The Impacts of a Conditional Cash Transfer Program on Children's Deaths and Hospitalizations in Brazil: A Cohort Analysis

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Abstract

This article examines the impacts of the Bolsa Família Program (BFP) on deaths and hospitalizations of Brazilian children born from 2004 to 2007, estimating the relationship between the percentage of program coverage in the year of birth and the total number of deaths and hospitalizations of individuals from zero to three years old, controlling for a series of fixed effects and municipality linear trends. The results show that the coverage of the BFP in the year of birth has significant impacts on the reduction of both indicators, being an important factor for the mortality reduction observed in this period in Brazil and playing an important role of protection during early childhood.

Keywords: Brazil; Health; Bolsa Família Program (BFP); Deaths; Hospitalizations; Differences in differences

1. Introduction

Brazil has been historically marked by great social inequalities, but in recent years it has undergone significant changes driven by changes in the labor market, access to education, and by conditional cash transfer programs (CCTP). While in 2003 there were 40.9 million people living in poverty in the country, in 2012 that number was reduced to 19.1 million (IPEA, 2013). Individuals living in situations of poverty most often face difficulties in access to health, education, and housing, and one of the possible ways to minimize such obstacles consists of governmental programs in the form of conditional cash transfers, in which the government transfers money to poor households in exchange of compliance with some conditions related to the children's health and education.

The Bolsa Família Program (hereafter also referred to as BFP) was created in 2003 by the Federal Government, and centralized some existing programs, consisting of providing resources to families in extreme poverty. In return, families were expected to meet some specific conditions related to health and education. The eligibility criteria to the BFP changes from time to time, and to be a beneficiary of the program in 2018 (MDS, 2021) it was necessary to have a monthly family income per capita of up to R$89 (situation of extreme poverty) or R$178 (situation of poverty). In the first case, there is a fixed benefit of R$89. There is the possibility of receiving a variable additional benefit of R$41 per beneficiary up to a limit of $ 205 per family, if the household is in extreme poverty or poverty and has pregnant women, nursing mothers, children between zero and twelve years old or adolescents up to fifteen years. In the case of adolescents between sixteen and seventeen years old, there is a benefit of R$48 per beneficiary, with a limit of R$96 per family, if the teenager is enrolled in school. There is also the possibility of an additional benefit, in order to overcome extreme poverty if the sum of family income and previous benefits does not reach R$89 per capita.

The beneficiary families of the BFP are responsible for complying with some conditionalities imposed by the government, aiming to promote access to the public health network, education and social assistance services. In relation to education, beneficiaries from six to fifteen years old must have a minimum monthly school attendance of 85%, while those over fifteen years old must have 75%. In terms of health, children under the age of seven must have their vaccination up to date, according to the National Immunization Program, and must have nutritional, weight and height monitoring. Pregnant women should have pre- and post-natal follow-up, in addition to

educational activities on health and nutrition. Whenever possible, health conditionalities must be met through the Family Health Strategy (FHS), a program that covers more than 98% of Brazilian municipalities, created in 1994 to disseminate and facilitate access to primary care and basic health services.

Conditional cash transfer programs have been adopted by several Latin American countries since the 1990s, in response to the foreign debt crisis. Mexico was one of the pioneers to adopt this type of initiative on a large scale, with *Progresa*, and positive results have encouraged other countries to do the same. Lagarde et al (2009) make a broad review of the available literature on the results of this type of intervention, analyzing mainly *Progresa*, but also the *Programa de Asignación Familiar* (Honduras), the *Red de Protección Social* (Nicaragua), the *Bolsa-Alimentação* (Brazil), and *Familias in Acción* (Colombia). The results found by the authors indicate that PTCRs can play an important role in increasing the use of health services (Maluccio, 2004), reducing the likelihood of diseases in children under three years of age (Gertler, 2004), and increasing immunization of children up to two years old (Attanasio, 2005).

There are several studies that directly address the impact of these programs on infant mortality. Barham (2010) uses a model of differences in differences to estimate the impact of *Progresa* on infant (less than one year old) and neonatal (up to 27 days old) mortality, and estimates that the program reduced infant mortality by 17% in Mexican rural areas, reaching up to 47% in poorest municipalities. In Brazil, Rasella et al (2013) use a negative binomial regression model with fixed effects and find significant reductions both in the mortality rate and in hospitalizations for children under five years old associated with the BFP. The mechanism described by the authors occurs through the increase in the access to food and other goods, in addition to the health services themselves, provided by the increase of household's income arising from the BFP and also from the conditionalities imposed on the beneficiaries. Shei et al (2014) show that the BFP increases the likelihood of children under seven years old of seeking preventive health services, in addition to increased growth monitoring, vaccinations and health checkups. Guanais (2015) finds that the BFP and the FHS contributed significantly and jointly to the reduction of post-neonatal mortality (between 28 and 364 days of life) observed in Brazil from 1998 to 2010.

