

A maternal and child health intervention in the context of unprecedented flooding

Lessons for Disaster Responsive Social Protection

Syeda Warda Riaz
Michael R. Carter



DIRECTED BY



FUNDED BY



A Maternal and Child Health Intervention in the Context of Unprecedented Flooding: Lessons for Disaster Responsive Social Protection.

Syeda Warda Riaz (Ph.D. Candidate, UC Davis)

Michael R. Carter (Distinguished Professor, UC Davis)

Final Project Report

August 2023

Abstract

Improvements in maternal and child health indicators remain a priority area in developing countries, but a lot yet remains to be achieved. Several different factors constraining this progress are at play and end up interacting with each other. On the demand side alone, the economic costs of availing healthcare often coexist with conservative socio-cultural norms making it hard for many policy initiatives to achieve the desired improvement, but the evidence on how these economic and non-economic costs work in conjunction to affect healthcare is limited which is what this paper sets out to do in the context of a conditional cash transfer program in Sindh, Pakistan. Additionally, the exposure of our study participants to the floods of 2022 provides us with a natural experiment to evaluate the effectiveness of a CCT program during and in the aftermath of a large-scale natural disaster where we will put special emphasis on the duration and trimester (of the pregnancy) to this exposure.

1. Introduction

Improvements in maternal and child health indicators remain a priority area in developing countries. The gaps in accessing proper maternal and newborn care and the consequent adverse effects on the health of the woman and child are not only a violation of basic human rights but are also found to have far reaching implications on their overall quality of life. Studies have found adverse effects on earnings potential (Hoddinott et al., 2008), mental health (Baranov et al., 2020), and cognitive development (Paxson & Schady, 2010). Despite the numerous benefits, progress in the healthcare utilization during and after pregnancy continues to be a struggle as several different factors constraining it are at play and also end up interacting with each other. On the demand side alone, the economic costs of availing healthcare often coexist with conservative socio-cultural norms making it hard for many policy initiatives to achieve the desired improvement, but the evidence on how these economic and non-economic costs work in conjunction to affect healthcare is limited which is what this paper sets out to do in the context of a conditional cash transfer program in Sindh, Pakistan.

Sindh, a south-eastern province of Pakistan, is the second most populated province of the country where 30 percent of women receive no prenatal care, 60 percent do not give birth in a health facility, and the maternal mortality ratio is thrice the SDG3 target (Demographic and Health Survey, 2018). The proportion of stunted children is over 45 percent (DHS, 2018). Unsurprisingly, these indicators further deteriorate in the rural regions of the province. To improve the state of these health outcomes, the provincial government has decided to launch a “Mother and Child Health Conditional Cash Transfer (CCT)” program as a policy response, the pilot of which is underway in the poorest two

districts of the province. In this project, we evaluate the impact of the same on healthcare utilization and health outcomes, with a particular emphasis on the interaction of cash receipt with the underlying norms captured by a household's decision-making structure and attitudes towards formal obstetric care.

The CCT is expected to encourage the uptake of institutional obstetric care by mainly alleviating liquidity constraints, but economic costs are only part of the explanation for the sparse healthcare utilization. Another equally important factor is the norms and attitudes around formal healthcare which not only shape people's beliefs about the importance of availing obstetric care but also dictate who will make these decisions for the mother-child dyad. While the cash receipt from the program will create the standard income and price effects that can have a positive impact on the health care utilization of services such as prenatal care, institutional deliveries, postnatal care, and child vaccinations, and the health outcomes of mortality, morbidity, and child growth, there is much to learn about the role played by these norms in mediating the impact of a CCT on the outcomes of interest.

In this paper, we seek to identify the same as it is particularly relevant in the given context where high levels of poverty overlap with conservative norms that continue to put a woman's health at risk. More specifically, we ask:

1. Does the CCT improve the rates of pre- and post-natal checkups, in-facility delivery, immunization and growth monitoring trips, with downstream effects on child health?
2. How does the treatment effect differ when we interact the cash receipt with the underlying norms and household tensions captured by the attitudes of the decision-makers and the empowerment measures for the pregnant woman?

3. How effective is the CCT at alleviating the economic costs of travel and forgone earnings to increase the utilization of obstetric care? We focus on these two costs because they have important synergies with a household's norms and decision-making structure.

