



The COVID-19 pandemic and intra-household tensions in Africa

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Abstract

This study examines the impact of countermeasures, such as stay-at-home orders and school closures, on stress within households during the COVID-19 pandemic. In a phone survey carried out in Uganda, Tanzania, Sierra Leone, and Mozambique throughout 2021 (N = 22,497), 70% of respondents reported the presence of intra-household tension. On average, we document that the stringency of the countermeasures increases intra-household tensions. The duration of the countermeasures significantly increases tension but at a diminishing rate. The type of countermeasure (e.g. workplace closure, public transport restrictions) is less important, with all measures, apart from international travel restrictions, significantly increasing tension. Income shocks, frequently experienced during the pandemic, were compounded by the countermeasures. Thus, countermeasures have a strong impact on the psychological and economic wellbeing of households. Policymakers need to carefully consider the intersection of economic vulnerability and public health interventions during future crises, balancing the expected benefits of countermeasures with their costs.

Keywords

COVID-19; Corona; pandemic; crisis; countermeasures; lockdown; intra-household tension; Africa

JEL Classifications

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1. Introduction

The COVID-19 pandemic prompted governments worldwide to implement a variety of countermeasures to reduce the transmission rate of COVID-19. Countermeasures included stay-at-home orders, travel bans, and the closure of non-essential businesses, among others. While the nature and strictness of the implemented measures varied significantly across different countries, they generally proved effective in slowing down the spread of the virus and preventing healthcare systems from becoming overwhelmed (Ayouni et al., 2021).

At the same time, countermeasures can also have significant costs and adverse consequences. Economically, many businesses faced closures or reduced operations, leading to significant job losses and financial instability for households (Egger et al. 2021). The closure of educational institutions and childcare facilities placed a further strain on families, particularly those with young children (Stojetz et al., 2022). Socially, the countermeasures limited social events and physical meetings with individuals from other households, decreased individuals' trust in others and in institutions and increased their feelings of isolation and stress (Annan & Archibong, 2023; Brück et al., 2020; Stojetz et al., 2024). Overall, the socio-economic impacts of the COVID-19 pandemic at the individual and household levels have been studied extensively. By contrast, relatively little is known about the impacts of pandemic countermeasures on intra-household relationships and well-being.

We aim to close this gap by studying the impacts of countermeasures implemented during the COVID-19 pandemic on intra-household tensions – the levels of tensions individuals perceive in their households. A priori, it is theoretically unclear if and how (more) stringent countermeasures affect intra-household tension, and how impacts vary with countermeasure, household and household member characteristics.

On the one hand, more stringent countermeasures may increase intra-household tension for several reasons. First, economic stress at the household level can intensify pre-existing or create new social conflict within households (e.g. Lucero et al., 2016). If stringent countermeasures increase economic stress on the household, for example, due to losses of income or economic opportunities, this may in turn cause an increase in intra-household tension. Second, a dominant class of economic models suggests that intra-household relationships are shaped by bargaining between two rational partners (Aizer, 2010; Anderberg et al., 2013). If countermeasures change the relative bargaining power structure of the income earners in the household, this may also affect tension. Specifically, we posit that a strong imbalance in how the main earners' incomes are affected by countermeasures may in turn lead to increased tensions. Third, criminologist approaches to conflict in households emphasize 'exposure theory', which implies that more exposure between partners (time spent together at home) can increase intra-household conflict

risks (e.g. Dougan et al., 1999). If countermeasures affect how much time household members spend together at home, this may also affect intra-household tension. Specifically, we argue that countermeasures that increase the time household members spend together at home, such as stay-at-home orders or school closures, may increase intra-household tensions.

On the other hand, more stringent countermeasures may also decrease intra-household tensions. A growing literature on collective experiences of adverse situations can bring individuals and groups closer (e.g. Bauer et al., 2016). Specifically, there is some descriptive evidence for increases in pro-social behavior and attitudes during the COVID-19 pandemic, including in response to the countermeasures (Ramkissoon, 2020; Shachat et al., 2021; Tekin et al., 2021). Thus, going through and coping with the challenges induced by countermeasures together may induce positive social impacts for households, strengthening intra-household relationships and reducing tension. Moreover, intra-household conflict is also a function of inter-household interactions. There is evidence that participation in social events (especially by men) can increase risks of intra-household conflict and spousal violence due to social norms and learning (Bandura, 2007), alcohol consumption (Rees & Schnepel, 2009), or emotional cues (Card & Dahl, 2011). More stringent countermeasures that limit (men's) participation in social events inducing such negative impacts may thus also positively affect households' social relationships, and decrease intra-household conflict and tension.

Our empirical analysis studies the relationship between the stringency level of COVID-19 countermeasures and intra-household tension in the context of four African countries: Uganda, Tanzania, Sierra Leone and Mozambique. We study the period between January and December 2021. Over this period, the severity of countermeasures varied substantially and the countries experienced multiple lockdown episodes, which varied both in intensity, duration and nature. We assess the overall impact of countermeasures, quantifying how various restrictions influence household stress levels, but also evaluate the role of the intensity, duration and the nature of countermeasures. We draw on detailed phone survey data of about 24,000 responses collected continuously in 2021 from the four African countries. To support a causal interpretation of our estimated effects, we rely on the plausible exogeneity of changes in the stringency of countermeasures, which are independent of households' preferences or decisions, and include country and month-fixed effects to control for contextual differences. In addition, we conduct several robustness tests, such as controlling for self-reported "COVID exposure" which measures individual level experiences with the pandemic beyond countermeasures, in order to distinguish the impacts of the measures from that of the pandemic they intended to counter.

Overall, we document that higher stringency of COVID-19 countermeasures significantly increases the prevalence of intra-household tension. Second, the duration of lockdowns plays a significant role; initially, longer lockdowns correlate with higher domestic tension but, beyond a certain point, the impact diminishes. Third, restrictions that specifically reduce income (such as workplace

closures) and limit physical movement (such as stay-at-home orders) have a more pronounced effect on increasing domestic tension than travel restrictions. Fourth, these restrictions interact with broader economic vulnerabilities, such as income levels and household size, to further amplify domestic stress. Finally, our mediation analysis shows that household income shock due to the pandemic is a key underlying factor for the impact of the countermeasure on domestic tension. These findings highlight the multifaceted consequences of countermeasures and the need for targeted interventions accounting for and mitigating their adverse effects on domestic life.

