

Maternal and Child Health in Brazil: Challenges and Public Policies

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Summary. This technical note raises a red flag for the state of child health, discusses the provision of maternal and child primary care services in Brazilian capitals and indicates public policy alternatives. In 2022, all Brazilian capitals had an infant mortality rate higher than the average of OECD countries. In some cases, even surpassing the rates of war-torn countries. Problems in the provision of primary health services may be behind this result: every 1 percentage point increase in adequate antenatal care coverage is associated with a reduction of 0.08 deaths of children under 1 for every thousand live births. The issues go beyond pregnancy: the low polio immunization coverage underscores a serious problem in childhood vaccination. In 2022, no capital reached the vaccination target of 95%, which is considered necessary to prevent the return of the disease. In terms of public policy, the literature indicates that infant mortality can be strongly impacted by policies that expand access to primary care. Municipal governments can improve these services, for example, by equipping care centers and systematizing monitoring throughout pregnancy, puerperium and early childhood. In addition, child vaccination rates can be improved with reminders, small incentives and dissemination of information to parents.

Introduction

Maternal and child primary care consist of offering basic health services to pregnant and postpartum women and children in their first months of life. This includes disseminating habits that contribute to the baby's health (such as adequate nutrition and breastfeeding); developing strategies to prevent diseases based on epidemiological evidence (e.g., immunization campaigns focused on vulnerable groups); identifying the risk factors in each pregnancy and treating morbidities (possibly with referrals to specialists). The expansion of programs that promote primary health care for pregnant women and babies can lead to concrete improvements in indicators such as fetal and infant mortality. This happened, for example, with the expansion of the maternal-child arm of the program Saúde da Família (described [here](#)¹).

This technical note focuses on Brazilian state capitals and discusses three issues. The first is identifying the cities where infant mortality rate is an issue. The second is an analysis of the state of the provision of two key primary health care services for mothers and children: adequate antenatal care and childhood vaccination. The third is a discussion about effective public policies to improve this scenario, with an emphasis on what can be done at the municipal level. In Brazil, federal, state and municipal governments are co-responsible for primary health care. A large part of the operation falls on municipalities. Consequently, this a central topic in the context of municipal elections.

In terms of infant health, there is room for improvement of and for fighting inequality across the board. In 2022, infant mortality ranged from 7.7 deaths per thousand live births in Florianópolis to 18.8 deaths per thousand live births in Macapá (See Figure 1). On the one hand, all these values are below the world average for mortality rate for children up to 1 year of age (27.1 deaths per thousand live births) in the same year according to data from the World Bank. On the other hand, the mortality rate in all capitals was above the OECD average of 5.5 deaths per thousand births.

There is a similar pattern of inequality in the provision of health services, which explains part of the differences in infant mortality. Adequate antenatal care coverage is, in general, better in the South and Southeast, reaching its best rate in Curitiba, where 90.1% of mothers of live births in 2022 went to at least 7 antenatal consultations (See Figure 2). On the other hand, only 47.1% of mothers of live births in Rio Branco had 7 or more antenatal consultations in 2022. In a regression with all Brazilian municipalities with available data, we showed that cities with better adequate antenatal care coverage also have lower infant mortality. Every percentage point increase in adequate antenatal care coverage is associated with a reduction of 0.08 deaths of children up to 1 year old per thousand live births.

(2020) and Rocha and Soares (2010)

¹ Impact Platform page based on academic articles [Bhalotra et al.](#)

The proxy used for adequate childhood immunization is the polio vaccination coverage. This vaccine is one of the oldest in the Brazilian vaccination calendar and considered by the Ministry of Health as an essential immunizer. Its low coverage represents an increase in the risk of return of this disease in Brazil, which is considered very high by the WHO. Furthermore, it serves as a proxy for the coverage of other vaccines and health care services in early childhood. In 2022, vaccination coverage in all Brazilian state capitals was below the average of all Brazilian municipalities. This indicates that the average city hall in Brazil had a better result than state capitals, where vaccination coverage ranged between 83.2% in Curitiba and 43.0% in Macapá and João Pessoa (see Figure 3). Importantly, all these levels are below the 95% set as a goal by the WHO and the Ministry of Health to generate herd immunity.

