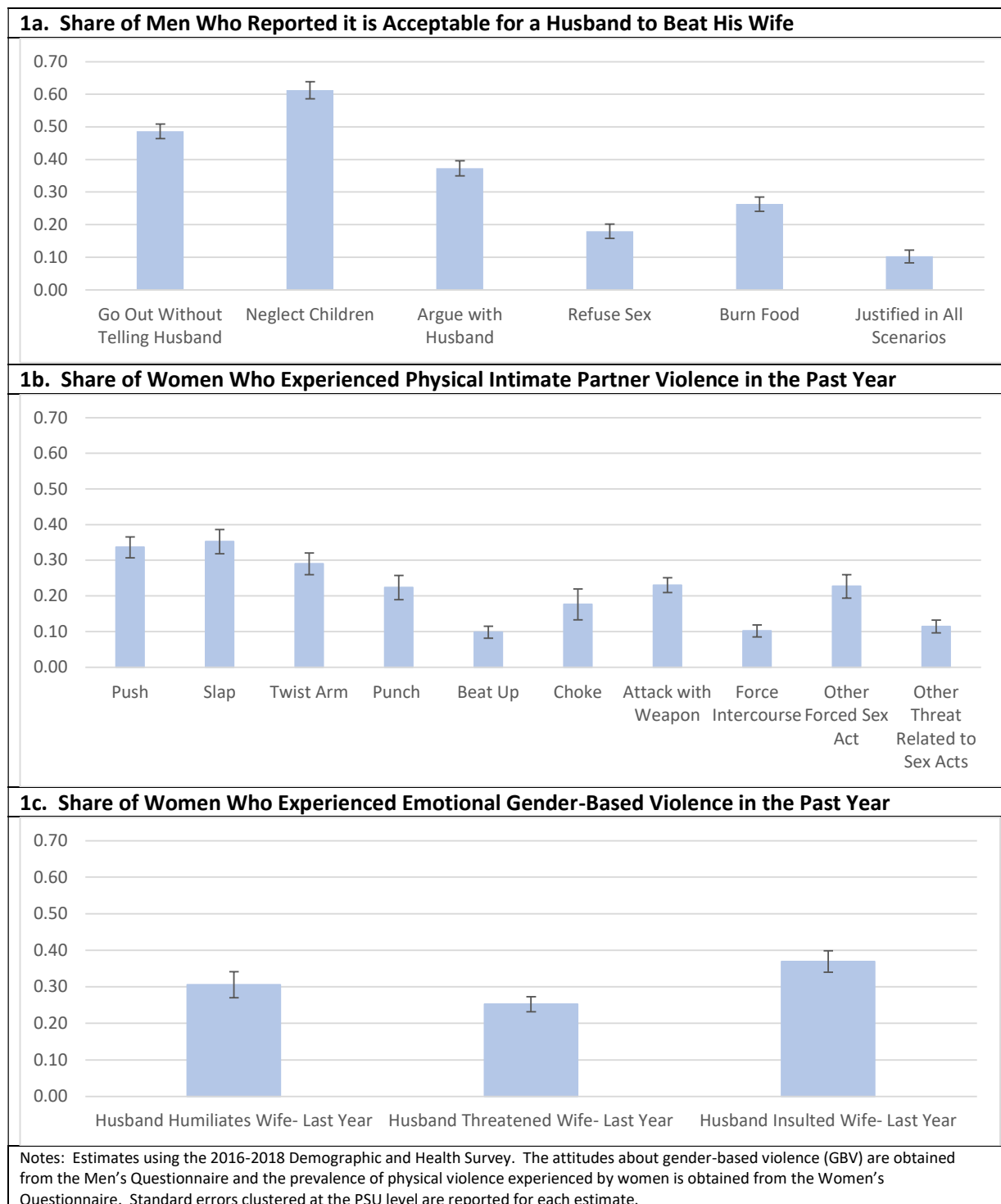
**Table 3. Differences in the Baseline Estimates by Education Level**

VARIABLES	Womens' Experience with GBV			Acceptability of Husband to Beat Wife- Men's Responses						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Experience Any GBV in the Past Year	Experience any Emotional GBV in the Past Year	Experience any Physical GBV in the Past Year	Total Affirmative Responses	Go Out Without Telling Husband	Neglect Children	Argue with Husband	Refuse Sex	Burn Food	Justified in All Scenarios
