Women's Well-being During a Pandemic and its Containment*

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May 27, 2021

Abstract

The Covid-19 pandemic brought the dual crises of disease burden and the impact of containment policies designed to mitigate it, both of which generate meaningful economic adversities. Yet, there is little evidence on the potential costs of these policies in a low-income country where online substitutes to in-person transactions and social safety-nets are scarce. Given adverse gender norms, women may be especially vulnerable in such settings. We conduct a large phone survey and combine it with India's unusually geographically variant containment policies, allowing us to estimate the relationship of the pandemic and containment policies with economic outcomes, food security, and female mental health in a lower-income country of 1.4 billion people. The pandemic resulted in drastic income losses and increases in food insecurity. Greater prevalence of containment policies is associated with increased food insecurity, particularly for women, and reduced female mental health and sense of safety. Mental health and food impacts were exacerbated for women who had daughters or lived in female-headed households, who may be more vulnerable. We provide new evidence on the effects of lockdown policies in a country with limited social safety nets and present some of the first estimates of the Covid-19 pandemic's effect on mental health outside of high-income countries.

*We thank Mushfiq Mobarak and conference participants at GLM|LIC for helpful feedback, and the GLM|LIC IZA Special Covid call for funding this research. William Stukas provided exceptional research assistance.

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1 Introduction

Pandemics represent a twin health and economic shock with devastating effects, particularly in low-income countries, where substitutes for in-person transactions are scarce and social safety nets are limited. Women may be especially vulnerable in these settings given less progressive gender norms, low availability of mental health services, and weaker state capacity. We conduct a large phone survey across five states in northern India, to examine how women fared during the pandemic. Combined with India's highly geographically variant containment policies, we are able to estimate the relationship between the pandemic and containment policies with key measures of women's well-being, including female mental health, in a country of 1.4 billion people.

We conduct a phone re-survey in August 2020, near the height of the first COVID wave in India, on a sample of households that was already interviewed in Fall 2019. This was a period when India had between 50,000 and 70,000 new Covid-19 cases per day.[1] We establish that the pandemic is associated to drastic income losses and increases in food insecurity, as well as declines in female mental health and well-being. These mental health effects point to the fact that many important costs of the pandemic may be difficult to observe in standard data sources. We note that these declines in well-being may be due to the aggregate stress and economic effects of the pandemic and/or the effect of containment policies. We next isolate the relationship between containment exposure, which is uniquely heterogeneous in our setting, and socioeconomic and health outcomes.

While India initially pursued a nation-wide lockdown in response to the pandemic, from June 2020 onward, it had a patchwork of containment zones in which lockdown measures were imposed. These zones were determined by district or town authorities, and their size could be as small as one apartment building or a 1 km radius (Express News Service, 2020). This mosaic of policies within relatively small geographic areas provides us with the opportunity to assess the relationship between lockdown policies and mental health, as well as other measures of well-being.

We show that the negative effects of the pandemic are exacerbated in areas with more containment, and respondents in these areas report more food insecurity. Two pieces of evidence suggest that the associations we report may be capturing the causal effects of containment policies, despite the fact that of course containment policies are not randomly assigned to geographic units. First, living in an area with a higher prevalence of lockdown policies is not systematically associated with pre-treatment socioeconomic measures, either for outcomes collected from our own sample prior to the pandemic or for district-level measures of food intake in the 2015-16 National Family Health Survey. Second, the inclusion of district-level cumulative measures of case and death rates, allowing us to compare two areas with the same Covid-19 incidence but different containment policies, has no effect on our estimates.

Last, we examine how the relationship between aggregate Covid-19 shock and out out-

[1] These numbers are from the COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University.

come measures varies with the pre-existing vulnerability of women. We find that the negative relationship between the pandemic and mental health and and between the pandemic and food security are significantly exacerbated for women who have daughters, and for women in female-headed households. This result is consistent with the existence of strong son preference in Indian culture, where daughters may lower a woman's status within the household (Jayachandran, 2015).

