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ABSTRACT

The Impact of Household Shocks on Domestic Violence: Evidence from Tanzania*

In this paper, we study the effect of household shocks on the incidence of domestic violence using household survey microdata from Tanzania. We use idiosyncratic variation in rainfall to proxy for shocks on household income of rural households. We find that droughts lead to a considerable increase of domestic violence in the households. A one standard deviation negative rainfall shock from the long-term mean increases the incidence by about 13.1 per cent compared to the baseline. We make use of the rich information from the household survey to investigate the underlying pathways.

JEL Classification: D13, I10, J12, J16

Keywords: domestic violence, household shocks, rainfall, Tanzania

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1. Introduction

Violence against women in general, and intimate partner violence in particular,[1] are a major public health issue, which has lately attracted increased attention from economists. An analysis by the Word Health Organization (WHO), based on data from over 80 countries, found that between 10 and 35 per cent of women worldwide have experienced either non-partner physical violence or physical intimate partner violence in the past (WHO 2014). While the incidence of non-partner physical violence against women varies considerably across countries, a substantial level of intimate partner violence is present universally in all countries. Intimate partner violence is a leading cause of death for women ages 15–44, and the majority of all female homicide victims in the United States (US), and indeed many other countries, are killed by their intimate partner.[2] Besides the direct welfare concerns for victims of domestic violence (DV), the costs of violence against women related to policing, health expenditure, lower intrahousehold productivity and distorted investment incentives are substantial (Walby 2004; Doepke *et al.* 2012; Duflo 2012). Walby (2009) estimates the cost of DV to be approximately 6 billion pounds a year for the United Kingdom (UK). This figure includes estimates for lost economic output due to time off work related to injury and cost estimates for public services used, including criminal justice, social services, housing and health care.[3] Health care costs associated with DV accounted for approximately 1.5 per cent of public health expenditure in

[1] We use the term domestic violence throughout the paper, to capture intimate partner violence, as well as violence against non-spouses in the same household.
[2] The Center for Disease Control and Prevention publishes annual data on the leading causes of death by age and sex. Source: http://www.cdc.gov/women/lcod/2013/index.htm.
[3] In Chile, women's lost earnings as a result of DV reportedly cost the country US$1.56 billion, which was more than 2 per cent of the country's GDP in 1996, while in Nicaragua a reported estimate of US$29.5 million translated into 1.6 per cent of the national GDP in 1997 (Morrison and Orlando 1999).

the UK in 2008.[4] In addition to the cost borne by the victim, the negative externalities of DV extend to children in households of victims and the unborn children of victims.[5]

Administrative data on the incidence of DV in developing countries is very limited and associated cost estimates are very rare. Available survey data show that the incidence of DV in low-income countries generally tends to be higher than in high-income countries, with countries in Sub-Saharan Africa among those countries with the highest incidence (WHO 2013).

In this paper, we investigate the economic determinants of DV in the form of shocks to household income in the resource scarce setting of rural Tanzania. To circumvent the potential endogeneity problem when using household income, we use rainfall variation to proxy for income shocks to rural households which make up the majority of households in Tanzania. We make use of a uniquely suitable household survey data that provides very detailed information on the incidence and the severity of domestic abuse for 2,606 households. We then combine this information with household level information on rainfall shocks for households that primarily engage in rain-fed agricultural practices to estimate the effect these shocks have on the incidence of domestic abuse. The fine partitioning of the weather data, the detailed information on the timing of shocks and extremely rich information on the characteristics of households, allow us to investigate the nature of the underlying relationship between household shocks and DV.

The role of the economic conditions of the household and the within-household distribution of resources has received considerable attention in the theoretical and empirical literature on

[4] Own calculation based on estimates on health care costs from Walby (2009) and official health care expenditure data from the Office for National Statistics (2011).
[5] Aizer (2011) documents the cost of exposure to DV *in utero* on newborn health in the US and finds that hospitalization for DV leads to a reduction in birth weight of about 160 grams. Rawlings and Siddique (2014) find that children exposed to DV *in utero* across 30 low- and middle-income countries have worse health at birth and an increased child mortality rate.

DV. In early work, Gelles (1976) uses a simple household bargaining framework to explain why abused household members stay with their abusive partners.[6] Bloch and Rao (2002) show how DV is used as a bargaining instrument to extract larger dowries from the spouse's family in rural India. In bargaining models, women with better outside options have higher threat points and lower reference points for abuse, leading to a lower incidence of DV in these households. A number of empirical papers have demonstrated how income or relative income between partners influence the prevalence of violence through shifts in the bargaining power of household members (Tauchen *et al.* 1991; Tauchen and Witte 1995; Farmer and Tiefenthaler 1997; Bowlus and Seitz 2006; Srinivasan and Bedi 2007; Chin 2012). Aizer (2010) estimates – using exogenous changes in the demand for labour in female-dominated industries – the effect of the male–female wage gap on the incidence of DV and provides evidence consistent with a household bargaining model. Anderberg *et al.* (2016) show for the UK how shifts in male and female unemployment have opposite effects on domestic abuse, where female unemployment leads to a weakening in the bargaining position of females and to an increase in DV.

The framework of our paper is similar to that of Sekhri and Storeygard (2014), who study the effect of rainfall shocks on dowry deaths in India. Using district level data from 583 Indian districts, they find that a one standard deviation decline in annual rainfall from the local mean increases reported dowry deaths by 8 per cent; they explain this result via the use of the dowry to smooth consumption during periods of negative rainfall shocks. A recent paper by Cools *et al.* (2017) investigates whether rainfall shocks affect intimate partner violence. Using data from the Demographic and Health Surveys (DHS) for a number of Sub-Saharan African countries, they do not find an effect of droughts or floods on the incidence of intimate partner violence.

[6] Subsequent household bargaining models include those in Manser and Brown (1980); McElroy and Horney (1981); Bloch and Rao (2002); Srinivasan and Bedi (2007); Anderson and Eswaran (2009); Aizer (2010); Eswaran and Malhotra (2011); and Bobonis *et al.* (2013).

They speculate that the collective nature of rainfall shocks and the slow onset of droughts may disguise the underlying shock–violence relationship, possibly in combination with the peculiarities of the DHS data and its collection across space and over time.

We contribute to the literature with estimates of the effect of rainfall shocks on DV in the context of Tanzania. We provide the first evidence to this literature that rainfall shocks have a significant effect on the incidence of DV. We make use of a comprehensive set of DV measures and household level variation in precipitation in combination with a very rich set of controls at the household and community level. We find that a one standard deviation negative rainfall shock (approximately equal to a 15 per cent decrease in precipitation from the long-run mean) increases the probability of DV by 1.6 percentage points – a 13.1 per cent increase in DV compared to the mean incidence.

Using future rainfall variation in a placebo test, we can show that rainfall variation using subsequent survey periods does not affect DV outcomes for the survey period used in this paper lending credibility to the identification strategy employed. We also show that the long-term variability of rainfall is orthogonal to the current period DV outcomes. Further, we show that reporting of DV is not affected by rainfall shocks.

We then focus on the potential underlying mechanisms at work. We provide evidence that the estimated effects are caused by the economic shock to the households caused by rainfall shocks. First, we show that the effects are driven by dry shocks (droughts) rather than wet shocks (floods). Consistent with that, robustness checks help to rule out that the effects are caused by families being forced to spend extended time in a confined space during periods of excessive rainfall or extreme heat. Likewise, we show that the effects are not driven by excess heat, which may affect violence directly. Next, we show that a non-agricultural wage income by a household member mitigates the estimated effects substantially. We also provide evidence that the estimated effects are concentrated among poor households, with no significant effects for relatively richer households affected by rainfall shocks.

The very detailed information on DV allows us to gain an understanding of the potential channels underlying estimated effects. We show that the overall effect of rainfall shocks on the incident of DV is driven by the use of moderate physical violence, rather than severe physical and sexual violence. We proceed to demonstrate that the violence response is targeted at female intimate partners, while we find no effect on children. We argue that these findings are consistent with the strategic use of violence by male household heads in a household bargaining context.

We also provide evidence for important mitigating factors: Using information on the organization of the system of inheritance rights in the local community, we provide evidence that 'empowered' females are shielded from male violence after rainfall shocks. Furthermore, households led by females do not reveal an increase in violence as a response to income shocks. Similarly, females exceeding their male spouses in age do not suffer from a significant increase in violence, although we cannot rule out that these households are selected.

The remainder of this paper is organized as follows. In section 2, we describe the data and the variables used in the analysis. Section 3 discusses the rainfall shock measures. Section 4 introduces the identification strategy. Section 5 presents and discusses the main results. In section 6, we explore possible underlying mechanisms, and we conclude in section 7.

2. Data

We use data from the Tanzanian Household Panel Survey, which is part of the World Bank's Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) for this paper. LSMS-ISA is a collaborative effort between the World Bank and national bureaus of statistics (or similar) in selected low-income countries, and it provides researchers with nationally representative high-quality household survey data. Tanzania participated in the LSMS-ISA for the first time in 2008/2009 and there are now four completed waves in total, with subsequent waves collected in 2010/2011, 2012/2013 and 2013/2014. Individual and household level data are complemented by extensive community level data from a variety of sources. The Tanzanian LSMS-ISA follows 3,265 households over the first three waves and includes information on 16,711 household members. The survey uses clustered sampling method where 409 enumeration areas (EAs) were randomly selected across Tanzania in the first stage. In the rural context of Tanzania, these EAs are roughly equivalent to villages. Figure 1 plots 383 rural EAs used in this paper (out of the total 409 EAs), confirming the comprehensive geographic coverage of Tanzania in the LSMS-ISA data. This leaves us with 3,051 households, roughly 8 households per EA that were randomly sampled from the EA population.

We restrict the data on households for which the agricultural questionnaire has been completed and for which data on rainfall at the household level is available, reducing the sample to 2,606 households. This excludes a small number of urban households that do not engage in agricultural production.

Household summary statistics are reported in Table 1. Average household size is just above seven; 82 per cent of households have a male household head with 66 per cent of these households being located in rural areas. The average age is 21 years, indicating both high fertility rates and relatively short life expectancy in Tanzania. The sample comprises 47 per cent males and 53 per cent married adults. Educational attainment is generally low among the adults, with the vast majority reporting primary education as the highest attainment (79 per cent), 20.1 per cent have a junior or senior high school qualification and only 0.8 per cent have a college degree. The large majority of adults work either in agriculture or in the mining sector (67 per cent), while a sizeable proportion of adults are self-employed (15 per cent) and a smaller fraction are employed in the private sector or in non-governmental organizations (NGOs) (7 per cent). The remainder either work as civil servants in local or regional government (5 per cent) or as domestic workers or are unemployed (6 per cent).