Finally, the technical note presents two types of public policies to improve the provision of primary care services: comprehensive maternal and child primary care policies and ways to improve immunization coverage. In the case of comprehensive policies, we see that Brazil already has successful examples: in national terms, the expansion of maternal and child health care in the context of the Saúde da Família program caused a 36% drop in infant mortality in the first eight years of implementation. At the municipal level, the city of Curitiba implemented in 1999 the Mãe Curitibana program, which systematized care in family planning, antenatal care and child health and sought to improve the quality of these services².

In terms of immunization policies, programs that remind parents to take their children to vaccination centers and/or provide small incentives can be quite effective. [Banerjee et al. \(2021\)](#) test different interventions to encourage vaccination in a context similar to ours: even though the vaccination coverage was low, there was adequate structure for vaccinating children, and most parents agreed that vaccination was important. The most effective combination of vaccination generated a 44% increase in the number of immunizations and combined sending SMS reminders for the next visit, recruiting people from within the villages to spread information (disseminators), and distributing small monetary incentives that grew with each visit. The most cost-effective combination, i.e., with the highest number of immunizations per dollar spent, was the intervention with broadcasters and SMS messages (9.1% increase in the number of immunizations per dollar).

Databases and Evidence

This technical note uses three indicators from the IMDS Municipal Elections Panel (see panel [here](#)) to analyze points of attention of public policy for maternal and child health at the municipal level:

1. Infant mortality rate, measured by the number deaths of children aged 0 to 1 for every 1000 live births in the municipality in the reference year (2022);
2. Percentage of mothers of live births who had 7 or more antenatal visits in the reference year (2022);
3. Percentage of children up to 4 years of age vaccinated against polio in the reference year (2022).

The main source of evidence on successful public policies is the Impact Platform (access [here](#)), which documents impact evaluations of programs that directly or indirectly impact the development of children and young people and the formation of human capital.

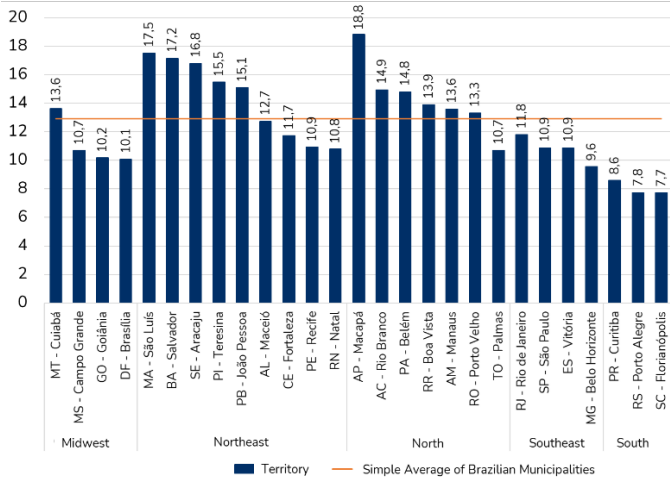
Where is maternal and child health a concern?

An important outcome of maternal and child health is infant mortality, measured as the number of deaths of children up to 1 year of age for every thousand live births in each capital in 2022 (see Figure 1). There is a large inequality among Brazilian capitals with respect to this indicator. The average municipality in Brazil³ (measured by the red line), has an infant mortality of 12.9 children for every thousand live births, with Brazilian capitals ranging from 7.7 in Florianópolis to 18.8 in Macapá. According to data from the World Bank, the Florianópolis indicator is well below the average of Latin American and Caribbean countries (13.5 deaths per thousand live births), but above the average of OECD countries (5.2 deaths per thousand live births) in the same year. The infant mortality rate in Macapá, in turn, is better than the average of all countries in the world (27.9 deaths per thousand live births), but worse than that of places like Syria (17.7 deaths per thousand live births) in 2022, when the country was still devastated by war.

