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Maternal Mental Health Responses to COVID-19 Shocks and Uncertainty in Rural Pakistan †

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The COVID-19 pandemic was a health and economic shock with devastating effects, especially for low- and middle-income countries (LMICs), where a larger fraction of the population lives in precarious health and economic conditions. In addition to the increase in morbidity and mortality stemming from the disease, COVID-19 lockdowns prompted extensive earnings losses and economic uncertainty about the future. Together, illness, death, job loss and increasing economic uncertainty likely contributed to the widespread deterioration in mental health observed during the pandemic (Adams-Prassl et al. 2020; Biroli et al. 2021; Giuntella et al. 2021; Witteveen and Velthorst 2020; Bau et al. 2022; Baranov et al. 2022).

Most of the current literature investigating the impacts of COVID-19 has focused on the impacts of experienced negative shocks. Yet, the *anticipation* of future shocks, has been shown to predict poor mental health outcomes in adults (Baranov, Bennett, and Kohler 2015), and the psychiatry literature suggests a strong link between economic uncertainty and mental health by increasing anxiety and depression symptoms, rates of PTSD, and reports of general distress (Di Quirico, 2023; Massazza et al., 2022).

In this paper, we document how different dimensions of the COVID-19 pandemic impinged on women's mental health in rural Pakistan. We consider four COVID-related stressors capturing both direct effects of *experienced* health and economic shocks as well as effects through the *anticipation* of future risks. Specifically, we investigate the association between a battery of mental health measures and (i) experienced morbidity and mortality due to COVID-19, (ii) worry about the disease risk, (iii) experienced economic shocks, and (iv) economic uncertainty about

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the future induced by the pandemic. We find that an environment of heightened economic uncertainty might impact mental health, above and beyond the effects of realized shocks.

I. Data

We use data from the Bachpan Study, a birth cohort in rural Pakistan with a nested randomized evaluation of the Thinking Healthy Program, Peer-delivered Plus (THPP+), a psychosocial intervention addressing perinatal depression (Maselko et al. 2020; Sikander et al. 2019). Pregnant women in the 3rd trimester of pregnancy residing in the study areas were screened for depression, and those screening positive were randomly assigned based on village cluster to control (n=287) or THPP+ (n=283). Additionally, the Bachpan cohort enrolled a subsample of those who did not screen positive for depression (n=584). Baseline data collection took place between October 2014 and February 2016, with approximately annual follow-ups. The primary data used for the present study is from the 6-year wave of data collection, between January 2021 to August 2022, which coincided with three of the deadliest pandemic waves in Pakistan. We also use data from baseline and the 7-year wave conducted between December 2021 and June 2023.

A. Maternal Mental Health

The data include a uniquely rich set of measures of maternal mental health which (variously) include across all waves of data collection: the Patient Health Questionnaire (PHQ-9), the Generalized Anxiety Disorder 7-item scale (GAD-7), the World Health Organisation Disability Assessment Schedule (WHODAS), the Perceived Stress Scale (PSS), the Stress Overload Scale (SOS), the UCLA Loneliness Scale (LS), and the Structured Clinical Interview for DSM-IV (SCID) disorders. For the regression analyses to follow, we construct a latent measure of mental health combining these measures with a principal component analysis, with a higher value indicating better mental health.

B. COVID-19 Uncertainty and Shocks

In the 6-year wave, we collected information on women’s reporting of COVID-related uncertainty and experienced shocks. Specifically, we asked mothers (i) whether they knew people who got sick or died from COVID-19 (friends, family, themselves, or others), (ii) how worried they felt about their family getting sick from COVID-19; (iii) whether they felt uncertainty about their family’s economic status over the following year, and (iv) whether they had experienced

different types of economic shocks due to COVID-19. These shocks included: a decrease in income, having to cut back on work hours, someone in the family changing their income generating activity, temporarily stopping work, and permanent job loss. We aggregated these shocks to create a COVID-19 economic impact score with higher values indicating worse economic impacts.

For the regression analyses, the four stressors were normalized to have a mean of zero and a standard deviation of one to ease interpretation and improve comparability of coefficients. During the 7-year follow-up, we additionally asked women the following questions: a) *Have you or someone in your family had any financial problems (e.g., debt), and b) On a scale of 1 to 10, how would you rate your level of SES relative to your community?* We use these data to explore whether a woman’s report of her perceived economic uncertainty predicts negative economic shocks in the future.

II. Results

A. Uncertainty and Mental Health

Figure 1 illustrates a striking positive relationship between heightened worry and economic uncertainty (on the x-axis) and every single measure of mothers’ mental health (on the y-axis), including symptoms of anxiety,

depression, disability, stress, loneliness and the prevalence of clinically diagnosed depression.

