

# Conditional cash transfer program and mortality in people hospitalized for psychiatric disorders: a quasi-experimental analysis of Brazilian Bolsa Familia Program

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This is the first study to estimate the association of Bolsa Familia Program (BFP), a conditional cash transfer, with mortality in individuals hospitalized with psychiatric disorders registered on the 100 Million Brazilian Cohort. **BFP was associated with a 7% reduction in overall mortality rate among beneficiaries, primarily driven by lower mortality due to natural causes of death.**

## BACKGROUND

- People living with psychiatric disorders have a higher risk of mortality compared to the general population<sup>1</sup>.
- Poverty contributes to these individuals experiencing more risky behaviors and receiving less healthcare<sup>2</sup>.
- Conditional cash transfer programs (CCTPs) have shown an association with reduced mortality in the general population<sup>3</sup>.
- However, there is a lack of studies investigating this among psychiatric patients.
- Aim of the study: to test the association of participating in a CCTP through Brazil's national BFP, and the risk of mortality due to overall, natural, and unnatural causes, as well as suicide, in those previously hospitalized with any psychiatric disorders.

## METHODS

- Design: Quasi-experimental study using Brazilian administrative datasets, linking social and health system data from the 100 Million Brazilian Cohort, a dynamic cohort, comprised of individuals registered on CadÚnico, the primary system to apply for social assistance in Brazil and BFP database<sup>4,5</sup>.
- Participants: 69,901 individuals aged 10 and older who were registered on CadÚnico following their first hospitalization with psychiatric disorder (defined by code "F", according to ICD-10) between January 1st, 2008 and December 31st, 2015.
- Follow-up:
  - BFP beneficiary: individuals were followed from the time they registered to receive the BFP benefit, and their follow-up ended either due to the individual's death by any cause, or on December 31st, 2015.
  - Non-beneficiary: individuals were followed from the time registered on CadÚnico, and their follow-up ended either due to their death by any cause, or the end of the follow-up period on December 31st, 2015.
- Statistical Analyses:
  - 1) Propensity score-based method (PS) using inverse probability of treatment weighting (IPTW) to promote comparability between treated and untreated groups
  - 2) Survival analysis model using Cox proportional hazard regression to estimate association between BFP and overall mortality
  - 3) Competing risk model using a Fine Gray model, which directly models the subdistribution hazard to estimate association between BFP and each cause of death (natural causes, unnatural causes and suicide)
  - 4) Sensitivity analysis: other PS based method using Stabilised Inverse Propensity Scores (SIPTW) and Kernel matching approaches as well as Poisson models and stratified analysis by sex and age groups

## RESULTS

- 26,556 (38%) of the individuals hospitalized with psychiatric disorders received BFP over the period. The average time after discharge was 2.86 years (SD=1.85).
- Before IPTW weighting, there were differences in sociodemographic characteristics between beneficiaries and non-beneficiaries (Fig. 1). After IPTW weighting, the groups became similar in sociodemographic characteristics (SMD<0.10).
- BFP was associated with a 7% reduction in overall mortality rate among beneficiaries, primarily driven by lower mortality due to natural causes (Table 1).
- For mortality due to unnatural causes and suicide, in particular, results were consistent with an effect, but they were not statistically significant (Table 1).
- We observed similar results in the sensitivity analysis (Table 1).
- A stronger reduction was observed for women (natural causes: HR: 0.73, 95%CI: 0.64 - 0.83; overall mortality: HR: 0.75, 95%CI: 0.67 - 0.85) and the younger population (natural causes: HR: 0.56, 95%CI: 0.33 - 0.95) (data not shown here).

## RESULTS CONTINUED

Figure 1. Study population characteristics by BFP participation, 2008-2015, N= 69,901