We emphasize that there may be two main channels through which the BFP acts to reduce deaths and hospitalizations, and since we are working with the overall program

coverage it might be difficult to disentangle them. The first one relies on the income improvement experienced by benefited households, through the direct cash transfer (discussed in detail above). Since beneficiaries are living in poverty or extreme poverty conditions, it might be expected that the additional income provided by the BFP will provide an increased access to basic health (Gaardner et al, 2010) and food items (Ligani et al, 2010). This could lead to better health outcomes on children, who will be less prone to undernutrition and its consequences such as diarrhea, stunting issues and other conditions that could translate into hospitalizations and, in more serious cases, deaths. The second channel is also very important, since this article focuses on health outcomes of children aged less than three years old. The conditionalities imposed by the program are centered mainly on the maternal and child health, with actions such as prenatal, postnatal care, educational activities for the mother and regular health checkups for the child. There is a vast literature pointing out the importance of both pre and postnatal care, as well as the mother's education on children's health (Gunes, 2015; Chen and Li, 2016; Leal et al, 2020). Therefore, the cash transfer and the conditionalities might have joint effects on deaths and hospitalizations during early childhood.

Even though there are a reasonable number of articles showing the impacts of conditional cash transfers on health outcomes on a worlwide perspective, there are still considerable gaps that could be filled, especially in Brazil, bringing more empirical evidence to the debate of the costs and benefits involved in this kind of initiative. In this sense, Rasella et al (2013) brings important evidence on the BFP and FHS impacts on under-5 mortality and hospital admissions from 2004 to 2009, analyzing the simultaneous association (i.e., in the same year) between the dependent and independent variables. Our study, on the other hand, proposes a different methodological approach, focusing on the cohorts born during the BFP implementation period and examining the impact of the program coverage in the year of birth when individuals are zero to three years old. Therefore, we look at the association between BFP coverage and the number of deaths/hospitalizations both in the present and in the future, so it is possible to account for cumulative effects that the program could have in later years. Additionally, this strategy allows us to control for a series of confounders, such as interactions of municipalities and year fixed effects, State and cohort fixed effects and the inclusion of municipality-specific cohort linear trends, for example.

The purpose of this work then is to expand the discussion about the impacts of the BFP on mortality and hospitalizations of individuals between zero and three years old, using an ecological and longitudinal study design, with a panel encompassing all Brazilian municipalities and following different cohorts (generations), born from 2004 to 2007, a period in which the greatest expansion of the Bolsa Família Program occurred. Despite the existence of several studies associating the BFP with infant deaths and hospitalizations, we have not identified in the literature studies based on cohort analyses, which allow the use of a variety of statistical controls. This article aims to fulfill this lacunae.

2. Data and Methods

This work uses data on deaths, hospitalizations and coverage of the Bolsa Família (BFP) and Family Health Strategy (FHS) programs, respectively, from the Ministry of Health (SIM-DO and SIH-RD), the Ministry of Social Development and of the Department of Primary Care (DAB-MS). The construction of the database took into account information on all deaths and hospitalizations recorded in Brazilian municipalities from 2004 to 2017, centering the analysis on generations (cohorts) born from 2004 to 2007, aged between zero and three years. We observed the results of the expansion of the Bolsa Família Program on deaths and hospitalizations through the percentage of coverage in relation to the total population in each municipality, in the year of birth of each generation. Data related to the coverage of the Family Health Strategy were also included, both individually and in interactions with the BFP, to capture possible joint effects.

To compare geographic areas consistently over time, we use Minimum Comparable Areas (MCAs), based on a territorial classification that makes Brazilian municipalities compatible between 1998 and 2010. From 1998 to 2017, 63 municipalities were created, and to make data compatible every year, we aggregate information in 5505 municipalities using a software developed by PUC-Rio. Thus, the base used has, for each of the municipalities, information associated with the generations born from 2004 to 2007 aged between zero and three years, totaling 77070 observations. We also verified, as a complementary analysis, the effects of the BFP on the same generations when they are four to eleven years old. For this secondary group, we have 165150 observations.

Statistical Analysis

The database contains cohorts of municipalities, denoted by *m*, born in year *c* in which the outcome variables *y*, deaths or total hospitalizations, are analyzed in year *t*. We explored the fact that, for each cohort and municipality, the data has a different age dimension, so that we can control for a series of factors that can simultaneously affect the dependent and independent variables but are constant over time. Thus, the estimated equation is as follows:

$$y_{cmt} = \alpha + \beta \times PBF_{cm} + \mu_m + \omega_t + \upsilon_c + \delta_{UF,c} + \gamma_m \times c + \eta_{tc} + \xi_{mt} + \varepsilon_{cmt} \quad (1)$$

Where PBF_{cm} indicates the percentage of coverage of the PBF in municipality *m*, in the year of birth of cohort *c*; $\mu_m, \omega_t, \upsilon_c$ are, respectively, municipality fixed effects, current year fixed effects, and cohort fixed effects; $\delta_{UF,c}$ are interactions between state and cohort fixed effects, $\gamma_m \times c$ are municipality specific linear trends over cohorts, η_{tc} are interactions between current year and cohort fixed effects, ξ_{mt} are interactions between municipality and current year fixed effects and ε_{cmt} is an error term. Standard errors are robust to autocorrelation and have been clustered at the municipality level, both for observations of the same cohort in different years, and for different cohorts.