Information on violence towards female household members is available only in the 2008/2009 Tanzanian LSMS-ISA wave. DV questions were administered to women within 15–50 years of age and great care was taken when collecting this information. Women were interviewed for these questions in separate rooms to ensure that conversations could not be overheard by anyone else. Specially trained female interviewers administered the questions and the interviewees were instructed so that the interview could be ended at any point at their request. Out of 3,588 women eligible for the DV section, 3,051 individuals answered these questions, leading to a response rate of 85 per cent of the DV section of the HH questionnaire.[7]

Questions on DV were asked on two timescales: reporting the incidence over the past 12-month period and over the entire life of the interviewees. Eight separate questions were asked about the incidence of domestic abuse for these timescales and their frequency was recorded, including whether the respondent was subjected to either hitting, pushing, beating, slapping, choking, burning, the use of or the threat to use a weapon, and forceful and unwanted sexual intercourse. As is standard in the literature, we categorized these questions into physical abuse, including the first four questions, severe physical abuse comprising choking, burning and the use of a weapon, and a category including sexual violence. From these categories, we created

[7] In Table A10 we show that the response rate to the DV section of the household survey questionnaire is not affected by our measure for rainfall shocks by running a regression of a non-response measure (an age-bracket fraction) on our rainfall shock measure. The coefficients for different specification are close to zero and not statistically significant.

indicator variables for the incidence of physical, severe physical violence and sexual violence, as well as a general indicator variable covering any of the three categories.

Further questions from the DV section reveal the number of repeat abuse incidents the interviewees experienced in the 12 months prior to interview or their entire lifetime.[8] We construct an index of DV using the frequency of occurrence available in the questionnaire, each for the 12-month and lifetime exposure. The DV index conveys the severity of DV over the 12-month period and over the entire life of the interviewees similar to the indicator variable. We also construct a severity index for each of the different categories.[9] Different to the indicator variable of DV, these indices further expand the severity of the repeat occurrence of abuse as revealed from higher numerical values for several and few occasions of abuse.

While 23 per cent of women in the sample report having experienced at least one form of physical or sexual violence over their lifetimes, 12 per cent reported as being victimized in the 12 months prior to interview (Table 2, Chart A), indicating that a proportion of females suffer from repeat incidences of DV. Within the previous 12 months, roughly 10 per cent reported having experienced some form of physical violence, 1 per cent of severe physical violence and 5 per cent sexual violence. The figures are slightly higher for spouses in the household. Thirty-one per cent have experienced abuse over their lifecycle, while 17 per cent were abused in the 12 months prior to interview. These figures are at the higher end of the WHO (2014) figures, but match well their data for Sub-Saharan countries from DV surveys.

[8] This is apparently restricted to the observations of those who have reportedly experienced any DV within the stipulated period.
[9] To build these indices, we assume a value of 3 for women who experienced abuse several times, 2 for women who experienced abuse a few times, 1 for women who experienced abuse only one time and zero for women who were not abused for each period.

In addition, the women were asked about their perception of the acceptability of violent acts by their partner. The question asked whether a husband was justified in hitting or beating his wife in a range of scenarios.[10]

Chart B Table 2 reports the findings on the perception of the acceptability of violence for female respondents. Going out without permission, child neglect, arguing with the male partner and refusal of sex were named equally frequently as acceptable justifications for violence by a husband, with on average just above 30 per cent of women accepting these as justifications. Problems with the families of either the respondents or their partners, financial problems and lack of food were much less frequently named as acceptable justifications, with 3, 2 and 7 per cent, respectively.

The survey also included questions on whether victims had ever sought help after physical violence from family, hospital or health centre, village or community leaders, an NGO, religious leaders or the police, which provides very insightful information on the reliability of the incidence of DV based on reporting with any of these institutions.

Chart C of Table 2 shows that 7 per cent of respondents had been to hospital or to a health clinic as a result of DV; 5 per cent had reported an incident to the police, and 1 per cent stated that they turned to an NGO. This demonstrated the likely degree of under-reporting of DV using administrative data from health institutions or the police, and it explained the discrepancy when comparing the incidence of DV across such datasets.

3. Measuring rainfall shocks

[10] These include ‘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’, ‘if there are problems with his or her family’, ‘if there are money problems’, ‘if there is no food at home’ and ‘other’.

We use annual and seasonal rainfall shocks to investigate the effect of these economic shocks on the incidence of DV for households where agricultural practices are a major component of income. To create measures of household rainfall shocks, we use the data provided in the LSMS-ISA using information from the georeferenced agricultural plot locations at the household level. After merging information on precipitation by household ID, georeferenced data is removed to preserve the confidentiality of the households.[11]

When constructing rainfall shocks we follow closely the previous literature (Maccini and Yang 2009; Björkman-Nyqvist 2013; Rocha and Soares 2015[12]), and we adopt the conventional measure of shocks as a deviation of a given year's rainfall from the historical average for the same locality.[13] The relevant year's rainfall in our case relates to the total yearly rainfall from July 2007 until June 2008 to capture the relevant rainfall for the main planting season for the 2008/2009 LSMS-ISA, while the historical rainfall average is the mean value of the yearly rainfall for the period 2001 to 2008 as measured for the July to June periods. Hence, we construct the rainfall shock variable as log-deviation from the historical average as follows:[14]

$$\text{rainfall shock}_{\text{h}} = ln\, R_{ht-1} - ln\, \overline{R_h} \quad (1)$$

[11] Different from many other datasets, precipitation is available on the household level rather than at the enumeration area or regional level, so that we have available variation in precipitation not only across regions or villages, but even within the village as individual plots are often spread out over a large area, even if the intr-village variation is relatively small compared to the inter-village variation. See details of the World Bank's formation of plot level geo-referenced precipitation estimates from both weather stations and multiple meteorological satellites in the appendix.

[12] Although, Rocha and Soares (2015) have alternative shock specification in terms of drought dummy, estimates from the rainfall shock specification adopted by our study is the focus for the general interpretation of their paper.

[13] In addition to the household-level rainfall measures, we construct village level long-term rainfall shock measures. We use the GPS information provided for each village in the Tanzania LSMS to access the University of Delaware's rainfall repository by matching each village to the four closest weather stations for historical rainfall data between 1978 and 2007 (Matsuura and Willmott 2012).

[14] We repeat the same exercise for agricultural season rainfall shock and out-of-planting season rainfall shock, respectively. Results for the agricultural season shock is similar to estimate from equation (2) above but weaker for the out-of-planting season shocks. Both shock estimates are not significant at conventional levels. Results are available from the authors upon request.

where R_{ht-1} indicates the yearly rainfall in household h for 2007/2008 planting season, $\overline{R_h}$ is the average historical yearly rainfall in household h. Thus, rainfall shock_h is defined as the deviation between the natural logarithm of the total rainfall in the 12 months prior to the 2008/2009 survey and the natural logarithm of the average yearly historical rainfall in household h and the rainfall deviation implies a percentage deviation from mean rainfall (Maccini and Yang 2009).

We plot the rainfall variation from the long-term average rainfall in Figure 2. Areas in red received less rainfall than the long-term average and areas in green more rainfall. The map reveals the distribution of dry shocks and their intensity across Tanzania and the 26 regions demonstrating across and within region variation in rainfall; the enumeration areas are superimposed. In addition, in Figure A2 we plot the distribution of rainfall for the subsequent two survey periods of 2010 and 2012 for comparison. These maps reveal a very different pattern of the rainfall variation from the long-term average compared to the 2008 distribution of rainfall confirming the idiosyncratic nature of rainfall used in this paper.

4. Identification strategy

The difficulty of estimating the effect of household income or shock on the incidence of DV arises from the fact that unobservable household characteristics may be correlated with both income or income shocks, and the propensity for violence in the household. There is also the possibility for reverse causality, such that the use of violence against household members affects the labour supply or productivity and hence affects household income.

To circumvent this problem we use variation in rainfall as an exogenous source of variation to estimate the effect of household shocks on the incidence and severity of DV and we estimate the following model:

$$DV_{ih} = \alpha + \beta \text{rainfall shock}_h + X'_{ih}\nu_x + Z'_c\upsilon_z + \varepsilon_{ih} \quad (2)$$

where DV_{ih} is the DV measure for an individual respondent i (either indicator or severity index of DV) in household h. β is the parameter of interest estimating the effect of the rainfall shock_h on the DV outcomes. ***X*** is vector of household and individual level controls; household characteristics include household size, number of children, gender of household head dummy, average household age, an indicator for rural households, proxies for household wealth, an indicator for membership in savings groups and an indicator on whether the household has taken out a loan previously. Individual controls consist of individual demographic characteristics including individual's age, education, occupation categories and marital status. ***Z*** is a vector of community level controls including infrastructure dummies for the presence of facilities such as banks, birth and death registration centres, courts, government health facilities and hospitals, government primary and secondary schools, daily and weekly market facilities, police station, post office, nursery care facility, savings and credit cooperative (SACCO), private health facilities and hospitals, private primary and secondary schools and veterinary clinics. In addition, community-level controls include the proximity of community of residence to the district and regional headquarter. We also include annual community-level temperature because of evidence in the literature on a direct effect of excess heat on the propensity for violence (Anderson 2001; Burke *et al.* 2013). We cluster standard errors at the enumeration area level (383 clusters) to account for the fact that households in the same village are faced with similar rainfall variation.[15] We also provide standard errors clustered at higher level, i.e. the 123 districts in Tanzania and the 26 regions.

To further investigate the differential role of negative and positive rainfall shocks – namely dry and wet shocks – we propose to separate these shock components following practice in the

[15] This is likely relevant even though we have plot-level rainfall measures as the vast majority of the variation in rainfall from the long-term mean is from across village variation and not from within-village across plot variation.

literature (Sekhri and Storeygard 2014) and we modify equation (2) to separately enter dry and wet shocks:

$$DV_{ih} = \alpha + \beta_1 \text{dry shock}_h + \beta_2 \text{wet shock}_h + X'_{ih}\nu_x + Z'_c\upsilon_z + \varepsilon_{ih} \qquad (3)$$

where dry shock_h is the absolute value of the rainfall deviation from the long-term average if this deviation is negative, and zero otherwise. We define wet shocks analogously.

The rainfall shock measures are constructed in a way to capture the agricultural season prior to the collection of the LSMS-ISA survey data. This is necessary because the survey data has been collected over a period of one year between October 2008 and October 2009.

5. Results

5.1 Main results

Table 3 presents the main estimates of equation (2) by reporting the marginal effects from probit models. As expected, we find a negative coefficient for the effect of rainfall shock on the incidence of DV, meaning that a negative rainfall shock (drought) leads to an increase in the incidence of DV, and vice versa for a positive shock. When we include the large array of community controls in column (2), the coefficient reduces substantially from -0.211 to -0.137, but remains significant at the 5 per cent level of significance. The additional inclusion of household and individual controls in column (3) reduces the coefficient further.[16] Focusing on the model including community and individual/household level controls, the coefficient in column 3 indicates that a negative rainfall shock (less rainfall) increases the propensity for DV in the household by 9.3 percentage points, the coefficient is only significant at the 10 percent of significance. This estimated coefficient of rainfall shock on DV corresponds to

[16] The difference between coefficients across models is nevertheless not statistically significant, when comparing (1)-(2) and (2)-(3), while (1)-(3) reveals a marginally significant difference.

approximately a 1.4 percentage point response of DV incidence to a one standard deviation movement in rainfall.[17] This effect translates to an 11.3 percent change in the DV incidence given the baseline.