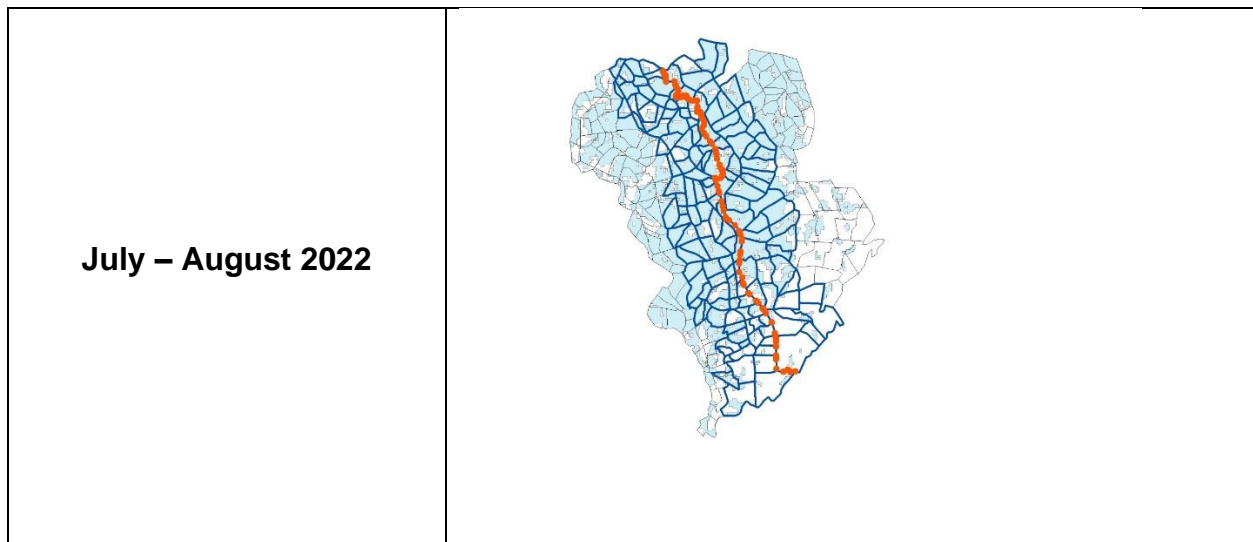
Taking advantage of the staggered rollout of the CCT which creates a sharp geographical jump in the eligibility of treatment, we use the Spatial Regression Discontinuity Design (SRD) to estimate the treatment effects. The cutoff is not a certain value of a poverty score but the border separating the treated district from the untreated district.

The crux of this paper, however, is the second and third question where we add to the existing work by taking a holistic approach towards the theory of change connecting the cash transfer to the eventual outcomes. Most papers that have evaluated a CCT in this context have explored heterogeneous treatment effects by a mother's education, pregnancy risk, mother's age, household wealth, and quality of care (see for example, Powell-Jackson & Hanson, 2012; Powell-Jackson, Mazumdar & Mills, 2015), but the focus on norms that greatly shape the demand for formal preventive and obstetric care has been limited. We fill this gap using detailed data on empowerment measures and the attitudes of individuals (who make decisions about a woman's maternal health) on the importance of prenatal care, institutional deliveries, and postnatal care. Another contribution of this paper is in estimating the heterogeneity in treatment effects by how costly it is for a woman to utilize formal healthcare where the focus is on travel costs and the loss in earnings for the woman and the person accompanying her on the day of the checkup. Evaluating these costs are informative with respect to a discussion around the adequacy of the cash transfer amount.