The rest of the paper is organized as follows. Section 2 reviews literature relevant to the link between countermeasures and intra-household tension. Section 3 describes the data and variables used in the paper, outlines the empirical strategy and provides an overview of the descriptive statistics. Section 4 presents and discusses the empirical findings. Section 5 concludes the paper.

2. Pandemic countermeasures and well-being

The COVID-19 pandemic had a profound global socio-economic effect, with most studies emphasizing economic outcomes. In low-income countries, sharp contractions in growth and widespread income losses were compounded by public health policies such as lockdowns and social distancing (Baliki et al., 2024; Egger et al., 2021b). These measures disrupted supply chains, closed businesses, and increased unemployment, especially in economies reliant on informal employment (Bargain & Aminjonov, 2021; Bundervoet et al., 2022; Hausmann & Schetter, 2022; Josephson et al., 2020; Narayanan & Saha, 2021).

While economic impacts have been widely documented, the social consequences—particularly domestic tension arising from the countermeasures—have received comparatively less attention (Bourgault et al., 2021; Peterman et al., 2020). Lockdowns and other restrictions created conditions conducive to domestic conflict by increasing time spent at home, disrupting routines, and heightening stress. Although people spent only about 2–3% more time at home during the pandemic (Orellana & Martelo, 2020), this led to major changes in daily life and family relationships (Biroli et al., 2021). These effects were amplified by economic hardship - a well-established driver of domestic violence (Nojomi & Babaei, 2020). Job losses and income shocks heightened financial strain, particularly in already vulnerable households, intensifying interpersonal tensions and conflict (Béland et al., 2021; Bourgault et al., 2021).

Mental health deterioration during the pandemic also contributed to rising domestic tension. Anxiety, depression, and stress were widespread as people faced uncertainty about health, income, and the future (Beck et al., 2023). These stressors, combined with disrupted routines and

reduced external support, made families — especially those with children or existing vulnerabilities — more prone to conflict (Fornara et al., 2022).

Gender dynamics played a key role in shaping household experiences during the pandemic. Women, who are often primary caregivers and overrepresented in informal employment in low-income countries, were disproportionately affected (UN Women, 2020). They faced heightened emotional and financial stress while also taking on a greater share of unpaid domestic labor, including caregiving and children's education—responsibilities that intensified under lockdown conditions (Spinelli et al., 2020). Even when men contributed more to childcare, their involvement typically focused on less burdensome or more enjoyable tasks, leaving women to shoulder the bulk of routine chores (Champeaux et al., 2022; Costoya et al., 2022). These inequalities reinforced traditional gender roles and exacerbated pre-existing disparities, further increasing household stress and tension.

In Africa, these issues were amplified by pre-existing vulnerabilities such as high levels of poverty, larger household sizes, patriarchal norms, gender inequality, and less robust social safety nets. Poverty, which was already a significant issue in many African countries, was worsened by the pandemic (Beck et al., 2023). The informal economy, which provides livelihoods for a large portion of the population, was heavily impacted by the lockdowns (Egger et al., 2021a). Due to the lack of robust social safety nets, many families faced extreme financial strain. This created fertile ground for domestic tension, as families grappled with hunger, unemployment, and uncertainty about the future (Mahmud & Riley, 2020).

The prevalence of larger household size further compounded the problem. In many African societies, households often include extended family members, leading to overcrowded living conditions. The imposition of lockdowns in these environments meant that individuals were confined to small spaces with limited privacy. In such settings, even minor disagreements can escalate into significant conflicts due to the lack of personal space and the prolonged proximity of family members (Peterman et al., 2020). Negotiating the transformation of shared living quarters into different functions (i.e., working, sleeping, exercising, studying, worshiping etc.) for each household member heightens interpersonal tension because most shared homes are not designed to accommodate multiple purposes (Blanc & Scanlon, 2022).

The impact of the lockdowns on domestic tension may vary significantly, depending on the specific type of restrictive measures, the duration of these measures, and the gender of individuals. While necessary for public health, the various forms of countermeasures likely influenced domestic tension in different ways. Stringency sub-indices, such as restrictions on movement, curfews, and closures of non-essential services, were some of the most direct contributors to domestic tension. In households where individuals could no longer engage in work or social

activities outside the home, conflicts related to financial stress and the division of household labor increased (Peterman et al., 2020).

The duration of restrictive measures significantly influenced domestic tension. Prolonged lockdowns intensified psychological and financial stress, exacerbating mental health issues and increasing the risk of domestic violence (Béland et al., 2021). Sustained confinement heightened anxiety, anger, and conflict, while also limiting victims' ability to escape abusive situations due to restricted mobility and support access (Chiru & Răban-Motounu, 2020; Plášilová et al., 2021).

Variation in countermeasure enforcement and impact across African countries reflected broader differences in political stability, digital infrastructure, and public trust. In some settings, governments were unable to impose strict measures due to concerns over food security and poverty, resulting in less stringent countermeasures (Birner et al., 2021; Ferraresi et al., 2020; Santini et al., 2022).

Albeit the negative outcome of COVID-19 countermeasure, some positive impacts were recorded such as reduction of virus transmission due to reduced mobility and interpersonal socialization (Deb et al., 2020). Moreover, while some families experienced heightened tensions, others strengthened their bonds due to increased time together (Evans et al., 2020). The positive experiences are associated with strong pre-existing relationships and effective coping mechanisms, including maintaining routines and engaging in shared activities. This suggests that a priori, the impact of the countermeasures on intra-household tension is not clear as it depends on differences in living conditions (i.e., in urban or rural areas), the strength of prior relationships within household members, and coping strategies (Neocleous, 2021). The objective of this study is, therefore, to assess the extent of domestic tension in Africa and its linkage to the pandemic-induced countermeasures, paying special attention to how the stringency, duration, and gendered effects of the measures influenced domestic conflicts.

3. Data and methods

3.1. Data

We use survey data collected as part of the "Life with Corona - Africa" (LwC-A) project (Brück & Regassa, 2022; Stojetz et al., 2022). The LwC-A survey is a large phone survey conducted in Uganda, Tanzania, Sierra Leone and Mozambique between January and December 2021. The selection of the four countries was aimed to ensure significant differentiation in terms of average per capita income and state capacity. The research team also considered their prior experience in these countries and the quality of proposals from survey companies in the final decision. After selecting the countries, individual respondents were randomly chosen from extensive databases

created in the past decade through Random Digit Dialing (RDD) and/or face-to-face interviews. In each country, repeated cross-section survey data were collected monthly between January and December 2021, with 500 respondents per country, yielding a total of about 24,000 observations over the year.