Our study contributes to the literature in two ways. First, we provide new evidence on the repercussions of lockdown policies in countries with limited social safety nets by leveraging the fine-grained geographical variation in containment, even conditional on pandemic severity. Second, while contemporaneous work examines the consequences of the pandemic on mental health, much of this work is concentrated in high-income countries (Davis, Grooms, Ortega, Rubalcaba, and Vargas, 2020; Witteveen and Velthorst, 2020; Adams-Prassl, Boneva, Golin, and Rauh, 2020; Huebener, Waights, Spiess, and Wagner, 2020; Etheridge and Spantig, 2020), or the middle-income setting of Turkey (Altindag, Erten, and Keskin, 2020).[2] In contrast, we focus on a lower-middle income country of more than a billion people, where a limited social safety net and gender norms may make women especially vulnerable. Furthermore, by collecting survey data in which the phone was passed to women, we are able to measure female mental health using measures validated in the psychology literature, a typically challenging outcome to observe in such contexts.

We emphasize that the adverse repercussions of the containment measures are positive, rather than normative results, as we can study contemporaneous outcomes while containment policies are in place, but not the long-run health or economic impacts of improved mitigation. Nonetheless, the large negative associations suggest that without expanded social insurance, lockdown policies could severely affect the well-being of individuals in low-income countries. Indeed, eight months after our survey, the cases in India skyrocketed six to eight times higher than when we conducted the survey, resulting in more containment policies. Our results suggest that any time such policies are instituted, they should be complemented with targeted aid, with particular attention to the well-being of women.

Finally, we note that these results are not merely relevant for the current pandemic. Global pandemics are expected to increase in frequency due to urbanization, globalization, loss of biodiversity, and climate change (Dodds, 2019). Thus, understanding the consequences of different containment policies is crucial to crafting future approaches to disease control in lower-income countries.[3]

2 Data

Phone Survey. We conducted a phone survey in 20 districts located across 5 states (Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, and Maharashtra) in Northern

[2]Turkey's PPP adjusted GDP per capita is four times greater than India's.

[3]Lower-middle income countries like India, alone, account for roughly 3 billion people or roughly 40 percent of the global population.

India in partnership with IDInsights, a global advisory, data analytics, and research organization. In September–October 2019, IDInsights had surveyed a representative random sample of households with lactating mothers in-person. At the time, they had collected data on the households' assets – allowing us to assess socioeconomic status prior to the pandemic – as well as the households' phone numbers. We called 4,799 of these households and were able to successfully survey 1,354 (28%). In the vast majority of cases, we did not re-survey a household as we were unable to reach that household with the listed phone number.[4]

To evaluate whether households that respond to our phone survey look different from those that do not, we regress an indicator for a household being reached on an index of the household's baseline assets.[5] Households that are available to be re-surveyed are slightly wealthier than those who are unavailable, but the effect is small, with a 1 standard deviation (sd) increase in the wealth index increasing the likelihood of being reached by less than 1 percentage point.

Households took part in a 20 to 30 minute survey with two parts, a household-head module and a female respondent module. The number of questions in both modules was limited since households resist taking part in surveys with a duration greater than 20 minutes over the phone.[6] In the household-head module, we surveyed the household head (who was male in 78% of cases) about the household's socioeconomic conditions, the male and female heads' nutrition, and the number of days the respondent wished for more food for themselves or their children. The nutrition questions were taken from the National Family and Health Survey (NFHS) round 4, allowing us to use the pre-pandemic responses to the survey from the same district to benchmark nutritional outcomes. After the head module, if the head was male, we asked him to pass the phone to a female household member (typically the female head). The female responded to an additional survey asking about her mental health and status within the household as well as if this had changed since the pandemic. In cases where the respondent to the head module was female, the same respondent answered the female survey. Altogether, this allowed the female module to be conducted with 573 women.

To ascertain information on women's mental health, we asked a selection of questions from the PHQ9 depression diagnostic scale (**?**) and the GAD7 anxiety scale (**?**).[7] From the PHQ9, we ask *Over the last two weeks, how often have you been bothered by:* (1) *Feeling sad, down, depressed, or hopeless?* and (2) *Feeling tired or like you are carrying a heavy burden or like you have little strength in your body?*. From the GAD7, we ask, *Over the last 2 weeks, on how many days have you been bothered by not being able to stop or control worrying.* We further supplement these mental health questions by asking women about their perceptions of their

[4]Twenty-eight percent is a relatively high response rate for a phone survey. For instance, Gallup response rates are approximately 7% (Marken, 2018).