² For a complete assessment of the quality of services provided in the first years of the program's implementation for women in their first pregnancies, see [Carvalho and Soares \(2004\)](#).

³ Calculated with the simple arithmetic mean of the municipalities with available data.

Figure 1. Infant mortality rate (per 1,000 live births) in State Capitals, 2022



Note: IMDS/OPPEN. The indicator represents the number of infant deaths (children under 1 year of age) for every thousand live births in the reference period. These numbers are obtained by dividing the number of infant deaths by the total number of live births and multiplying the result by one thousand. The red line represents the simple arithmetic mean of this indicator in all Brazilian municipalities with available data, characterizing the average Brazilian municipality.

This indicates that there is room for improvement in all Brazilian capitals. A direct and potentially effective path is to invest in quality and access to maternal and child health services. This technical note discusses the state of local provision of these services and public policy paths for their improvement.

What is the state of the provision of maternal and child health services?

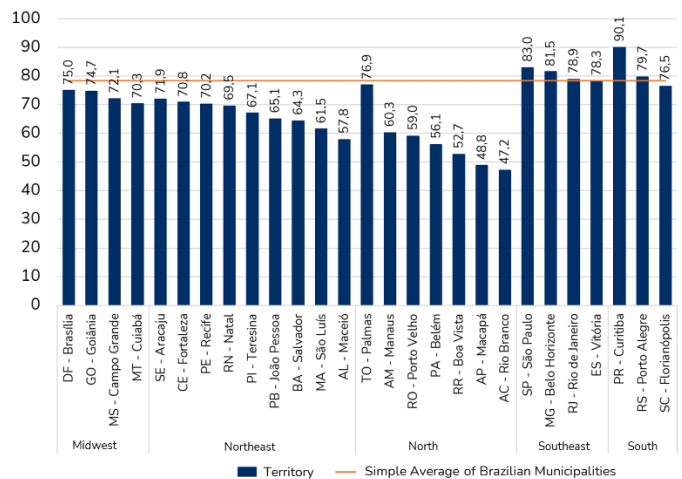
In terms of the results of the provision in the municipality, we measured the effectiveness of two important aspects of primary care: the coverage of adequate primary care for pregnant women and childhood vaccination, measured with polio vaccination coverage.

Antenatal visits. Ideally, antenatal visits promote healthy practices, enable the identification of diseases that evolve silently (such as diabetes and hypertension) and pregnancy-specific problems, such as malformation of the fetus. The identification of high-risk pregnancies, in turn, makes it possible to refer them to specialized care and prevent complications. The World Health Organization (WHO) recommends 8 interactions with the health system during pregnancy: a first contact when pregnancy is suspected, ideally up to the 12th week, and 7 periodic antenatal visits throughout pregnancy (World Health Organization, 2016). This indicator was used as a measure of success in the evaluation of Chile Crece Contigo (see here⁴) and Saúde da

Família (see here).

Figure 2 shows the percentage of live births in 2022 that had adequate antenatal care. The regional differences are quite striking, with the capitals of the South and Southeast showing better coverage. This difference goes beyond state capitals: in 2022, the simple average of adequate antenatal care coverage in the municipalities of the southern region was the highest, with 84.13%, followed by the Southeast (81.42%), the Northeast (75.91%), the Midwest (75.41%) and the North (64.03%). A positive highlight is the city of Curitiba-PR, where the mothers in more than 90% of live births in 2022 had at least 7 antenatal consultations. The Mãe Curitibana Vale a Vida program, described in more detail in the next section, may explain this success. The program has been in place since 1999 and made the care for pregnant women and children better and more efficient.

Figure 2. Live births with 7 or more antenatal visits (%) - Adequate antenatal care coverage in State Capitals, 2022



Note: IMDS/OPPEN. This indicator represents the proportion of live births whose mothers received seven or more antenatal consultations during pregnancy, indicating an antenatal care coverage considered adequate by the World Health Organization (WHO) in the reference period. These numbers are obtained by dividing the number of live births from mothers who had seven or more antenatal consultations by the total number of live births and multiplying the result by 100. Due to the absence of population data for 2023 and 2022, we resorted to 2021 estimates.