To understand the importance of negative (dry shock) and positive (wet shock) deviations from long-run average rainfall separately, we estimate equation (3) where we simultaneously enter relative deviations for dry shock and wet shock as explanatory variables. This may help the understanding of how deviations in rainfall from the long-run average impact rain-fed crop production. Rain-fed agricultural practices are particularly vulnerable to drought and if the effects on DV are driven by resource shocks at the household level we would expect dry-shocks to have a strong impact on the incidence on DV. The effect of wet shocks on agricultural production are less clear cut a priori, as positive deviations from historic rainfall averages may initially help agricultural production, but excessive rainfall in form of flooding may destroy crops and irrigation systems (World Bank 2010). The estimates in Panel B of Table 3 show that the overall effects presented in Panel A are almost exclusively driven by dry shocks, while wet shocks have no effect on DV. While wet shocks have an effect close to zero and are not statistically significant, dry shocks have a strong positive effect on the incidence of DV and are robust to the inclusion of community, household and individual level controls.[18] For this reason, we focus the subsequent analysis on using dry shocks rather than positive and negative deviations from average rainfall. Allowing for clustering at the enumeration level (383 clusters), the estimates across different specifications are significant at the 1 percent level. In addition, we provide alternative standard errors allowing for clustering at the district (123

[17] A standard deviation in rainfall variation from the long-term average equates to roughly 15 percent change in actual rainfall.
[18] The differences between the coefficients for dry shocks in Panel B are not statistically different from each other.

clusters; in curly brackets) and even at the region level (26 clusters; in square brackets). This leaves the precision of the estimates unchanged across specifications.[19]

As a falsification exercise, we run placebo tests using future rainfall variation. Future rainfall, by construction, should not display an effect on the contemporaneous DV incidence and sizeable and significant coefficients would raise concern with the identification strategy. In Table A2 we present the coefficients using our preferred specification for rainfall deviation for the 2011 and 2013 LSMS survey periods.[20] Both coefficients are very close to zero and statistically insignificant lending additional credibility to our identification strategy. In a similar fashion, we would like to rule out that the DV incidence in 2008 across villages is correlated with the long-run variability of rainfall so that our estimates for the 2008 rainfall deviation may be driven by long-term variability in rainfall. For this purpose, we regress the aggregate incidence of DV at the village level on long-term rainfall variability measured by the standard deviation of 40-year historical rainfall pre-empting the 2008–09 growing season. Table A3 presents the results using both the 12 month DV measure (as used in Table 3) and the lifetime DV incidence. We do not find any sizeable and/or significant effect of long-term rainfall variability on these measures, further reducing any concerns around spatial correlation of rainfall variation in our cross-section.

Next, we investigate the effect for different categories of DV, decomposing the overall measure for DV into physical, severe physical and sexual violence; we report the effects for the different categories in Table 4, alongside the estimate for dry shocks alone reported for

[19] To test for specification issues using a probit model, we alternatively use a linear probability model. We present the results in Table A1 in the annex. The linear probability model provides a similar pattern of results using dry shocks. The coefficient changes slightly more across different specifications when including different sets of controls.
[20] This is using the variation in rainfall constructed the same way as for the 2009 growing season and displayed in Figure A2.

overall DV in column (1)[21]. The results indicate that the overall effect on DV is almost entirely driven by moderate physical violence, rather than severe physical or sexual violence.[22] The coefficient on physical violence is almost identical with the overall effect, whereas the effects on severe and sexual violence are very small and not significant at conventional levels.

In panel B of Table 4 we also report the coefficients for an index of DV severity. We compose a DV severity index using information on the frequency of DV incidents reported by DV questionnaire respondents. This is particularly useful to assess the consistency of the estimates for the incidence across the different DV categories (see Hidrobo and Fernald 2013). For this purpose, we assign a value of 0 for *no occurrence*, 1 for *one time,* 2 for *a few times* and 3 for *many times* and estimate equation dry shock specification by ordered probit.[23] The overall pattern observed for the incidence of DV persists, with the overall effect driven by moderate *physical abuse*, rather than *severe physical* or *sexual abuse*.

Information on DV reported independently for several females in a household allows us to investigate whether violence is targeted, for example towards spouses or children in the household. If any female, regardless of being spouse, child or other relative is targeted with a similar intensity, this might likely dispute the interpretation as targeted and strategic use of

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[21] This estimated coefficient of dry shock on DV corresponds to approximately 1.6 percentage point, resulting in 13.1 percent increase in DV relative to baseline mean.

[22] Physical abuse is defined as slapping, pushing, hitting, beating, severe physical abuse as choking, burning, the use of or the threat to use a weapon, and sexual violence as the use of forceful and unwanted sexual intercourse. Neither the coefficient on severe physical nor sexual violence is significant at conventional levels of significance. Compared to baseline, the coefficient on *severe physical* violence is also much smaller in relative terms, while the coefficient on sexual violence is larger compared to baseline, but still smaller than the coefficient on physical violence. In Table A4 in the annex we use the raw DV categories as outcomes and find a similar pattern consistent with the categorization in physical, severe physical and sexual violence. The coefficients for outcomes in the physical violence category, including slapping, pushing, hitting and beating, are all very similar. The coefficients for individual outcomes in the severe physical category – burnings and weapon use – are very small and not significant. The coefficients for forced sex and unwanted sex are both marginally significant at the 10 percent level. The questionnaire for the original questions asked on DV in the LSMS-ISA can be found in the annex.

[23] Rather than using ordered probit, we have also estimated these regressions using OLS and the results are very similar (not reported).

violence, but may be consistent with an emotional cue interpretation where perpetrators lose control after emotional cues.

Using our preferred specification with the full set of controls as in column (3) of Table 3, in Table 5 we provide the estimates of the effect of dry shocks on the DV incidence separately for the spouses, children of 18 years and under, and all other females in the household. Compared to our main estimate in Table 4, column 1, the coefficient for spouses is almost twice as large. In contrast, the coefficient for children is negative, much smaller and not statistically significant. Similarly, the effect for other females in the household is very small and not significant.

Using the decomposed categories for the incidence and the index of DV, but restricting the sample on spouses only (Table A5), reveals that the effect is more pronounced for spouses, driven by the effect on moderate physical violence. Remarkably, the effect on severe physical evidence remains basically zero, both for the incidence and the index estimates reported in Panels A and B respectively. The coefficient on sexual violence in column (4) is augmented and now marginally significant. These results suggest that violence towards women in the household as a response to economic shocks is very clearly targeted at spouses in the household.

Together with the finding that household resource shocks lead to an increase in the use of moderate physical violence, but not of severe physical, we interpret this as being broadly consistent with the strategic use of violence in a scenario of household bargaining for scarce resources, rather than the interpretation as violence in response to emotional cues as in Card and Dahl (2011), which is consistent with the relatively slow onset of the shock over the period of the growing season.

5.2 Robustness checks

For the interpretation of the effect of rainfall shocks on domestic violence as being the consequence of the economic shock to the households, we would like to rule out that rainfall shocks lead to an increase in DV directly, i.e. even in the absence of an underlying economic shock. We show in Panel B of Table 3 that the results are driven almost exclusively by droughts, limiting the potential for the effects being driven by families needing to spend more time in limited space for example sheltering from rainfall, and thus increasing tensions between household members. Similarly, household members may shelter from excessive sunshine during droughts. The exposure theory of DV postulates that lack of space for privacy may induce DV from an aggressive partner. This may be exacerbated during periods of excessive sunshine or rainfall.

To rule out that the results are driven by this effect, we investigate the relevance of household living conditions by separately adding controls to the main specification of Table A6. Column (1) of the table repeats the coefficient for dry shocks using the full sets of controls as in column (1) of Table 4; in column (2) we add a proxy for the size of the habitable living space of the dwelling, the number of rooms, and in column (3) we add a variable for adequacy of the roofing material of the dwelling.[24] The separate inclusion of either of these control variables does not affect the coefficient for the dry shock in any meaningful way, indicating that inadequacy of housing conditions unlikely play an important role for explaining our results, suggesting a limited role for the exposure theory in our setup.

Having identified droughts as the main driver of the general effect of rainfall variation in Panel A of Table 3, we next want to check whether excessive droughts may also directly affect the incidence of DV through mechanisms other than their impact on agricultural production and the economic shock caused to the households. Droughts may, for example, have an effect

[24] Inadequate roofing material may lead to rainwater leaking into the dwellings and making part or the entire dwelling temporarily inhabitable posing additional stress on household members.

on the availability and quality of drinking water accessible to the households and may possibly lead to tensions in the household. Moreover, fetching water is a time consuming task in rural Tanzania mostly performed by female household members.[25] In columns (4) and (5) of Table A6, we separately include a variable for the source of drinking water in the rainy season (the main agricultural season) and the dry season.[26] The inclusion of either variable has only a minimal effect on the coefficient of interest. Lastly, we include a control for water shortage as declared by the household head; the inclusion leaves the coefficient of interest virtually unchanged.

In addition, dry shocks could be associated with excessively high temperatures directly leading to an increase in violence, even in the absence of economic shocks to the household.[27] We therefore add controls for excess temperatures. We focus on extreme heat waves and construct an indicator when the monthly temperature exceeds the 90th percentile threshold of the historical mean temperature at the village level. We include this variable as an additional control and report the effects in column (2) of Table A7. The inclusion reduces the coefficients only slightly.[28]

We also investigate whether dry shocks generally lead to more crime and violent attacks from outside of the household. If droughts increase criminal activity in the villages, this may have an indirect effect on the incidence of DV or on reporting such incidents in the household survey. In Table A8 we report the coefficients from a regression of household victimization in crime and violence on dry shocks reported by the household head. In column (1) we report the

[25] This is a pattern observed in many Sub-Saharan African countries. See UNICEF press release at goo.gl/14Cjpe.
[26] The categories for sources of drinking water include piped water inside the dwelling; private standpipe/tap outside of dwelling; public standpipe/tap; neighbouring household; water vendor; water truck/tanker service; well with pump; well without a pump; river, lake, spring, pond; rainwater; and other.
[27] There is an established literature in psychology investigating the *heat hypothesis* (see Anderson 2001 for an overview).
[28] We also experimented with alternative specifications including average temperature, but the coefficients do not differ in a meaningful way from Table A7 (not reported).

effect on overall victimization of the household in crime and in column (2) the coefficient on assault. The coefficients either are negative or very small and neither of the coefficients is statistically significant. We regress household head gender indicator on dry shock in Table A9 to address potential issues with village level bias in shock realisations. Dry shock coefficient estimates in Table A9 are very close to zero and statistically insignificant. This result is reassuring that household with certain gender characteristics are not selected into villages with predominantly negative shocks.