[5]We follow Filmer and Pritchett (2001) and create an index by conducting a principle components analysis over indicators for the assets owned prior to the pandemic – car, jeep, bicycle, motorcycle, scooter, refrigerator, radio, television, electric fan, dressing table, stove, pressure cooker, mobile phone – and predicting the first principal component.

[6]Providing incentives for survey participation in India is challenging because mobile money is not widespread and most households have monthly, unlimited cell phone bundles, reducing the value of offering households extra data or cell phone minutes.

[7]The phone survey's short time frame prevented us from asking the two complete scales.

safety during the pandemic and we ask, *Over the last two weeks, how often have you been bothered by: Feeling worried about your physical safety?*.

While all the survey questions allow us to make cross-sectional comparisons of our samples' outcomes, for a subset of questions, we also directly elicit how respondents' outcomes changed due to the pandemic. For example, for each of the mental health questions above (as well as the safety question), we ask respondents a follow-up question about whether their experiences have improved, worsened, or stayed the same since the pandemic. By measuring these outcomes in changes, we are able to both assess the aggregate effects of the pandemic and measure the relationship between containment policy and the outcome variables, accounting for pre-pandemic differences across individuals. Table A1 reports summary statistics for our outcomes of interest.

Additional Data on Case Rates/Deaths. We supplement our phone survey data with additional district-level data on Covid-19 hospitalizations and death between the start of the pandemic and the time of the survey. This data is assembled by the Development Data Lab.[8]

3 The Aggregate Shock

We use questions that directly elicited how respondents' outcomes had changed from the pre- to post-pandemic period to measure the aggregate effects of the pandemic. The left sub-figure in Figure 1 reports the distribution of the head's self-reported income before and after the pandemic, which shows a dramatic drop in income. On average, the head's monthly income fell from 8,625 Rupees (120 USD) in a normal month to 3,584 Rupees (50 USD) in the current (during Covid) month, a decline of about 50%. The right sub-figure shows that 76% of the households reported reduced income for the respondent, and 24% reported reduced meals for someone in the household.

Next, we use the female well-being questions to show the percentage of households where the female respondent reported that their feelings of depression, exhaustion, anxiety and safety have worsened over the course of the pandemic. For each measure, roughly 30% of respondents indicate that their feelings have worsened. For all four measures, female respondents report that their feelings have worsened roughly twice as much as they report that they have improved, suggesting that worsening does not simply reflect idiosyncratic changes or mean reversion.

4 Association with Containment Policies

Having established that the pandemic had large negative consequences for both households' economic outcomes and female well-being in India, we now turn to understanding the relationship between containment policies and our outcomes. In the first part of this section, we document variation in our containment measure and show that it is not correlated with pre-pandemic characteristics that could impact the outcomes we measure. In the latter half of this section,

[8]This data can be accessed at http://www.devdatalab.org/covid.

Figure 1: Impact of Aggregate Shock



The left sub-figure reports the distribution of the inverse hyperbolic sine of the household head's self-reported income in the current month and a normal month. The right sub-figure reports the percentage of households reporting reduced income (difference of the income measures described above), reduced meals and worsening measures of female well-being.