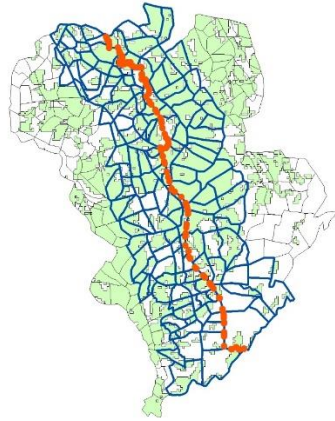
2. Changes to the Scope of the Study

2.1. Floods 2022

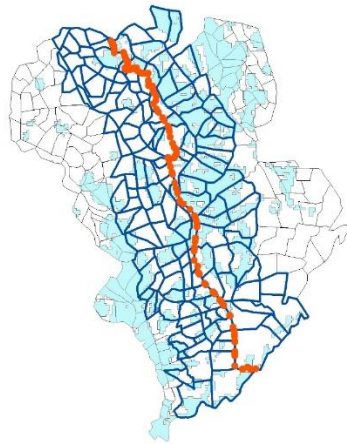
The study area was affected by the unprecedented floods of 2022 soon after we completed our baseline. We used satellite data to construct flood maps to trace the time trajectory of surface water and found that the levels were the highest from July to September and it only began to decrease from October. However, the decrease in the flood water extent was not uniform creating a variation in exposure to flooding within our original treatment and control groups. The figures below show the extent of flooding in our study area and the uneven 36+ decrease in surface waters.



September 2022



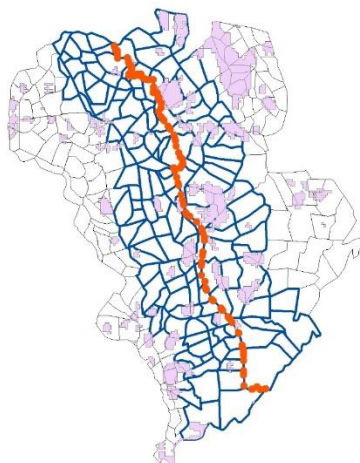
October 2022



November 2022



December 2022



Note: The colorful shading represents flood water extent. The dark blue outline shows the 158 *dehs* in our study sample and the red dotted line marks the border between Umerkot and Mirpurkhas, i.e., our treatment and control regions, respectively.

Given the flooding, we decided to broaden the scope of our research question and supplement the evaluation of the CCT with its effectiveness when interacted with a large-scale natural disaster. With natural disasters becoming more frequent in the face of climate change and their disproportionate effects on the poor and vulnerable, it has become increasingly important to identify effective mitigation strategies. While conditional cash transfers have emerged as a popular tool to improve health outcomes, it is not entirely clear if they can achieve the desired results in a situation like ours as the floods may well have shifted the focus away from the health of the mother and the child. On the other hand, extra income from the cash transfer may produce meaningful effects as the floods would have tightened the households' budget constraints. To study this parallel question, we first conducted a small telephone interview with 50 households in February 2023, out of which 40 (spatially spread out) consented to be a part of it and used this data to understand the extent the flood damages and design the flooding module in the main

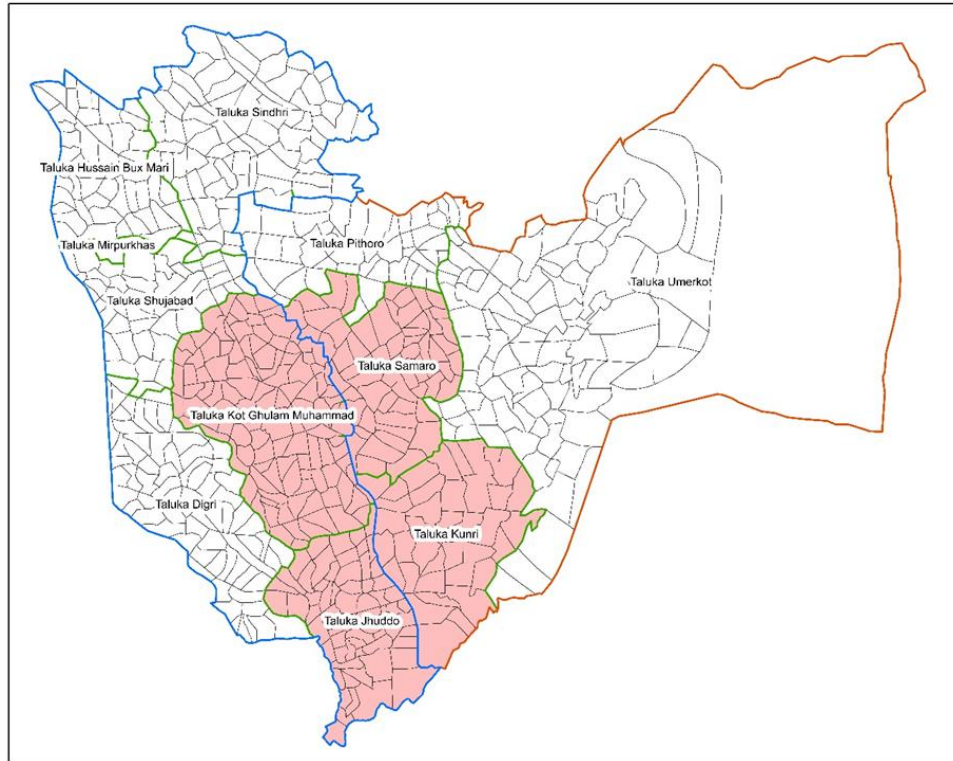
midline survey. The flooding module asked respondents to report losses born because of damages to their houses, crops, livestock, and productive assets. It asked respondents to report the time it took them to go to the health facility and market before and during the floods, and it asked them if they received any assistance from the private or public sector.