With this specification, through municipality fixed effects, we can control for pre-existing differences between the municipalities that are constant over time, but that could influence the decision to expand the BFP, and be correlated with deaths and hospitalizations. Other factors, such as differences related to geographic, cultural or historical characteristics are also covered by these fixed effects. The expansion of the BFP could be related to specific dynamics at the state and municipal level, such as negative external shocks on socioeconomic indicators, which could impact, in the future, the number of deaths and hospitalizations. Thus, following Rocha and Soares (2010), we include both interactions between state and cohort, as well as between cohort and current year. We also included linear municipal trends in relation to the cohorts, making it possible, therefore, not to include the total number of live births as a control, which is a variable with considerable measurement error (Andrade and Szwarcwald, 2007). Although the total number of deaths and hospitalizations also has a potential measurement error, there is a tendency to improve the collection and dissemination of these type of data over time, so that estimates pointing to a reduction in both indicators could be underestimated (or conservative). By using interactions between cohort fixed effects and

current year as control, we capture shocks and dynamic trends that affect all units in each year of birth and current year. Additionally, we also control for possible effects of public health policies that could influence deaths and hospitalizations adopted in a certain year, for each municipality, through the interactions between municipality and current year fixed effects.

As a robustness analysis, we tested specifications using the presence of the program and conducted placebo tests using the coverage of the program at a later age than it was being analyzed (at the age of four), in addition to including interactions between the BFP and the FHS, a primary care health program with significant expansion since 1998 and that could affect the number of hospitalizations and deaths of children. We also conducted tests considering the ICD-10 chapters with the highest prevalence in deaths and hospitalizations of children in this age group, as well as diseases related to poverty. As an additional placebo test, we tested BFP coverage, and the ICD-10 Chapter of external causes. We also conducted statistical exercises using indicators for three levels of coverage of the PBF (Rasella et al, 2013): low (<17% of the population), intermediate (17% to 32%) and high (> 32%). When controlling by municipality, cohort and current year, there is no variation observed for specific municipal linear trends for some observations. Thus, the final sample is composed of 77070 observations, which are described in detail in Table 1.

3. Results

Tables 2 and 3 show, respectively, the mean and standard deviation (in parentheses) of the number of deaths and hospitalizations recorded in each cohort, in each year analyzed, so that $age = current\ year - cohort$. Thus, the "Total" column shows the average number of deaths/hospitalizations for each generation, considering all ages, while the "Total" line shows the average observed in each current year, considering all the generations analyzed in the period together. It is observed that, through the 2004 to the 2007 cohort, there is a continuous reduction in both the average number of deaths and hospitalizations, in the ages of zero to three years old. The average number of deaths in the year of birth, for example, is reduced by almost 12%; at one year old, 21%; two years old, 12% and 10% at three years old. As for hospitalizations, there is a 10% reduction in the year of birth, 17.6% at one year of age and 13.5% at two years old. These numbers refer only to the sample used in the regressions, when comparing the 2007 and 2004 cohorts (and in the case of the year of birth, 2007 and 2005).

Table 4 shows the percentage coverage of the BFP from 2004 to 2007. It is possible to see that there was a significant expansion in the first three years, and subsequently (2007) there is a reduction in the average coverage in the municipalities in relation to the total population. It should be noted that in 2004 the program was present in almost all Brazilian municipalities already (~ 99%).

In Tables 5 and 6 we show the estimation of Equation (1), adding controls to each column. Column (5) contains all the controls described in the Methodology. Table 5 shows the relationship between the coverage of the BFP in the year of birth and the number of deaths of the generations born from 2004 to 2007, when they are less than four years old. We found a negative association between the coverage of the program and the number of deaths in all specifications. In addition, all columns have statistically significant coefficients, but when we include the controls, the magnitude drops considerably. More specifically, the coefficients decrease when we include municipal linear trends over the cohorts, which in the model fulfill the role of controlling for the size of each generation. We estimate that the marginal increase of 1% in the coverage of the BFP over the total population of the municipality is related to the decrease of 1.5 deaths of children from zero to three years old. In Table 6, which relates the BFP to the number of hospitalizations, the results are similar, but the magnitude of the effect is greater. An increase of 1% in the coverage of the BFP is associated with a reduction of 6 hospitalizations of children from zero to three years old.

In Table 7 we carried out a robustness test of our main specification, including the municipal coverage of the BFP four years after the birth of the cohorts. Thus, we performed a placebo test, as we hope that the coverage of this period does not maintain a statistically significant relationship with deaths and hospitalizations of individuals from zero to three years of age. The Table shows that both coefficients are not significant, providing some degree of robustness to our results.

In Table 8 we use three coverage indicators, based on Rasella et al (2013): low (less than 17%), intermediate (between 17% and 32%) and high (greater than 32%). The BFP seems to reduce the number of deaths in a similar way, but there is a small increase in the effect according to the percentage of the population covered. All coefficients are statistically significant. In the case of hospitalizations, however, we found an effect of less intensity, and not statistically significant.

