

Gender norms explain the sex differences in the impact of droughts on child wasting: the case of Bangladesh

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Introduction and background

Climate change is often referred to as the defining crisis of our era, with projections indicating an increase in the frequency and severity of extreme weather events in the future. These developments can have profound implications for population dynamics. Extensive research shows that weather shocks significantly influence fertility, mortality, and migration patterns (Barreca 2018; Basu and Samet 2022; Abel, Mutarak, and Stephani 2021). Nonetheless, vulnerability to climate extremes varies widely across different segments of the population: climate change impacts vary depending on factors like socioeconomic status, geographic location, gender, age, and pre-existing health conditions (Mutarak, Lutz, and Jang 2016).

In this paper, we advance existing literature on climate vulnerabilities, which has often emphasized the role of individual-level mitigators, by exploring how meso-level dynamics can influence individual vulnerabilities to climatic shocks. Specifically, we investigate the extent to which gender differences in nutritional outcomes following extreme weather events are shaped by gender norms. Our research question stems from literature highlighting gender-based differences in parental investments vis-à-vis extreme circumstances such as droughts or loss of income in contexts characterized by son preference (Dimitrova and Mutarak, 2020; Flatø and Kotsadam 2014; Mutarak and Dimitrova, 2019). In these contexts, in times of hardship, the wellbeing and survival of male children would be prioritized over that of female children through a differential allocation of resources such as foods, vitamins, time, and healthcare (Barcellos, Carvalho and Lleras-Muney 2014; Rahman 2018), leading to relatively poorer health outcomes for female children.

We leverage Demographic and Health Survey (DHS) data and fine-grained climate data on the Standardized Precipitation Evapotranspiration Index (SPEI) to explore gendered effects of droughts on child undernutrition and the role of contextual gender dynamics in mitigating these effects. We focus on the case of Bangladesh which has recently been affected by droughts and has varying levels of son preference. Our analysis first investigates differences in nutritional status between male and female children following a drought, and then examines whether this gender gap in undernutrition is moderated by levels of son preference in the area. We look at nutritional status because it allows us to test the existence of gender-based investments in intrahousehold allocation in the aftermath of a shock. Drawing on existing literature, we hypothesize that (1) there is a negative association between drought exposure and children's nutritional status, (2) female children experience larger negative impacts of droughts on their nutritional status than male children, and (3) this gender gap is larger in higher-son preference areas.

Data and methods

Data

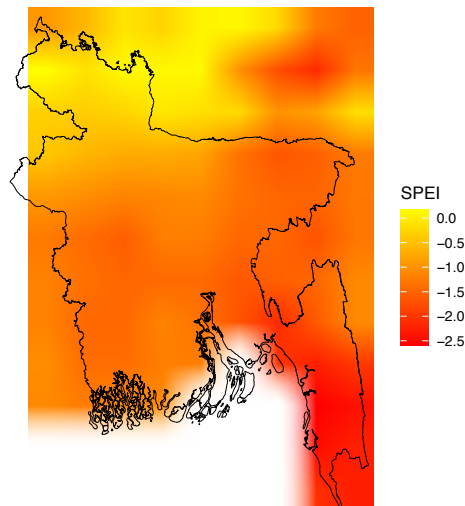
We combine georeferenced individual-level data from the 2022 BDHS and (2) weekly georeferenced data on droughts, measured via the SPEI, available at a 0.5° spatial resolution. Since we are interested in childhood undernutrition, our unit of analysis is children under 5 in the DHS. To capture short-term moisture conditions relevant to nutritional shocks, we use SPEI at 12-month (SPEI-12) time scale. This temporal alignment allows us to assess how drought conditions may translate into immediate nutritional impacts on children. Using information on the geographic

location and the date of interview, we infer the SPEI conditions each child was exposed to in the 12 months prior to the survey.

Methods

Our outcome variable is wasting, a key measure of acute malnutrition. Wasting is measured by looking at children’s weight-for-height z-score (WHZ): a child is classified as wasted if he or she has a WHZ that is more than 2 standard deviations below the median of the World Health Organization (WHO) Child Growth Standards. Our key predictors is exposure to drought as measured by the SPEI12. The SPEI measures how much the observed total surface water balance deviates from the long-term average for a given location and time period. SPEI values indicate the number of standard deviations from the long-term mean. The index can be calculated at different time scales (from 1 to 48 months), to account for the cumulative effect of the decline in precipitation or excessive evapotranspiration in the considered timeframe (WMO 2012). We use SPEI12 to assess the role of long-term drought conditions. We take the weighted average value of SPEI12 of all intersecting cells in the 10-km buffer around the DHS cluster before the interview date. We then classify a child as having experienced a severe or extreme drought if for the area where he or she resides was registered a SPEI level below -1.5 in the 12 months preceding the survey. Figure 1, which reports SPEI-12 levels in Bangladesh on October 8, 2022 (i.e., the median date of interview of the BDHS 2022), shows variation across space.