Affected x Post x Indicator for No Education	0.529**	0.486**	0.311	-1.270*	0.031	-0.015	-0.185	-0.245	-0.271	-0.342**
	(0.228)	(0.219)	(0.233)	(0.670)	(0.137)	(0.147)	(0.195)	(0.150)	(0.187)	(0.145)
Observations	3,912	3,909	3,910	7,203	7,203	7,203	7,203	7,203	7,203	7,203
R-squared	0.045	0.032	0.041	0.109	0.043	0.038	0.037	0.040	0.045	0.047

Notes: The table estimates the difference in the baseline difference-in-differences estimate for key variables based on whether the respondent ever attended any school. Specifically, each dependent variable is regressed on a term that intereacts the baseline difference-in-differences estimate with an indicator equaling one if the respondent never attended any school, and the specifications include all lower-order terms. Columns (1)-(3) uses indicators equaling one if the women experienced any form of GBV in the past year as the dependent variables, and columns (4)-(10) indicators equaling one if the male respondent thought it was acceptable for a husband to beat their wife as the dependent variable. All specifications include control variables and regional fixed effects. Control variables include the number of children born in the household, the share of household members that were eligible for the women's survey, the years of total schooling, the age of the household head, and indicators for the last level of schooling obtained (partially completed primary, completed primary, partially completed secondary completed secondary, or higher than secondary), for whether the respondent was the head of the household, for the respondents literacy level (illiterate, partially literate, can read a sentence out loud), and for whether the head of the household was male. Standard errors are clustered at the PSU level and the associated 95 percent confidence intervals for each estimate are reported.