Municipalities with better antenatal care coverage also tend to have lower infant mortality. Curitiba, for example, has the best antenatal care coverage (as shown in Figure 2) and the third lowest infant mortality rate in Brazil (see Figure 2). We can see this relationship more clearly in Table 1, which shows the linear regression of the municipal mortality rate of children up to 1 year old (per 1000 thousand live births) on adequate antenatal care coverage, with different sets of controls.

⁴ Impact Platform page based on the article Clarke et al. (2020). Laneuville | Saúde Materno-Infantil no Brasil

The controls include the value of the municipality's spending on health per inhabitant and indicators of adequate sanitation provision in the municipality (percentage of inhabitants with sanitary sewage at home, access to treated water and household garbage collection services at least once a week). The coefficient referring to adequate antenatal care coverage remains significant and with the same magnitude even after the inclusion of controls for health expenditures (column 2) and for the provision of basic sanitation services in the municipality (column 3). Regression in column (1) shows that each 1 percentage point increase in antenatal care coverage corresponds to a reduction of 0.08 deaths of children up to 1 year of age for every thousand live births⁵.

Poliomyelitis Vaccination Coverage. In addition to health care during pregnancy, it is important to access primary care services in the first years of life. The polio vaccine is one of the main vaccines in the national vaccination calendar, offered by the SUS. Therefore, its coverage not only shows the reach of an important immunizer but is also a proxy for the success of childhood vaccination in the territory.

The immunization rate for poliomyelitis is much lower than desired in Brazilian capitals. Figure 3 shows the percentage of children up to 4 years old vaccinated against polio in 2022. No Brazilian capital has reached the level of 85% of children aged 0 to 4 years immunized for polio, even though the goal of the Ministry of Health⁶ and the Pan American Health Organization (PAHO)⁷ is to reach 95% of children in this age group. Some capitals, such as Macapá and João Pessoa, have not immunized even 50% of children up to four years of age.

Although the last case of polio in Brazil occurred in 1989, the low coverage is very worrying for two reasons. The first is that, since the polio vaccine has been part of the SUS vaccination schedule for many years, this vaccine serves as a proxy for what happens with other vaccines recommended in early childhood. The second is that polio is returning in the world and Brazil, due to low vaccination coverage, was classified by the WHO as having a very high risk of seeing the disease return (see CNN report of 06/08/2024 on the subject [here](#)).

Table 1. Relationship between Infant Mortality and Antenatal Care Coverage in Brazilian Municipalities between 2013 and 2022

	(1)	(2)	(3)
Antenatal Care	0.08*** (0.01)	0.08*** (0.01)	0.08*** (0.01)
Per Capita Health Expenditure		0.00 (0.00)	0.00 (0.00)
Treated Water			0.01** (0.01)
Sanitary Sewage			-0.00 (0.01)
Garbage Collection			0.02** (0.01)
Average 2022	12.93	12.93	12.93
Average 2013-2022	12.83	12.83	12.83
Fixed Effect Year	✓	✓	✓
Fixed Effect UF	✓	✓	✓
Num. obs.	56016	54833	21372

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Note: Each observation corresponds to a municipality in a reference year. All municipality-year pairs for which the variables in the regressions were available were included. Differences in sample size in columns (1), (2) and (3) are due to the lack of availability of some indicators for some municipalities and years. The dependent variable is the number of deaths of children up to 1 year of age for every thousand live births each year. All regressions have year and UF fixed effects. The explanatory variable Antenatal indicates the proportion of live births in the reference year whose mothers received seven or more antenatal visits during pregnancy, multiplied by 100. In column (2), the per capita health expenditure, i.e. the total health expenditure of each municipality divided by its population size, is added as control. In column (3), the regression includes controls for access to sanitation services in each municipality. It includes the percentage of the population with access to treated water, the percentage of the population with access to sanitary sewage at home and the percentage of the population with access to household garbage collection services at least once a week. Source: Prepared by the authors based on data from the IMDS Elections Panel.

