Rural Brazil and *Programa Bolsa Família*: Do conditional cash transfers differentially Impact Rural Mortality Rates?

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Abstract

Conditional cash transfers are popular development programs throughout most of Latin America. Recent studies find positive short and medium-term impacts for health and education outcomes of participants. This paper examines the differing effects of the Brazilian conditional cash transfer program, Bolsa Familia, on rural and urban infant mortality. Utilizing an interaction model and data from the years 2001-2008, I find that rural areas on average experienced a 6.21% higher reduction in infant mortality rates than their urban counterparts. Controlling for factors that could potentially alter infant mortality, results maintain original findings and are statistically significant.

1 Introduction:

There is a growing consensus among economists and health professionals alike that environmental factors are major determinants in childhood health status, and that said status impacts a child's future labor and health outcomes[1]. However, evidence points to disparities in childhood health outcomes based upon different socioeconomic strata. These disparities are particularly pronounced between rural and urban populations throughout the developing world, and there has been much debate among policy makers on how to best counteract these health disparities. One of the more prominent responses to these disparities in recent years has been the rise of conditional cash transfer programs. Since the 1990s, conditional cash transfer programs (CCTs) have been among the most popular development policies in Latin America and Asia. With many programs nearing their 20 year anniversary, there are an increasing amount of impact evaluations being done to assess their effectiveness. To date, these evaluations have found the positive, short and medium-term effects on health and education outcomes, demonstrating their potential effectiveness at combating poverty.

In 2003, the largest CCT program in the world was rolled out in Brazil. Known as Bolsa Familia, this program provides a monthly income transfer to poor families provided they comply with certain conditionalities. Said conditionalities are investments in the human capital of their children. Previous literature has outlined the positive effects that BFP have had on short and medium-term outcomes amongst the extreme poor. However, few papers have examined the effects of the health conditionalities associated with BFP and their effect on health outcomes. Beyond this, there has been even less research about the effects of BFP on rural areas versus

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[1] An overview of current literature on childhood environments and health outcomes can be found in (Almond and Currie 2011).

urban areas. This study seeks to fill the gaps that exist between existing research on CCT's by examining the differing effects of these programs on rural and urban areas. To that end, I hope to answer the following: has BFP impacted infant mortality rates in rural areas differently than rates in urban areas? This study utilizes an interaction model on a subset of Brazilian municipalities from the years 2001-2008 to answer this question. I find that rural municipalities experienced a 6.1% larger decline than urban municipalities in mortality rates after controlling for health supply variables. Rural areas also experienced higher decreases in IMR when Bolsa Familia coverage increased. These results are further supported by robustness checks analyzing varying BFP coverage rates across the country.

2 Literature Review:

In Latin America, there is a sharp juxtaposition in most countries between the urban and rural poor. Typically, the rural poor have lower incomes, reduced access to public services, and different implicit costs to maintain their standard of living. Despite rapid economic growth and reduction in income inequality in the last twenty years, the rural poor in Latin America continue to be some of the most underserved communities throughout the region. Sadoulet and de Janvry note the problematic dichotomy between the urban and rural poor in most Latin American countries, where many public policies have been only marginally effective in combating rural poverty (2000). The authors state that policies must be aimed specifically at reducing rural poverty, noting that it is highly interdimensional, disproportionately responsive to economic shocks, and dependent on agriculture as a source of income[2].

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[2] The authors list several other reasons why the rural poor may not be responsive to traditional anti-poverty policies, including the impact of market failures and extensiveness of rural poverty. I list here only the most relevant to our discussion.

The study further concludes that the only country to effectively reduce the number of rural poor has been Brazil. Helfand et al. propose that the fall in income inequality between urban and rural areas has been largely attributable to increases in real income and increases in aggressive social programs (2009). The most important of these social programs have been income transfers such as Bolsa Familia and social security.