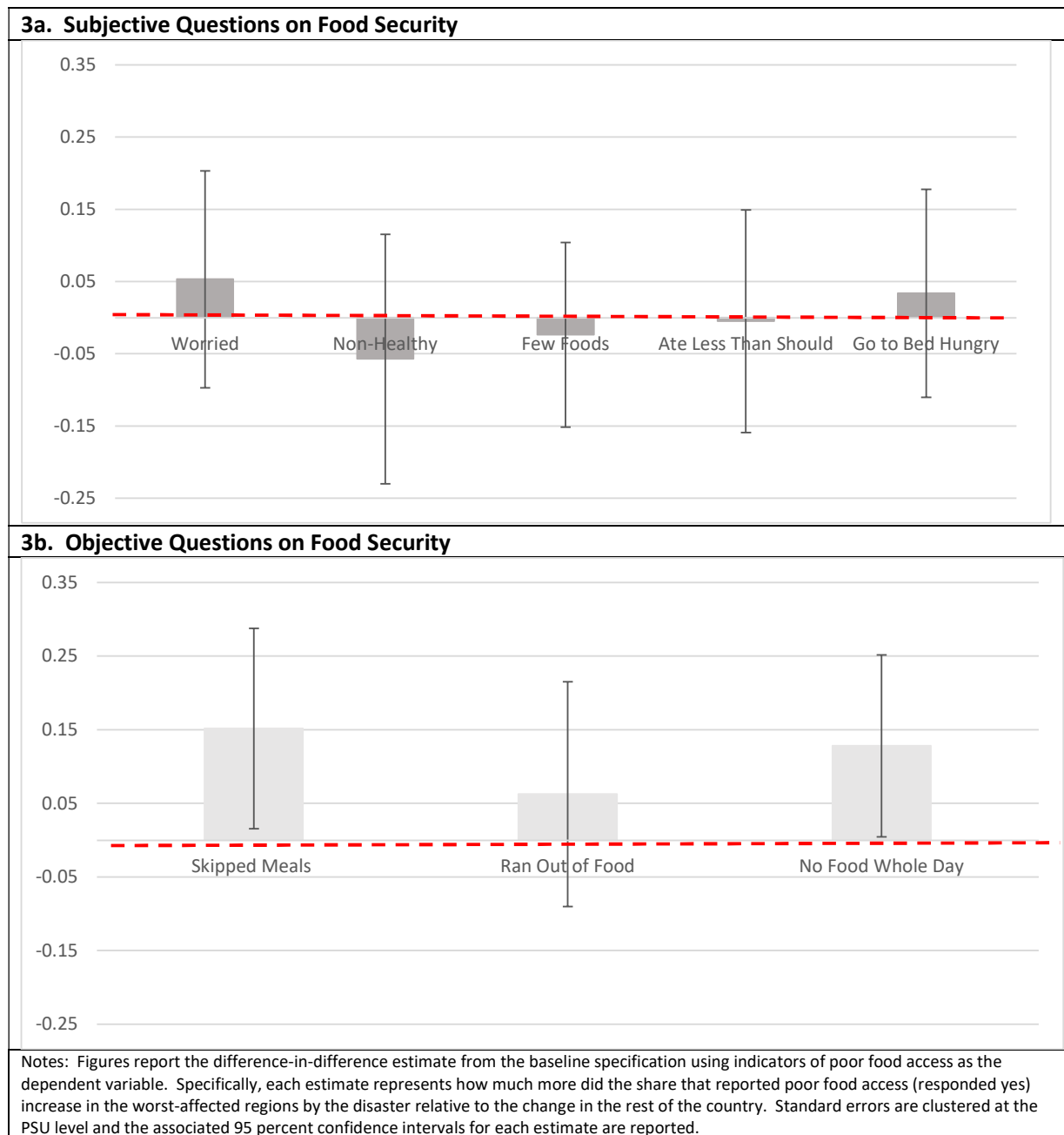
**Figure 1. Gender-Based Violence Summary Statistics**



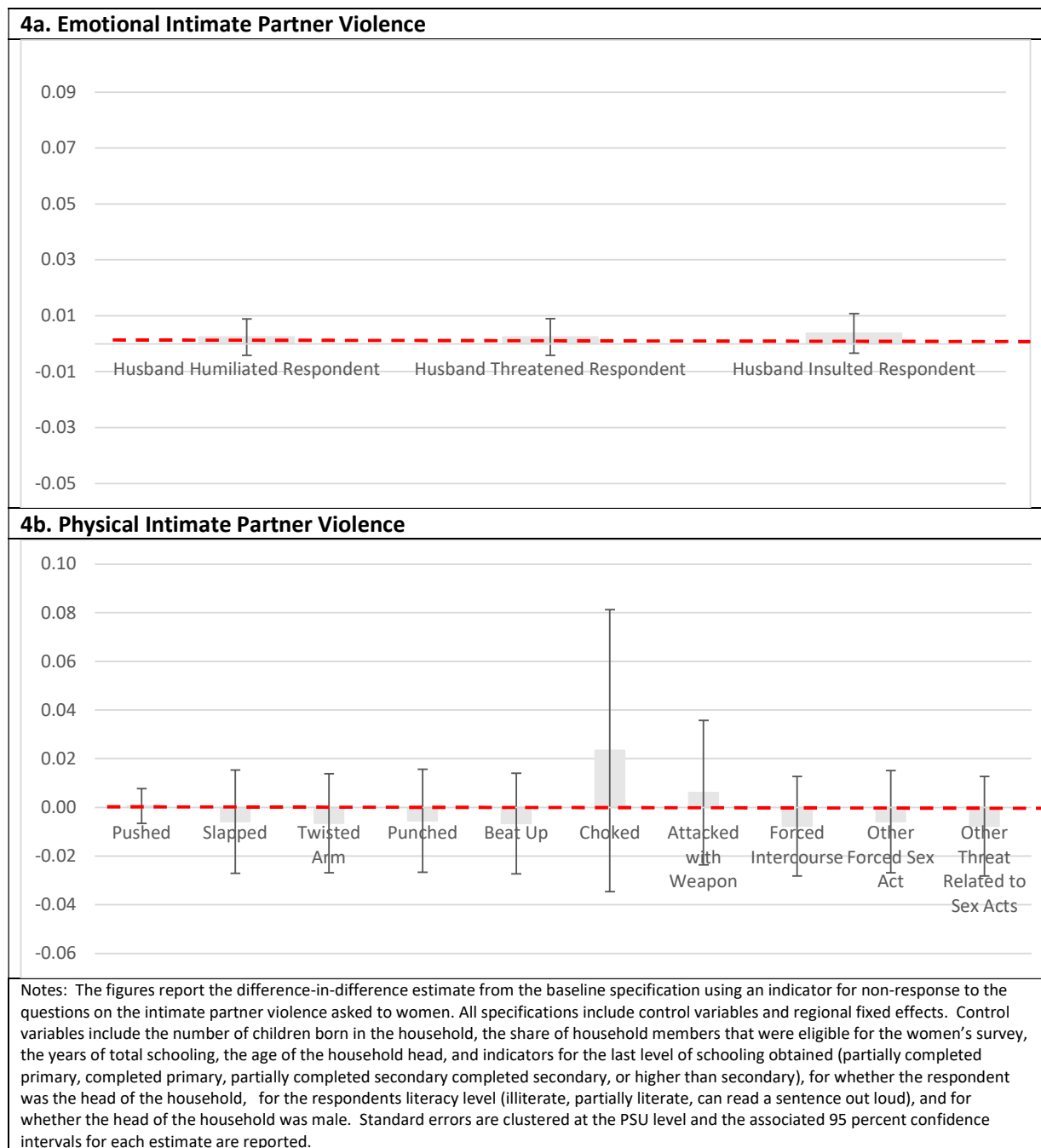
**Figure 2. Increasing Share of the Sample that is Rural Over the Course of the Survey and Implications for Gender-Based Violence Measurement**



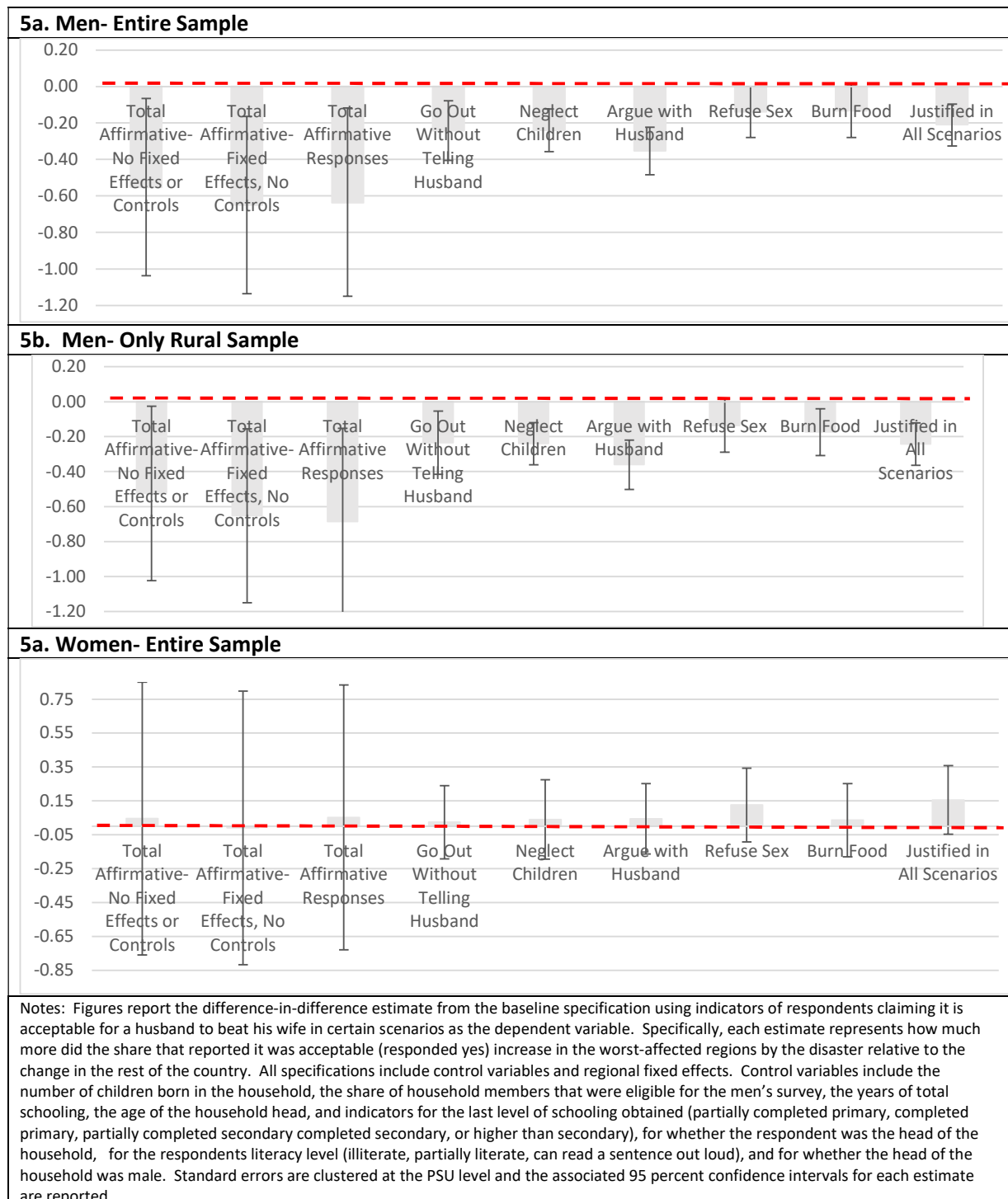
**Figure 3. How Much More Food Access Worsened in Disaster-Affected Regions Relative to the Rest of the Country**



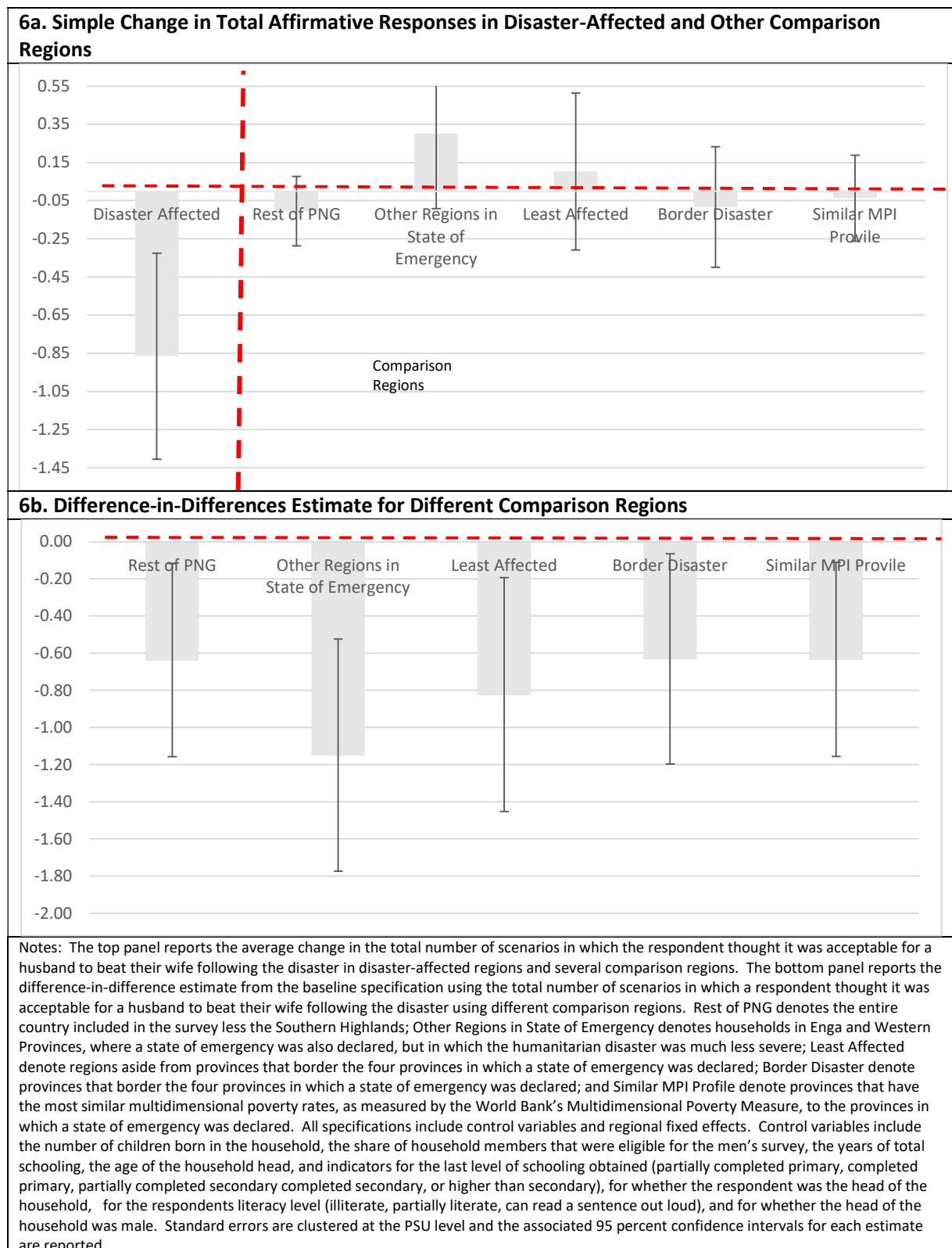