Again, we want to rule out that reporting of DV is associated with rainfall shocks, such that the responses may be selected. For this purpose, we regress the fraction of non-response females within the eligibility age group in the DV questionnaire on our dry shock.[29] We report the results in Table A10. The coefficient for non-response is very small in all specifications and none is statistically significant at conventional levels, precluding a role for selective reporting of DV related to dry shocks.[30]

5.3 Effect on household divorce and separation

We make use of the rich information available in the LSMS data and estimate the effect of dry shocks on additional outcomes that are possibly related to the prevalence of DV, namely the frequency of divorce and separations of spouses in the twelve months prior to the survey. The results in Table 6 indicate that a negative rainfall shock leads to a substantial increase in the likelihood of divorce among partners in the household.[31] In detail, a one standard deviation negative rainfall shock increases the likelihood of divorce by close to 1.1 percentage points

[29] Eligibility is defined by age and all females in the household between the age of 15 and 65 are eligible.

[30] We also have investigated whether the non-response rate is linked to the availability of government institutions, such as health outlets and whether the presence of such government institutions may be related to weather shocks. We find no evidence for such relationships (results available from authors upon request).

[31] This variable comes from self-reported divorces and separations and cannot be attributed directly to the couple involving the household head, but includes any couple being part of the household. These are recorded through the LSMS efforts to collect the survey data even in the case where the households break up between the baseline and subsequent collection of the survey.

(Column (1) of Table 6). We find a similarly sized effect for separations (column (2), also significant at the 1 percent level. This paper is to our knowledge the first to document such a robust effect of droughts on household separations and divorce, but we can only speculate about the underlying mechanism. While it is possible that the increase in the incidence of DV leads to more separations and divorces, it is also possible that dry shocks affect these outcomes through alternative mechanisms.

6. Heterogeneous effects and mitigating factors

6.1 Household wealth

Household assets may play a pivotal role in insuring against economic shocks to the household and thus may have an effect on the relationship between shocks and the incident of DV. If the underlying mechanism at work of our main findings works through the economic shock caused by droughts and the use of violence as a bargaining tool by male household heads in response to these shocks, we would expect that the broader economic conditions – for example through household wealth – may play an important role for mediating this relationship. To investigate the role of household wealth, we created a wealth index for households using information on assets in the household not used in agricultural production.[32] We divide households into wealth quartiles and estimate the effect of the dry shocks on DV using the most satiated specification (Column (3) of Table 3) separately for households in these wealth quartiles. In Table 7 we report these results. We adopt the 2012/2013 household asset valuation because the actual values of assets are not available within the 2008/09 survey. The table reveals that the effects

[32] We use information from the LSMS questionnaire that provides market price of each household asset during the time of the interview. Each price gives a market value of the household asset holding during the survey period in Tanzanian shillings. We combine this information with the enumeration of household assets to create a wealth index for each household. We limit this exercise to the non-agricultural assets of households in the survey. In case a household possesses more than a unit item of a particular asset, we multiply the index of the asset value by the quantity held before summing the value of each asset holding to measure the non-agricultural asset index of the household.

of shocks on the incident of DV are driven by poor households, with a coefficient of 0.390 and 0.347 for the first and second wealth quartile, both significant at the 1 per cent level. The effects for the third quartile and fourth quartile are very close to zero and not statistically significant.

Households with a higher asset valuation seem able to shield against the economic shock induced by droughts, whereas the same is not true for poorer households. This may be due to the ability of these households to insure against the economic shock directly by the sale of household assets. Our asset index may also simply be a proxy for general household wealth, which we cannot directly measure, and wealthier households may generally be better able to cope with temporary income shocks. Our result is consistent with evidence from Cools and Kotsadam (2017), who investigate resource inequality as a source of intimate partner violence within households.

6.2 The effect of employment outside of agriculture

In addition to household wealth, sources of income independent from agriculture may play an important role in buffering the negative effect of droughts on household income. In Table 8 we split the sample by households where either the household head or their spouse have a source of income outside of agriculture.[33] Most households exclusively depend on agricultural income, but in about one-third of households one of the household members associated with the household head had other sources of income. Not surprisingly, we find that the effect of rainfall shocks on DV in these households is much smaller than in households that exclusively rely on agriculture (column 1). These households seem better able to protect themselves from rainfall shocks, which may also reduce the incentives for the male household head to use violence in the household bargaining for scarce resources. We cannot rule out though, that

[33] We restrict our analysis in this section to spousal relationships, with 1,736 observations in total. The LSMS household questionnaire includes information on the main occupation during the past 12 months for all household members. Estimates follow the same specification as the most satiated model from Table 3.

these households also differ in their composition or in other unobserved ways, which may lead to the differential effect of rainfall shocks on the incidence of DV.[34] Together with the results on household wealth, we believe that these results point to an important role of economic mechanisms to buffer the impact of rainfall shocks on households and in turn, the role these play to reduce the burden of DV.

6.3 Gender of household head

Apart from economic variables, there may be other factors mediating the impact of shocks on the incidence of DV. While we cannot investigate – due to the small number of observations – how employment outside of agriculture matters by gender for the incidence of DV in the previous exercise, it may be interesting to understand the role of females in the household have in this relationship. For this purpose, we make use of a feature in the LSMS household survey for Tanzania that collects information on the household head.

As expected, the number of households that are headed by a man by far exceeds the number of households with a female head.[35] We split the sample of households by the gender of the household head and estimate the effect of dry shocks on DV with the full set of controls as in column (3) of Table 3. We present the results in Table 9. In households with a male head, the effect is much more pronounced than for the benchmark; whereas the effect in households with a female household is much smaller and not significantly different from zero. These results indicate a potential mediating role of gender status in the household. Most Sub-Saharan African communities attribute household headship to household responsibilities, which suggests that

[34] Because of the relatively small number of households with an income outside of agriculture, we refrain from splitting this further and separately looking at male versus females engaged in these activities.
[35] We formally test whether households look systematically different for households with male and female heads using household characteristics and we do not find any systematic difference in the composition of these households.

ex-ante bargaining power may play an important role in moderating the impact of rainfall shocks in these households.

6.4 Female empowerment

While the gender of the household head itself may be the outcome of household bargaining, we would like to analyse the role of the empowerment of females in the household further.[36] We investigate this by using information on the inheritance policy at death of the husband, as a proxy for female empowerment.[37] We estimate equation (3) using dry shock only, including an interaction term for dry shock and the empowerment indicator.[38] We report results for two alternative inheritance rules and empowerment measures. In the first measure, we focus on a rule that attributes the inheritance exclusively to the female spouse in case of death of the male household head. We define an alternative variable using an inheritance rule that allocated the inheritance to the female spouse and the joint children. The results using the fully specified model of Table 3 are reported in Table 10. For the spousal inheritance rule only, we find that the interaction term mitigates to some extent the positive effect of the dry shock on DV, but the coefficient is not statistically significant, possibly due to the relatively small number of enumeration areas with spousal inheritance rights for females. Next we investigate the effect of joint inheritance rights of spouse and children. Interestingly, we document that this inheritance rule has a positive and significant effect on DV on its own, while we control for the full set of HH and community level controls. We next find that the interaction term almost entirely neutralises the positive effect of dry shocks on DV, which we interpret as evidence that

[36] While an existing literature has pointed out the differential impact across genders of economic shocks (see for example Björkman-Nyqvist 2013), little is known about the impact empowerment may have in mediating these impacts.
[37] See appendix for a detailed discussion of the origin and variation in female inheritance policy in our data. Table A11 shows that inheritance customs in our sample favour widows in 45.4 per cent of the communities and children of the deceased in 32.6 per cent.
[38] This indicator takes a value of one if women and children are to inherit at the death of the husband and zero otherwise.

factors that potentially impact the bargaining position of females in the household may work as mediating factors in the relationship between economic shocks and the incidence of DV.

Although inheritance is an indirect measure for female empowerment, the advantage of using inheritance is that it is plausibly exogenous in our context[39] and has been shown to matter for bargaining power in the household in the regional setting (Harari 2018).

6.5 Age gap

Lastly, we would like to understand whether the age gap between married partners affects the estimates. Women often get married at younger age compared to men for a variety of reasons, including the different economic burden on the parental household (Anukriti and Dasgupta 2017), which possibly leads to a power imbalance between couples. We want to empirically test whether an age gap between married partners affects our estimates.

As men predominantly exceed their partners' age in Tanzania, we split the sample in couples where the husband is older and couples where the wives are the same age or older (as measured in years of age). Table A13 presents these estimates. We find that the coefficient for the older men exceeds the coefficient for the overall sample (with the full set of controls), but the difference to couples where the husband is younger is relatively small. Probably due to the small sample size, the coefficient for these couples is not statistically significant.

7. Summary and conclusion

In this paper, we estimate the effect of idiosyncratic shocks to households in rural Tanzania on the incident of DV. We exploit rainfall variation at the household level to overcome the

[39] More details on the orthogonal nature of rainfall patterns to our inheritance measure can be found in the appendix. Table A12 reports the coefficients from a regression of the inheritance rule on historical rainfall. We find no evidence that historical rainfall is related to the inheritance rule adopted in the enumeration villages.

potential endogeneity of income variation and make use of a unique dataset from a household survey that provides very detailed information on the incidence and severity of DV for 2,606 rural households in Tanzania. We provide evidence that rainfall shocks can be treated as exogenous source of economic shocks to the households and we provide a number of falsification tests to investigate this.

We find strong evidence that the economic shock to these rural households, due to rainfall variation, has a considerable impact on the incidence and severity of DV of female spouses in Tanzania. The effects are driven by dry shocks (droughts) rather than wet shocks and we can rule out that they are driven by families being forced to spend excess time in a confined space during periods of excessive rainfall or excessive sunshine, or through excessive heat exposure. Rather, we provide evidence that the estimated effects are caused by the economic shock to the households linked to droughts and the strategic use of violence in household bargaining for scarce resources.

We show that the overall effect of rainfall shocks on the incident of DV is driven by the use of moderate physical violence, rather than severe physical and sexual violence. We also show that the violence response is targeted at female intimate partners, while we find no effect on children, both consistent with the strategic use of violence in a household bargaining context. We furthermore find that non-agricultural wage income by a household member mitigates the estimated effects substantially and we provide evidence that the effects are concentrated among poorer households, with no significant effects for relatively richer households affected by rainfall shocks. In addition, we provide evidence for further mitigating factors: Female spouses who are empowered through inheritance rights are shielded from male violence, and households that are led by female heads are equally not subjected to violence in response to household shocks.[40] As a separate outcome, we show that droughts lead to a substantial increase in divorces and separations of these households, and we are first to document such effects.