One of the most popular policy responses to poverty in Latin America since the mid-1990's has been conditional cash transfer programs - Bolsa Familia, for example. I will provide further background information on both CCTs and BFP in section 3. It is sufficient to say here that previous studies find positive impacts of conditional cash transfer programs on health outcomes, an important aspect of the multidimensionality of poverty. The Mexican CCT program, PROGRESA/Oportunidades resulted in a large reduction in rural infant mortality in its first several years (Barham 2011). The reduction was primarily in poverty-related, preventable causes such as respiratory infections and nutritional deficiencies. Barham and Maluccio find further positive results on childhood vaccination rates for rural participants in the Nicaraguan CCT, RPS (2009). The authors find that areas receiving the benefit had close to 95% vaccination rates amongst children - the typical standard to eradicate infectious diseases. Both of these studies show that CCTs can lead to vital health improvements in children - a primary goal of many of these programs.

In the context of Brazil, further studies of the Bolsa Familia Program, the focus of this paper, indicate positive returns from enrollment in the program. Infant mortality experienced a significant decline across the country after the implementation of Bolsa Familia when examined between the years 2004-2006 (Rasella et al. 2013). Areas with higher enrollment percentages

experienced the largest reduction in infant mortality throughout the country. Other research found that enrollees experienced better nutritional status, food availability, and utilization of preventive health services for children[3] (Paes-Sousa et al. 2011; Martins and Monteiro 2016; Shei et al. 2014). These are all important determinants in improving childhood health outcomes as a means of investing in human capital.

Nevertheless, there has been little research analyzing the effects of CCTs in the rural-urban dichotomy in Latin America, described above. Higgins is the first to note the differing outcomes of BFP in a rural and urban context (2012). Utilizing spatial price differences between predominantly-rural and urban states, the author finds that the probability of escaping from poverty is significantly higher for rural regions after being enrolled in BFP. In essence, Bolsa Familia is disproportionately more effective for rural populations than urban ones, what he calls a "rural bias". Given that this study only examines the year 2009 and the poverty status after being enrolled in BFP, it is my goal to extend this research further. To date, however, there has not been a study that examines pre- and post-BFP trends in infant mortality, nor one that analyzes health outcomes in a rural versus urban context. The research presented in this paper further investigates the differing effects of Bolsa Familia on rural poor presented previously, but also evaluates health outcomes from participating in the program. I specifically analyze the mechanisms in Bolsa Familia that affect infant mortality and may lead to more positive outcomes in rural municipalities by examining pre- and post-program IMR trends.

3 CCTs and the Bolsa Familia Program:

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[3] Nutrition, preventive care, and environmental factors are all important determinants in childhood health outcomes (Almond and Currie 2011).

3.1 Conditional Cash Transfers:

Conditional cash transfer programs are social assistance programs typically aimed at poor families with children with the intent of disrupting cyclical poverty through income transfers and incentivized investments in human capital (Fiszbein et al. 2009). As a crucial element in many developing countries' anti-poverty policies, conditional cash transfers provide enrollees with a monthly cash transfer, provided they comply with certain "conditionalities". These conditionalities aim at building children's human capital by increasing take up of education and preventive healthcare measures. For example, a child must be attend school a set number of days per school year and/or receive all recommended doses of a vaccination for her family to receive the benefit. More broadly, these conditionalities aim to increase investment in the human capital of poor children.Such investments are vital to a child's development and subsequent labor and health outcomes (Almond and Currie 2011).

To incentivize this investment and further relieve the everyday income burden the poor face, the head of household - usually the mother - receives a predetermined amount of money each month provided they and their children complete all conditionalities. This two-sided approach to poverty alleviation is what sets CCTs apart from other social programs (2009). As Johannsen et al. note, such programs theoretically will generate an investment and consumption effect for poor families, allowing their budget constraint to be expanded while also making investments in their children's human capital. The goal of these programs is to address many of the market failures that prevent the poor from investing in their human capital by incurring demand-driven uptake of health services and education.