**Figure 4. Differential Non-Response for Questions on Intimate Partner Violence Experienced**



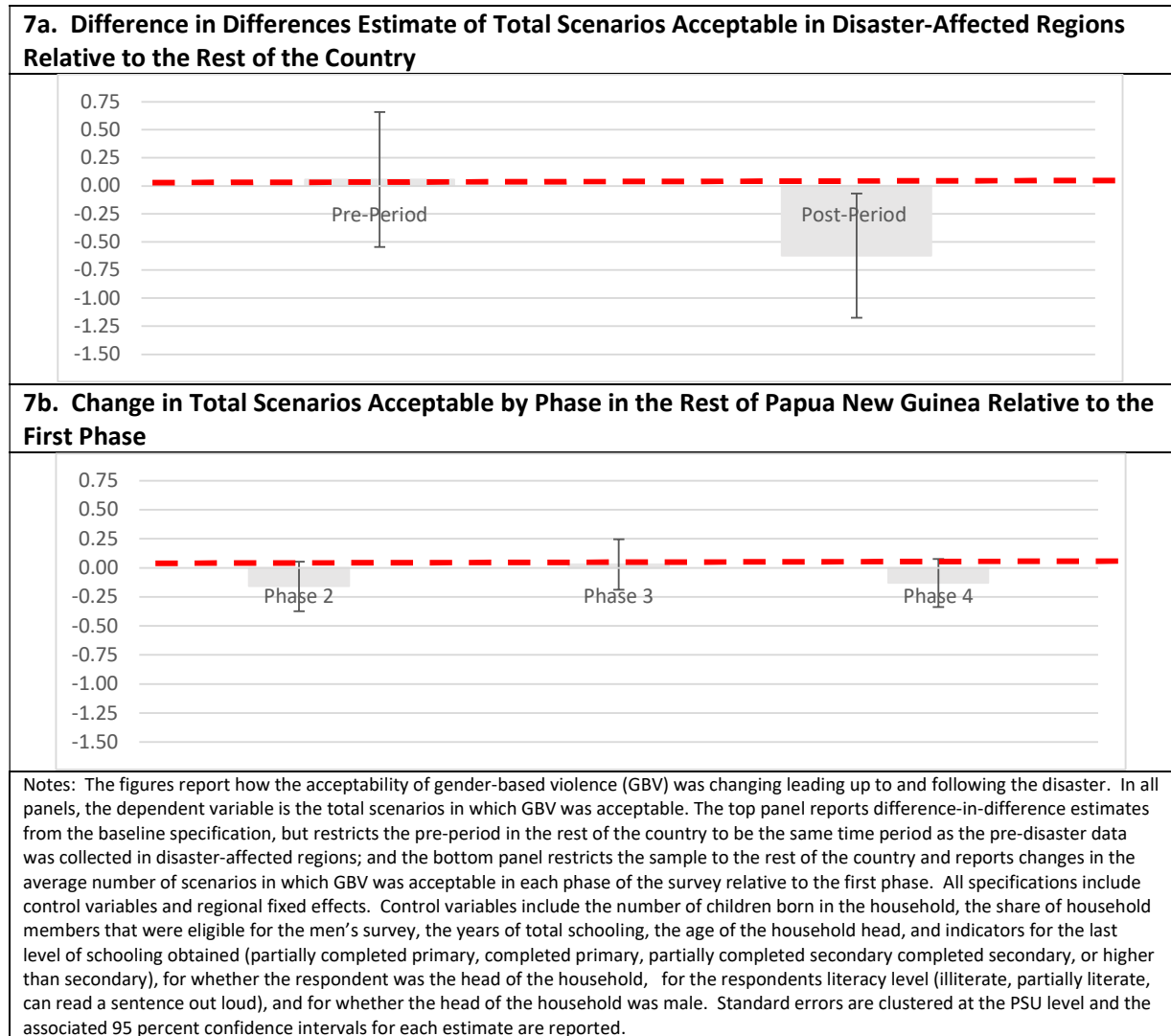
**Figure 5. How Much Larger the Increase in the Share Who Reported it is Acceptable for a Husband to Beat His Wife was in Disaster-Affected Regions**



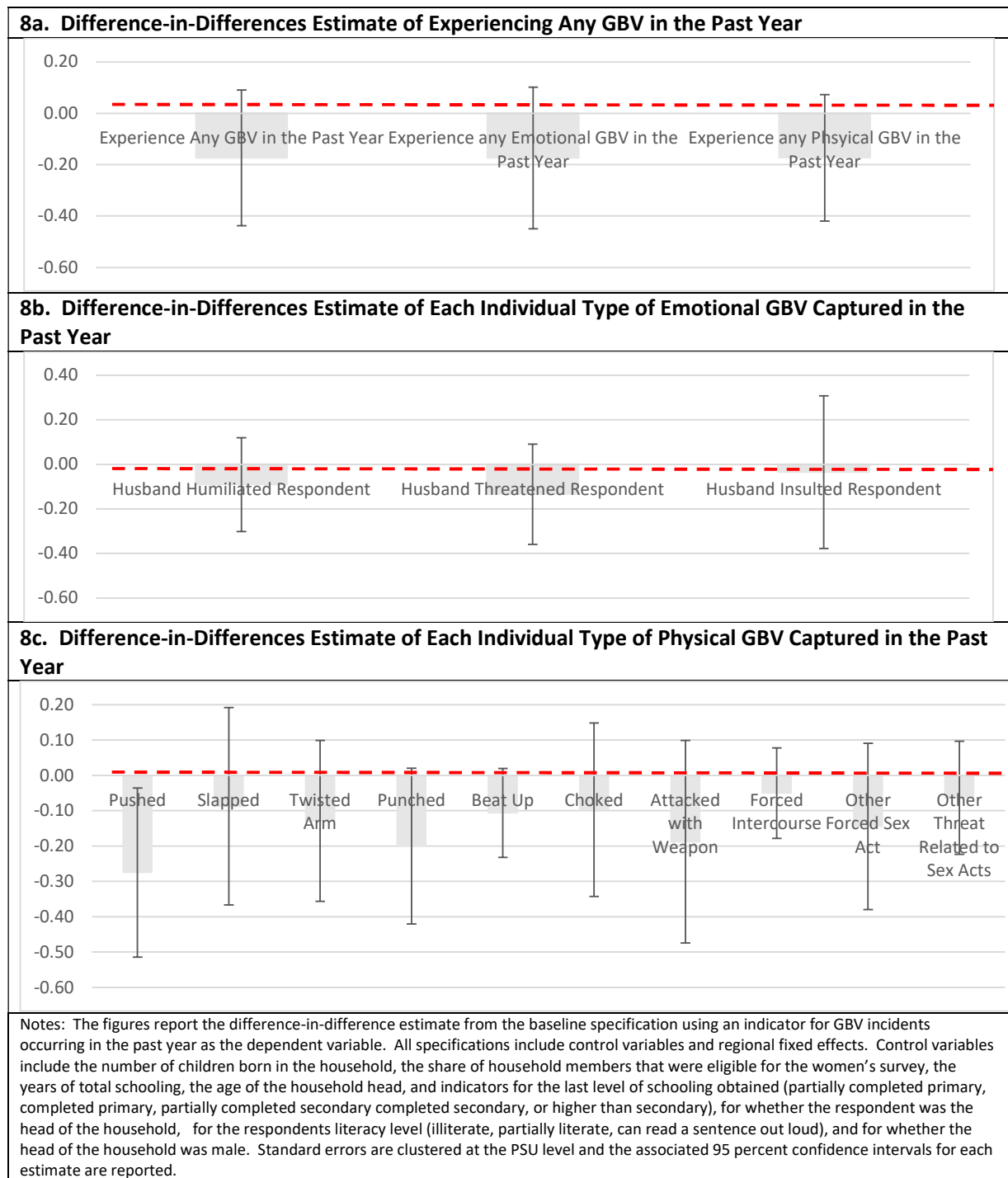
**Figure 6. Changes in the Acceptability of Gender-Based Violence for Men**



**Figure 7. How Much Larger the Increase