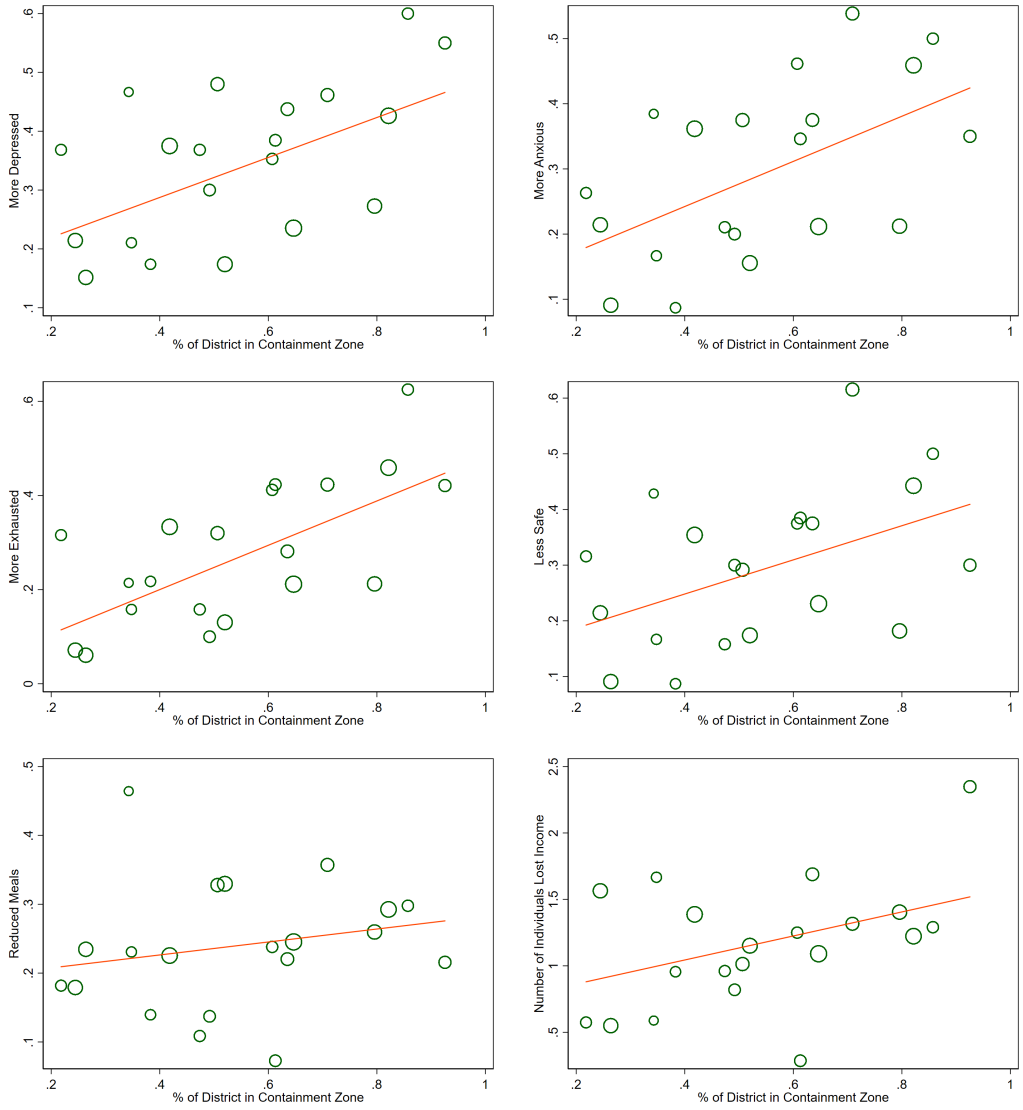
we report estimates of the relationship between containment and contemporaneous economic, nutritional and female well-being measures and show that the point estimates are not sensitive to the inclusion of district-level controls for case rates and deaths.

Containment Measure. Since the end of the federal lockdown in May 2020, there are no centralized databases (even at the state-level) containing complete information on India's patchwork of lockdown policies. To assemble this information, we asked households in the survey if they were currently experiencing containment restrictions and calculated the share of respondents in a district experiencing containment policies. Figure A1 reports the distribution of this measure and shows that the prevalence of containment policies widely varies across districts. Consistent with the fact that containment areas can be extremely localized (i.e. as small as an apartment building or street (Express News Service, 2020)), the district-level distribution shows substantial variation within districts in the proportion of respondents that report being affected by containment restrictions.

In Figure 2, we report scatter plots of negative changes in various measures in household economic status and female well-being against the proportion of the respondents in the district that report being in a containment zone. Higher containment is associated with a worsening of all four female well-being outcomes, and an increase in the fraction of households with reduced meals. Households in a higher containment area also report larger numbers of individuals who have lost income in their households.

To rule out that pre-existing characteristics of districts with high containment are driving these effects, we evaluate whether district-level containment measures are correlated with prior district charactaristics. Each row of Table A2 regresses a different pre-pandemic covariate on the district-level containment measure and reports the coefficient and standard error (columns

Figure 2: Female Well-being and Socioeconomic Outcomes Variation by Containment



District-level relationships between women's well-being and fraction of district in a containment zone. Each point represents a district, with bubble sizes weighted by sample size.