The first wide-scale conditional cash transfer to be implemented was in Mexico in 1997. Other middle-income countries have followed suit, including the majority of Latin America, southeastern Asia, and parts of Africa. Fiszbein et al. note the positive short-term impacts of many programs, but acknowledge the obvious shortcomings of demand-side incentives without sufficient supply of social services[4] (2009).

3.2 Bolsa Familia Program - Overview:

Initially begun on a municipal level in two Brazilian cities in 1995, the program that would eventually become Bolsa Familia, or BFP, was subsequently expanded to encompass four national programs between 2001-2003 (Lindert et al. 2007). *Bolsa Escola*, *Bolsa Alimentação*, *Auxílio Gás*, and *Fome Zero* all provided low-income families with a cash transfer or voucher for food or gas provided they comply with the conditionalities. In 2003, these four programs were consolidated under then president Luiz Inácio Lula da Silva into *Programa Bolsa Família.* The consolidation was primarily to reduce disparities in coverage, inefficiencies in administration, and promote vertical cohesion across federal and local-level programs (2007). The year 2004 was given as transition time from the previous programs to the new and to dramatically expand coverage across the country. By the end of 2006, more than 46 million individuals were enrolled, making Bolsa Familia the largest CCT program in the world.

Bolsa Familia is specifically targeted at poor families with at least one child between the ages of 0-17 (MDS). To be eligible for BFP, families must fall into either one of two categories: poor or extremely poor, originally defined as having a monthly income of less than R$100

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[4] Barham et al. review an increasing amount of literature regarding CCTs. They find that short-term education and health results tend to be positive, but many long-term labor impacts still have not been demonstrated, given the relative newness of these programs (2016).

(around US \$47 in 2004) or less than R\$50 (US \$25) per family member (Lindert et al. 2007).

Once enrolled, they must begin complying with the conditionalities. The conditionalities are

specifically targeted at the children and pregnant women in each family. The conditionalities are

the primary mechanism that provide investments in human capital. Table 1 lists them below

(Lindert et al. 2007).

Table 1:

	Children:	Pregnant and Lactating Mothers:
Health Conditionalities:	For children ages 0-7: ● All vaccinations per standard schedule. ● Routine medical check ups.	● Pre- and post-natal medical exams. ● Participate in local parenting and health classes.
Educational Conditionalities:	● All children ages 6-15 must be enrolled in school. ● Must attend school at least 85% of the time per month.	● Must advise if child must miss school.

For the purposes of this paper, I will focus only on those mechanisms that could potentially

affect infant mortality. There is an increasing body of economic research that highlights the

importance of pre-gestational maternal health and its effects on health outcomes for both infants

and adults (Almond and Currie 2011). Thus, if mothers are making appropriate *in utero*

investments in their health after getting the required checkups per BFP conditionalities, they may

ensure more positive health outcomes for their children. Vaccinations are another vital

mechanism in preventing communicable diseases and childhood death. If other children around

an infant are vaccinated, the resulting spillover will help ensure he or she does not acquire the disease, a positive externality. Another important mechanism put forward in BFP is the cash transfer. If poor mothers have an expanded budget constraint, they may be able to purchase more nutritious food for themselves and their children. This is especially important for children suffering from malnutrition. The nutrition component of the health classes the mother must take educate them on improving their children's nutritional status, another important investment. These mechanisms are crucial to understand when we examine the effects of BFP on childhood health outcomes.

4 Data:

I constructed a set of municipality-level, panel data made available by the Brazilian federal government. The IBGE[5] and Ministry of Social Development[6] provided data regarding municipality characteristics and Bolsa Familia coverage. Infant mortality data and health supply statistics were all provided by the Brazilian public health system, SUS. I examine the years 2001-2008 to capture pre- and post-treatment trends following the 2004 rollout of Bolsa Familia. The data consist of all municipalities that report infant birth and mortality statistics for each year of the study, resulting in a weakly balanced panel of 3092 observations (municipalities).