2.2. Food Security and Dietary Diversity

This round also collected data on household food security and the dietary diversity of the woman and the child. While the latter was added as a possible channel to understand the main outcomes of child health and morbidity, the former was added on the request of our government stakeholder given the interest in assessing vulnerability as measured by food insecurity which in turn can inform the provisions and design of their social protection programs. We added 8 questions to construct the Food Insecurity Experience Scale (FIES). These questions were also asked in the nationally representative PSLM round of 2019-20 and therefore can be used as a benchmark or as a comparison to see how the levels changed when the population was exposed to large-scale natural disaster.

3. Methodology

The program under evaluation is a conditional cash transfer introduced by the Government of Sindh, Pakistan, and is aimed at improving maternal and child health against the backdrop of dismal health indicators. It was introduced in June 2021 in four Union Councils of the poorest two districts, Tharparkar and Umerkot. At this stage, the implementing partners wanted to test the registration and payment disbursement process with the scale-up in these two districts and the remaining 20 districts planned for late 2023 and early 2024, respectively.



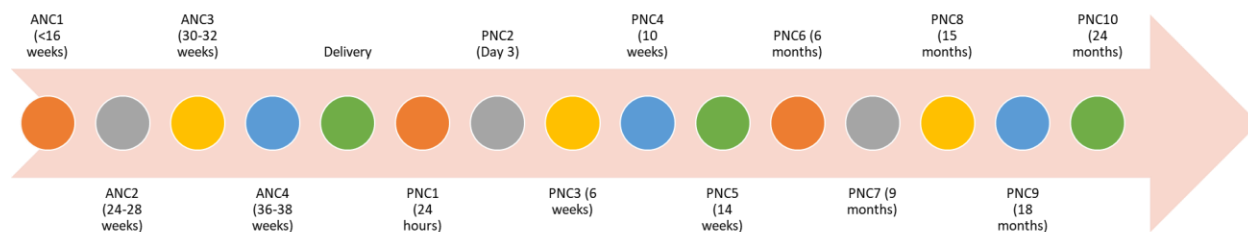
We take advantage of this staggered rollout to obtain the source of identification. The evaluation in this paper is based on the scale-up in Umerkot which took place in April 2022. We obtain the control group from the adjacent district of Mirpurkhas in line with the Spatial Regression Discontinuity Design, details of which are presented below. Umerkot has four Talukas and Mirpurkhas has six. The ones relevant for this study are Taluka Samar and Taluka Kunri in District Umerkot, and Taluka Kot Ghulam Muhammad and Taluka Jhuddo in District Mirpurkhas. The map above shows the two districts, Mirpurkhas bounded in blue and Umerkot bounded in orange, and the 4 Talukas of interest shaded in pink. The other Taluka boundaries are in green. The finer divisions in black are *dehs* which are relevant at the stage of drawing the sampling frame, details of which are in Section 6.

As already noted, the CCT beneficiaries will register and avail healthcare at the designated health facilities. Besides this, there are three main eligibility conditions to become a beneficiary:

- i. The woman must be pregnant at the time of registration.
- ii. The woman must be a CNIC [Computerized National Identity Card] bearer (i.e., at least 18 years of age).
- iii. The woman must be a resident of the treatment Taluka which will be verified against her CNIC.