3 and 4). The top half of Table A2 reports the relationship between the containment measure and self-reported normal income (row 1), an asset index constructed from the pre-pandemic baseline survey (row 2), and indicator variables for whether the household male and female heads have completed secondary school. The bottom half uses measures of the frequency with which individuals in a given district report eating different food types in the NFHS. These answers have been recoded so that a higher value indicates a higher likelihood of consumption and normalized so that the coefficients can be interpreted in terms of standard deviations.[9] Across 20 measures, the containment measure is only marginally significantly related to one female consumption measures (vegetable consumption), and the positive coefficient suggests that, if anything, areas with higher containment had better nutritional outcomes prior to the

[9]The values were normalized with the full NFHS, which is why the means and SD in the table are not exactly 0 and 1.

pandemic. Altogether, we conclude that a higher prevalence of containment policies in the future is not strongly related to district characteristics, and there is certainly no evidence that districts with more containment are substantially poorer or more disadvantaged.

Research Design. To examine the relationship between containment and different outcomes, we estimate the following regression specification:

$$y_{iasd} = \beta\, containment_d + \alpha_a + \delta_s + \mathbf{\Gamma X_i} + \epsilon_{iasd},$$

where i denotes an individual, a denotes the respondent's age, s denotes the respondent's state of residency, and d denotes a district, y_{iasd} is our outcome variable, and $containment_d$ is the district-level measure of containment (the share of respondents in a district experiencing containment policies). All specifications include age fixed effects α_a and state fixed effects δ_s. The vector of controls $\mathbf{X_i}$ always includes indicator variables for whether the district was in a red or orange zone in India's previous centralized lockdown during April and May 2020.[10] We include two additional specifications to assist in ruling out either simultaneous causality between containment and the negative outcomes we observe or omitted variable bias from pre-pandemic socioeconomic measures. First, we control for the cumulative per capita Covid-19 death and case rate between the start of the pandemic and the time of the survey to control for the direct effects of the health crisis. Second, we use double-lasso (Urminsky, Hansen, and Chernozhukov, 2016) to select additional controls from the pre-pandemic socioeconomic measures from our survey (variables in the top half of Appendix Table A2).

Female Well-being: Table 1 reports the relationship between containment and our primary set of outcomes, measures of well-being from the female survey. Containment is associated with a substantial and statistically significant decrease in both the depression indicators: moving from 0 to 100% containment is related to a 23-26 percentage points (pp) increase in the likelihood that feelings of depression have worsened and a 37-42pp increase in the likelihood that feelings of tiredness have increased.Containment is also associated with a significant increase in the anxiety measure where moving from 0 to 100% containment is related to a 24-31pp increase in the likelihood that respondents feel more worried.[11] Finally, containment is also related to decreased feelings of safety, but these results are not statistically significant. For all the results in this table, the point estimates in the odd columns (without lasso or case and death rate controls) and even columns (additional controls) are almost identical. Controlling for the direct health effects of the pandemic has no effect on the estimated relationship between containment and female well-being.

[10] India's central government classified all districts into green, orange and red zones, where red zones had the strictest mobility restrictions and green the most lenient. In June 2020, the centralized district-level restrictions were dismantled, and each state could demarcate their own containment regions.

[11] Since the mean of the containment variable is equal to 0.554, moving from no containment to average levels of containment is associated with a 13-14pp increase in the likelihood that feelings of depression have worsened, a 20-23pp increase in the likelihood that feelings of tiredness have increased and a 13-17pp increase in the likelihood that respondents feel more worried.

Table 1: Effect of Containment on Female Well-being

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	More Depressed		More Exhausted		More Anxious		Less Safe	
Containment	0.264*	0.228***	0.415**	0.366***	0.306*	0.239***	0.220	0.138
	(0.127)	(0.0729)	(0.163)	(0.113)	(0.152)	(0.0733)	(0.145)	(0.130)
Past Containment Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lasso Controls	No	Yes	No	Yes	No	Yes	No	Yes
Case and Death Controls	No	Yes	No	Yes	No	Yes	No	Yes
Dep Var. Mean	0.334	0.337	0.277	0.274	0.299	0.300	0.297	0.297
Observations	560	504	560	503	552	496	558	501

This table reports the effect of district-level containment on female well-being. Standard errors are clustered at the district level. *,**, and *** denote 10, 5, and 1% significance respectively.