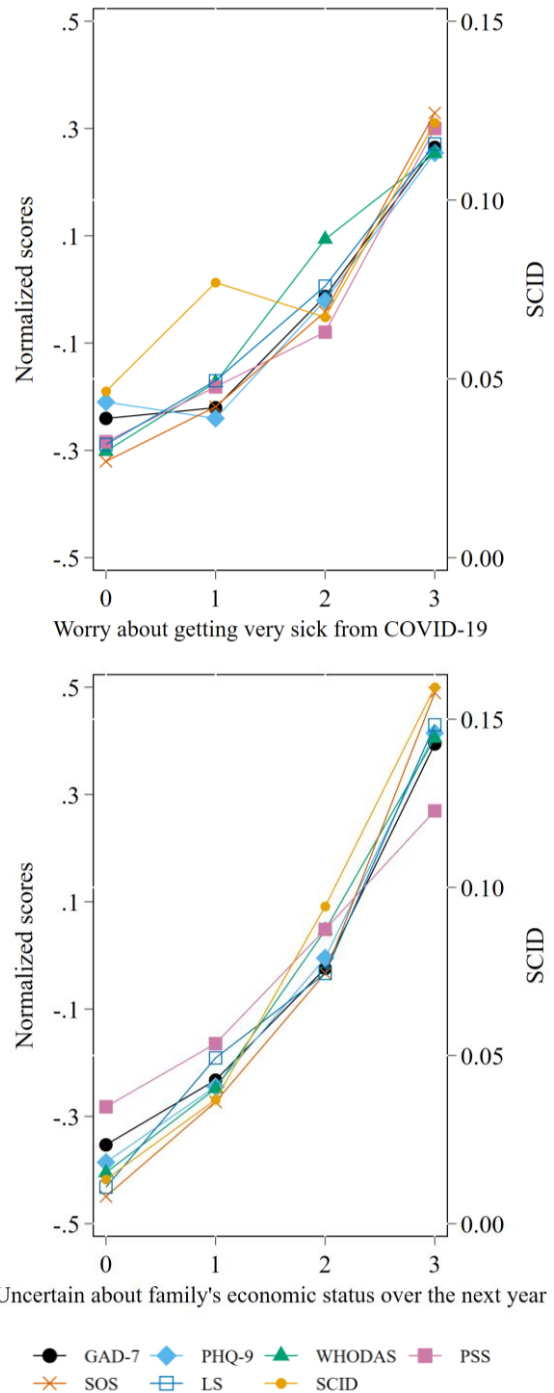


FIGURE 1. MATERNAL MENTAL HEALTH AND COVID-19 UNCERTAINTY

Note: The figure shows the average normalized scores for anxiety (GAD-7), depression (PHQ-9), disability (WHODAS), stress (PSS and SOS), loneliness (LS) and clinically diagnosed depression (SCID) by intensity of worry about getting sick from COVID and uncertainty about the family’s economic future status.

To quantify the association between COVID-19 related shocks and maternal mental health we estimate the following model:

$$y_{ict} = \beta_0 + \beta_1 \mathbf{COVID}_{ict} + \boldsymbol{\delta}' \mathbf{X}_i + \gamma_t + \varepsilon_{ict},$$

where y_{ict} is the composite mental health score for woman i , in union council c and month t . \mathbf{COVID}_{ict} is a set of combinations of COVID-19 economic uncertainty or worry about getting sick from COVID and the actual experience of an economic or health shock.

In all regressions, we include a vector of demographic and mental health controls measured at baseline (detailed in the table notes). We also control for year-6 assessor fixed effects and month fixed effects (γ_t). Controlling for maternal mental health during the 3-year follow-up, which took place roughly in the year before the onset of COVID-19, does not significantly change our results. This mitigates the concern that women who were already suffering from mental health problems may report more fear and uncertainty after COVID struck. We cluster standard errors at the survey-cluster level.

The results in Panel A of Table 1 (column 1), confirm the intuition from Figure 1. Sub-panel I shows that a 1 s.d. increase in worry about getting sick due to COVID is associated with a 0.178 s.d. decrease in maternal mental health. Worrying about getting sick from COVID is

more than twice as predictive of poorer mental health as actually knowing someone who got sick or died from COVID-19 (-0.074 s.d.).

Sub-panel II reveals an even stronger association between economic uncertainty and mental health. A 1 s.d. increase in economic uncertainty is associated with a 0.249 s.d. decrease in mental health, compared to a 0.092 s.d. decrease for people who experienced more pronounced economic impacts.

In sub-panel III, we include all four COVID-19 related dimensions to test which has the largest correlation with maternal mental health. The results suggest that uncertainty about the family's economic position over the next year has the highest explanatory power, such that a 1 s.d. increase in economic uncertainty is associated with a 0.223 s.d. decrease in the mental health score, which is more than twice as large as the three remaining COVID stressors.

B. Heterogeneity Analysis

Next, in columns (2) - (4) and (5) - (7), we study whether these relationships differ by baseline depression ($\text{PHQ9} \geq 10$) and baseline socioeconomic status (bottom 50% of the asset score), respectively. Our results indicate that health and economic uncertainty lead to worse mental health outcomes among women who suffered from baseline depression compared to those who were non-depressed.