The estimates on the effect of rainfall shocks on DV are important for understanding the total costs of rainfall shocks, in particular droughts, on individual welfare. As we demonstrate in this paper, droughts significantly increase the incidence of DV in rural households where agriculture is the main source of income. The results in this paper may therefore contribute to the understanding of the persistent high incidence rates of DV in Sub-Saharan African countries subject to frequent droughts. The findings are also important for understanding the possible consequences of an increase in the variability of rainfall in the context of climate change. There is a consensus that the productivity of rain-fed agriculture, predominant in Sub-Saharan African countries, will suffer with the increase in the prevalence of droughts linked to climate change (Kurukulasuriya *et al.* 2006; IPCC 2012). There may therefore be a risk that climate change leads to an increase in the incidence of DV in affected countries. Our findings contribute with household level evidence using a unique set of microdata to a literature linking more generally weather variability and climate change to violent conflict in Africa (Hsiang *et al.* 2011; O'Loughlin *et al.* 2012; Burke *et al.* 2013; Burke and McGuirk 2017).

[40] Female empowerment does not always lead to relatively higher bargaining power as argued in the literature. Chin (2012) explores male backlash as a potential threat for women employment status in India, while Bobonis *et al.* (2013) considers the instrumental use of further abuse targeted at uncooperative spouses in Mexico.

Compliance with Ethical Standards:

The authors declare that they have no conflict of interest.

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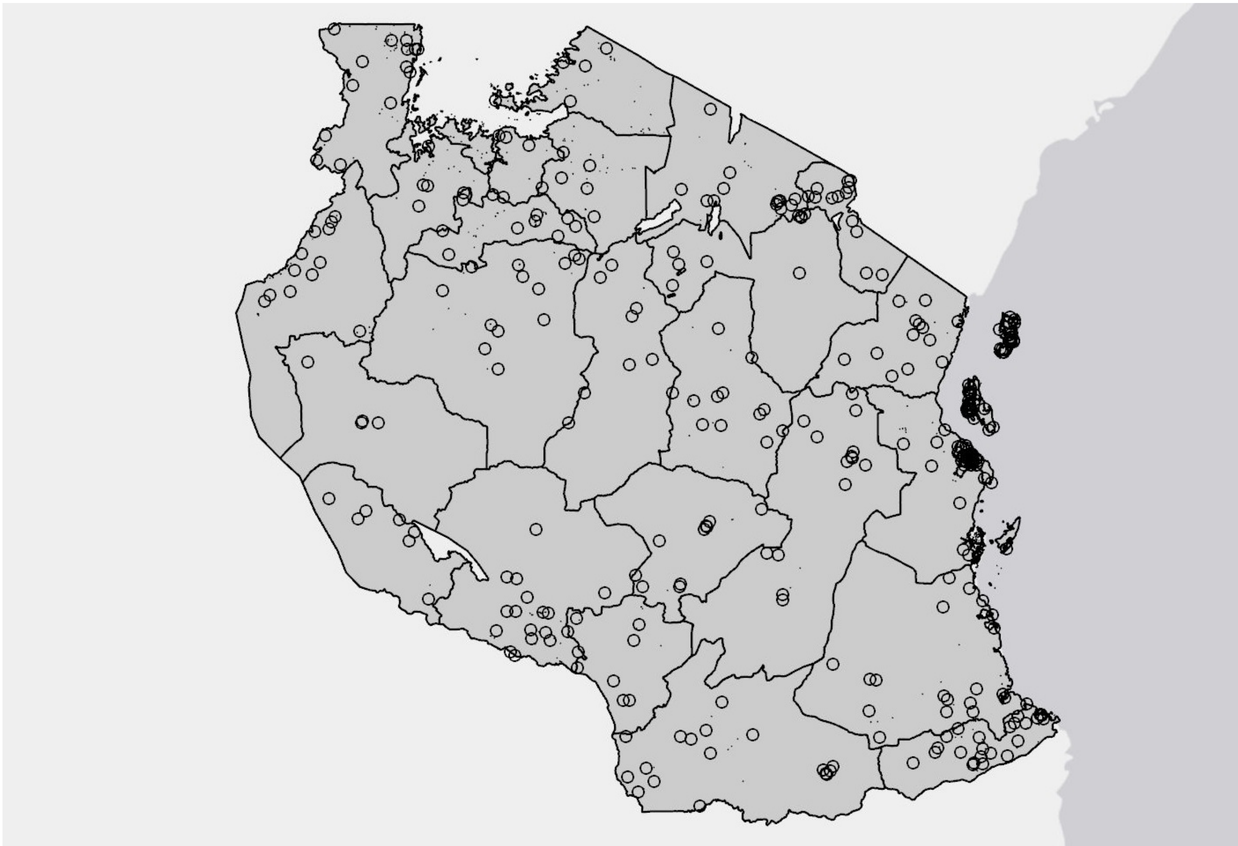
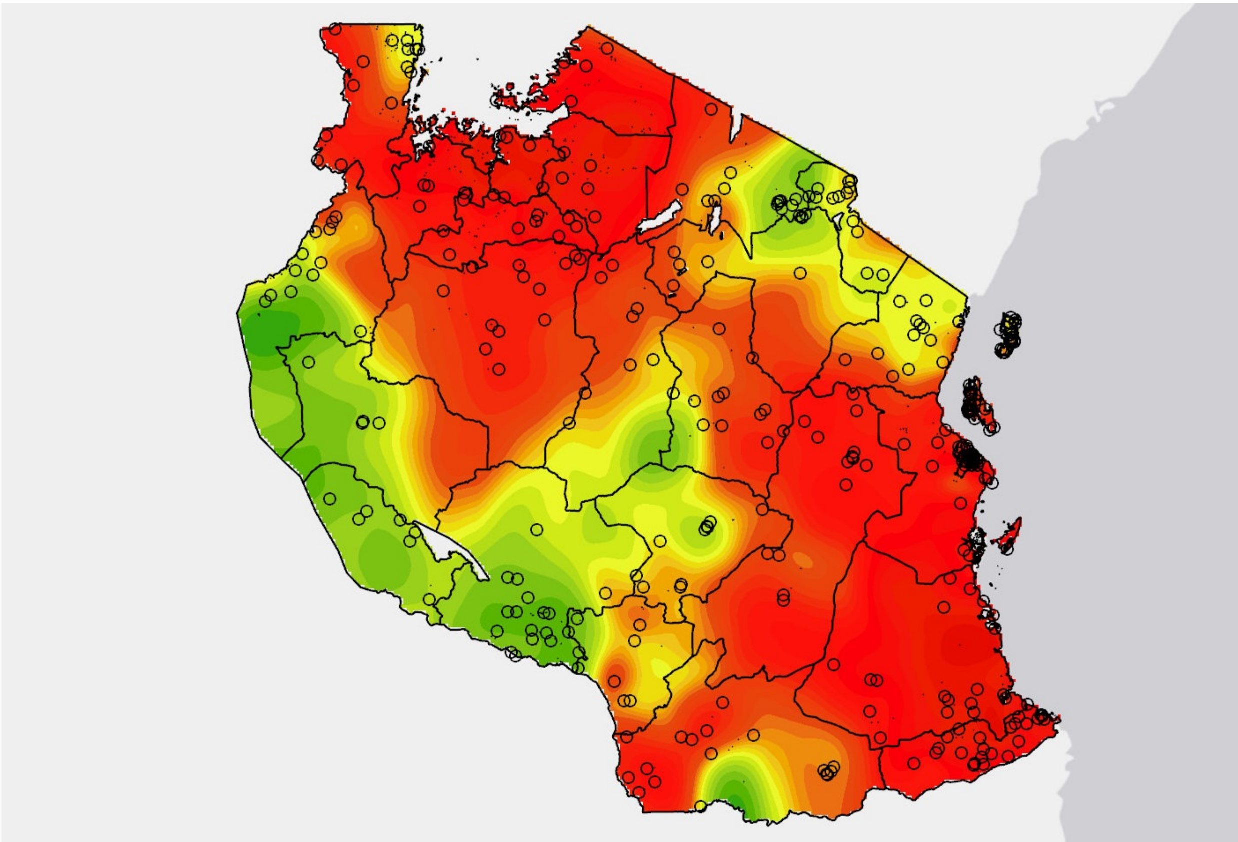
Figure 1: Map of the United Republic of Tanzania (Depicting the Enumeration Areas of LSMS Survey.



Notes: The map depicts the 26 regions of Tanzania with the black circles representing the Enumeration Areas in the LSMS-ISA used in this paper.

Figure 2: Map of Rainfall Deviation from Long-term Averages.



Notes: The map reports the rainfall for the 2008/09 main growing season as deviation from long-term average rainfall. Darker red shades represent less than average rainfall; green shades represent more than average rainfall. The 26 regions of Tanzania and Enumeration Areas in the LSMS-ISA used in this paper (black circles) superimposed.

Table 1: Selected Summary Statistics of Household and Individual Characteristics

Variables	Mean	Std. Dev.
Household Characteristics		
Rural	0.658	0.475
Household size	7.049	3.834
Female head	0.186	0.389
No. of children	4.056	2.812
SACCO membership	0.067	0.250
Individual Characteristics		
Age	21.271	17.691
Male	0.468	0.499
Married	0.534	0.499
Education (adults)		
None	0.004	0.066
Primary	0.786	0.410
Junior high	0.184	0.387
Senior high	0.017	0.131
College	0.008	0.088
Sector of employment (adults)		
Agriculture and extractive industries	0.675	0.469
Self-employed	0.150	0.357
NGO and private	0.068	0.251
Unemployed and domestic work	0.061	0.240
Civil servant	0.047	0.211

Notes: Summary statistics for final sample used in the analysis. Number of HH observations: 2,606. SACCO stands for Savings and Credit Co-operative.

Table 2: Summary Statistics of DV Incidence for Females Aged 15-50.

Variables	All		Spouse only		Other females in HH	
Chart A: Prevalence of DV	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
DV (lifetime)	0.231	0.422	0.307	0.461	0.132	0.338
DV (12-months)	0.124	0.329	0.166	0.373	0.067	0.250
Categorised DV (12-month):						
Physical	0.099	0.299	0.136	0.343	0.050	0.218
Severe Physical	0.012	0.111	0.015	0.121	0.009	0.095
Sexual	0.053	0.225	0.071	0.258	0.030	0.170
Chart B: Victim statements on justification of violence						
Violence is generally justified if (there are/is):						
A woman goes out without permission	0.341	0.474	0.385	0.487	0.282	0.450
A woman neglects children	0.369	0.483	0.403	0.491	0.324	0.468
A woman argues with him	0.311	0.463	0.341	0.474	0.271	0.445
A woman refuses sex	0.330	0.470	0.391	0.488	0.249	0.433
Household problems	0.033	0.179	0.039	0.193	0.026	0.159
Financial problems	0.017	0.131	0.025	0.157	0.007	0.082
No food	0.068	0.252	0.075	0.264	0.058	0.233
Chart C: Reporting of DV incidence						
Family	0.478	0.500	0.494	0.500	0.426	0.496
Hospital	0.067	0.249	0.072	0.259	0.049	0.217
Community Leaders	0.198	0.399	0.210	0.408	0.160	0.368
NGO	0.009	0.094	0.010	0.098	0.006	0.079
Religious Leader	0.036	0.185	0.033	0.179	0.043	0.204
Police	0.052	0.222	0.047	0.211	0.067	0.252

Notes: Total number of individual observations: 3,051. The number of observations for spouses is 1,736 and 1,315 for other females in the household. The division of the DV incidence in Chart A into physical DV, severe physical DV and sexual DV follow mutually non-exclusive categories of 12 months. Chart B reports the fraction of women that declare the reported reasons as acceptable justification for the use of violence of their male spouse while Chart C indicates rates of reports for victims of abuse at designated locations.