Socioeconomic and Nutritional Outcomes: Table 2 reports the relationship between containment and socioeconomic and nutritional measures from the phone survey. Columns 1 and 2 examine the number of household members who experienced reductions in income. The point estimate indicates that moving from a district with 0% to 100% containment is related to an increase in the number of household members who have lost income by 1 member. In columns 3 and 4, the outcome is an indicator for whether the household had to reduce meals; the point estimates indicate that moving from none to full containment is related to a 12pp increase in the likelihood of reducing meals.[12]

The final four columns examine the relationship between containment and food intake for men and women, compared to the median by gender and district in the NFHS. Thus, the regressions "control" for cross-district variation, since a positive coefficient for these estimates indicates that an individual is doing worse than their pre-pandemic *district-specific* average. Moving from a district with 0% to 100% containment is related to an increase in the likelihood that a woman's aggregate consumption is below her district's pre-pandemic median by 20-23pp.[13] For males, the coefficient is positive but not statistically significant and one-fifth as large. As before, across all outcomes, controlling for the direct health effects of the pandemic leaves the estimated associations with containment unchanged.

The results in these last four columns underline the relationship between food insecurity and containment and suggest that food insecurity may disproportionately impact women. Further, they provide one potential mechanism for the negative mental health effects in Table 1. When there are negative economic shocks to households, women are particularly vulnerable to declines in consumption. Hathi, Coffey, Thorat, and Khalid (2021) provides evidence in favor of such a connection: women who eat after men in their households also have worse mental

[12]Hence, moving from no containment to average levels of containment is associated with 0.6 additional household members who have lost income and a 6.7pp increase in the likelihood of reducing meals.

[13]These estimates imply that moving from no containment to average levels of containment is associated with a 11-13pp increase in the likelihood that a woman's aggregate consumption is below her district's pre-pandemic median.

health in the India Human Development Survey.

Table 2: Effect of Containment Measures on Socioeconomic and Nutritional Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Below Median Consumption for:			
	Num. Lost Income		Reduced Meals		Male		Female	
Containment	0.942**	1.071***	0.118**	0.121**	0.0409	0.0450	0.201*	0.230***
	(0.409)	(0.337)	(0.0541)	(0.0568)	(0.0981)	(0.0975)	(0.0970)	(0.0854)
Past Containment Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lasso Controls	No	Yes	No	Yes	No	Yes	No	Yes
Case and Death Controls	No	Yes	No	Yes	No	Yes	No	Yes
Dep Var. Mean	1.166	1.180	0.239	0.248	0.335	0.338	0.390	0.391
Observations	1280	1169	1212	1105	1210	1118	1175	1109

This table reports the effect of district-level containment on socioeconomic and nutritional outcomes. In columns 1 and 2, the outcome is the number of household members who lost income. In columns 3 and 4, it is an indicator variable for whether the household reduced meals for at least some members. In columns 5-8, it is an indicator for having nutritional intake below the district-level median in the pre-pandemic NFHS. Standard errors are clustered at the district level. *,**, and *** denote 10, 5, and 1% significance respectively.

5 Family Structure & Vulnerable Women

The results from Tables 1 and 2 speak to the vulnerability of women – a particularly hard to reach population in phone surveys in countries like India – during the pandemic. In this section,we examine the relationship between the pandemic and the outcomes of women who are in more vulnerable position in the household. We focus on women with daughters, because son preference is common in India (Jayachandran, 2015) and having a daughter (rather than a son) may lower a woman's status. Indeed, Milazzo (2018) finds that having a daughter rather than a son increases a woman's likelihood anemia and of being a victim of severe intimate partner violence. We also examine whether there appear to be differential negative changes for female-headed households, although we caution that these households are likely to be initially of lower socioeconomic status.