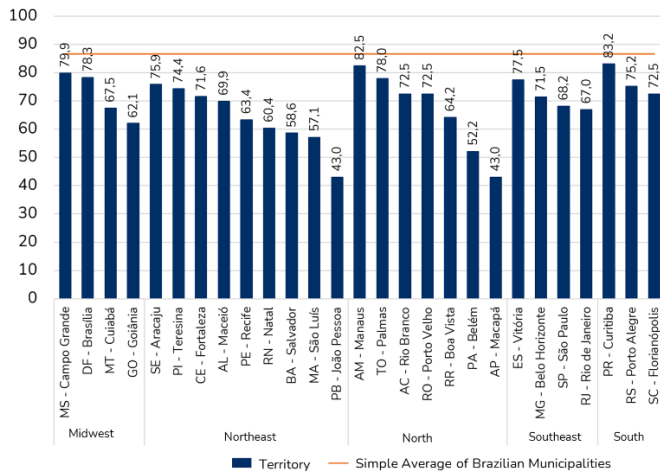
⁵ To exemplify what this result means, suppose that the same number of babies are born alive in municipalities A and B each year: 10 thousand. If, in municipality A, 5 thousand of the 10 thousand live births in year t came from mothers who received adequate antenatal care during pregnancy (50% of live births) and, in municipality B, this number is 6 thousand (or 60% of live births) in the same year, the difference in adequate antenatal care coverage between A and B in t is 10 percentage points. Using the adequate antenatal care coverage coefficient in column (1) in Table 1, we would expect that municipality B would have

8 fewer deaths of babies under one year of age than municipality A at the end of year t . After all, an increase of 10 percentage points would be associated with a reduction in the mortality rate by $10 \times 0,08 = 0.8$ for every thousand live births, or 8 for every 10 thousand live births.

⁶ Explained, for example, [here](#).

⁷ Arm of the World Health Organization (WHO) in the Americas, which made this goal explicit [here](#).

Figure 3. Polio vaccination coverage (%) by capitals, 2022



Note: IMDS/OPPEN. The indicator represents polio vaccination coverage, which refers to the proportion of the eligible population (up to 4 years of age) that received the polio vaccine in the reference period.

Discussion: Public Policy Paths

In the previous sections, we showed that there are Brazilian capitals with high infant mortality and poor provision of maternal and child primary health care services. In particular, we found that there are many municipalities with low coverage of adequate antenatal care and vaccination against poliomyelitis, one of the main immunizers in the Brazilian vaccination calendar. In this section, we discuss examples of successful policies that focused on correcting these problems and the lessons that can be used by municipalities throughout Brazil. We divided these policies into two groups: comprehensive primary care policies and policies aimed at specific primary health problems, such as vaccination programs.

Comprehensive Primary Care Programs. There are successful Latin American examples of universalization of maternal and child primary care at the national level in Latin America, such as Chile Crece Contigo (details [here](#)) and the maternal and child arm of the Saúde da Família program in Brazil (details [here](#)). In local terms, city halls can also act by equipping basic health units, improving services and optimizing care. This was done within the scope of the Curitiba Mother Worth a Life program (more information about the program [here](#)).

The Chile Crece Contigo program (details [here](#)) is a comprehensive universal primary care program that stands out for integrating various services for pregnant women and children up to 5 years of age, optimizing care. There are two key components: one concerning primary health care and the other concerning social assistance.

The primary health care component, the *Programa de Apoyo al Desarrollo Biopsicosocial* (PADB), is directed at pregnant women. This initiative includes periodic consultations, aiming at a minimum of seven 40-minute visits with distribution of informative materials. Pregnant women are tested for issues such as prepartum depression and referred to specialists and to social protection services when needed. The program also distributes kits for babies and toddlers in local health centers, which include cribs, blankets, baby carriers, toys, clothes, hygiene products and fortified milk powder.