In Tables 9 and 10 we tested whether there are joint effects between the BFP and the FHS on deaths and hospitalizations, respectively. The first column includes only the coefficient related to the BFP, the second includes the coefficient related to the FHS and in the third column we include the term of interaction between both. There is a negative relationship between the percentage of FHS coverage and the total number of deaths, but of a lesser magnitude compared to the BFP. Municipalities with high coverage in both programs seem to decrease the number of deaths even further, avoiding, on average, about 1.3 additional deaths in relation to the municipalities with low coverage. We found a positive and statistically significant relationship between the FHS and the number of hospitalizations, possibly resulting from the increase in access to the public health system. The interaction term between the BFP and the FHS is also positive (an increase of 5.7 hospitalizations, on average) and significant, reinforcing the hypothesis that greater access to the health system may have an influence on the detection of diseases and increase the possibility of treatment, through hospitalizations.

Table 11 shows the results of the regression of the coverage of the BFP on deaths of individuals from zero to three years of age, stratifying by the Brazilian macro-regions. We found statistically significant results for the North, Northeast, Southeast and South. Interestingly, the coverage of the BFP is positively associated with the number of deaths in the North. We believe that this could be the result of an increase in notifications and records of deaths by the public health system promoted by the BFP, and not exactly as a direct result. In the Southeast, we noticed a greater magnitude of the effect, with the coverage of the Program associated with a reduction of 6 deaths. Such a discrepancy could be due to the greater number of individuals in the cohorts of this region; while in the other regions we see cohorts of up to 45 thousand individuals, in the Southeast this number reaches 179 thousand. Table 12 shows the effects of the Program's coverage on hospitalizations, separating by regions, and we observed significant results for the Southeast, with 1% increase in the coverage of the PBF being associated with a reduction of 23 hospitalizations. For other regions, the association is always negative, except for the Midwest. In Table 13, we include the same generations, but at a more advanced age, from four to eleven years old. We did not find significant results for deaths, but the BFP seems to influence the reduction in hospitalizations (-1.5) for this age group.

In Table A1 in the Appendix, we test our main specification (with the exception of the interaction between municipality and year, since there are not multiple periods of time

when analyzing only one age group) by age, separately, and found significant effects of the BFP on deaths only for the three-year-old group (-0.25). In Table A2, in which we tested the effects of BFP on hospitalizations by age groups separately, we found significant effects for four and five years old, with coefficients of -4.8 and -4.9, respectively. In Tables A3 and A4, we test the impacts of the presence of the BFP, of the FHS, and the interaction between both in the deaths and hospitalizations, respectively, of children from zero to three years of age. We found a negative and significant association between the presence of the two programs and the number of deaths, but we found no effects on the interaction between both. In the case of hospitalizations, we found only a positive and significant association at the level of 10% for the presence of the Family Health Strategy and the number of hospitalizations.

Table A5 shows the impact of BFP coverage on deaths and hospitalizations on selected chapters of the ICD-10 classification. We selected three chapters that are responsible for a significant parcel of deaths and hospitalizations in this age group (Chapter 16: some conditions originating in the perinatal period; Chapter 10: diseases of the respiratory system; Chapter 17: congenital malformations, deformities and chromosomal abnormalities) and one chapter in which we would not theoretically expect effects from the program, serving again as a robustness test (Chapter 20: external causes). The results indicate a negative and statistically significant association for deaths and hospitalizations in chapter 16, and for deaths in chapters 10 and 17. We did not find significant results for chapter 20, referring to external causes. Finally, in Table A6, we verify the impact of the BFP on deaths and hospitalizations due to Conditions Sensitive to Primary Care, and from diseases related to poverty (diarrhea, malnutrition and respiratory infections). We found a negative, but not significant, association between BFP and deaths from both causes, and a positive one for hospitalizations, with the BFP coverage coefficient being significant at the level of 10% in relation to hospitalizations due to poverty-related illnesses.

4. Discussion

Our results show that the coverage of the BFP is associated with a decrease in the number of deaths and hospitalizations of the cohorts born from 2004 to 2007, when they are between zero and three years old. This relationship is maintained even after the inclusion of several fixed effects and specific linear trends of municipalities, including interactions between municipalities and current year fixed effects, which capture the

effects of regional health policies in the current year. The percentage of coverage of the BFP at birth is associated with a reduction of 1.5 deaths and 6 hospitalizations in the municipalities. Considering the average coverage (28.7%) of the Bolsa Família Program in Brazilian municipalities for the period concerning 2004-2007, we estimate that the Program may be associated with a drop in the order of 43 deaths and 172 hospitalizations per year, in each cohort (which may vary according to the degree of coverage in each municipality).

We tested specifications with the coverage intensity of the BFP and found heterogeneous effects, in which greater coverage is associated with stronger effects in the reduction of deaths. In addition, agreeing with results previously found (Rasella, 2013), we observed that the interaction between the BFP and the FHS enhances the reduction in the number of deaths. This relationship, however, is reversed in the case of hospitalizations; we found a positive association in the order of 5.7 hospitalizations associated with the term of interaction between the two programs, bringing the hypothesis that an expanded access to the public health system, coupled with conditionalities imposed by the PBF, allow for greater detection and mapping of susceptible diseases that require hospitalization for children from zero to three years of the analyzed cohorts.