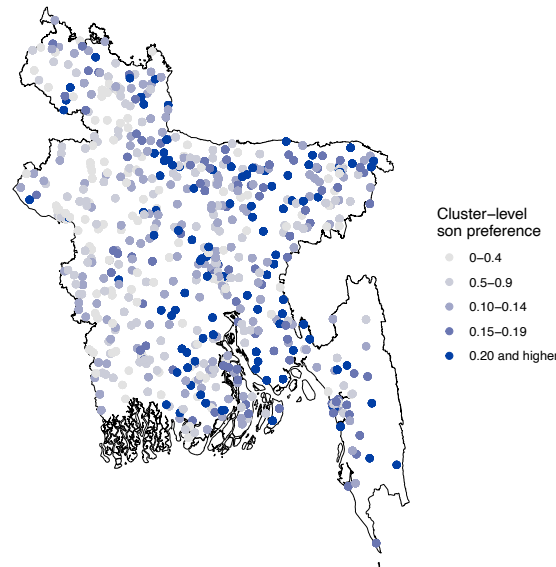
Figure 1 – SPEI-12 levels in Bangladesh, October 2022



Source: Own elaborations from Vicente-Serrano et al. (2023) dataset.

Our other key predictor is son preference. To measure it, we rely on questions about women’s fertility ideals. Specifically, women in reproductive age are asked questions about the ideal number of children by sex. We define son preference as the proportion of women in each DHS community who reported a higher ideal number of male children compared to female children. In Figure 2, we map son preference by clusters in Bangladesh, according to the reported fertility ideals in BDHS 2022.

Figure 2 – Son preference by cluster in Bangladesh



Source: Own elaborations from BDHS 2022 dataset.

We employ linear regression models with division-month-of-interview and division-age-fixed-effects to account for seasonal and age-related patterns in malnutrition across divisions. We additionally control for child and maternal characteristics.

In Model 1, we assess how exposure to severe or extreme droughts in the 12 months preceding the survey impacts a child’s likelihood to be wasted. In Model 2 we include an interaction between severe or extreme drought and the child’s sex to test for gendered impacts of severe or extreme drought on children’s undernutrition. In Model 3, we assess whether the impact that the experience of a severe or extreme drought on the gender gap in children’s undernutrition is moderated by community-level son preference. We do so by including in the model an interaction between the experience of severe or extreme drought, the child’s sex, and community-level son preference.