Pregnant women will receive regular payments at the various trigger points during a pregnancy as shown below. They get PKR 1000 (USD 6) at each pre-natal visit, PKR 4000 (USD 24) for delivery at a health facility, PKR 2000 (USD 12) upon obtaining the birth certificate, PKR 1000 (USD 6) at each post-natal visit, and PKR 1000 (USD 6) at each child immunization and growth monitoring visit. At the time of registration, women are supposed to provide a mobile number on which they will receive the payment details.¹

¹ These payments may be received with a lag of a couple of weeks.



The announcement for the program is made in an English, Urdu (national language), and Sindhi (local language) newspaper but given the low literacy levels, we argue that this is not an effective way to reach out people. The implementing partners rely on word of mouth and mobilization by the health facilities to increase the take-up rates. These methods, however, may be more effective at reaching out some people than the rest. To overcome these limitations, all survey respondents in the treated areas were handed out the advertisement pamphlet at the time of baseline to boost compliance. The pamphlet mentioned the eligibility criteria as well as the names of the hospitals that are a part of the program.

The evaluation will be based on three rounds of data collection: the baseline was completed last year in June 2022 and this report is being submitted upon the completion of the midline. The endline is scheduled for the summer of 2024.

The first step is the estimation of the average treatment effect to determine if the CCT proved effective at improving the healthcare utilization and health outcomes of the woman (y_i) and of the child (y_c). For healthcare services, we will look at the number of pre- and

post-natal checkups, whether or not the child was delivered in a facility, and whether or not a child received all relevant vaccinations. For the consequent effects on health, we will focus on family planning, anthropometrics of the child, as well as morbidity patterns typically measured as the probability of any self-reported illness or of diarrhea/cough/fever in the past 2 weeks. The outcomes will be measured in the midline and endline surveys.

With these outcomes, the simplest regression to start with is:

$$y_{id} = \alpha + \beta_0 CCT_d + \varepsilon_{id}$$

$$y_{cd} = \alpha + \beta_0 CCT_d + \varepsilon_{cd}$$

Where y records the outcome for pregnant woman (i) or child (c) in district (d). CCT_d is an indicator variable taking the value of 1 for Umerkot, the treated district, and 0 for Mirpurkhas, the untreated district. If the treatment assignment were random or independent of the potential outcomes, β_0 would have identified the Intent to Treat Treatment Effect of the CCT. However, as already mentioned, the cash transfer program, while planned for Mirpurkhas in 2023, was first rolled out to Umerkot on account of being the second poorest district of the province on the basis of multidimensional poverty index (MPI), which means that $Corr(CCT_d, \varepsilon_{id}) \neq 0$ and a simple comparison of the treated with untreated women will produce a biased estimate. A closer look at the poverty distribution in the two districts in figure 4 reveals that Mirpurkhas is, on average, better than Umerkot, but the differences seem negligible around the border separating the two. The poverty profile around the border suggests that **similar** individuals reside on both sides who are separated by an **arbitrary** boundary that also determined their treatment status and so a

comparison of their outcomes will be an unbiased treatment effect of the CCT. This identification strategy is called the spatial regression discontinuity design.

While the CCT beneficiaries in Umerkot cannot be directly compared with the non-beneficiaries in Mirpurkhas, the identification can be obtained from focusing on a group of individuals that only differ in their treatment status. We argue that this group of individuals can be found along the border of these two districts. *The identification assumption is that while two neighboring districts may be different from each other, these differences will be negligible (on average) when comparing locations within a small distance separated by an arbitrary border.*

The Spatial RD, like the standard RD, relies on a running variable to categorize units into treatment and control groups. The main difference is that the running variable can be both scalar and vector-valued. The former is expressed as distance from the boundary separating the treatment and control areas. The distance between the treatment units and the border is recorded as a positive value whereas the distance between the control units and the border is recorded as a negative value. Distance on the border itself equals 0 which becomes the cut-off point. The vector-valued approach defines the running variable as a function of latitude and longitude coordinates since the treatment status is a discontinuous function of the location referenced by these coordinates.