The social assistance component is aimed at the 60% most vulnerable families and includes 1-hour home visits from social workers and health technicians following their first antenatal care consultation. These visits are guided by an individualized plan prepared by the public health teams. Following this plan, parents can be referred to educational and labor market programs based on their needs. The program covered 70% of pregnancies and births in Chile 3 years after its implementation, which resulted in an increase in the coverage of the services it provided. Consequently, there were significant improvements in infant health, with a 16% reduction in fetal mortality in the 3 years following implementation and a 3.7% reduction in the percentage of babies born underweight.

In Brazil, the expansion of maternal and child care services under the Saúde da Família program (see [here](#)) has brought substantial improvements to the health of mothers and babies. The program was created in 1994 and reached 70% of Brazilian municipalities in 2002. The Saúde da Família teams include a general practitioner, a nurse, a nursing assistant and a group of community health agents. Each team is responsible for about 1000 families (or 3500 people). They have contact with these families in the basic health units and through monthly home visits. The maternal and child health arm includes antenatal and postpartum care. When interacting with families, the teams teach hygienic practices and ways to prevent potential health hazards at home. They also identify signs of more complex diseases early on, referring families to hospitals for treatment. In addition, since 2002 the teams include other professionals from the Saúde da Família Support Centers (NASFs) who can be called in case of need, such as psychologists. The adherence of the municipalities to the program caused a 16% increase in the percentage of women who had more than 7 antenatal consultations and a 36% reduction in infant mortality by the 8th year of implementation. In addition, maternal mortality in the municipalities covered also fell on average, 25% in the eight years following joining the program.

Municipalities can take important initiatives to equip basic health units for maternal and child health, encourage antenatal care and refer high-risk pregnant women to specialized care. A successful municipal program in this regard is Mãe Curitibana Vale a Vida (details [here](#)), which is an extension of the program Mãe Curitibana. The program has 3 components: family planning, antenatal care, childbirth and puerperium, and child health. In addition to equipping the basic units to carry out exams, the program has an easy-to-use electronic system for scheduling consultations. There is also a system in place to share information regarding high-risk pregnancies within the municipal system so that the pregnant woman can seek help more easily. In addition, pregnant women are referred to services such as family planning and child vaccination. Furthermore, if a pregnancy or birth involves a health-related risk, the child is more closely monitored afterwards, for instance, by home visits.

Policies for Specific Issues. In addition to broader policies to expand primary health coverage as a whole, there are actions that can be taken to address specific problems, such as low immunization. Brazil used to have a very high childhood vaccination rate. In 2015, more than 95% of children under 5 were vaccinated against polio. However, this is not the reality today in Brazilian capitals. It is possible to increase vaccination rates with reminders to parents, as long as this is done efficiently.

In an experiment in the Indian state of Hayana, [Banerjee et al. \(2021\)](#) tested various combinations of policies aimed at encouraging immunization. This context is interesting because it is similar to the Brazilian one: there is an immunization structure and most parents (about 90%) agree that immunizations are beneficial. However, the rate of children aged 12 to 23 months with the complete immunization schedule is relatively low, having fallen from 62% between 2007 and 2008 to 52.1% between 2012 and 2013. They test combinations of 3 types of policies, at varying levels of intensity: sending SMS reminders for the next vaccination date, giving small monetary incentives for each visit to the vaccination center, and selecting villagers to disseminate vaccination information (broadcasters). They find that the broadcasters are not effective per se, but they magnify the effects of other policies. The most effective to increase the number of immunizations was a combination of SMS reminders, broadcasters and small monetary incentives that increased with each visit (44% increase in the number of immunizations). The combination with the lowest dollar per vaccination ratio

was the combination of broadcasters with SMS messages (9.1% increase in the number of immunizations per dollar).

Lessons that remain. On the one hand, the data show a scenario of high infant mortality and alarming levels of under-provision of two important primary health services: adequate antenatal care and vaccination against poliomyelitis. On the other hand, there are feasible public policy alternatives to improve antenatal care and vaccination rates. As the municipalities are, to a large extent, responsible for the operationalization of primary care, measures in this sense are within their scope of action. Hence, providing primary care to mothers and small children should be an important topic in municipal elections.

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