In Mozambique, data collection was conducted by Intercampus, a survey firm that sampled from a large database containing approximately 600,000 mobile phone contacts. In Uganda, Tanzania, and Sierra Leone, data collection was carried out by BRAC International. BRAC relied on the Independent Evaluation and Research Cell (IERC) database, which consists of more than 10,000 beneficiaries per country selected from their current and previous programs. While these databases are large and include respondents from all regions, they are not nationally representative. Therefore, in each round, we followed a stratified random sampling procedure to generate a sample that mirrors the national population distribution by gender, age group, and location. However, we could not fully reach this goal due to two limitations. First, mobile phone subscriptions were not universally available across the study countries. For instance, for every 100 people in Tanzania and Sierra Leone, only 80 people have access to the subscription. Subscription rate was even lower in Uganda and Mozambique, with 61 and 49 subscriptions per 100 people, respectively. Second, given the large sample size of the study, the databases did not contain enough respondents to maintain sample balance at the national level (e.g., many of the BRAC projects focus on women). Although the results cannot be generalized to the country level, the large sample size and the consistency of survey timing and structure across the four countries provide useful insights into how the public policy restrictions placed to contain the COVID-19 pandemic have affected interpersonal relationships in these four African countries.

Since the focus of this study is to understand the relationship between lockdown measures, and interpersonal and domestic tension, the sample was limited to respondents who share living quarters with at least one other person.¹

The LwC-A survey questionnaire includes information on basic socio-demographic characteristics, housing and asset ownership, household economic well-being, personal coronavirus exposure, testing and vaccination experiences, and assistance received since the start of the pandemic. It also includes questions on social life, mental health, and interpersonal relationships within the household. The survey modules were kept short to accommodate phone interviews, the questions were straightforward, and many response options were dichotomous (e.g., yes or no).

¹ This led to the exclusion of 616 respondents (2.5% of the sample).

3.2. Variable description

Intra-household tensions (outcome variable). The primary outcome of interest in this study is the perceived household tensions, which we define based on self-reported assessments of interpersonal conflict within households. In the survey, respondents were asked to rate the current level of tensions between household members on a scale from 1 (no tension at all) to 10 (very high tensions). Thirty percent of respondents reported no tension at all, while the remaining 70% indicated varying degrees of tension. Given the unequal distribution of responses across categories, we created a binary indicator.² This variable is coded as 0 if the respondent reported no tension and 1 if any tension was reported. Prevalence varies strongly across countries (*Figure 1, left*). For example, 37% of respondents in Mozambique reported household tensions, compared to 94% in Sierra Leone. The share of the respondents in Uganda and Tanzania that reported tension are 63% and 86%, respectively. The prevalence of self-reported tension at home shows little variation over time.

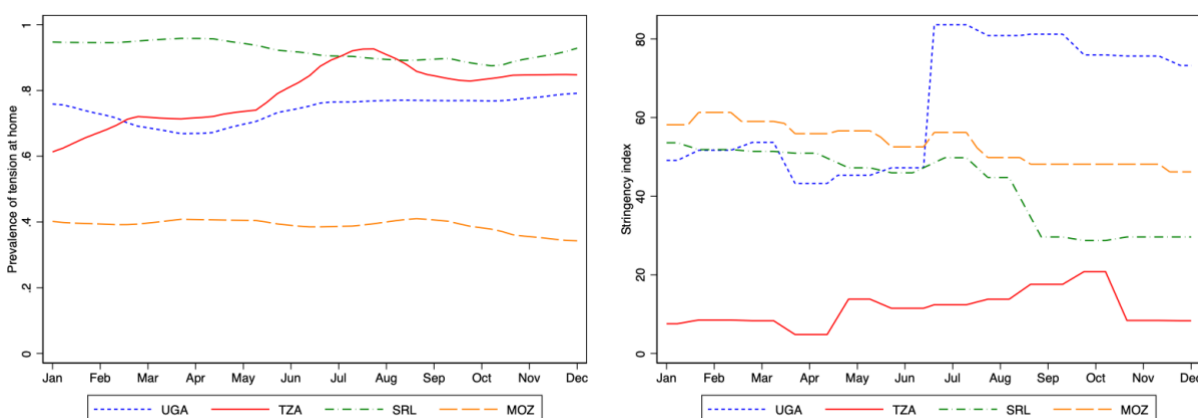


Figure 1: Tension at home (left) and countermeasure stringency (right)

Note: *Tension at home is a binary variable which takes a value of 1 if a household reported any tension at home, zero otherwise. Stringency index is a standardized z-score of a 14-day average indicator.*

Policy stringency of pandemic countermeasures (treatment variable). We measure the intensity of COVID-19 countermeasures using policy stringency data from the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale et al., 2021). OxCGRT compiles data on various government interventions aimed at controlling the spread of the pandemic. Using this information, the tracker creates the stringency index, which quantifies the strictness of these policies. The index is built from nine key indicators: school closures, workplace closures, cancellation of public events, restrictions on public gatherings, public transport closures, stay-at-home requirements, public

² In section 4.3, we explore the robustness of our findings using alternative versions of the variable.

information campaigns, and restrictions on both domestic and international movements.³ Each indicator is assigned an ordinal score, normalized to a value between 0 and 100, with equal spacing between points on the scale (Hale et al., 2021). The overall stringency index for each country is calculated as the average of the nine indicator scores, with equal weighting applied to each. A score of 100 represents the strictest possible policies. The index has been updated daily since January 2020 and covers most countries, including the four featured in this study. The main advantage of the stringency index is its ability to ensure comparability of lockdown measures across countries and over time, making it well-suited for our analysis.

We merged the daily stringency index data with the LwC-A survey using the interview date and country as merging variables. This allows the stringency variable to reflect the level of restrictions each respondent was exposed to in their country on the day of the interview. That is, the daily stringency index captures the exact level of stringency each household faced on the interview date. Additionally, we calculated the average stringency levels for each country over the 14, 30, 60, 90, and 180 days preceding the interview date. These aggregate indices represent the average levels of restrictions experienced by households over the last 14 days, 30 days, 2 months, 3 months, and 6 months, respectively.