While the staggered roll-out of the program creates an unambiguous division between the treated and control areas based on the administrative border, it is possible that the CCT beneficiary status does not conform to this distinction for some women. Per the eligibility criteria of the program, the place of residence of a recipient will be verified against the address listed on her CNIC and it is possible for some women in the treated regions to

have an address of the control areas making them ineligible and for some women in the control regions to have an address of the treated areas making them eligible. Because of this complication and the usual non-compliance, we distinguish between the Intent-to-Treat Treatment Effect and the Treatment Effect for the compliers. For now, we focus on the former. To get the ITT, we simply compare the average outcomes for pregnant women and children in the two regions or estimate the Sharp RDD. The equation is (subscript i denotes the outcome for both the woman and the child for brevity):

$$y_{idb} = \alpha + \beta_1 CCT_d + g(X_{idb}) + \Omega_b + v_{idb}$$

This equation is different from the one presented above in two main ways: we add the RD polynomial, $g(X_{idb})$, and boundary fixed effects referenced by b . The term Ω_b is a boundary segment fixed effect that ensures that we are comparing women and children that are within the same segment of the coverage boundary, and the RD polynomial is function of the running variable defined as a scalar measure of distance measured between the household and the boundary separating the treatment and control. Following the specification in Dell (2010) and Gonzalez (2021), we define the polynomial as follows:

$$g(X_{idb})_{scalar} = \alpha_1 dist_{idb} + \delta_1 CCT_d * dist_{idb} + \alpha_2 dist_{idb}^2 + \delta_2 CCT_d * dist_{idb}^2$$

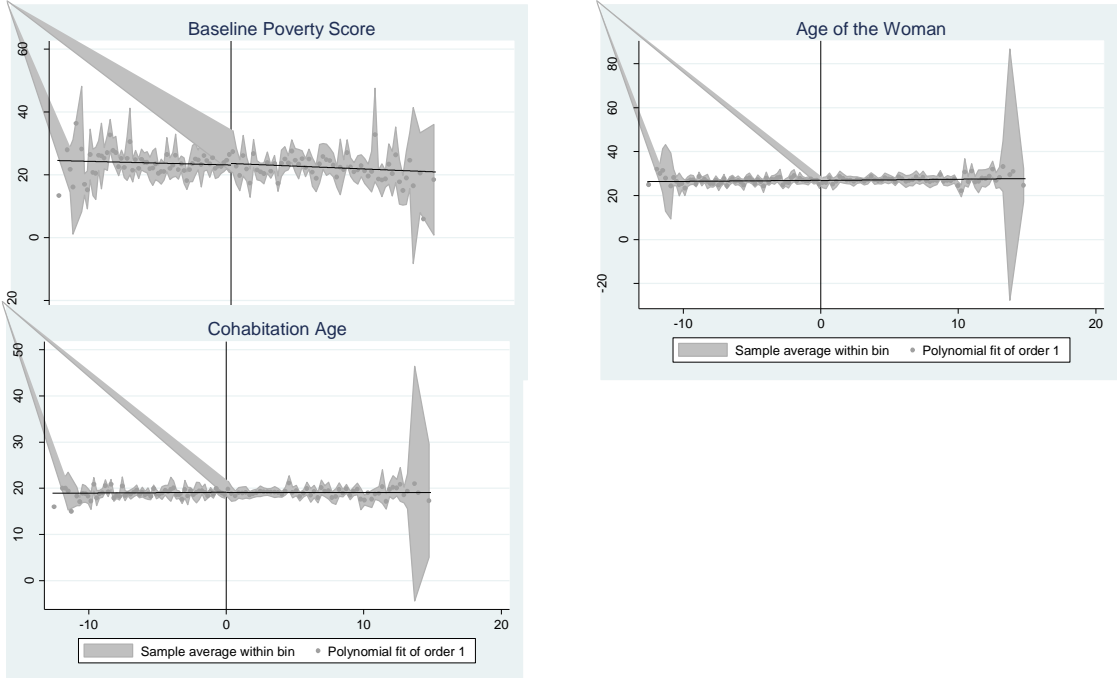
where $dist_{idb}$ measures the Euclidean or Chordal distance of the household from the treatment boundary.