in the Acceptability of GBV was in Disaster-Affected Regions than in the Rest of the Country Before the Disaster**

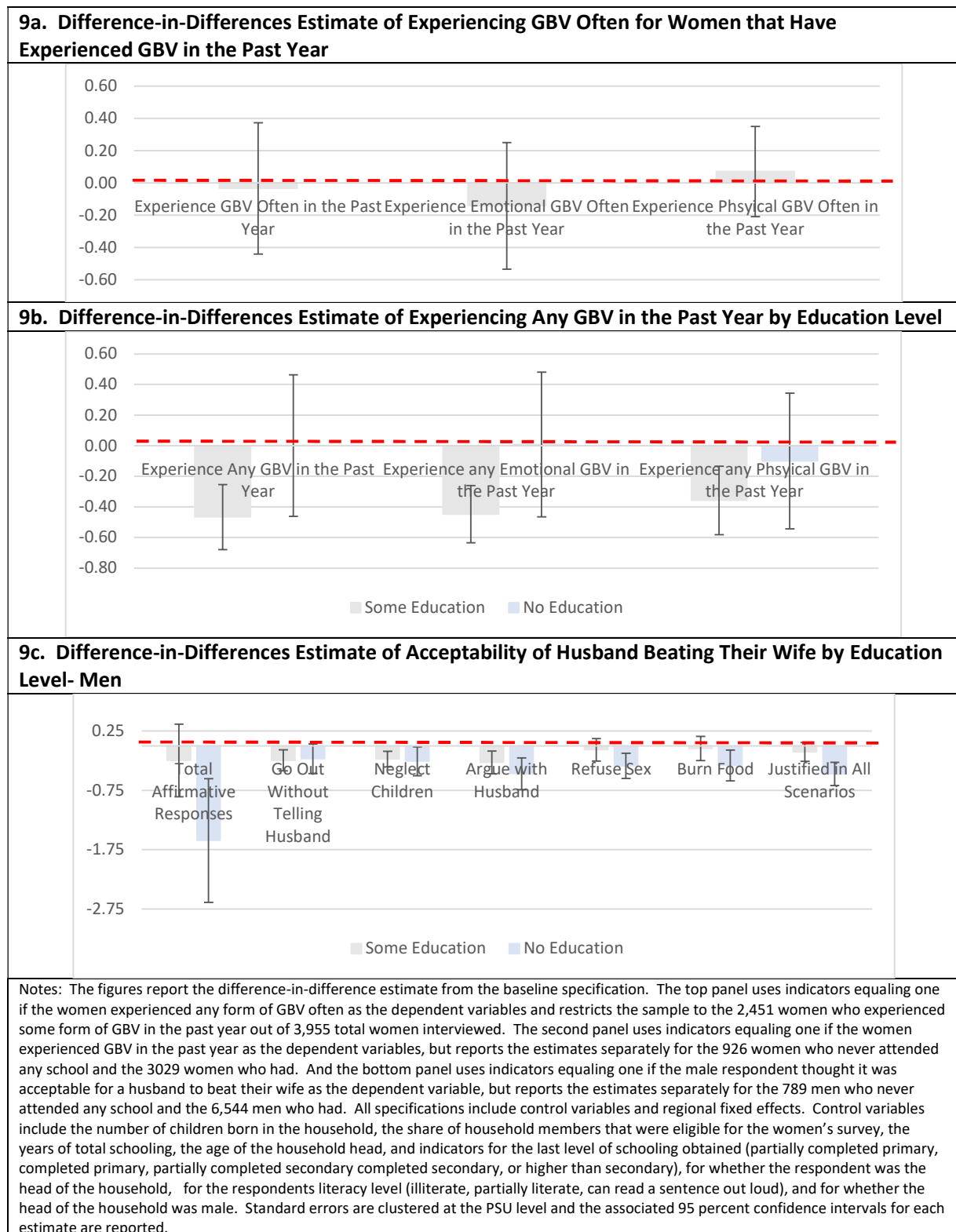


**Figure 8. How Much Larger the Increase in the Prevalence of GBV was in Disaster-Affected Regions than in the Rest of the Country**





**Figure 9. Potential Reasons for the Differences Between Changes in GBV Attitudes and GBV Prevalence**



**Figure 10. Responsibility for Decision Making in the Household**