Infant mortality rate (IMR), was constructed using number of live births based upon the primary residence of the mother and number of deaths before age one for a given municipality. It is defined as the number of infant deaths per 1000 live births in any given year. I choose to exclude all municipalities that had abnormally high IMR (greater than 200 deaths per live births)

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[5] Brazilian Institute of Geography and Statistics.
[6] *O Ministério de Desenvolvimento Social.*

to remove any sort of variation caused by error in reporting or municipality-specific health shocks that could potentially bias my results.

I determine rural status of a municipality as defined by the Brazilian federal government. The total number of rural and urban residents in a municipality are determined each census[7]. The IBGE then defines a municipality as rural if more than 50% of the population lives in a rural zone[8]. Marcuzzo and Ramos note the varying issues with this simplistic assumption for rurality; however, I have opted to maintain these definitions for methodological purposes and simplicity's simplicity's sake (2004). Other control variables included are those that could potentially affect health outcomes for children. I included a measure for GDP per capita for a given municipality, given in terms of R$1000 to account for the large macroeconomic growth that Brazil experienced over this time period. Furthermore, I control for sanitation and development indicators that are potential environmental determinants of childhood health status (Almond and Currie 2011). These include the percentages of homes in a municipality with indoor plumbing and household water treatment. Bolsa Familia coverage percentage is further included as a robustness check. Coverage is defined as the percent of eligible individuals that are receiving the benefit for a specific year.

Additionally, I include a measure of the Family Health Program as a proxy for health supply control. The Family Health Program (FHP), was initially implemented in 1994 and provides primary health services to underserved communities as part of the expansion of the national public health care system. A FHP team is responsible for providing comprehensive care

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[7] In other words, this is the population that live in urban or rural zones in a municipality as determined by the federal government.
[8] I opted to use standards used by the IBGE as opposed to OECD, which are defined by population density. Most areas in Brazil, including urban ones, would be designated as rural given this definition due to the relatively low population density that characterize most municipalities.

to a specific number of people in a municipality, with a focus on preventive and primary care (Aquino 2009). As most causes of infant death in rural areas in Brazil are related to preventable causes such as diarrhea, malnutrition, and respiratory infections, I include the percentage of the population covered under the program in a given municipality to approximate primary care supply.
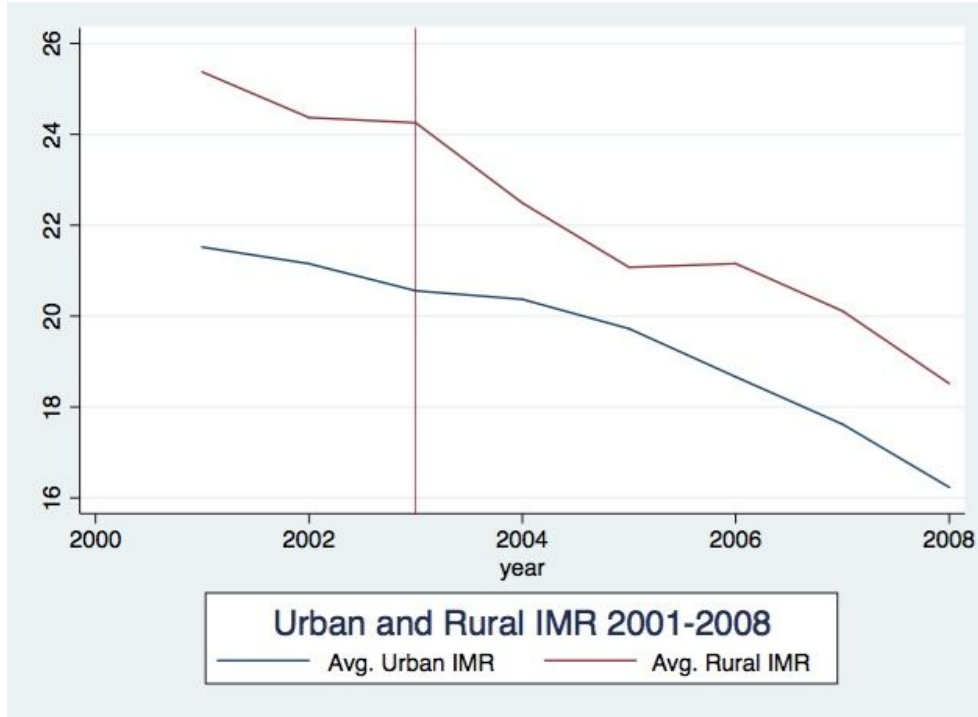
Included in Table 2 below is a set of summary statistics:

Table 2:

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                      (1)
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IMR                 20.41
                   (15.86)

Rural                0.33
                   (0.471)

GDP/Cap           6621.27
                   (6746.0)

FHP Coverage         0.79
                   (0.251)

BFP Coverage         0.79
                   (0.249)
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N                   24556
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Graph 1 displays time trends for average IMR between urban and rural municipalities below:

Graph 1:

Urban and Rural IMR 2001-2008
Avg. Urban IMR   Avg. Rural IMR

We see in Graph 1 that the end of 2003 through the year 2004, there appears to be a more

downward trend in rural infant mortality. It appears that in general, after the rollout of program,

rural IMR is slightly more negatively-sloped than urban IMR. We see that there appears to be no

pre-treatment trends in IMR that could potentially bias results.

5 Identification Strategy:

5.1 Base specification:

I use the following interaction model as a base specification for my ITT to

approximation:

$$IMR_{mt} = \beta_0 + \beta_1 Rural_{mt} + \beta_2 After_{mt} + \beta_3 After * Rural + u_{mt}$$

where *IMR* is the infant mortality rate for a municipality *m* in a given year *t*. Because BFP was

rolled out entirely by the end of 2004 across all municipalities, all areas received the benefit,

albeit at varying coverage rates. However, my question focuses on the differing effects of BFP for rural and urban groups. To establish this difference, I define *Rural* and *After* as binomial variables where a 1 indicates a municipality, m, is rural for a year, t, before or after the rollout of BFP. The parameter β_3 is the primary parameter of interest, representing the change in infant mortality for rural areas beyond what urban areas experienced after the program was enacted.

<div align="center">5.2 Empirical Model:</div>

In order to isolate the effects of BFP, further controls are introduced in the regression:

$$IMR_{mt} = \alpha_m + \tau_t + \beta_3 After * Rural + C_{mt} + u_{mt}$$

This specification includes controls for time-invariant, municipality fixed effects, α_m, to control for unobservable municipality-specific characteristics. Time fixed effects, τ_t, to control for yearly trends common amongst all municipalities are also introduced. Including these two variables removes the need to report the *Rural* and *After* variables. I further introduce municipality time-variant variables in C_{mt}, a vector of such controls that could potentially bias IMR. Once again, the parameter of interest here is β_3, which represents the difference in IMR after BFP was rolled out between urban and rural municipalities. It can be interpreted as the extra effect that Bolsa Familia had on infant mortality in rural areas versus urban areas. An important assumption I am making in this specification is that all municipalities received uniform rollout of the program in 2004. I discuss further in section 5 how this affects my results.

<div align="center">**6 Results:**</div>

Table 3:

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	IMR	IMR	IMR	IMR	High IMR	Low IMR
After*Rural	-1.382***	-1.363***	-1.349***	-1.362***	-2.607***	0.467***
	(0.398)	(0.405)	(0.404)	(0.500)	(0.745)	(0.180)
Observations	24,553	24,384	24,384	15,544	10,410	13,974
Adjusted R-squared	0.194	0.195	0.195	0.221	0.234	0.145
Municipality GDP	N	Y	Y	N	Y	Y
FHP Coverage	N	N	Y	Y	Y	Y
Sanitation Indicators	N	N	N	Y	N	N

Effect of BFP enrollment on rural IMR

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6.1 Initial Findings:

Table 3 reports the effects of Bolsa Familia on rural infant mortality. Standard errors are robust and clustered at the municipal level to correct for group structure error. The first column shows the coefficient of After*Rural after controlling for municipality and time fixed effects. The -1.382 coefficient indicates that rural municipalities experienced a decline of roughly 1 death per 1000 live births more than urban areas after the rollout of the program. In other words, this is a decline of 6.21% in rural IMR beyond what urban areas experienced over this time period[9]. Urban areas experienced a total decrease of 4.1 deaths per 1000 births for reference

6.2 Robustness checks:

It is difficult, however, to strictly interpret this as a causal relationship between Bolsa Familia and IMR. Thus I further test the various time-variant controls listed in Table 1 to isolate the effects of BFP enrollment. Adding the controls caused 169 observations to be lost from the sample, but this is not enough to potentially alter results. Once again, municipalities are clustered

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[9] The mean IMR at this time was 22.24 deaths per 1000 births.

with themselves, and robust standard errors are used. Column 2 shows the effect of BFP

enrollment for rural municipalities, controlling for the change in GDP as measured by the

logarithm of GDP per capita. The coefficient of interest for After*Rural is reduced minimally but

is still statistically significant at the 1% level. Thus, rural municipalities had a 1.36 decrease in

infant deaths per 1000 births more than urban municipalities. Nevertheless, this still translates

into an increased decline of 6.1% in rural infant mortality.

Another key determinant in IMR over this time period, the Family Health Program, is

included as a control and reported in column 3. As previously mentioned, FHP Coverage Rate is

defined as the percentage of a municipality's inhabitants that are covered by the program; in

other words, they have at least one, locally-based set of primary care providers. However, once

included, FHP coverage does not significantly alter the magnitude nor statistical significance for

the coefficient of After*Rural. Including FHP coverage resulted in a coefficient of -1.349, an

average difference of 6.06% in IMR between urban and rural areas. Thus, while FHP may have

significantly contributed to the decline in IMR across the country[10], it may not have accounted

for the difference in said decline between urban and rural areas as we would expect.

Column 4 includes controls for sanitation and development indicators for a given

municipality. These controls are defined as the percentage of FHP households that have

plumbing and some form of water sanitation treatment in their house in a municipality[11]. We see

that controlling for these actually increased the coefficient of interest to 1.362, a difference of

6.13%, and maintained the statistical significance at the 1% level.

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[10] (Aquino et al. 2009)
[11] I did not control for GDP per capita here to avoid collinearity with sanitation indicators.

The large dispersion of IMR across Brazil implies that many of the larger rates may be the source of the negative relationship presented in my results thus far. To test this, IMR was divided into low and high groups based upon the pre-intervention median rate[12] and then tested with the previous GDP and FHP controls. Results are presented in column 5 (high IMR) and 6 (low IMR). The relationship between large mortality rates and BFP is particularly strong, with above-median rates experiencing an average decline of 2.607 deaths per 1000 live births. The low IMR group, however, shows that rural areas experienced a higher decrease of .467 deaths per 1000 live births. Both are statistically significant at the 1% level. The coefficient for low IMR municipalities may be positive because investments in health mandated by the BFP conditionalities did not provide as positive returns to childhood health outcomes. To that end, they may have also increased strain on the public healthcare system due to jumps in demand. The strain may have caused increases in rural infant mortality if quality and/or quantity is reduced. This is a potential question to be examined in future research.

<u>6.3 Bolsa Familia Coverage and Bias</u>

Table 4:

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[12] The median IMR over this time period was 19.66.