Empirical Strategy. To examine the relationship between family structure and female well-being, we estimate the following regression:

$$y_{iasd} = \beta_1\, has_son_i + \beta_2\, has_daughter_i + \beta_3\, female_headed_i + \alpha_a + \delta_s + \mathbf{\Gamma X_i} + \epsilon_{iasd},$$

where i denotes an individual, a denotes the respondent's age, s denotes the respondent's state of residency, and d denotes a district, y_{iasd} is our outcome variable, and has_son_i and $has_daughter_i$ are indicator variables denoting whether the respondent has a son or daughter. $female_headed_i$ denotes whether the respondent lives in a household where the head is female. The fixed effects and other controls are the same as in the previous specifications.

Results: Table 3 reports results for the female well-being measures regressed on family structure. Having a daughter is associated with a substantial and statistically significant decrease in mental health: If the woman has a daughter, she is 10pp more likely to have worsening feelings of depression and tiredness. Having a daughter is also associated with a statistically significant effect on the anxiety and safety measures, leading to a 6pp increase in the likelihood that respondents are more anxious and a 9pp increase in the likelihood that they feel less safe. The latter finding may capture an increased threat of intimate partner violence. These negative effects appear to be specific to women with daughters rather than women with children. The effects associated with having a son are small, statistically insignificant and not systematically positive. While we lack the precision to reject that the coefficients on having a son and daughter are the same in all cases, we also reject that they are the same for safety at the 5 percent level.

The effects on well-being are also exacerbated when the head of the household is female, although we caution that female-headed household's socioeconomic status could also be systematically different from male-headed households.[14] When the respondent lives in a female headed household, she is 10-12pp more likely to have worsening feelings of depression and 10pp more likely to have worsening feelings of exhaustion. Living in a female-headed household is also associated with a significant effect in the anxiety and safety measures, leading to a 6pp increase in the likelihood that respondents are feeling more worried and a 12pp increase in the likelihood that respondents feel less safe.

Table 3: Effect of Household Structure on Female Well-being

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	More Depressed		More Exhausted		More Anxious		Less Safe	
Has Son	0.0612	0.0446	0.0244	0.0114	-0.000123	0.00910	-0.00846	-0.00416
	(0.0449)	(0.0530)	(0.0374)	(0.0411)	(0.0464)	(0.0573)	(0.0439)	(0.0472)
Has Daughter	0.106***	0.101**	0.111***	0.106***	0.0687**	0.0617*	0.0876**	0.0875**
	(0.0363)	(0.0394)	(0.0314)	(0.0330)	(0.0287)	(0.0338)	(0.0322)	(0.0402)
Female Headed Houshold	0.0970***	0.120***	0.0995**	0.0996***	0.0686*	0.0641*	0.118***	0.128***
	(0.0330)	(0.0305)	(0.0348)	(0.0332)	(0.0365)	(0.0379)	(0.0393)	(0.0443)
Past Containment Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lasso Controls	No	Yes	No	Yes	No	Yes	No	Yes
Case and Death Controls	No	Yes	No	Yes	No	Yes	No	Yes
Dep Var. Mean	0.333	0.337	0.279	0.276	0.301	0.302	0.302	0.301
Observations	549	498	549	497	541	490	547	495
P Value of Difference	0.310	0.278	0.0875	0.0427	0.125	0.298	0.0105	0.0170

This table reports the effect of household structure on female well-being. The p-value from testing the equality of the coefficients "has son" and "has daughter" is reported in the last row. Standard errors are clustered at the district level. *,**, and *** denote 10, 5, and 1% significance respectively.

[14] Around 20 percent of the households in the data have a female-headed household. Among these households, 84 percent of the female heads are currently married, and 13 percent are widowed. Anderson and Ray (2019) document that widows are particularly vulnerable in India.

6 Discussion and Implications for Policy

In this paper, we find that the onset of the COVID pandemic was associated with adverse outcomes for women's mental health, household food security, and incomes in India. In addition to the aggregate shock, there is evidence that increased containment, or lockdown, measures were associated with worse outcomes, demonstrating that movement restrictions are materially important. In areas with greater exposure to containment policies, women experienced greater declines in mental health and well-being, as well as increased food insecurity.