TABLE 1— COVID-19 UNCERTAINTY AND MATERNAL MENTAL HEALTH

Panel A. Worry and Uncertainty versus Realized Shocks							
	Mental Health Score	Heterogeneity by baseline depression status			Heterogeneity by baseline SES status		
		Depressed (N = 431)	Non-Dep. (N = 472)	p-val	Bott. 50% (N = 452)	Top 50% (N = 451)	p-val
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>I. Health</i>							
Worried about getting sick	-0.178*** (0.030)	-0.232*** (0.047)	-0.110*** (0.033)	0.039	-0.181*** (0.046)	-0.162*** (0.036)	0.750
Know someone who got sick/died	-0.074** (0.029)	-0.068 (0.044)	-0.056* (0.028)	0.833	-0.070** (0.033)	-0.055* (0.031)	0.718
<i>II. Economy</i>							
Uncertain about family's economic status	-0.249*** (0.039)	-0.341*** (0.047)	-0.150*** (0.040)	0.000	-0.275*** (0.055)	-0.212*** (0.045)	0.335
COVID-19 economic impact score	-0.092*** (0.032)	-0.098* (0.053)	-0.073** (0.032)	0.695	-0.088* (0.046)	-0.084** (0.038)	0.956
<i>III. Combined</i>							
Worried about getting sick	-0.079** (0.030)	-0.112** (0.054)	-0.044 (0.030)	0.298	-0.069 (0.046)	-0.084** (0.037)	0.803
Know someone who got sick/died	-0.063** (0.027)	-0.050 (0.041)	-0.054** (0.026)	0.937	-0.047 (0.031)	-0.056* (0.032)	0.822
Uncertain about family's economic status	-0.223*** (0.039)	-0.304*** (0.053)	-0.139*** (0.039)	0.009	-0.257*** (0.058)	-0.182*** (0.045)	0.301
COVID-19 economic impact score	-0.081** (0.031)	-0.087* (0.049)	-0.061* (0.032)	0.676	-0.076* (0.044)	-0.074* (0.037)	0.972
Observations	901		901			901	
Panel B. Current Uncertainty and Future Shocks							
	Financial Problems (Debt)		SES relative to the community				
	(1)		(2)				
Uncertain about family's economy	0.038** (0.015)		-0.154* (0.089)				
Outcome mean	0.49		5.34				
Observations	824		824				

Notes: OLS coefficients from a regression of a composite mental health score on COVID-19-related dimensions, controlling for baseline PHQ-9, WHODAS, PSS, the woman's height, waist circumference, joint household structure, number of adults in the house, number of people per room, asset score, the woman's education, her husband's education, experience of sexual IPV in the 12 months before the intervention, treatment arm, union council fixed effects, year-6 assessor fixed effects, and month fixed effects. Sub-panel A-I includes health-related shocks as controls; sub-panel A-II includes economic-related shocks as control; sub-panel A-III includes all four shocks together. Columns 2-4 (5-7) test for heterogeneous mental health responses by baseline depression (SES – asset wealth). P-value of a test of equality of coefficients between baseline depressed and non-depressed (bottom and top 50% SES) shown in column 4 (7). Coefficients in columns 2-3 (5-6) in each section of Panel A (I-III) belong to a single regression that employs the full sample, as in column 1. Specifically, each of the COVID shocks is interacted with a dummy equal to one for each category of the dimension of heterogeneity (e.g., Panel A I: $y_{ict} = \beta_0 + \beta_1(\text{COVID}_{ict} * \text{depressed}_{it}) + \beta_2(\text{COVID}_{ict} * \text{non depressed}_{it}) + \delta'X_i + \gamma_t + \varepsilon_{ict}$). Panel B controls for treatment arm, as well as outcomes and mental illness score in year 6.

The magnitude of the association between uncertainty and mental health was, in general, larger for the low SES group compared to high SES, albeit we cannot statistically reject equality of the two coefficients.

C. Uncertainty and Future Shocks

In Panel B, we study the relationship between economic uncertainty in year 6 (COVID wave) and the experience of two types of economic shocks in the following year, largely free of COVID restrictions:

having financial problems (specifically debt), and changes in socio-economic standing relative to other members in the community. These specifications control for mental health and the experience of the same shocks in year 6, and treatment arm.

We find that, even after controlling for mental health and economic outcomes in year 6, economic uncertainty in year 6 is a strong predictor of economic shocks in year 7. Specifically, a 1-unit increase in uncertainty is associated with a 3.8 percentage point increased likelihood of having financial problems such as debt, and a 0.154 unit decrease in a 0-10 score on self-reported SES standing relative to other members in the community.

These results indicate that economic uncertainty does not merely reflect subjective escalation of risk driven by current mental ill-health and experiences of economic shocks. Reports of uncertainty also contain important information about future economic prospects of the family.

IV. Discussion

In addition to experienced shocks, the extent of the decline in mental health attributed to the COVID pandemic may be explained, in part, through increased perceptions of economic uncertainty.

Potential mechanisms may include the direct effects of psychological stress, as well as the indirect effects of maladaptive coping behaviors which may hasten the realization of the anticipated shock. Further research is needed on the potential for mental health intervention to improve psychological resilience against future shocks and their anticipation among vulnerable populations.

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