Effect of BFP on Rural and Urban IMR.		
VARIABLES	(1) Log(Rural IMR)	(2) Log(Urban IMR)
Log(BFP coverage)	-0.0675**	-0.0134
	(0.0282)	(0.0174)
Observations	4,974	9,904
Adjusted R-squared	0.228	0.234
Municipality GDP	Y	Y
FHP Coverage	Y	Y
Sanitation Indicators	N	N

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For methodological and data purposes, I did not initially include a measure of Bolsa Familia in the primary regression. By omitting a measure of Bolsa Familia coverage, I assume that the program was rolled out uniformly across all municipalities. This assumption is difficult to uphold when we know that BFP did not cover all eligible program participants in every municipality by the end of 2008[13]. To test this assumption, I include three more robustness checks. Because BFP was not rolled out until 2004, I replace the After variable in my initial regression with the program coverage percentage and logarithm of program coverage, defined here as the percent of eligible people in the municipality that are enrolled and receiving the benefit. The results were neither statistically significant nor economically interpretable, and as a result, I have chosen to omit them. Interacting BFP coverage with rural status showed that increasing BFP coverage actually resulted in higher rural IMR versus urban IMR[14].

To address this issue from another standpoint, I also regressed the logarithm of BFP coverage percentage on logged IMR, broken into rural and urban subgroups from the years

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[13] We see in the data that this many municipalities still had below full coverage percent.
[14] There is also a potentially problematic assumption with this model in that we assume urban areas had uniform roll out of the program. Hence why I have chosen to omit results.

2004-2008[15]. Column 1 in table 4 reports the effect of BFP coverage on solely rural IMR over

the years 2004-2008. The coefficient indicates a 1 percent increase in BFP coverage resulted in a

0.0675% decrease in rural IMR and is statistically significant. The effects on urban mortality are

presented in column 2. We see that, while not statistically significant, a 1 percent increase in

BFP coverage for urban areas on average resulted in a .0134% decrease in IMR. While direct

interpretation of these results is not economically intuitive[16], the difference in magnitude

between confirm our previous findings. It appears that rural areas did in fact receive more benefit

from being enrolled in the program.

6.4 Potential Bias from excluding BFP coverage:

By not incorporating a direct measure of BFP into the general model, it is difficult to

interpret the relationship between rurality, the program, and its effect on infant mortality. By

excluding this variable, I am most likely omitting a potentially important factor in my

specification. The assumption of the model is that Bolsa Familia was implemented uniformly

over this time period, and that every eligible person was covered under the program immediately

in 2004. However, the data tells us that this is not the case. The majority of municipalities had

near-full or complete coverage by 2008[17], but many during the initial rollout of the program had

less than 50% enrolled. Omitting BFP coverage rates most likely results in a positive bias for the

parameter of interest, After*Rural. We see that the relationship between coverage rates and rural

IMR is negative. Furthermore, the relationship between rurality and coverage rates is also most

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[15] I once again cluster standard errors at the municipal level and control for year and municipality fixed effects.
[16] This may be in large part due to the reduced sample size. Many municipalities did not report BFP coverage rates over these years, thus limiting the sample severely.
[17] The average coverage rate was 83% in 2008.

likely negative, as rural areas typically have lower BFP coverage[18]. Both of these indicate that

coefficient of interest is positively biased, meaning the magnitude of the coefficient for

After*Rural in the initial specification is most likely underreported.

6.5 BFP and specific causes of death:

It is also worthwhile to breakdown the effect of BFP on several poverty-related,

preventable causes. As outlined in section 3, the mechanisms in BFP are designed to reduce

specific, preventable causes of death. I replaced IMR in my initial specification with the

percentages of deaths due to respiratory infections, gastrointestinal infections, and nutritional

status. However, the data is extremely limited for infant causes of death. It appears there is a

large lack of reporting causes of deaths for infants, specifically in rural areas. I have opted to

omit the results because they are neither statistically nor economically significant, despite

indicating minimal decreases in gastrointestinal infections. This is an area where future research

may be very beneficial so we are able to further breakdown the exact effects and investments in

health from being enrolled in BFP.