We use both the aggregate and the composite stringency index. Our main analysis focuses on the average stringency index, which reflects the intensity of restrictions (Baliki et al., 2024). To ease the interpretation of our results, all stringency indices are converted to z-scores. Figure 1 (right) shows the aggregate stringency indices for all four countries over our study period (January - December 2021). It shows that the majority of households in all countries, apart from Tanzania, faced a stringency level between approximately 40 and 60 in January 2021. Over the subsequent months, while the countermeasure stringency in Sierra Leone quickly declined, the level in Uganda increased significantly. In contrast, Tanzania's stringency level was notably lower than that of the other countries, with a significant peak observed toward the end of the measurement period.

Several control variables are included at both the individual and household level to ensure our analysis is robust. On an individual level, we control for age, gender, and education, as these factors are likely to influence baseline perceptions of tension. For example, women may report higher tension levels due to traditional caregiving roles, while higher education levels may correlate with better-coping mechanisms. Marital status is also a control variable. Compared to unmarried respondents, married individuals may experience different household dynamics as joint decision-making can invoke tension.

³ It is important to note that while the stringency index provides a comprehensive picture of governmental responses, it does not evaluate the effectiveness or appropriateness of these policies in mitigating COVID-19 transmission or their broader social impacts.

Moreover, at the household level, we control for household size. This is because larger households might experience more frequent and severe tensions. We also include an asset index to control for wealth, as wealthier households may be better equipped to avoid or resolve tensions. Assets include ownership of properties, livestock, land, vehicles, household items (TV, radio, sofa, refrigerator), and variables describing housing quality (access to piped water, electricity, and number of rooms). The overall wealth index is calculated using weights from the first component of a Principal Component Analysis (PCA), which captures the most variance in asset variables (Kolenikov & Angeles, 2005). This approach effectively reflects economic well-being, especially in low-income SSA countries (Filmer & Scott, 2012). We also control for whether the household is located in a rural or urban area, as rural households may experience fewer restrictions and less stress due to differences in population density and mobility patterns. Lastly, we include a control for COVID-19 exposure to account for the potential direct psychological and economic stress associated with illness or perceived health risk, which may independently influence levels of tension at home.

3.3. Model and identification

The outcome of interest is estimated with the following linear probability model (LPM):

$$Y_i = \alpha_0 + \beta_1 S_i + \beta_2 X_i + FE_{cr} + \varepsilon_i \quad (1)$$

where Y_i refers to the outcome of interest for individual i , perceived household tensions, which takes on a value of 1 if a respondent reports they perceive any level of tensions between members of their household and a value of 0 if tensions are absent. S_i is the average stringency index over 14-days prior to date of interview⁴. Our main parameter of interest, β_1 , is the composite or a component of the stringency index. It measures the change in the share of individuals that reported intra-household tension. More specifically, and given that we are using the z-scores of the stringency indices, β_1 can be interpreted as the difference in the share of households who report intra-household tension in response to a one standard deviation increase in the level of stringency above the mean. X_i is a vector of household and respondents' socioeconomic and demographic characteristics (age, sex, years of education, marital status, household size, wealth rank, and living in a rural area). FE_{cr} represent country and survey round fixed effects. Finally, ε_i is the error term to control for unobserved heterogeneity across space and time. Standard errors are clustered at district level.

⁴ In section 4.3, we explore the robustness of our findings using stringency index aggregated at different levels.

Our identification strategy is based on the key assumption that changes in government-imposed stringency measures are exogenous, meaning they occur independently of the choices and decisions of respondents and their partners. In other words, we assume that households do not directly influence the implementation or adjustment of these policies. Furthermore, other factors that could affect intra-household tension—aside from the stringency measures—among households with similar socioeconomic characteristics are controlled for through the inclusion of country and month fixed effects. These fixed effects help isolate the specific impact of the stringency measures by accounting for broader contextual differences across countries and time periods.

4. Results and discussion

4.1. Descriptive statistics

Table 1 presents socio-demographic characteristics at both the household and respondent levels. Column 1 reports summary statistics for the full sample with non-missing data on intra-household tension. Column 2 shows the mean values for the reference group—households that did not report tension. Column 3 presents the difference in means between households that reported tension and the reference group, along with the magnitude of the change and the statistical significance of these differences. This allows for an assessment of how key characteristics vary with the presence of reported intra-household tension. As shown in column 1, 56% of respondents are females, with an average age of 37 years. 75% of respondents are married, and the average number of years of education is 9.5. The average household has 6 members, and 35% of households reside in rural areas. 19% of the respondents reported to have exposure to COVID - defined as direct infection or proximity to infected individuals.

Column 2 and 3 show most of these covariates differ significantly between households with and without reported tension, suggesting that they are correlates of intra-household tension. In general, intra-household tension is more prevalent among older, married, less educated, and poorer households with large family sizes. The table also shows systematic spatial variation in the reported incidence of domestic tension, with households in urban areas being significantly more likely to report tension than households from rural areas. As a robustness check and to improve the explanatory power of our models, we will estimate specifications that include these variables as covariates.

Table 1: Descriptive statistics

Variable	[1] Total	[2] No tension	[3] Mean difference
Respondent is female	0.56 (0.00)	0.56 (0.01)	-0.007
Age of respondent	36.76 (0.07)	34.35 (0.14)	3.379***
Respondent is married	0.75 (0.00)	0.66 (0.01)	0.128***
Respondent education, years	9.46 (0.03)	10.57 (0.05)	-1.559***
Household size	6.26 (0.02)	5.63 (0.03)	0.877***
Asset index, PCA	0.00 (0.01)	0.46 (0.02)	-0.638***
Rural household	0.34 (0.00)	0.41 (0.01)	-0.104***
COVID-19 exposure	0.19 (0.00)	0.24 (0.01)	-0.078***
Observations	23,654	6,794	23,654

Notes: .01 - ***, .05 - **, .1 - *; Column [2] represents the mean of the reference group - a subgroup that reported no tension at all. Column [3] represents the mean difference of the group that reported tension relative to the reference group.

4.2. Countermeasure stringency and tension at home

Table 2 reports estimate of the impact of the composite stringency index (over the past 14 days) on the self-reported presence of intrahousehold tension. We find robust evidence that the policy stringency of countermeasures increases intra-household tension.

Controlling only for country-fixed effects (column 1), we find that a one standard deviation increase in the stringency of countermeasures is associated with a roughly 9-percentage-point increase in the likelihood of intrahousehold tension. The magnitude and statistical significance is remarkably stable as we add the additional covariates. In column 2, we control for a comprehensive set of individual and household-level characteristics, including socioeconomic factors and country and time-fixed effects.