There are two main mechanisms by which the BFP could affect these indicators. First, the transfer of financial resources implies an increase in household income, consequently expanding the family's access to pharmaceutical and personal hygiene products, and to a greater availability and quality of food consumed (Gaardner et al, 2010), for example. Thus, the increase in income translates into better living conditions, implying a reduction in the incidence of diseases. This is true not only for the children themselves, but also for the mother: there is strong empirical evidence that interventions that improve maternal health can contribute to the reduction of children with growth problems, malnutrition and nutrient deficiencies (Britto et al, 2016). The second channel occurs through the conditionalities of the program; with the requirements of nutritional and prenatal monitoring, keeping the vaccination portfolio up to date and encouraging greater contact with the FHS, the health care of individuals is enhanced, which can also affect the number of deaths and hospitalizations.

Infant mortality in Brazil has dropped significantly in the past two decades. In 2000, the rate was 29 deaths per 1000 births, while in 2015 it was 13.8 (IBGE, 2021). If we consider the period analyzed in this study, the infant mortality rate observed in the 2004-

2010 period fell by 26.4%, while in the 2000-2004 period the reduction was 19.4%. In other words, even before the implementation of the Bolsa Família Program, there was already a downward trend in this indicator, and the results presented show that the BFP, as well as the FHS, contributed positively to this process. To provide robustness to our analysis, we used placebos consisting of coverage of the Program in posterior years than the periods in which we analyzed deaths and hospitalizations, as well as chapters of ICD-10 that theoretically should not be affected through the mechanisms described above. Both tests did not show statistically significant results, which leads us to believe that the BFP contributed, in fact, to the reduction of deaths and hospitalizations. Furthermore, by focusing the analysis on the cohorts and using data for all Brazilian municipalities, we were able to use a series of statistical controls in several dimensions, including interactions between the municipality and the current year, and linear municipal trends on cohorts, thus allowing us to control for possible endogeneities in the adoption to the Program (Rocha and Soares, 2010) and for possible measurement errors in the dependent variables.

We contributed to the literature by bringing evidence that the BFP, a cash transfer program with conditionalities, is associated with decreases in the number of deaths and hospitalizations in early childhood of generations born at the time of creation and greater expansion of the Program, using data for all Brazilian regions and municipalities. This result reinforces the idea that this type of intervention can be efficient to improve the living conditions of part of the population living in poverty and extreme poverty at a reasonable cost to the government, showing itself as an important component of public policy, especially in a middle-income country like Brazil.

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Tables

Table 1. Observations: 0 to 3 years (N=77,070)

Cohort (birth year)	Current year					Total
	2005	2006	2007	2008	2009	
2004	5505	5505	5505	0	0	16515
2005	5505	5505	5505	5505	0	22020
2006	0	5505	5505	5505	5505	22020
2007	0	0	5505	5505	5505	16515
Total	11010	16515	22020	16515	11010	77070

Note – Data are the number of observations.

Table 1. Observations: 4 to 11 years (N=165,150)

Cohort (birth year)	Current year									Total
	2009	2010	2011	2012	2013	2014	2015	2016	2017	
2004	5505	5505	5505	5505	5505	5505	5505	0	0	38535
2005	5505	5505	5505	5505	5505	5505	5505	5505	0	44040
2006	0	5505	5505	5505	5505	5505	5505	5505	5505	44040
2007	0	0	5505	5505	5505	5505	5505	5505	5505	38535
Total	11010	16515	22020	22020	22020	22020	22020	16515	11010	165150

Note – Data are the number of observations.

Table 2. Deaths (N=77,070)

Cohort (birth year)	Current year					Total
	2005	2006	2007	2008	2009	
2004	1,7	0,5	0,3	-	-	0,8
	(8,2)	(2,4)	(1,5)	-	-	(5)
2005	8,1	1,5	0,5	0,3	-	2,6
	(39,2)	(7,7)	(2,2)	(1,3)	-	(20,3)
2006	-	7,6	1,4	0,4	0,3	2,4
	-	(38,2)	(6,8)	(2,1)	(1,4)	(19,7)
2007	-	-	7,2	1,3	0,4	3
	-	-	(36,3)	(6,7)	(2,2)	(21,6)
Total	4,9	3,2	2,3	0,6	0,4	2,4
	(28,5)	(22,8)	(18,7)	(4,2)	(1,8)	(18,3)

Note – Data are the municipal average of deaths (SD).

Table 3. Hospitalizations (N=77,070)

Cohort (birth year)	Current year					
	2005	**2006**	**2007**	**2008**	**2009**	**Total**
2004	74,3	45,8	27,9	-	-	49,3
	(346)	(188,8)	(134,6)	-	-	(241,2)
2005	65,3	75,8	41,6	28,8	-	52,9
	(418,1)	(345,9)	(183,7)	(126,6)	-	(293,9)
2006	-	63,7	65,9	40,2	28,2	49,5
	-	(410,5)	(335)	(167,6)	(128,1)	(285,6)
2007	-	-	58,5	61,2	39,6	53,1
	-	-	(418,5)	(284,1)	(173,6)	(308,9)
Total	69,8	61,7	48,5	43,4	33,9	51,2
	(383,8)	(328,7)	(291,6)	(204,4)	(152,6)	(284,4)

Note – Data are the municipal average of hospitalizations (SD).