Table 3: The Impact of Rainfall Shock on DV Incidence

	Dependent Variable: DV Incidence		
Variables	(1)	(2)	(3)
Panel A: Overall rainfall deviation			
Rainfall shock	-0.211	-0.137	-0.093
	(0.051) ***	(0.056) **	(0.052) *
	{0.058}***	{0.054}**	{0.049}*
	[0.055]***	[0.043]***	[0.043]**
R^2	0.012	0.048	0.125
Panel B: Decomposed rainfall deviation			
Dry shock	0.280	0.246	0.211
	(0.080) ***	(0.090)***	(0.082) ***
	{0.089}***	{0.085}***	{0.077}***
	[0.093] ***	[0.067] ***	[0.070] ***
Wet shock	-0.134	-0.020	0.030
	(0.119)	(0.108)	(0.098)
	{0.136}	{0.116}	{0.101}
	[0.100]	[0.065]	[0.050]
R^2	0.012	0.049	0.127
Community controls	No	Yes	Yes
Household controls	No	No	Yes
Individual controls	No	No	Yes

Notes: The Table presents marginal effect coefficients of probit regressions for 3,051 observations. Outcome variable is incidence of DV where 1 indicates that the respondent has been a victim of aggression in the household during the previous 12 months and 0 otherwise. Columns (1) – (3) present coefficients for specifications without controls (column (1)), with community level controls (column (2)) and community, household and individual controls (column (3)). Community level controls include infrastructure facilities at the community level including the number of banks, courts, government primary and secondary schools, government hospital and/or other government health facilities, private primary and secondary schools, private hospital and/or other private health facilities, daily and weekly markets, post office facility, police station and SACCO groups and a dummy for the presence of district headquarters. Individual level controls include household characteristics such as household size, gender of household head, number of children, residential place and a wealth index summarizing non-agricultural asset of the household. Individual controls include the individual's age, education, marital status, and occupational categories. Robust standard errors clustered at the enumeration area level (383 clusters) are reported in parentheses. Robust Standard errors clustered at the district level (123 clusters) reported in curly brackets and robust standard errors clustered at the region level (26 clusters) reported in square brackets.
***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels, respectively.

Table 4: The Impact of Dry Shock on DV by Categories (Incidence and Index)

Dependent Variable: DV				
Panel A: DV Incidence	Overall (1)	Physical (2)	Severe Physical (3)	Sexual (4)
Dry shock	0.198***	0.192***	0.010	0.066
	(0.075)	(0.071)	(0.022)	(0.055)
Mean	0.124	0.099	0.012	0.053
R^2	0.127	0.127	0.190	0.129
Panel B: DV Index	Overall (1)	Physical (2)	Severe Physical (3)	Sexual (4)
Dry shock	0.066**	0.057***	0.002	0.024
	(0.029)	(0.022)	(0.008)	(0.021)
R^2	0.094	0.096	0.163	0.101

Notes: The Table above presents marginal effect coefficients from probit (Panel A) and ordered probit (Panel B) regressions for 3,051 observations. Each column represents a separate regression for all DV, physical DV, severe physical DV and sexual DV categories respectively. Categories are hierarchically ranked from highest to lowest for many times, a few times and one time respectively; while 0 indicates none. The regression specification follows Table 3 column 3 with all controls. See notes of Table 3 for details. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 5: Dry Shocks and Targeting of DV Incidence

Variables	Wives	Children (18 years old and younger)	Others
Dry shock	0.352***	-0.095	0.016
	(0.109)	(0.117)	(0.119)
Mean DV	0.166	0.015	0.085
Observations	1,736	341	974
R^2	0.100	0.110	0.191

Notes: The regressions for the Table above repeat estimation in Table 3 column 3 by household membership dichotomy for 3,051 observations. Others indicate female household residents who are neither currently married nor children within the household, this includes widowed female household members. Each column presents the outcomes from a regression including all controls. See Table 3 above for a list of the complete set of controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 6: The Impact of Dry Shock on Household Divorce and Separation

Variables	Dependent Variable: Divorce (1)	Separation (2)
Dry shock	0.137***	0.104***
	(0.043)	(0.038)
R^2	0.228	0.208

Notes: The Table above presents the marginal effect coefficients of probit regression for 3,048 observations. Each column represents a separate regression for twelve months household incidence of divorce and separation respectively. The coefficients presented follow Table 3 column 3 with the full set of controls. See notes of Table 3 for details. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 7: The Impact of Dry Shock on DV Incidence by Household Asset Valuation Quartiles.

Variables	quartile1: 0-25%	quartile2: 25-50%	quartile3: 50-75%	quartile4: 75-100%
Dry shock	0.390***	0.347***	-0.059	0.066
	(0.130)	(0.128)	(0.135)	(0.145)
Observations	733	733	726	859
R^2	0.201	0.216	0.210	0.177

Notes: The Table above presents marginal effect coefficients for probit regression. The coefficients presented follow Table 3 column 3 with all controls by household non-agricultural asset quartiles referenced by the average of purchase and current price. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 8: The Heterogeneous Impact of Dry Shock on DV Incidence By Occupational Sector of Partners

Variables	Both spouses in agricultural sector	At least one spouse outside agricultural sector
Dry shock	0.470***	0.149
	(0.126)	(0.231)
Observations	1,066	670
R^2	0.116	0.162

Notes: The regressions for the Table above split the observations in Table 5 column 1 above by occupational sector mix of spouses. The coefficients presented follow Table 3 column 3 with all controls. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 9: The Impact of Dry Shock on DV Incidence by Household Head Gender.

Variables	Male household head	Female household head
Dry shock	0.389***	0.149
	(0.116)	(0.281)
Observations	1,503	233
R^2	0.112	0.307

Notes: The regressions for the Table above splits observations in Table 8 column 1 by household head gender. Each regression is carried out with all controls. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table 10: Community Inheritance Rights and the Impact of Dry Shock on DV Incidence.

Variables	Wives' inheritance right	Wives and children's inheritance right
Inheritance dummy	0.029	0.102***
	(0.018)	(0.028)
Dry shock	0.224**	0.646***
	(0.108)	(0.225)
Dry shock * Inheritance	-0.129	-0.547**
	(0.143)	(0.230)
R^2	0.130	0.137

Notes: The Table above reports marginal effect coefficients of probit regression for 2,986 observations with the addition of community inheritance rights for wives and their children with interaction terms to baseline specification. This is short of 65 observations from the baseline observations due to non-reported inheritance right for some communities. The coefficients presented follow Table 3 column 3 with all controls. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Online appendix

Figure A1: Location Map of the United Republic of Tanzania

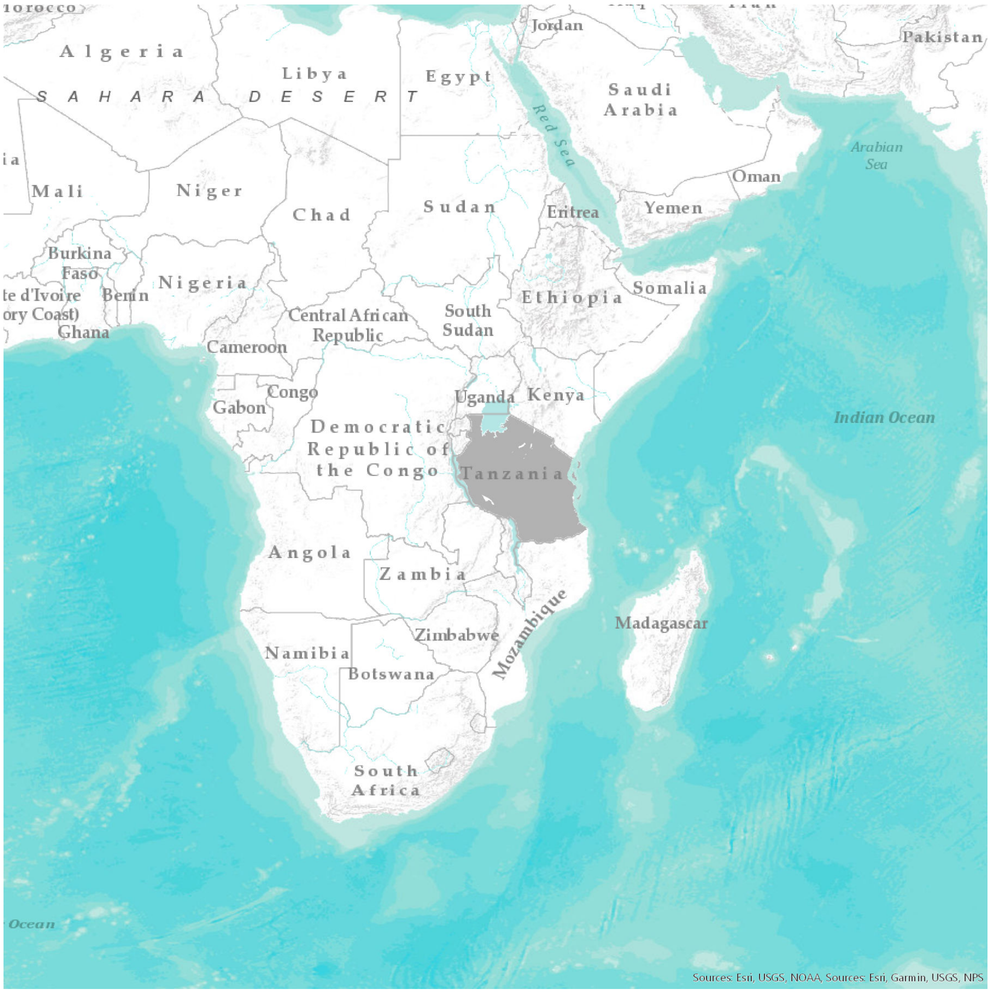
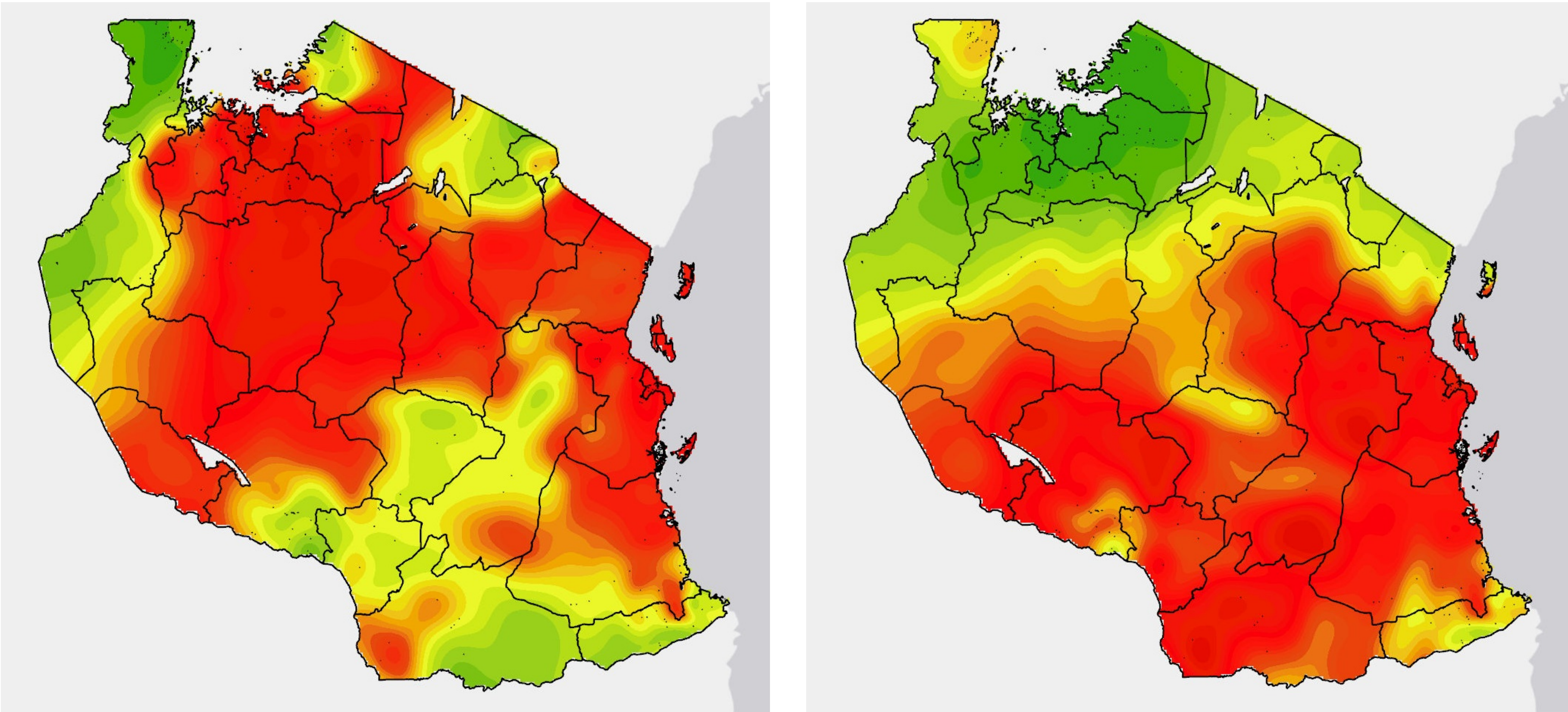