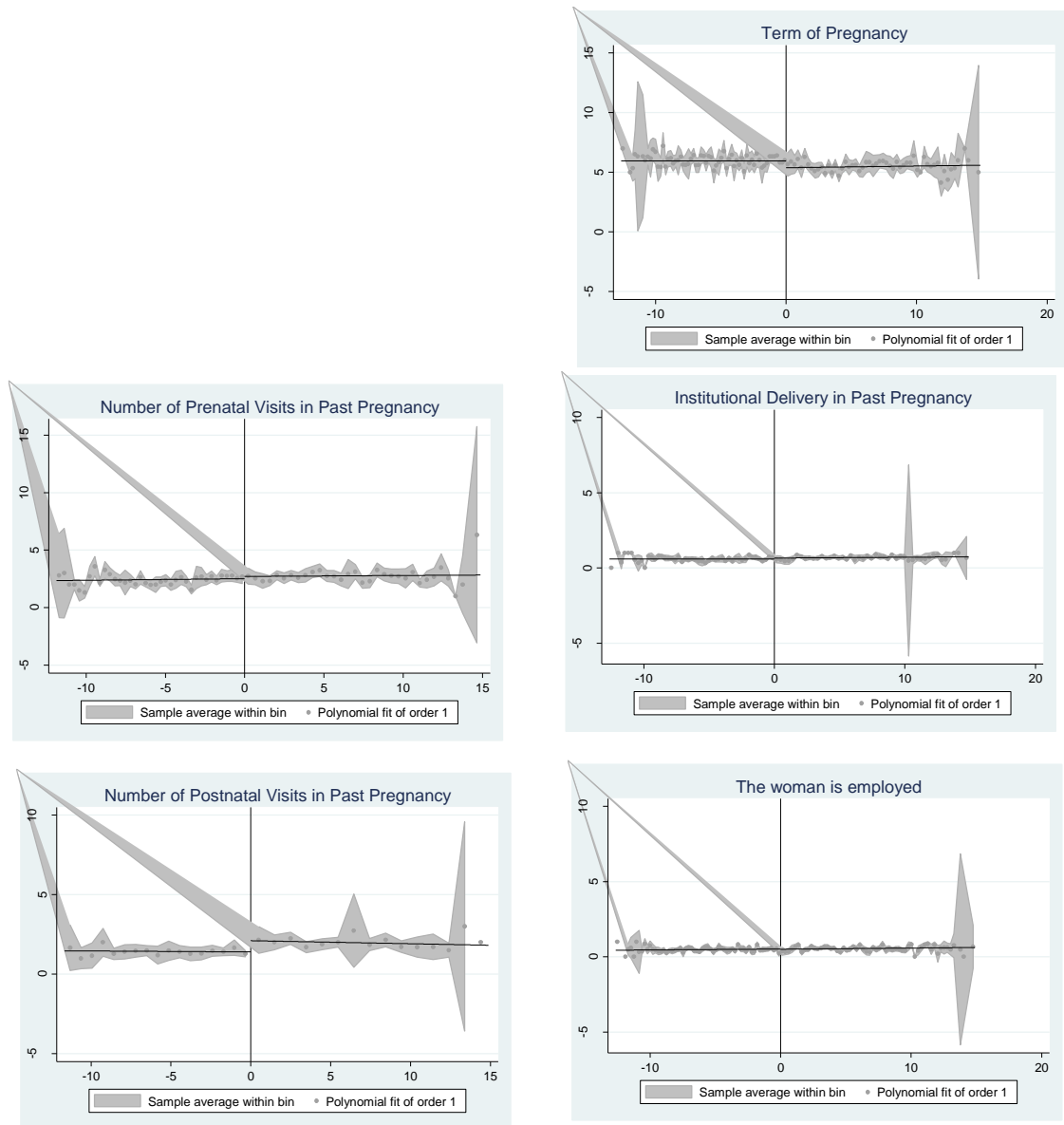
Variation introduced by the floods: To study our parallel question on how effective the cash transfer program was in the presence of floods; we will re-define our treatment such that it not only measures the beneficiary or eligibility status of the CCT program but also the extent and duration of the flood waters. Furthermore, the trimester in which a

woman was exposed to the floods can also reveal some interesting patterns about how the in-utero experience affects health outcomes later, and if there is a particularly vulnerable time during in-utero.