Table 4. BFP coverage in the year of birth (N=77,070)

	2004	**2005**	**2006**	**2007**	
BFP Coverage	0,21	0,27	0,33	0,33	
	(0,14)	(0,16)	(0,2)	(0,19)	
	0	0	0	0	Min
	0,84	1	1	1	Max

Note - Data are the average coverage of the BFP in the municipalities (SD). BFP coverage is the proportion of the population covered by the program in Brazilian municipalities.

Table 5. BFP in the year of birth and number of deaths

	Deaths			
	(1)	**(2)**	**(3)**	**(4)**
BFP coverage (%) in the year of birth	-5.461***	-12.65***	-1.506***	-1.509***
	(1.767)	(1.942)	(0.370)	(0.370)
Constant	3.812***	5.876***	2.677***	2.678***
	(0.507)	(0.557)	(0.106)	(0.106)
Year fixed effect	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes
Interaction State*Cohort	No	Yes	Yes	Yes
Municipality linear trend (over cohort)	No	No	Yes	Yes
Interaction Cohort*Year	No	No	No	Yes
Observations	77,070	77,070	77,070	77,070
R-squared	0.544	0.558	0.812	0.819
Dependent variable average	2.244	2.244	2.244	2.244
Number of municipalities	5505	5505	5505	5505

Note - Data are estimated mean effect (standard error) of BFP on deaths. Models adjusted with fixed effects of municipality, cohort, current year and interactions between municipality and current year. Additional controls for interactions of fixed effects between state and cohort, municipality linear trends and for interactions of the other fixed effects are subsequently introduced in each column. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007, aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1.

Table 6. BFP in the year of birth and number of hospitalizations

	Hospitalizations			
	(1)	**(2)**	**(3)**	**(4)**
BFP coverage (%) in the year of birth	-77.17***	-67.00***	-6.030***	-6.050***
	(16.00)	(11.78)	(1.867)	(1.869)
Constant	73.34***	70.43***	52.93***	52.93***
	(4.593)	(3.381)	(0.536)	(0.536)
Year fixed effect	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes
Interaction State*Cohort	No	Yes	Yes	Yes
Municipality linear trend (over cohort)	No	No	Yes	Yes
Interaction Cohort*Year	No	No	No	Yes
Observations	77,070	77,070	77,070	77,070
R-squared	0.896	0.898	0.977	0.978
Dependent variable average	51.20	51.20	51.20	51.20
Number of municipalities	5505	5505	5505	5505

Note - Data are estimated mean effect (standard error) of BFP on hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year and interactions between municipality and current year. Additional controls for interactions of fixed effects between state and cohort, municipality linear trends and for interactions of the other fixed effects are subsequently introduced in each column. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007, aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1.

Table 7. BFP coverage in deaths and hospitalizations: placebo

	Deaths		Hospitalizations	
		Placebo		Placebo
	(1)	(2)	(3)	(4)
BFP coverage (%) in the year of birth	-1.506***	-1.544***	-6.032***	-5.812***
	(0.370)	(0.367)	(1.868)	(1.834)
BFP coverage 4 years after birth		0.586		-3.426
		(0.465)		(2.811)
Constant	2.677***	2.513***	52.93***	53.89***
	(0.106)	(0.179)	(0.536)	(1.052)
Year fixed effect	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes
Observations	77,070	77,070	77,070	77,070
R-squared	0.819	0.819	0.978	0.978
Dependent variable average	2.244	2.244	51.20	51.20
Number of municipalities	5505	5505	5505	5505

Note - data are estimated mean effect (standard error) of the BFP on deaths and hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table 8. BFP intensity and deaths/hospitalizations

	Deaths	Hospitalizations
	(1)	(2)
Small coverage in birth year	-1.128***	0.0461
	(0.265)	(1.063)
Intermediate coverage in birth year	-1.319***	-0.601
	(0.291)	(1.247)
High coverage in birth year	-1.510***	-1.476
	(0.298)	(1.309)
Constant	3.572***	51.92***
	(0.282)	(1.181)
Year fixed effect	Yes	Yes
Municipality fixed effect	Yes	Yes
Cohort fixed effect	Yes	Yes
Interaction State*Cohort	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes
Interaction Cohort*Year	Yes	Yes
Interaction Municipality*Year	Yes	Yes
Observations	77,070	77,070
R-squared	0.819	0.978
Dependent variable average	2.244	51.20
Number of municipalities	5505	5505

Note - data are estimated mean effect (standard error) of the BFP on deaths and hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table 9. BFP and FHS coverage and the number of deaths

	Deaths		
	(1)	**(2)**	**(3)**
BFP coverage (%) in the year of birth	-1.506***		-0.438
	(0.370)		(0.512)
FHS coverage (%) in year of birth		-0.163**	0.219*
		(0.0728)	(0.124)
Interaction between BFP and FHS			-1.295***
			(0.375)
Constant	2.677***	2.360***	2.502***
	(0.106)	(0.0514)	(0.159)
Year fixed effect	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes
Observations	77,070	77,070	77,070
R-squared	0.819	0.819	0.819
Dependent variable average	2.244	2.244	2.244
Number of municipalities	5505	5505	5505