7 Discussion:

7.1 Program Mechanisms and theoretical framework:

As previously discussed, the rural poor face different implicit and explicit costs when it

comes to investing in their health stock. For example, distance to health clinics or lack of public

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[18] See table 1 for breakdowns of BFP coverage based upon rurality.

providers may discourage them from consuming health care. Furthermore, we see that rural

health indicators are worse than urban ones - IMR, for example, is typically higher for rural areas

in Brazil. Economic theory implies that investment in health stock when low will provide a

higher return - as outlined in the Grossman model for health (Bhattacharya 2013). Thus, we

would assume that investments in childhood and pre-gestational health made through BFP's

conditionalities will have a larger impact in rural areas. In other words, because rural areas have

higher base IMR, these investments will reduce infant mortality on a wider margin. The results

confirm this, as we see a larger decrease in IMR across rural municipalities after the rollout of

BFP.

The incentivized take up of health services may be the primary causes for the reduction in

rural infant mortality. Because the poor lack access to many social services, health care in

particular, the cash transfer incentive may encourage them to seek out access to health care. As

discussed in section 3, the conditionalities are the primary mechanism through which infant

mortality may be reduced. Economic theory also tells us that the the reduction in infant mortality

after the rollout of BFP may have been due to an increasing birth rate due to more people having

children in order to receive the benefit. Previous research has found this to not be true. In fact,

we see that BFP enrollment reduced the fertility rate from 2004-2006 (Signorini and Queiroz

2012).

One of the ways Bolsa Familia may have more positively impacted rural areas as well is

due to eligibility cut offs. Previous research finds that many urban poor have higher nominal

incomes and thus may be excluded from the program despite the positive impact it could have on

them (Higgins 2012). Thus, the rural poor may be disproportionately impacted by the program if a higher percentage of the population is eligible.

7.2 Study limitations

There are two main limitations to this study. The first is institutional in nature and refers to the implementation of Bolsa Familia Program. As previously mentioned, a major assumption made in this paper is that BFP implementation was uniform across the country. That is, municipalities enroll all eligible people in the year 2004. In reality, municipalities are free to promote the program to their target population as they wish. Most aspects apart from eligibility requirements and benefit amounts are determined by the municipal governments themselves. This heterogeneity in implementation makes it particularly difficult to study Bolsa Familia, as areas with less financial capabilities to implement the program may not reach the entire target population (Lindert et al. 2007). Others, however, may not have the political commitment to ensuring the program is executed successfully, especially if the public has negative view of Bolsa Familia.

Secondly, the data are somewhat limited given the rollout of the program. Because the rollout of the program happened in one year, this did not allow the possibility of creating a control group to effectively compare pre and post-intervention trends. A more effective analysis might have been to compare individuals in different municipalities with varying coverage rates. However, individual-level data was not available publicly for this time frame, another major limitation of the data. What this paper does instead is examine BFP from an ITT analysis, or intent-to-treat analysis because of these limitations.

This paper opens up further possibilities for future research. There are still extensive areas to study household decisions after participating in CCTs. In Brazil specifically, there is a wide gap in impact evaluations of BFP. Health outcomes are also another area that may be further examined when it comes to how rural households allocate resources while receiving the CCT benefit.

8 Conclusion:

This paper examines the differing effects of the Brazilian conditional cash transfer program, Bolsa Familia, on rural and urban infant mortality. I find that enrollment in BFP led to a reduction in rural infant mortality 6.21% larger than in urban zones. After controlling for the Family Health Program (health supply variables) and other infant mortality determinants, I show that results are still robust and consistent with initial findings. All of these findings were statistically significant. When broken down by cause of death, I find that BFP did not significantly impact poverty-related causes. However, this is most likely due to lack of data and underreporting of causes of death.

From a development standpoint, these findings point to the issues of "one-size-fits-all" poverty policies. We see that in a country as large as Brazil, national-level policies may disproportionately affect rural and urban poor given the vast differences that exist between the two groups. On another note, we see the importance of program implementation when doing impact evaluations. Bolsa Familia's decentralized implementation make it particularly difficult to analyze its effects. However, this study also leaves room for further evaluations of CCTs, specifically BFP. There are numerous extensions that can be made with the results presented here to further understand the interactions of public policy, poverty, and rurality.

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