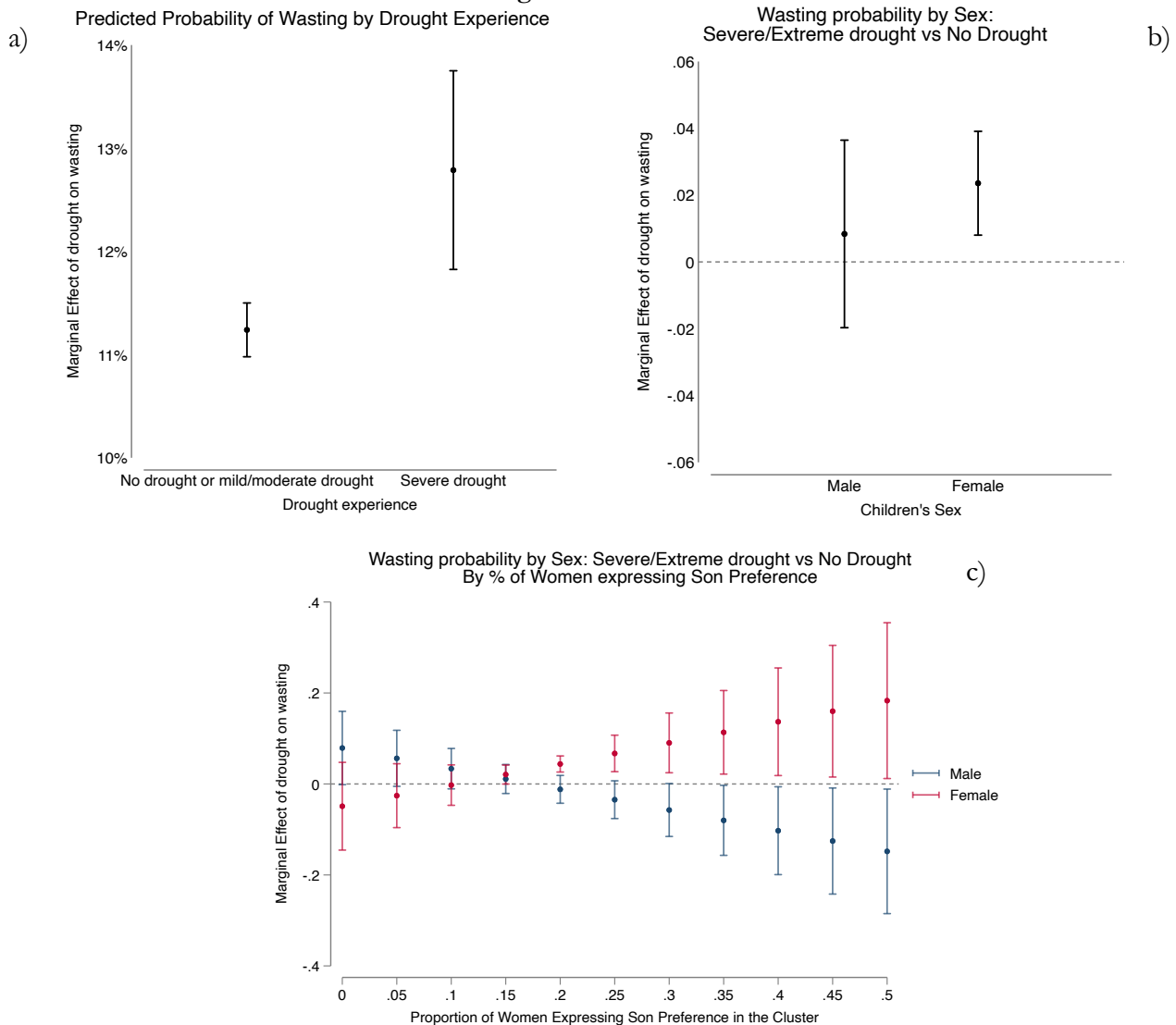
Preliminary findings

In figure 3, we report the results of our regression models. Panel (a) provides the results of the first model, in the form of predicted probabilities of being wasted by experience of severe drought. We find a significant association between experience of drought and children’s probability of being wasted: children who experienced a severe or extreme drought in the 12 months preceding the survey were more likely to be wasted than children who did not experience it. In panel (b) we plot the results of Model 2, in the form of average marginal effect of experience of severe or extreme drought on the probability of being wasted, separately for male and female children. The increase in the probability of wasting associated with drought exposure is concentrated among female children, with no statistically significant association observed for male children. This finding supports the hypothesis that there is a gendered impact of droughts on nutritional status, with female children experiencing larger negative impacts than male children.

We next move to testing whether this result could be driven by gender norms, which may lead to gendered resource allocation following a drought, with parents prioritizing male children’s wellbeing over that of females in the aftermath of a shock. Panel (c) provides the marginal effect of having experienced a severe or extreme drought in the 12 months preceding the survey according to various degrees of community-level son preference, for males and females separately. In line with our expectations, we find that the gender gap in the impact of droughts on children’s undernutrition widens at higher levels of son preference. This suggests that the adverse effects of drought on

female children’s nutritional outcomes exist and are amplified in communities with stronger son preference, as parents may further prioritize male children in response to resource scarcity following climatic shocks.

Figure 3 – Results



Source: Own elaborations on BDHS 2022 and SPEI dataset.

To further explore the mechanisms underlying these gendered patterns, we conduct two additional tests examining intra-household resource allocation during drought periods. First, we assess whether the presence of male siblings under age 15 moderates the relationship between drought and wasting differently for boys and girls, as brothers may intensify resource competition in contexts where sons are more highly valued. Second, we examine gender differences in healthcare-seeking behavior by analyzing treatment rates for diarrhea—an illness known to increase during droughts—among affected children. These tests reveal that drought increases wasting probability only for girls living with at least one male sibling, with no effect observed for girls without brothers or for boys regardless of sibling composition. Additionally, during drought periods, girls suffering from diarrhea face a 22 percentage point lower probability of receiving treatment compared to boys, suggesting that discriminatory practices in both food and care allocation contribute to the observed nutritional disparities. These findings suggest that discriminatory practices in both food and care allocation contribute to the observed nutritional disparities following the climatic shock.

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