In contrast to the bivariate comparisons in the previous section, in these multiple regression models only a few geographic and socio-demographic factors are significantly correlated to tension at home beyond the stringency of countermeasures. Age, gender, and education level of respondents do not significantly influence perceived tension within the household. However, being married and those residing in rural areas is associated with a much higher likelihood of

tension. Additionally, household size and wealth play a notable role, with larger and poorer households being more prone to report tension. This suggests that both family structure and environmental factors contribute to stress at home beyond policy stringency.

Table 2: Association of stringency index on tension at home

	[1]	[2]
Stringency index	0.093*** (0.022)	0.095*** (0.020)
Respondent is female		0.002 (0.007)
Age of respondent		0.001 (0.001)
Respondent is married		0.034*** (0.013)
Respondent edu., yrs		0.000 (0.001)
Household size		0.008*** (0.001)
Asset index, PCA		-0.009** (0.004)
COVID-19 exposure		0.016 (0.011)
Rural household		0.023* (0.013)
Country FE	yes	yes
Survey round FE	no	yes
Constant	0.777*** (0.025)	0.604*** (0.046)
Observations	23,792	23,782
R2	0.283	0.294
Adjusted R2	0.282	0.292

Notes: .01 - ***; .05 - **; .1 - *; *Stringency index is a standardized z-score of a 14-day average indicator. Reported coefficients are from LPM regression models for the binary outcome variable feeling tensions at home. Country and survey round fixed effects are included but not reported for brevity.*

4.3. Short and protracted countermeasures and tension at home

To investigate the role of the *duration* of particularly restrictive measures in shaping perceived tension at home, we analyze three key variables in our regression: an indicator of ‘duration of relatively high stringency’, duration squared, and the average stringency index above a defined threshold. The duration indicator is measured as the number of consecutive days that stringency levels remained above an average threshold level of 40 prior to the interview date⁵ (see Figure

⁵ We also increased the threshold level to 50. But the result remained qualitatively similar (see Table A1).

A1). This variable is crucial as it captures the temporal aspect of policy stringency and its potential cumulative effects on domestic tension. To account for the possibility of non-linear effects, we also include the squared term. This term allows the model to capture diminishing or accelerating impacts over time, acknowledging that the relationship between stringency and tension might not be strictly linear. The third variable, the average stringency index above a threshold, focuses on the intensity of stringency measures above the threshold. This variable is especially relevant in understanding how high levels of policy enforcement influence domestic tension, which may have distinct implications from more moderate stringency periods. Together, these variables provide a nuanced understanding of how the stringency index, both in terms of duration and intensity, relates to changes in domestic tension.

The results presented in Table 3 reveal a positive coefficient for the duration of high stringency, suggesting that longer periods of strict countermeasures correlate with increased domestic tension. This indicates that as stricter stringency measures are maintained over time, tensions within households tend to rise. However, the inclusion of the duration squared term leads to a negative coefficient, which implies that the relationship between duration and domestic tension is not linear. Specifically, this negative coefficient suggests that the effect of longer durations increasing tensions diminishes after a certain point. While domestic tension increases initially as stringency extends, the impact starts to lessen over time. This could reflect adaptive coping mechanisms, a reduction in the perceived severity of restrictions over time, or even a shift in the focus of household priorities. Thus, the data support the notion of a diminishing marginal effect of stringency duration on domestic tension.

Table 3: Tension at home by duration of stringency

	[1]	[2]	[3]
Duration of strict stringency	0.014** (0.006)	0.093*** (0.022)	0.086*** (0.024)
Duration of strict stringency sq.		-0.014*** (0.004)	-0.013*** (0.004)
Average stringency index			0.014 (0.020)
Individual controls	yes	yes	yes
Household controls	yes	yes	yes
Country FE	yes	yes	yes
Survey round FE	yes	yes	yes
Constant	0.735*** (0.056)	0.551*** (0.055)	0.671*** (0.063)
Observations	23,782	23,782	23,782
R2	0.288	0.291	0.291
Adjusted R2	0.287	0.290	0.290

Notes: .01 - ***, .05 - **, .1 - *; Stringency index is a standardized z-score of a 14-day average indicator. Stringency duration is measured in terms of the number of consecutive days that the stringency index remained above a threshold. Reported coefficients are from LPM regression models for the binary outcome variable feeling tensions at home. Individual, household, country and survey round fixed effects are included but not reported for brevity.

4.4. Variation across countermeasure stringency sub-indices and tension at home

Next, we disaggregate the composite stringency index and examine the effect of its individual sub-components on perceived intrahousehold tension by running separate regressions for each sub-index. These sub-indices represent different dimensions of government-imposed restrictions, including school closures, workplace closures, stay-at-home orders, public event cancellations, internal and external movement restrictions, and public information campaigns.

Our analysis reveals several important findings, summarized in Figure 2. First, we find that the coefficient estimates for nearly all sub-indices, except for external movement restrictions, are positive and statistically significant. This indicates that most types of government-imposed restrictions, especially those affecting social interactions and economic activities, contribute to an increase in reported household tensions. Restrictions such as workplace closures, stay-at-home orders, public event cancellations, and internal movement restrictions exhibit the largest coefficient estimates. Workplace closures and stay-at-home orders severely limit individuals' ability to earn a living, particularly in economies where wage work and small-scale trading are essential for day-to-day survival. Additionally, public event cancellations and restrictions on internal movement further disrupt social and economic networks, isolating individuals from their

communities and cutting off access to local markets for both income and consumption. This economic isolation, combined with the physical confinement of stay-at-home orders, creates significant stress within households, intensifying intrahousehold tensions.

These results are particularly relevant in the African context, where many households rely on the informal economy and daily interactions with physical markets to sustain their livelihoods. In most countries, formal safety nets are limited or non-existent, and hence, households have few alternative sources of income or social support, making them particularly vulnerable to the economic shocks induced by these restrictions (Bargain & Aminjonov, 2021). The absence of stable welfare programs or government support further exacerbates the pressure on household dynamics, as families struggle to meet basic needs under increasingly restrictive conditions.

On the other hand, the coefficient corresponding to external movement restrictions (which target international travel) is negative and statistically significant indicating that external movement restrictions are associated with a decrease in perceived tension within the household. This may be explained by the fact that, in low-income countries, international travel is less common, and thus these policies do not disrupt the daily lives of most households. Instead, they may provide a psychological sense of security, as limiting international travel could be seen as reducing the risk of external threats, such as the virus entering the country from abroad. This perception of safety may, in turn, alleviate some of the stress and anxiety within households, leading to a reduction in tension.