Figure A2: Deviation from Long-term Average Rainfall in the 2010 and 2012 survey years

2010 2012



Notes: The maps report the rainfall for the 2010 and 2012 main growing seasons as deviation from long-term average rainfall. Darker red shades represent less than average rainfall; green shades represent more than average rainfall. The 26 regions of Tanzania are superimposed.The left panel is for the 2010 main growing season, the right panel for the 2012 main growing season.

Table A1: The Impact of Dry Shock on DV Incidence (Linear Probability Model)

	Dependent Variable: DV Dummy		
Variables	(1)	(2)	(3)
Dry shock	0.374***	0.275***	0.225**
	(0.080)	(0.095)	(0.091)
R^2	0.009	0.035	0.082

Note: The estimated coefficients above are from a linear probability model of the impact of rainfall shock on DV incidence. See Table 3 in the main text for a list of all controls. Number of observation is 3,051. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A2: Placebo Test using Future Shocks on DV Incidence

	Dependent Variable: DV Incidence	
Variable	(2011)	(2013)
Dry shock	-0.057	0.006
	(0.055)	(0.090)
R^2	0.126	0.125

Notes: The first column reports the coefficient for 2,933 observations with the full set of controls for rainfall variation using 2011 rainfall data, and the second for 2,919 observations using rainfall variation using 2013 data including the full set of controls. See Table 3 in the main text for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses.

Table A3: The Impact of Long-term Rainfall Variation on Aggregate DV

	Dependent Variable: Aggregate Domestic Violence	
Variables	12 months	Life-time
	(1)	(2)
Long-term shock	-0.010	-0.027
	(0.018)	(0.022)
R-squared	0.280	0.277

Notes: The Table above presents coefficient estimates of linear regression for our focus sample observations. Estimations are carried out by aggregating DV cases at the community level and weighed by number of observations by community. Long-term shock is computed as the standard deviation of 40-year historical rainfall distribution at the community level from UDel precipitation data. The standard deviation measure adopted centralizes drought and flood over the years. Coefficients presented follow Table 3 column 2 with community level controls. See Table 3 above for a list of community level controls. Robust standard errors (clustered at the community level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A4: The Impact of Dry Shock on DV Incidence (by DV categories)

	Dependent Variable: DV Dummy							
	Slapped	Pushed	Hit	Beat	Burnt	Use weapon	Forced sex	Unwanted sex
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dry shock	0.176***	0.169***	0.124**	0.135***	0.015	0.008	0.095*	0.073*
	(0.059)	(0.057)	(0.049)	(0.042)	(0.017)	(.)	(0.049)	(0.041)
R^2	0.147	0.123	0.150	0.136	0.320	0.263	0.131	0.161

Note: Each column is a separate regression for different types of DV dummy for 3,051 observations. The estimation uses a probit model. The estimated coefficients reported above include all controls. See Table 3 in the main text for a list of all controls. Robust standard errors are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A5: The Impact of Dry Shock on DV for Wives by Categories (Incidence and Index)

	Dependent Variable: DV			
Panel A: DV Incidence	Overall	Physical	Severe Physical	Sexual
	(1)	(2)	(3)	(4)
Dry shock	0.352***	0.286***	-0.000	0.146*
	(0.109)	(0.103)	(0.032)	(0.079)
Mean	0.166	0.136	0.015	0.071
R^2	0.100	0.103	0.273	0.114
Panel B: DV Index	Overall	Physical	Severe Physical	Sexual
	(1)	(2)	(3)	(4)
Dry shock	0.118***	0.084***	-0.003	0.055
	(0.044)	(0.032)	(0.014)	(0.034)
R^2	0.072	0.077	0.227	0.085

Notes: The Table above presents marginal effect coefficients from probit (Panel A) and ordered probit (Panel B) regressions for 1,736 observations of female partners. Each column represents a separate regression for all DV, physical DV, severe physical DV and sexual DV categories respectively. Categories are hierarchically ranked from highest to lowest for many times, a few times and one time respectively; while 0 indicates none. The regression specification follows Table 3 column 3 with all controls. See notes of Table 3 for details. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A6: Robustness Check on the Impact of Dry Shock on DV Incidence.

	Dependent Variable: DV Incidence					
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Dry shock	0.198***	0.199***	0.196***	0.194***	0.194***	0.196***
	(0.075)	(0.075)	(0.074)	(0.075)	(0.075)	(0.075)
Habitable space		Yes				
Roofing material			Yes			
Water source (rainy season)				Yes		
Water source (dry season)					Yes	
Water shortage (dummy)						Yes
R^2	0.127	0.128	0.127	0.127	0.127	0.127

Notes: The Table above presents marginal effect coefficients of probit regression for 3,051 observations. While column 1 presents our baseline dry shock coefficient of eq. 3, we add a control for the number of rooms in column (2). In column (3) we add a control for the type of roofing material; the categories available are grass, leaves, bamboo; concrete, cement; metal sheets; asbestos sheets; tiles; other. In columns (4) and (5) we add controls for the main source of drinking water during the rainy season and the dry season, respectively. The categories include piped water inside the dwelling; private standpipe/ tap outside of dwelling; public standpipe/tap; neighbouring household; water vendor; water truck/ tanker service; well with pump; well without a pump; river, lake, spring, pond; rainwater; other. In column (6) we add a control for whether the household has experienced serious drinking water shortage over the past 12 month. The coefficients presented follow Table 3 column 3 with all controls in addition to the household level variables inputted as controls. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A7: The Impact of Dry Shock on DV Incidence Including Extreme Temperature Indicator

	Dependent Variable: DV Incidence	
Variables	(1)	(2)
Dry shock	0.198***	0.173**
	(0.075)	(0.079)
Community controls	Yes	Yes
Household controls	Yes	Yes
Individual controls	Yes	Yes
Extreme temperature control	No	Yes
R^2	0.127	0.128

Notes: The regression specification follows Table 3 column 3. The extreme temperature shock indicator is constructed with reference to the 90th percentile of 40-year temperature variation within the community. The indicator variable is denoted 1 if the temperature is higher than the 90th percentile of historical temperature; 0 otherwise. See notes of Table 3 for details. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A8: Impact of Dry Shocks on HH crime and assault

	All	With code only
VARIABLES	(1)	(2)
Dry shock	-0.100	0.002
	(0.153)	(0.125)
R^2	0.060	0.114
Household controls	Yes	Yes
Individual controls	Yes	Yes
Community controls	Yes	Yes
Observations	3,051	3,051

Notes: Outcome variable in the first column is an indicator variables taking a value of 1 if a HH experiences at least one case of a theft, attempt to steal or attack in the previous 12 months. Outcome variable in column (2) takes a value of 1 if a HH member has been assaulted from a third part. For details on the specification see Table 3; specification as for column (3).

Table A9: The Impact of Dry Shock on Gender of Household Head

	Dependent Variable: Female HH head indicator	
Variable	(1)	(2)
Dry shock	-0.046	0.054
	(0.131)	(0.133)
R^2	0.000	0.020

Notes: The Table above presents marginal effect coefficients for a probit regression of dry shock on a dummy for female HH head. The coefficients presented follow Table 3 columns 1 and 3 for 3,051 observations. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses.

Table A10: The Impact of Dry Shock on Fraction of Non-respondents

	Dependent Variable: Fraction of DV respondents from eligible sample by age group		
Variable	(1)	(2)	(3)
Dry shock	-0.012	-0.017	0.003
	(0.012)	(0.013)	(0.007)
R^2	0.000	0.010	0.705

Notes: The Table above presents coefficients for linear regression of dry shock on the non-response of women in the target age group in the HH to the questions on DV. The coefficients presented follow Table 3 columns 1 – 3 for 3,029 observations. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses.

Table A11: Inheritance Custom for Deceased Husbands in Tanzanian Communities

Custom	Freq.	Fraction
Wife of Deceased	174	0.454
Children	125	0.326
Clan	14	0.037
Extended Family	62	0.162
Unknown	8	0.021
Total	383	1.000

Source: 2008 LSMS Tanzanian Data.