Note - data are estimated mean effect (standard error) of the BFP and FHS on deaths. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table 10. BFP and FHS coverage and the number of hospitalizations

	Hospitalizations		
	(1)	**(2)**	**(3)**
BFP coverage (%) in the year of birth	-6.032***		-10.72***
	(1.868)		(2.958)
FHS coverage (%) in year of birth		1.459***	-0.206
		(0.415)	(0.758)
Interaction between BFP and FHS			5.678**
			(2.360)
Constant	52.93***	50.17***	53.17***
	(0.536)	(0.293)	(0.853)
Year fixed effect	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes
Observations	77,070	77,070	77,070
R-squared	0.978	0.978	0.978
Dependent variable average	51.20	51.20	51.20
Number of municipalities	5505	5505	5505

Note - data are estimated mean effect (standard error) of the BFP and FHS on hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table 11. BFP coverage and the number of deaths: Brazilian regions

	Deaths				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	North	**Northeast**	**Southeast**	**South**	**Midwest**
BFP coverage (%) in the year of birth	1.486**	-1.417***	-6.092***	-2.811***	-0.836
	(0.697)	(0.518)	(1.677)	(0.875)	(0.518)
Constant	3.108***	3.129***	3.730***	1.561***	2.170***
	(0.215)	(0.243)	(0.337)	(0.141)	(0.0932)
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes	Yes
Observations	6,286	25,018	23,324	16,226	6,216
R-squared	0.833	0.799	0.824	0.799	0.806
Dependent variable average	3.565	2.463	2.505	1.107	2.020
Number of municipalities	449	1787	1666	1159	444

Note - data are estimated mean effect (standard error) of the BFP on deaths. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table 12. BFP coverage and the number of hospitalizations: Brazilian regions

	Deaths				
	(1)	(2)	(3)	(4)	(5)
	North	Northeast	Southeast	South	Midwest
BFP coverage (%) in the year of birth	1.486**	-1.417***	-6.092***	-2.811***	-0.836
	(0.697)	(0.518)	(1.677)	(0.875)	(0.518)
Constant	3.108***	3.129***	3.730***	1.561***	2.170***
	(0.215)	(0.243)	(0.337)	(0.141)	(0.0932)
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes	Yes
Observations	6,286	25,018	23,324	16,226	6,216
R-squared	0.833	0.799	0.824	0.799	0.806
Dependent variable average	3.565	2.463	2.505	1.107	2.020
Number of municipalities	449	1787	1666	1159	444

Table 13. BFP in birth year and number of deaths/hospitalizations: 4 to 11 years old

	Deaths	Hospitalizations
	(1)	(2)
BFP coverage (%) in the year of birth	-0.0483	-1.454***
	(0.0311)	(0.531)
Constant	0.157***	14.82***
	(0.00889)	(0.152)
Year fixed effect	Yes	Yes
Municipality fixed effect	Yes	Yes
Cohort fixed effect	Yes	Yes
Interaction State*Cohort	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes
Interaction Cohort*Year	Yes	Yes
Interaction Municipality*Year	Yes	Yes
Observations	165,150	165,150
R-squared	0.829	0.994
Dependent variable average	0.144	14.41
Number of municipalities	5505	5505

Note - data are estimated mean effect (standard error) of the BFP on hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 4 to 11 years, in the years 2009 to 2017. Significance: *** p <0.01, ** p <0.05, * p <0.1

Appendix

Table A1. BFP coverage in birth year and the number of deaths: age groups

	Deaths						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Age	**0**	**1**	**2**	**3**	**4**	**5**	**6**
BFP coverage (%) in the birth year	1.088	0.247	-0.0551	-0.253**	0.0480	-0.106	-0.195
	(1.070)	(0.312)	(0.159)	(0.117)	(0.110)	(0.101)	(0.157)
Constant	7.196***	1.391***	0.467***	0.339***	0.190***	0.202***	0.207***
	(0.331)	(0.0887)	(0.0451)	(0.0332)	(0.0312)	(0.0288)	(0.0425)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Municipality*Year	No	No	No	No	No	No	No
Observations	16,512	22,016	22,016	22,016	22,016	22,016	16,512
R-squared	0.998	0.987	0.953	0.927	0.913	0.900	0.899
Dependent variable average	7.533	1.461	0.451	0.267	0.204	0.172	0.154
Number of municipalities	5504	5504	5504	5504	5504	5504	5504

Note - data are estimated mean effect (standard error) of the BFP on deaths. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 6 years, in the years 2005 to 2012. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table A2. BFP coverage in birth year and the number of hospitalizations: age groups

	Hospitalizations						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Age	**0**	**1**	**2**	**3**	**4**	**5**	**6**
BFP coverage (%) in the year of birth	0.228	-6.937	3.599	-1.741	-4.791**	-4.869***	-0.539
	(8.481)	(6.752)	(3.951)	(2.413)	(1.908)	(1.741)	(2.749)
Constant	61.52***	70.63***	40.52***	28.79***	24.08***	20.68***	17.05***
	(2.626)	(1.921)	(1.124)	(0.687)	(0.543)	(0.495)	(0.745)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Municipality*Year	No	No	No	No	No	No	No
Observations	16,512	22,016	22,016	22,016	22,016	22,016	16,512
R-squared	0.998	0.993	0.993	0.995	0.996	0.996	0.998
Dependent variable average	61.59	68.65	41.54	28.29	22.72	19.29	16.90
Number of municipalities	5504	5504	5504	5504	5504	5504	5504