Overall, our results suggest that policies that curtail local economic activities—such as workplace closures and internal movement restrictions—lead to a significant rise in stress and domestic tensions. Therefore, policymakers in resource-constrained settings should take these nuances into account when instituting policy measures.

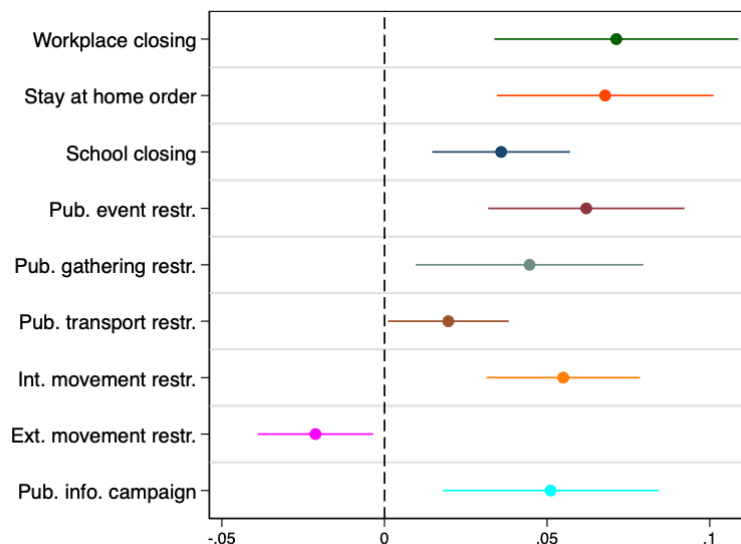


Figure 2: Stringency index sub-indices and tension at home

Notes: Dots: coefficients from ordinary least square regressions for the binary outcome variables feeling tensions at home; Bars: 95% confidence intervals; Stringency index is standardized z-scores at the 14-day average indicator. Coefficients of individual and household controls as well as survey and country FE are not reported for brevity.

4.5. Mechanisms

To investigate underlying mechanisms that may explain the observed positive association between the countermeasure stringency and domestic tension, we focus on two factors: an absolute household income decline and a relative income change between members of the household. The premise is that stricter stringency measures may not only directly affect the household's economic situation but also alter the relative positions of household members, thereby impacting their interactions and creating tension. To explore the relevance of these pathways, we employ structural equation modeling (SEM), which allows for a nuanced examination of the causal relationships between these variables.

The results of the SEM analysis, presented in Figure 3, indicate that the countermeasure stringency leads to an *absolute* reduction in household income ($p < 0.001$). Individuals that faced stricter countermeasures are 7.5 percentage points more likely to report reduction in household income. This income shock emerges as a key driver of increased domestic tension, as financial strain places pressure on household dynamics, leading to stress and conflict. Households that experienced an income shock during the pandemic were 6.6 percentage points more likely to report domestic tension than those that did not face income disruptions. Overall, household income declines accounts for about 7 percent of the association between countermeasure stringency and tension at home.

The analysis also shows that stricter stringency measures cause significant changes in *relative* income between household members, altering existing intra-household economic roles and bargaining power. However, the result presented in Figure 3 indicates that households that experienced a change in relative income are 2.1 percentage points less likely to report tension within the household. This finding suggests that when one member of the household experiences a larger relative decline in income—regardless of whether they continue to earn more in absolute terms—it may shift power dynamics in a way that reduces conflict, potentially by rebalancing influence within the household or altering expectations around decision-making and responsibility.

Thus, while both absolute household income decline and relative income change are mechanisms through which stringency affects domestic tension, it is the overall income shock that plays a dominant explanatory role in *increasing* risks of tension.

In line with these findings, a significant body of literature has highlighted the detrimental effects of negative income shocks on household dynamics. Income losses—whether due to job layoffs, reduced working hours, or the closure of businesses—have been identified as a key driver of stress within households, exacerbating conflicts and tensions. Studies consistently show that financial insecurity heightens emotional stress, leading to increased friction between household members. In a systematic review that summarized 26 studies on violence against women and children during the pandemic in low-and middle-income countries, Bourgault et al. (2021) find that economic vulnerability is a major risk factor for the increase in domestic violence during the pandemic.

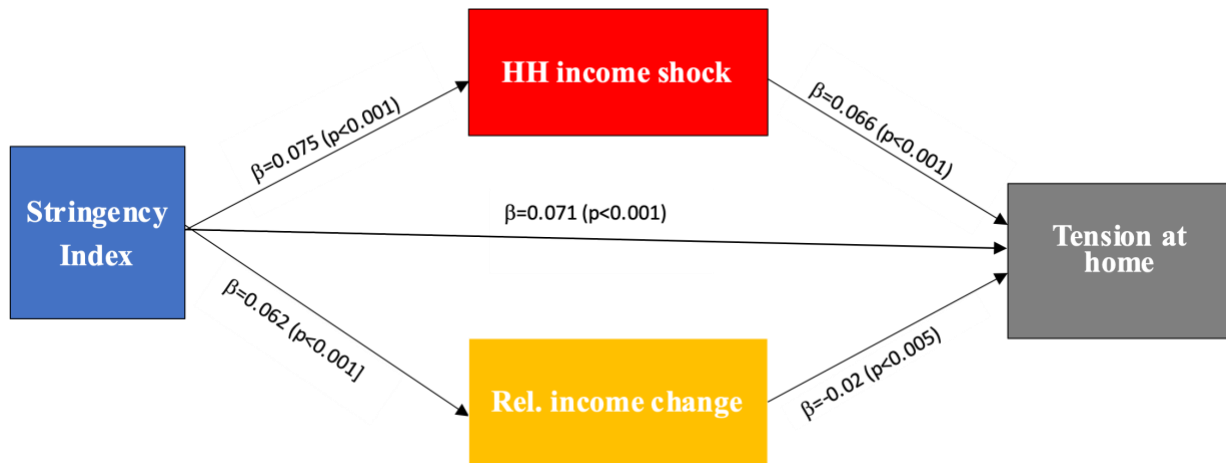


Figure 3: Countermeasure stringency, household income and tension at home

Notes: The stringency index is the standardized z-score of a 14-day average indicator. Reported coefficients are from structural equation estimates for the binary outcome variables feeling tensions at home. Coefficients of individual and household controls as well as survey and country FE are not reported for brevity.

