

# Executive Summary

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This report summarizes the findings from the paper “**The Effects of Better Houses on Infant Health**”, from Cecilia Machado (FGV EPGE) and Laísa Rachter (FGV EPGE). The paper examines the effects of better houses on infant health in the context of Brazil’s Minha Casa Minha Vida program, which built roughly 900,000 million houses to poor households in Brazil during the period 2010-2017. We use a regression discontinuity design and administrative data to estimate the program’s effects on health at birth and infant health. We find the program reduced the share of households living in inadequate houses by 18 percentage points. We find this improvement in housing conditions led to increases in birth weight and decreases in infant (before 1 year) mortality caused by conditions originating in children’s perinatal period. We find no effect of the program in children with more than one year. Our results point out the importance of better houses in improving health at birth.

## Methodology & Data

We examine the effects of housing conditions on health at birth exploring exogenous changes in housing conditions coming from investments of the Minha Casa Minha Vida Program (hereafter, MCMV). The MCMV is a series of initiatives introduced in the late 2000s focused on helping households become homeowners. It is divided into different segments according to the income of the beneficiaries. We focus on segment I of the program. In this segment, the federal government provides funds for the construction of heavily subsidized houses for poor households (monthly income below R\$ 1,600 or US\$ 320 at the current exchange rates). We obtain causal estimates of the construction of these houses exploring differences in the MCMV rules that facilitated municipalities with a population above 50,000 inhabitants to obtain funds from the program. **This enables us to use a Regression Discontinuity (RD) design to estimate the effects of the MCMV program on health outcomes for municipalities close to the 50,000 inhabitants cutoff.**

We use data from multiple data sources. To obtain information on MCMV housing contracts, we use official data of the program’s contracts obtained from Caixa. To generate health outcomes on the municipality level, we use health data at birth, hospital admissions, and mortality from the Brazilian Ministry of Health (MS/DATASUS). Furthermore, to generate information on demographic and socio-economic characteristics, we use the 2010 Population Census.

## Results

1. We begin by exploring the MCMV contracts’ data to document the program’s investments increase at the 50,000 population threshold. **We find that the number of houses delivered by the program increases by 300-350 units during the period 2011-2017**

at the 50,000 inhabitants threshold. This corresponds to 14-18% of the housing deficit of the typical municipality to the left of the discontinuity.

2. **Birth weight.** We find that the birth weight increases by 12.9-15.6 grams at the 50,000 inhabitants threshold during 2011-2017. This effect is robust to different bandwidths and weighting procedures and statistically significant at the 5% levels regardless of the specification. Its magnitude corresponds to 0.4-0.5% of the mean birth weight in the sample. This is comparable to the effect of fasting during Ramadan on birth weight (see Almond & Mazumder (2011)) and the effect of job losses through announced notices during pregnancy (see Carlson (2015)). The increase in birth weight is driven by a combination of gestational length changes and birth weight conditional on gestational age (small for gestational age, thereafter SGA).<sup>1</sup> The share of pregnancies of less than 32 weeks decreases 0.2 p.p. (13% of the mean) while the share of SGA births decreases 0.8 p.p. (7.8% of the mean) at the discontinuity.
3. **Timing of the effect.** The effects of the MCMV on birth weight reflect a combination of changes in housing quality, housing costs, and labor market conditions. We use the timing of the effects to disentangle between these mechanisms. The program is expected to temporarily improve labor market conditions during the construction of the houses, improve housing quality, and permanently reduce housing costs after the houses are delivered. Thus, we expect the effects of the construction to be stronger in the program's early periods (when the program's investments are at their peak, but the number of units delivered is modest) and the effects of housing quality and costs to be stronger in the program's final periods (when the program's investments fall but the number of units delivered is considerable). We find the MCMV effects increase weakly through time, going from a statistically insignificant effect of fewer than 10 grams in 2011 to a statistically significant effect of more than 20 grams in 2017. This is suggestive evidence that the effects are driven primarily by housing quality and costs.
4. **Morbidity and Mortality.** We further examine the effects of the MCMV on children's morbidity and mortality from 0-1 and 1-5 years. We test the program's effects on overall hospitalization and mortality rates and hospitalization and mortality rates by causes. We focus on causes most strongly connected to housing conditions and sanitation, and consider infectious, nutritional, and respiratory diseases, and perinatal origin's affections (also the main drivers of infant/child morbidity and deaths (Organization et al., 2019)). For children between 0-1 year, we find no effects of the MCMV on morbidity. However, there is a negative and statistically significant effect on mortality due to perinatal conditions of 1.1 deaths per 1,000 births. This is consistent with the findings that the program improves health at birth. For children between 1-5 years, we find no effects either on morbidity or mortality.

## Contribution

There are several studies documenting positive effects of housing programs on different measures of adult health (e.g., Katz et al. (2001), Ludwig et al. (2013), Gale (2018) for the U.S., Barnhardt et al. (2017) for India, and Franklin (2019) for Ethiopia). There are also several studies documenting the positive effects of slum upgrading initiatives on the prevalence of diarrhea and respiratory problems on children (e.g., Cattaneo et al. (2009) and Galiani et al. (2017)). However, there is considerably less evidence linking housing policies and increases in housing quality with health at birth. We contribute to this literature by documenting the meaningful effects of a housing program in Brazil on infant health.

The health externalities our work uncovers have important implications for the debate on the design of housing policies. The UN estimates that close to 900 million people live in these poor housing conditions in cities throughout the developing world. To deal with this issue, governments typically invest heavily in constructing houses for poor households in the cities' peripheries. However, there is concern these programs hurt households as moving to peripheries might increase the distance to job opportunities, thereby reducing employment and earnings and inducing households to return to their original neighborhoods (e.g., Barnhardt et al. (2017) and Picarelli (2019)). We contribute to this literature by documenting that, despite their negligible or negative effect on adults' economic outcomes, the construction of houses for poor households improves the health outcomes of children. Because improvements in infant health generate long-run benefits in terms of human capital and income (e.g., Gould et al. (2011) and Lavy et al. (2016)), this suggests that the long-run return of these programs might differ substantially from their short-run return. This distinction between effects on adults and children has proved important in other settings (e.g., Chetty et al. (2016) and Kumar (2019)), and is suggestive housing programs might have substantially different intra and inter-generational effects.

This discussion of the effectiveness of housing programs in general mirrors the effectiveness of the MCMV program in particular. The literature on the program finds no effects of the MCMV on employment and earnings (Pacheco, 2019; Squarize Chagas et al., 2019; Belchior, 2019). **Our work shows that, despite its negligible effect on adults' economic outcomes, the MCMV improves the health outcomes of children.** This effect is important for assessing the program's cost-effectiveness. For instance, comparable effects on birth weight increases earnings in the long run by 1.7% (Bharadwaj et al., 2014).