Moreover, we show that women who are in a more vulnerable position in the household are more likely to experience declines in mental health and increased concern for their safety. While potentially crucial for public health purposes, containment policies are associated with large negative consequences for both standard socioeconomic outcomes and outcomes that are often harder to observe and measure, like mental health. This may be especially the case in low-income contexts with limited social insurance. Moreover, more vulnerable populations – such as women in India – may be particularly harmed by both the direct effects of the pandemic and these policies.These results further suggest that some of the important negative consequences of lockdown policies may be hidden in more standard socioeconomic datasets that do not collect information on mental health.

These results have strong implications for economic policy, as policymakers should target aid, particularly access to food, to vulnerable households and women. As vaccine disparities in lower-income countries persist, and other pandemics are likely, understanding the consequences of the pandemic and containment policies is of crucial relevance to policymakers.

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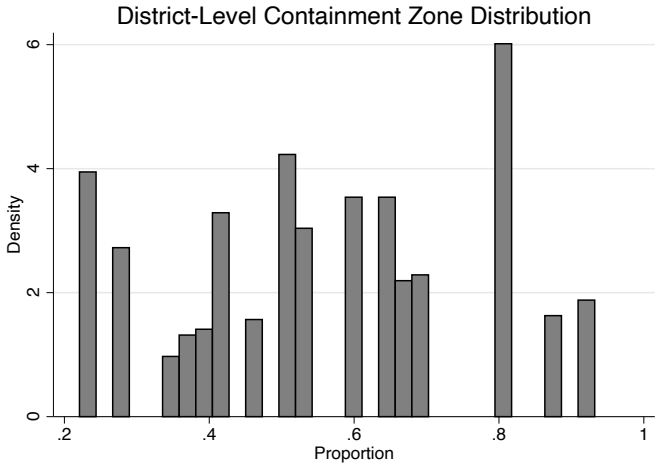
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Appendix

Figure A1: Distribution of Containment Measure



This table reports the distribution of the district-level average of households' responses to a question regarding level they were currently affected by containment policies.

Table A1: Summary Statistics

	Mean	SD	25 Pct	50 Pct	75 Pct	Obs
Socioeconomic Status						
Num. Lost Income	1.196	1.465	0	1	2	1430
Household Reduced Meals	0.242	0.428	0	0	0	1266
Days wished for more food...						
For self	0.838	1.775	0	0	1	1370
For children	1.113	2.093	0	0	2	1300
Reduced consumption for male	0.338	0.286	0	0.25	0.5	1239
Reduced consumption for female	0.393	0.303	0.25	0.25	0.5	1232
Mental Health						
Female Depression Worse	0.336	0.473	0	0	1	566
Female Anxiety Worse	0.296	0.457	0	0	1	558
Female Exhaustion Worse	0.277	0.448	0	0	1	566
Female Safety Worse	0.296	0.457	0	0	1	564

Table A2: District-Level Balance Table

	Mean	SD	Containment Coef.	Se	N
Pre-Treatment Outcomes in Survey Sample					
IHS(Pre-pandemic Income)	8.910	2.346	0.190	0.535	1389
Asset Index	0.000	1.779	-1.214	0.841	1538
Male Head Completed Secondary	0.589	0.492	-0.069	0.118	1468
Female Head Completed Secondary	0.450	0.498	-0.022	0.139	1461
NFHS 4 Female Consumption (Normalized)					
Milk	-0.166	0.970	-0.029	0.320	22012
Pulses	0.159	1.009	0.478	0.477	22012
Veg	0.016	1.010	0.855*	0.461	22012
Fruits	-0.348	0.845	-0.137	0.189	22012
Eggs	-0.212	0.949	-0.158	0.425	22012
Fish	-0.148	0.897	-0.010	0.483	22012
Meat	-0.156	0.953	-0.190	0.406	22012
NFHS 4 Male Consumption (Normalized)					
Milk	-0.214	0.995	0.129	0.295	2992
Pulses	0.086	0.988	0.379	0.513	2992
Veg	-0.194	1.028	0.435	0.414	2992
Fruits	-0.322	0.882	-0.060	0.238	2992
Eggs	-0.222	0.996	0.037	0.431	2992
Fish	-0.126	0.935	0.078	0.511	2992
Meat	-0.213	0.981	-0.101	0.463	2992