4.6. Heterogeneity Analysis

To assess whether and how the effect of stringency on domestic tension varies across household characteristics, we conduct a heterogeneity analysis focusing on household size, wealth status, and gender. To do this, for ease of interpretation, we use binary indicators of being a large household ('large HH'), being a poor household ('poor'), and being a female respondent ('female'). Large HH takes the value of 1 if family size is above the sample median of 7. Poor takes the value of 1 if the household is below the 40th percentile of the wealth distribution. Female takes the value of 1 if the survey respondent is female. Then, we re-estimate Equation 1 by adding an

interaction term between the stringency index and each of the three binary indicators. This approach allows us to test whether the relationship between countermeasure stringency and tension differs systematically across these subgroups.

The results, summarized in Figure 4, show that levels of tension are significantly higher among poorer households, as indicated by the positive and significant coefficient on the "poor" indicator. However, the interaction between stringency and poverty status is not statistically significant, suggesting that while poorer households are more likely to report tension overall, the marginal effect of stringency is not significantly different for them. In contrast, both the binary variable for large household size and its interaction with the stringency index are statistically significant. This indicates not only that larger households experience more tension on average, but that the effect of stringency is amplified in those households. This likely reflects the increased stress and logistical strain associated with managing a larger group under restrictive conditions. Finally, we find no significant differences in the effect of stringency on tension by the respondents' gender, though further gender-disaggregated analysis may be needed to uncover more nuanced dynamics. These results underscore the importance of household composition, particularly size, in shaping vulnerability to the social impacts of policy restrictions. In many African societies, large and multigenerational households are common, often resulting in overcrowded living conditions where lockdowns intensified interpersonal tensions due to limited privacy and the need to repurpose shared spaces for multiple functions (Peterman et al., 2020; Blanc & Scanlon, 2022).

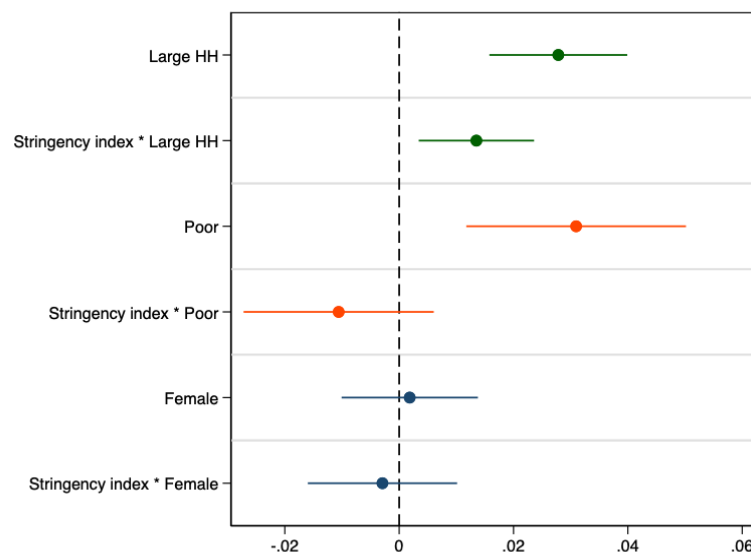


Figure 4: Heterogeneous effect of stringency index on tension at home

Note: Dots denote the coefficients from ordinary least square regressions for the binary outcome variables feeling tensions at home; bars denote 90% confidence intervals. Stringency index is the standardized z-score of a 14-day

average indicator. Coefficients of individual and household controls as well as survey and country FE are not reported for brevity.

4.7. Robustness analysis

We assess the robustness of our main results in several ways.

First, we estimated our basic results using a LPM model, defining the outcome as a linear variable. However, since tension at home is defined as binary variables, using a linear model may not be unequivocally appropriate. Linear models are preferable due to their simplicity, interpretability, and because they provide a host of specification tests (Angrist & Pischke, 2009; Caudill, 1988). However, for limited dependent outcomes, a linear model may be unreliable (Wooldridge, 2002). Therefore, we assess the robustness of the basic findings using logit model regressions. The results presented in Column [2] of Table 4 reporting logit model regression results indicate that the basic finding remains robust and is not driven by the non-linear nature of the outcome variables.

Second, given the nested structure of our data, the assumption of independent errors is likely violated. Instead, it is plausible to assume that individual responses are more highly correlated within country-survey round than they are across country-survey rounds. Individuals interviewed within one country at a one-time point are more likely to be exposed to a similar set of factors (e.g., government policies and social safety net programs) compared to individuals interviewed in a different country at a different point in time. The linear regression model used for the basic model assumes that one intercept is common to all individuals in our sample. However, in our context – where individuals are clustered together in countries and survey rounds – it is likely that the conditional mean of the dependent variable is different across clusters. We attempted to address this issue in the analysis so far by controlling for country and survey round fixed effects as well as clustering the standard errors at the district level. This might not be sufficient as it does not introduce cluster-specific intercepts (Hedeker, 2003). Therefore, in this part, as a sensitivity analysis, we fit a random intercept logistic regression model (melogit). The result presented in Column [3] of Table 4 shows that the effect of the stringency index on intra-household tension is qualitatively similar to the result from the basic model.

Third, the main explanatory variable used in the basic analysis is a binary variable indicating whether the respondent reported tension at home. While this variable has an advantage owing to its ease of interpretation, it does not differentiate households based on the intensity of exposure. To partially address this, we alternatively used the outcome variable indicator ranging from 1-10, with 10 indicating the highest tension. The results presented in Column [4] of Table 4 corroborate

the main result, namely that there is a strong positive association between the countermeasures and tension at home.

Fourth, the primary analysis relies on a 14-day average of the countermeasure stringency prior to the interview date, which captures short- to medium-term exposure to restrictive policies. However, the choice of this window may influence the observed relationship between stringency and domestic tension. To test the sensitivity of the results to this modeling decision, we re-estimate the core specification using alternative aggregation periods, including shorter (1-day index) and longer (30, 60, 90 and 180-day averages) measures of the stringency index. This allows for an assessment of whether the effect of countermeasure stringency on household tension is sensitive to the timeframe over which the stringency indices are aggregated. The results, presented in Figure 5, provide the coefficient estimates from these regressions, capturing the relationship between different aggregation levels and perceived tension within the household. While there is slight variation in the magnitude of the estimates, the result remains qualitatively very similar.