Table A12: Women's Inheritance Rights and Historical Rain Pattern in Tanzania

Variables	Wives' inheritance right	Wives' and children's inheritance right
Historical rain	0.309	-0.197
	(11.400)	(6.05)
R^2	0.258	0.574

Notes: The Table above presents coefficients of probit regression for 2,986 observations. Each column represents a separate regression of inheritance rights for wives or wives and children respectively. Estimates for historical rain (and standard errors) above are reported in multiple of ten thousands (x10,000). The coefficients presented follow Table 3 column 3 with community controls. See Table 3 above for a list of community controls. Robust standard errors are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

Table A13: The Impact of Dry Shock on DV Incidence For Wives (By Age Gap Between Partners)

Variables	Husband Age > Wife Age	Husband Age ≤ Wife Age
Dry shock	0.388***	0.315
	(0.117)	(0.229)
Observations	1,410	325
R^2	0.114	0.209

Notes: The regressions for the Table above split the observations in Table 5 column 1 above by age difference of spouses. The coefficients presented follow Table 3 column 3 with all controls. See Table 3 above for a list of all controls. Robust standard errors (clustered at the enumeration area level) are reported in parentheses. ***, ** and * represent significance at 1 percent, 5 percent and 10 percent levels respectively.

A. Creating Rainfall Deviation Data

The main rainfall data used in this paper are obtained from the National Oceanic and Atmospheric Administration Climate Prediction Centre (NOAA CPC) African Rainfall Estimation Algorithm Version 2.0. The rainfall dataset from Rainfall Estimate (RFE) v2.0 is a valuable component of geographical variables because it provides a standardized time-series for all of the LSMS-ISA countries. Toté *et al.* (2015) provide a validation of the RFE rainfall measure relative to other measurement methods. The RFE outperforms Climate Hazards Group InfraRed Precipitation with Stations (CHIRPS) and TAMSAT African Rainfall Climatology and Time-series (TARCAT) v2.0 products, especially in drought detection for Mozambique.

It is important to understand that RFE is a merged product using data from multiple meteorological satellites and rainfall stations. The remote sensing data provide a continuous surface, at a specific resolution, measuring rainfall estimates. According to a sourced technical document from the World Bank's LSMS team, station data are essentially used to calibrate the merged satellite surfaces. The apparent granularity of the household measure comes from the RFE modelling, as well as the method used to extract the data. Rainfall values are extracted at household locations using a bilinear interpolation or distance-weighted average of the four nearest grid cell values as used in practice.

Seasonal precipitation data gathered from the Tanzanian meteorological weather stations are used in the interpolation of the global positioning system (GPS) of surveyed Tanzanian households.[41] While the household level GPS are withheld for confidentiality reasons, these are engaged to capture household specific approximates of precipitation measures outlined

[41] Due to spatial distribution of household observations in the survey data, enumerators were provided with a technological device that helps to capture exact GPS location of the respondent household and its immediate environs. Households close to each other have exactly the same GPS while households farther away may have different GPS measurements.

above. Spatial distribution of households included in the LSMS-ISA survey for Tanzania enhances the credibility of the rainfall variation at the Enumeration Area (EA) level with additional variation achievable within the EA – engaging the household level approximations of the precipitation measures. Preliminary analysis shows that rainfall measures within the same locality are actually correlated but different in absolute terms. It is important to reiterate that while this unique data displays more variation of precipitation measures between EA compared to within EA, availability of such precision in precipitation augments rainfall shock inquiries in the literature.

Furthermore, the precise nature of the rainfall data helps to address the inter-spatial correlation of rainfall data commonly associated with broader geographical precipitation variation, such as the district level, commonly used in the literature. Other weather parameters captured are geophysical characteristics at the landscape level including rainy season parameters and soil fertility conditions for agricultural production. While the unmodified household GPS measured are not released for confidentiality of survey observations, modified EA level GPS are released as part of the survey data.

We mainly focus on rainfall data generally collated as the total precipitation measure by geographical space over a period of a year from July 2007 to June 2008. To complement this most important rainfall data, LSMS-ISA also provides measures of planting season rainfall measures, labelled wet season precipitation measures, within the same period. We construct the out-of-season rainfall measure as the total precipitation minus the precipitation measure for the planting season for this period. In addition, we replicate this process for historical average values in order to construct an approximate out-of-season rainfall shock for the same period across geographical space.

B. Descent Tracing (Patrilineal and Matrilineal) and Inheritance Patterns: The Tanzanian Context

Various succession laws guide inheritance in Tanzania. These range from customary, Islamic to statutory laws. Ethnicity and religious affinity are the major underlying factors in the decision for the appropriate inheritance legal system applicable in each Tanzanian community. However, in rural communities, customary laws play a predominant role in guiding inheritance sharing. Given that most deceased persons in sub-Saharan Africa die intestate, the intent of the deceased may not be a feasible way for property sharing.

Islamic law somewhat contends with customary laws with inheritance procession concerning Muslims due to diverging views on inheritance sharing in the community and Quran. In the case of conflict of customary and Islamic laws, the court of law is resorted to; to engage in the mode of life test of the deceased.[42] In essence, customary laws overrule Islamic laws on distribution of estates except otherwise proven unacceptable to the deceased through means of official documents (testate succession category) or mode of life test. Statutory law is generally applicable to most of the other population in the rural communities (Christians and Traditional rulers) and this consists of the use of codified egalitarian principles of inheritance sharing among survivors/dependants. However, it is rarely applied in the rural communities since upholding customs leads to preference for customary laws compared to others laws.

The laws that generally apply to the majority of people in inheritance are the Customary Law and Probate Administration Ordinance. Importantly, the codified customary law, contained in the Customary Law Declaration Order (CLDO) 1963 (Government Notice No. 436 of 1963) applies to diverse patrilineal ethnic groups (constituting about 80 per cent) of

[42] The mode of life test investigates the more accustomed way of life - either religious or customary - that an individual affiliates with before demise and decides which of the two dominates his/her life. The outcome determines the premise upon which the estate of the deceased is shared among beneficiaries.

Tanzania communities. On the contrary, the unmodified customary law rules remain the guiding rule for the matrilineal communities (20 per cent of the communities) subject to proof of authenticity from groups relying on them (Rwebangira, 1996).

There is historical evidence that women are marginalized in sub-Saharan African countries when it comes to inheritance. Household resources are generally not equally owned by married partners by virtue of the belief that domestic contribution to the ownership of household property is not suitable enough for women to claim equality of household assets. The undervaluation of domestic work, contributed mainly by women, further inhibits their rights to inheritance after the deaths of their husbands. This form of disempowerment may contribute to the prevalence of DV in the communities where these beliefs are upheld. For instance, complexity surrounding widow's inheritance rights eludes the Marriage Act and thus solely relies on Customary Laws for resolution of widow's inheritance matters.

The customs of the parties' community prevail in the treatment of widows over the inheritance rights that should be adopted after a deceased husband irrespective of patrilineal or matrilineal descent tracing in such communities (Rwebangira, 1996). This is contrary to a clearer pattern of children's inheritance rights following closely with patrilineal or matrilineal structure practised within the community. In addition to descent tracing for community individuals in each village (Table A11), the 2008 Tanzania World Bank Household data extracts information on the inheritance patterns of widows (Table A8). This sheds light on female empowerment status across various Tanzanian communities, which we use in the estimation of heterogeneous effects by widows' inheritance status. Because the spousal inheritance status may not be exogenous for the purpose of our exercise, we investigate the orthogonality of the local inheritance practice (the practice adopted at the village level) with historic rainfall patterns.

Table A8 above shows that inheritance customs in the sample communities favours widows in 45.9 per cent of the communities. Also, descent is commonly traced to the father in a majority (81.9 per cent) of the communities as sole patrilineal societies while 11.7 per cent others are shared with the matrilineal societies (Table A11).

Historical Rainfall and Inheritance Rights

It is important that historical rainfall pattern is orthogonal to inheritance practice to ensure the heterogeneous effect across inheritance platform is not driven by historic rainfall variability. A positive relationship between inheritance customs and historic rainfall shocks would invalidate the findings for heterogeneous effects using inheritance rights. In order to examine the orthogonality of female inheritance customs to rainfall pattern, we regress inheritance practice on historical rainfall.

Table A10 reports the estimates of this exercise. We basically find a zero relationship between historic rainfall pattern and the predominant inheritance rule on the community level (note that the coefficient estimates in Table A10 are in multiples of 10,000) removing any concerns one may have about the use of inheritance practice for the estimates in Table 10.

Table A14: Descent Tracing in Tanzanian Communities

Descent	Freq.	Fraction
Father	314	0.820
Mother	17	0.044
Both	44	0.115
Unknown	8	0.021
Total	383	1.000

Source: 2008 LSMS Tanzanian Data.

Appendix References

Rwebangira, M. K., 1996. "The Legal Status of Women and Poverty in Tanzania." *Research Report No.100.* The Scandinavian Institute of African Studies.

Toté, C., Patricio, D., Boogaard, H., van der Wijngaart, R., Tarnavsky, E., Funk, C., 2015. "Evaluation of Satellite Rainfall Estimates for Drought and Flood Monitoring in Mozambique." *Remote Sensing*. 7(2), 1758-1776.

Domestic Violence Questions (Page 29, 2008 Tanzania LSMS Questionnaire)

SECTION I: VIOLENCE AGAINST WOMEN

1. ENTER THE HOUSEHOLD ROSTER ID OF THE RESPONDENT: [ ]

THIS SECTION SHOULD BE ASKED TO EVERY WOMAN, AGE 15-50. QUESTIONS SHOULD BE ASKED IN PRIVATE. REMIND RESPONDENT THAT SHE IS FREE TO STOP AT ANY TIME.

2. Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations: YES…1 NO…2

A. If she goes out without telling him?		E. If there are problems with his or her family	
B. If she neglects the children?		F. If there are money problems	
C. If she argues with him?		G. If there is no food at home	
D. If she refuses to have sex with him?		H.Other (specify)	

	3. Has your current partner, or any partner ever ……[….] YES…1 NO…2 ►NEXT ROW	**4. Has this happened in the past 12 months?** YES…1 NO…2 ►NEXT ROW	**5. In the past 12 months would you say this has happened once, a few times or many times?** NEVER………….0 ONE TIME……..1 A FEW TIMES….2 MANY TIMES….3	**6. Before the past 12 months would you say this has happened once, a few times or many times?** NEVER………….0 ONE TIME……..1 A FEW TIMES….2 MANY TIMES….3
A. Slapped or thrown something at you that could hurt you?				
B. Pushed you or shoved you?				
C. Hit you with his fist or with something else that could hurt you?				
D. Kicked you, dragged you, or beaten you up?				
E. Choked or burnt you on purpose?				
F. Threatened to use or actually used a gun, knife or other weapon against you?				
G. Physically forced you to have sexual intercourse when you did not want to?				
H. Did you ever have sexual intercourse you did not want because you were afraid of what he might do?				

7. DID RESPONDENT REPORT 'YES' TO ANY ITEM IN QUESTION 3? [ ] YES…1 PROCEED TO 8; NO….2 ► END

8. After any of the incidents of physical violence, did you ever go to […] for help? YES…1 PROCEED TO OPTIONS NO….2

A. Family		D. NGO	
B. Hospital/health centre		E. Religious leader	
C. Village/community leaders		F. Police	