Note - data are estimated mean effect (standard error) of the BFP on hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 6 years, in the years 2005 to 2012. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table A3. BFP and FHS presence in the year of birth and the number of deaths

	Deaths		
	(1)	**(2)**	**(3)**
BFP presence in the year of birth	-1.112***		-1.047**
	(0.262)		(0.479)
FHS presence in the year of birth		-0.147**	-0.0758
		(0.0692)	(0.537)
Interaction between BFP and FHS			-0.0693
			(0.539)
Constant	3.355***	2.377***	3.420***
	(0.262)	(0.0621)	(0.479)
Year fixed effect	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes
Observations	77,070	77,070	77,070
R-squared	0.819	0.819	0.819
Dependent variable average	2.244	2.244	2.244
Number of municipalities	5505	5505	5505

Note - data are estimated mean effect (standard error) of the BFP and FHS on deaths. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table A4. BFP and FHS presence in the year of birth and the number of hospitalizations

	Hospitalizations		
	(1)	**(2)**	**(3)**
BFP presence in the year of birth	0.140		-1.989
	(1.057)		(2.717)
FHS presence in the year of birth		0.804*	-1.837
		(0.462)	(2.789)
Interaction between BFP and FHS			2.646
			(2.782)
Constant	51.06***	50.48***	52.46***
	(1.056)	(0.414)	(2.723)
Year fixed effect	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes
Observations	77,070	77,070	77,070
R-squared	0.978	0.978	0.978
Dependent variable average	51.20	51.20	51.20
Number of municipalities	5505	5505	5505

Note - data are estimated mean effect (standard error) of the BFP and FHS on hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1

Table A5. BFP coverage and deaths/hospitalizations: Selected ICD-10 chapters

	D - ICD 16	H - ICD 16	D - ICD 10	H - ICD 10	D - ICD 17	H - ICD 17	D - ICD 20	H - ICD 20
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)
BFP coverage (%) in the year of birth	-1.215***	-11.31***	-0.112**	0.884	-0.261***	-0.0553	0.00726	-0.00326
	(0.297)	(2.483)	(0.0518)	(1.288)	(0.0723)	(0.119)	(0.0354)	(0.00684)
Constant	1.448***	10.96***	0.211***	20.55***	0.425***	1.308***	0.0972***	0.00729***
	(0.0852)	(0.713)	(0.0149)	(0.370)	(0.0207)	(0.0342)	(0.0102)	(0.00196)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	77,070	77,070	77,070	77,070	77,070	77,070	77,070	77,070
R-squared	0.692	0.792	0.919	0.926	0.821	0.976	0.859	0.806
Dependent variable average	1.099	7.716	0.179	20.80	0.350	1.292	0.0993	0.00636
Number of municipalities	5505	5505	5505	5505	5505	5505	5505	5505

Note – Data are the estimated mean effect (standard error) of the BFP on deaths (D) and hospitalizations (H). Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1. "D" refers to Deaths. "H" refers to Hospitalizations. ICD-16: Some conditions originating in the perinatal period. ICD-10: Diseases of the respiratory system. ICD-17: Congenital malformations, deformities and chromosomal abnormalities. ICD-20: External causes.

Table A6. BFP coverage and deaths/hospitalizations: CSPC and poverty related issues

	Deaths - CSPC	Hospitalizations - CSPC	Deaths - Poverty	Hospitalizations - Poverty
	(1)	(2)	(3)	(4)
BFP coverage (%) in the year of birth	-0.0219	2.141	-0.0858	3.062*
	(0.0588)	(1.550)	(0.0667)	(1.834)
Constant	0.192***	20.72***	0.281***	23.74***
	(0.0169)	(0.445)	(0.0191)	(0.529)
Year fixed effect	Yes	Yes	Yes	Yes
Municipality fixed effect	Yes	Yes	Yes	Yes
Cohort fixed effect	Yes	Yes	Yes	Yes
Interaction State*Cohort	Yes	Yes	Yes	Yes
Municipality linear trend (over cohort)	Yes	Yes	Yes	Yes
Interaction Cohort*Year	Yes	Yes	Yes	Yes
Interaction Municipality*Year	Yes	Yes	Yes	Yes
Observations	77,070	77,070	77,070	73,121
R-squared	0.832	0.903	0.904	0.898
Dependent variable average	0.186	21.33	0.256	24.62
Number of municipalities	5505	5505	5505	5501

Note – Data are the estimated mean effect (standard error) of the BFP on deaths and hospitalizations. Models adjusted with fixed effects of municipality, cohort, current year, interactions of fixed effects between state and cohort, linear trends of municipality and interactions between municipality and current year. Standard errors grouped at the municipality level (MCA) in parentheses. Sample of cohorts from municipalities born between 2004 and 2007 aged 0 to 3 years, in the years 2005 to 2009. Significance: *** p <0.01, ** p <0.05, * p <0.1. CSPC refers to Conditions Sensible to Primary Care.