4. Preliminary Findings

As mentioned earlier, the evaluation of this program is based on three rounds out of which only two have been completed, and the field for the midline survey finished just last week. Therefore, we cannot share detailed findings in this version of the report but will present some preliminary ones and the balancing analysis from the baseline data. Treatment and control groups were compared household poverty, woman’s current and cohabitation age, term of pregnancy, the take-up of prenatal and postnatal care and institutional delivery in the previous pregnancy, and the employment status of the woman. In the RDD setup, this was done by treating these variables as “outcomes” to perform what are called the falsification tests. The statistical tests supported the continuity assumption as there were no “jumps” on either side of the border, i.e., the cut-off of the running variable.





Authors' calculations based on the Round

1

Overview of the Flooding Module:

98.9% of the respondents in the control region said that their village was affected by the floods of 2022, and the figure for the treatment group equals 97.7%. In places where the surface water made it difficult to travel, for 70% of the households it took up to October

2022 for these water levels to recede, which is in line with the maps shown above. 91% of the respondents reported damages to their house structure and for about 80% of these, the damage was severe with the whole house coming down or getting washed away. In addition to these, 70% reported losses to crops and livestock. The time it took women to get to the health facilities doubled during the floods (September 2022). Just a basic overview of these indicators confirms that the respondents faced severe economic hardships during the floods which could have affected the impact the of the CCT program, but over 94% of the women also reported to have visited a hospital/health facility during the floods suggesting multiple (and possibly opposing) forces at play.

5. Lessons and Policy Implications

- The important aspect of our study is the focus on norms and attitudes which are relevant for all social protection programs especially when the burden of navigating the conditions is left upon the recipients without any supplementary interventions. By collecting detailed data to proxy for norms and attitudes around women's empowerment, we can determine if CCT programs like these are sufficient to shift the needle on them which is also one of the important goals of introducing such programs and target them to women. However, in a context like ours where access to a resource does not necessarily translate into control and exit options from a marriage are not fully viable, the effect of this CCT and others like it can inform the policy discourse around tools that can be used to empower women.
- Our engagement with Social Protection Strategy Unit, the key stakeholder, provided the government with an alternative to engage in Evidence Based Policy

Planning. While provincial governments are, in principle, very interested in systematic evaluations and evidence-based policymaking, processes of due diligence around procurement often impose a time frame that is inconsistent with systematic evaluations. Collaborating with academia and accessing research grants ameliorates these concerns, while, at the same time, builds capacity for local resources and increases the academic value of the work.

- With rising inflation and difficult economic conditions putting the poor and vulnerable segments of the country further at risk, the government is looking for ways to alleviate those burdens and cash transfers are one possible tool of doing that. However, a more sustainable policy is to support individuals that can help them overcome the vicious circles of poverty through investments in health and education which is why conditionalities are encouraged. These conditions also help give the programs greater legitimacy. While this study will eventually identify the effects on healthcare utilization, the detailed data on poverty indicators will inform how effective the targeting of these programs are in reaching the economically and socially marginalized sections of the society which is the first order of information that our stakeholders in the government expect from us to take into account for future initiatives. We collect data on CNIC ownership, caste, and household locations which will help us get a holistic view of people's marginalization and the reach of the government's social protection programs in that context will be critically studied.
 - o Compliance and Under-Reporting in Survey Data: With the data on compliance from the midline, we are also in the process of obtaining

administrative data. Comparing the two can help us comment on the extent of under-reporting and genuine exclusion errors found in the survey data providing lessons for other researchers.

- Disaster Preparedness: From this project, we will also highlight whether social protection programs can provide the extra cushion during times of calamities, and if the design and targeting of these programs should be modified to better achieve this goal. We think this will be an important contribution given the urgent need to address climate change in the country. To evaluate this question, we have also surveyed the 24 health facilities in the study area and asked them about the extent of flood damages and how the registration of the CCT was impacted during the floods, if at all.
- We have been in constant touch with the Coordinator to the Sindh Chief Minister on Social protection, who is very keen to use our analysis for scaling up the CCT, eventually to the entire province of Sindh. Currently, the Coordinator is discussing a scale up to 10 districts next year. The same collaboration also got UNICEF, Pakistan, interested in this project who is now a co-funder.

IGC

www.theigc.org