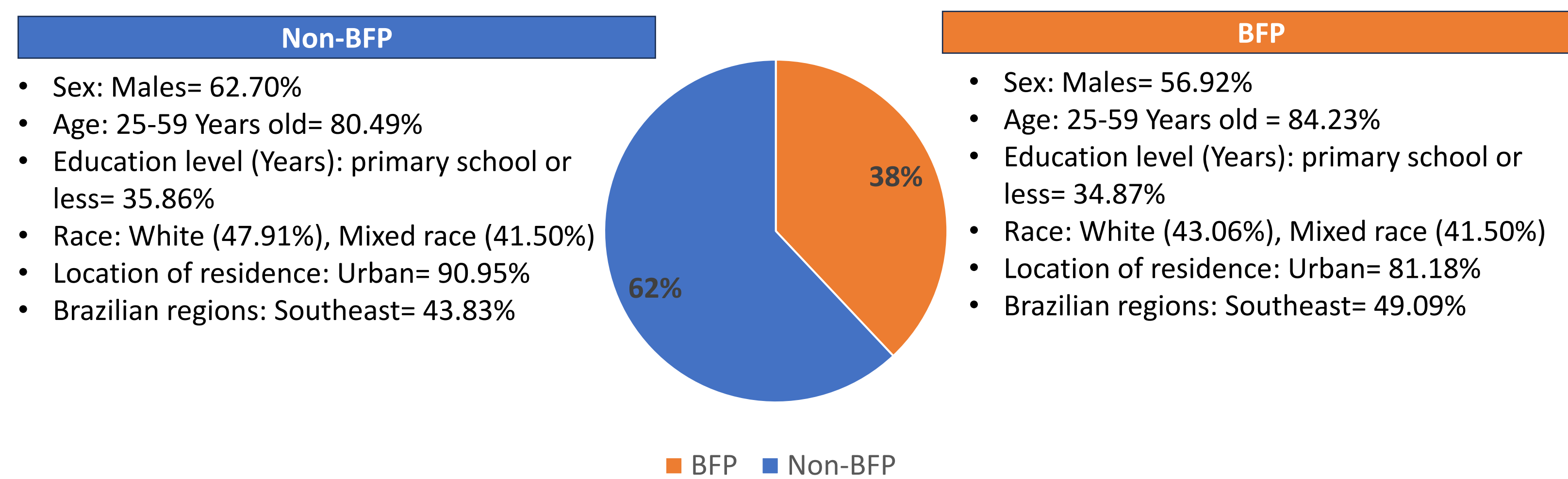


Table 1. Association of BFP participation with overall, natural, unnatural, and suicide mortalities, 2008-2015, N=57,905.

|                                   | Cox Model                     | Competing risk models      |                            |                    |
|-----------------------------------|-------------------------------|----------------------------|----------------------------|--------------------|
|                                   | Overall mortality<br>N= 2,960 | Natural causes<br>N= 2,327 | Unnatural causes<br>N= 633 | Suicide<br>N= 121  |
| Final model                       | HR (95% CI)                   | HR (95% CI)                | HR (95% CI)                | HR (95% CI)        |
| Cox adjusted with IPTW            |                               |                            |                            |                    |
| Non-BFP                           | 1.00                          | 1.00                       | 1.00                       | 1.00               |
| BFP                               | <b>0.93 (0.87, 0.98)</b>      | <b>0.89 (0.83, 0.96)</b>   | 1.14 (0.97, 1.33)          | 0.90 (0.68, 1.21)  |
| p value                           | 0.018                         | 0.001                      | 0.112                      | 0.514              |
| Sensitivity analysis              |                               |                            |                            |                    |
| Cox adjusted with SIPTW           |                               |                            |                            |                    |
| Non-BFP                           | 1.00                          | 1.00                       | 1.00                       | 1.00               |
| BFP                               | <b>0.91 (0.86, 0.97)</b>      | <b>0.87 (0.82, 0.93)</b>   | 1.21 (1.04, 1.40)          | 0.94 (0.71, 1.23)  |
| p value                           | 0.002                         | <0.001                     | 0.012                      | 0.642              |
| Cox adjusted with kernel matching |                               |                            |                            |                    |
| Non-BFP                           | 1.00                          | 1.00                       | 1.00                       | 1.00               |
| BFP                               | <b>0.77 (0.72, 0.81)</b>      | <b>0.74 (0.69, 0.78)</b>   | 1.02 (0.89, 1.18)          | 0.91 (0.69, 1.20)  |
| p value                           | <0.001                        | <0.001                     | 0.795                      | 0.502              |
| Poisson adjusted with IPTW        |                               |                            |                            |                    |
| Non-BFP                           | 1.00                          | 1.00                       | 1.00                       | 1.00               |
| BFP                               | 0.95 (0.89 - 1.01)            | <b>0.92 (0.86 - 0.98)</b>  | 1.08 (0.94 - 1.25)         | 0.91 (0.68 - 1.21) |
| p value                           | 0.089                         | 0.011                      | 0.243                      | 0.526              |

## CONCLUSIONS

- This study contributes to understanding the role of a CCTP in increasing the chance of survival in a population subgroup that disproportionately faces financial hardship and complex mental and physical health care needs.
- These findings illustrate the potential of BFP in advancing tertiary prevention within this highly vulnerable patient population.
- While not initially designed to address the heightened mortality risk in this population, our observations highlight the effectiveness of poverty alleviation in mitigating mortality rates in one of the highest-risk population subgroups.

## ADDITIONAL KEY INFORMATION

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- Funding Source: National Institute of Mental Health of the National Institute of Health (NIH) (Award number: R01MH128911)
- Declaration of interest: The authors declare no competing interests.
- Acknowledgments: We thank the data production team and all CIDACS/FIOCRUZ collaborators as well as the State University of Bahia (UNEB) and CIDACS for the funding to attend the congress.

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