Table 4: Tension at home - robustness analysis

	[1]	[2]	[3]	[4]
Outcome	Binary	Binary	Binary	1-10
Model	LPM, coefficients	Logit, Marginal effects	Multilevel logit, Marginal effects	OLS, coefficients
Stringency index	0.098*** (0.011)	0.144*** (0.026)	0.092* (0.023)	0.172*** (0.034)
Individual controls	yes	yes	yes	yes
Household controls	yes	yes	yes	yes
Survey & country FE	yes	yes	yes	yes
Observations	22,487	22,487	22,487	22,487
Adjusted/Pseudo R2	0.292	0.257		0.118

Notes: .01 - ***; .05 - **; .1 - *; Stringency index is the standardized z-score of a 14-day average indicator. [1] - [3], the outcome variable is binary: feeling tensions at home. In [4], the outcome variable is the tension at home indicator ranging from 1-10, with 10 indicating the highest tension. Coefficients of individual and household controls as well as survey and country FE are not reported for brevity.

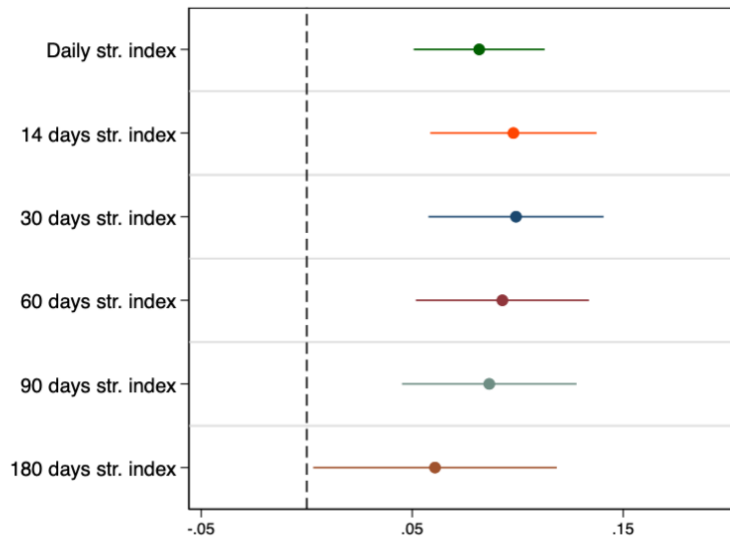


Figure 5: Countermeasure stringency on tension at home, alternative stringency measures

Notes: Dots: coefficient from ordinary least square regressions for the binary outcome variables feeling tensions at home; Bars: 95% confidence intervals; Number of observations=23,782. Stringency index is standardized z-scores aggregated over different time periods. Coefficients of individual and household controls as well as survey and country FE are included in the regression but not reported for brevity.

5. Conclusion

Phone survey data collected from four African countries throughout 2021 enabled the study of the psychological and economic wellbeing of almost 22,500 individuals during the early COVID-19 pandemic, focusing on the relationship between countermeasures and reported tension within the household. In nearly three quarters of households there is some level of intra-household tension (70%), although this varied considerably across the four countries: Mozambique (39%), Uganda (63%), Tanzania (86%) and Sierra Leone (94%). As country governments responded to the public health challenge of COVID-19, they introduced countermeasures, such as school- and workplace closures and travel restrictions. These measures were imposed and thus can be regarded as plausibly exogenous to individual behavior in the analysis. The stringency of the countermeasures varied by country and over time (Figure 1).

Our analysis employing linear probability models reveals that the stringency of the countermeasures significantly increased tensions. We find that the duration of measures was important and that tensions increased with duration, but at a diminishing rate. In contrast, the type of countermeasure was less important, with all measures increasing tension with the exception of international travel restrictions. Our analysis of the underlying mechanisms indicate that countermeasures have strong direct and indirect impacts on the psychological and economic wellbeing of individuals. Household income shock represents the main indirect channel through

which the countermeasures affect tension. In future crises, policymakers need to carefully consider the intersection of economic vulnerability and public health interventions, especially when a crisis lasts for several months or years. While countermeasures in a pandemic may save lives, they may also place a burden on some households in other important ways.

Conflict of Interest

The authors declare that they have no conflict of interest.

Data availability statement

The authors confirm that they will share all data generated or analyzed during this study as supplementary material upon publication of this article.

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Appendix

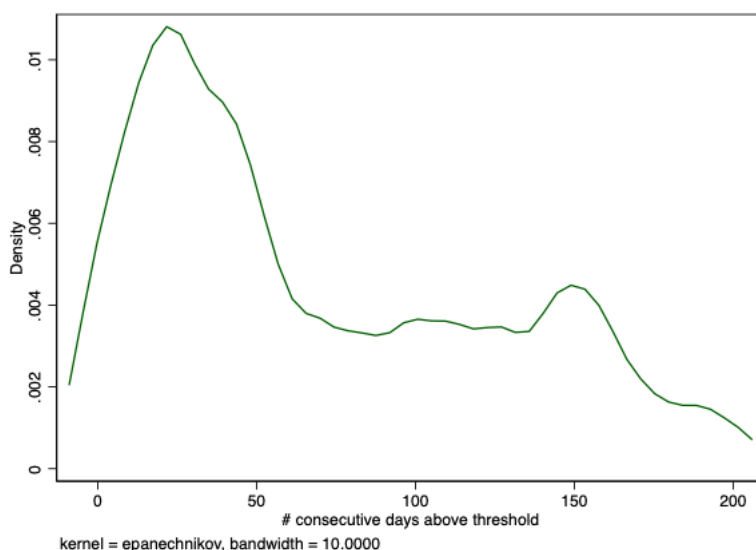


Figure A1: Patterns in duration of strict stringency index

Note: Duration of strict stringency is measured as the number of consecutive days above which stringency countermeasures is higher than a threshold level.

Table A1: Tension at home by duration of stringency			
	[1]	[2]	[3]
Stringency duration	0.019*** (0.004)	0.060*** (0.013)	0.044** (0.018)
Stringency duration sq.		-0.009*** (0.003)	-0.007* (0.004)
Stringency index			0.026 (0.025)
Individual controls	yes	yes	yes
Household controls	yes	yes	yes
Country FE	yes	yes	yes
Survey round FE	yes	yes	yes
Constant	0.755*** (0.048)	0.754*** (0.046)	0.712*** (0.055)
Observations	23,782	23,782	23,782
R2	0.291	0.292	0.292
Adjusted R2	0.290	0.290	0.291

Notes: .01 - ***, .05 - **, .1 - *; Stringency index is a standardized z-score of a 14-day average indicator. Stringency duration is measured in terms of the number of consecutive days stringency index remained above a threshold (50). Reported coefficients are from LPM regression models for the binary outcome variable feeling tensions at home. Individual, household, country and survey round fixed effects are included but not reported for brevity.