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# PATHWAYS FOR PROMOTING MATERNAL AND CHILD HEALTH PERFORMANCE AND THE ROLE OF STATE CAPACITY

## CAMINHOS PARA A PROMOÇÃO DO DESEMPENHO DA SAÚDE MATERNO-INFANTIL E O PAPEL DA CAPACIDADE ESTATAL

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## ABSTRACT

Maternal and infant mortality are critical health indicators that mirror the social inequalities within a nation, with higher rates prevailing in regions characterized by lower to moderate socioeconomic development. The principal aim of this investigation is to examine the intricate association between state capacity and the performance of maternal and infant health in Brazilian municipalities. To achieve the study's objectives, Structural Equation Modeling was utilized. The findings indicate that health performance is contingent upon various capacities provided by the State, encompassing the capability to furnish appropriate environments and information to regulate public actions, ensuring favorable social and economic conditions for the populace, particularly pregnant mothers and their children, and providing essential human and physical resources dedicated to maternal and infant health for efficient prevention and care. Notably, the Family Health Strategy, with its focus on preventive measures, emerges as an exceedingly effective approach to bolstering maternal and infant health performance, thereby reducing dependence on costlier secondary and tertiary healthcare services, and ultimately benefiting public finances.

**Keywords:** State Capacity. Maternal and child health. Social Control.

## INTRODUCTION

Maternal and child health has been a global concern. Maternal and infant mortality are important health indicators that reveal a country's social inequities, as they exhibit higher rates in areas of low and moderate socioeconomic development (Laurenti, Jorge, & Gotlieb, 2004).

Some studies demonstrate the various determinants of maternal and child health performance: the socioeconomic conditions of mothers and the municipality where they reside (Diderichsen, Evans, & Whitehead, 2001; Coimbra et al., 2003; Martins & Velásquez-Meléndez, 2004; Gonçalves, Cesar, & Mendoza-Sassi, 2009; Viacava et al., 2011; Viellas et al., 2014); access to primary care (Quental et al., 2017); human resources in primary care (Duarte & Andrade, 2008); physical resources (Sanine et al., 2019); access to secondary care (Andrade et al., 2015; Medeiros et al., 2019); and the participation and social control in health policies (Martin et al., 2018).

The majority of these determinants stem from the State's capacity to provide an appropriate context for the implementation of maternal and child health public policies. In this study, state capacity refers to the State's ability to implement public policies that benefit citizens (Besley & Persson, 2011), i.e., the capacity to provide resources so that the implemented public policies yield effective results (Ingraham, Joyce, & Donahue, 2003).

Health studies have been categorical in establishing the relationship between state capacities and access, performance, or effectiveness in public health. Among them, Macedo and Ferreira (2021) highlighted the relationships between various state capacities and the outcomes of the public policy *Mais Médicos para o Brasil* (More Doctors for Brazil). Similarly, Ferreira, Lima, and Ferreira (2019) found that the management capacity of the "Política Nacional de Prevenção e Controle do Câncer" (National Policy for Cancer Prevention and Control) is a key factor for the policy's improved performance. Likewise, Pereira et al. (2021) presented state capacity as a crucial tool for managing health crises such as the one caused by the Covid-19 pandemic. Finally, Mendes and Ferreira (2021) observed that state capacity is an important instrument for the allocation of public resources and, consequently, for improving the social conditions of a population.

In the field of maternal and child health, the policies already implemented by the Federal Government include: *Programa de Humanização do Pré-Natal e Nascimento - PHPN* (Program for

Humanization of Prenatal and Birth), *Política Nacional de Atenção Integral à Saúde da Mulher - PNAISM* (National Policy for Comprehensive Women's Health Care), *Plano de Qualificação das Maternidades e Redes Perinatais do Nordeste e da Amazônia Legal - PQMRP* (Plan for Qualification of Maternities and Perinatal Networks in the Northeast and Legal Amazon). The most recent and still in effect, is the *Rede Cegonha* (Stork Network). And finally, the *Rede de Acolhimento Materno-Infantil - RAMI* (Maternal-Infant Welcoming Network) was implemented in 2022 to replace the *Rede Cegonha* (Stork Network).

However, Brazilian data related to maternal and child health still demonstrate that the implemented policies have not been sufficient to improve the maternal and child health reality. In 2020 and 2021, the Covid-19 pandemic further highlighted that this has not been a priority, particularly evidenced by the maternal mortality rate, which reached 107 maternal deaths per 100,000 live births in 2021 (Souza, Souza, & Praciano, 2020; Souza & Amorim, 2021; Sim, 2021).

In light of this contemplation, our objective is to investigate the following research question: How do state capacity relationships influence the outcomes of maternal and child health public policies? As a result, this study seeks to analyze the dynamics of state capacity in the performance of maternal and child health within Brazilian municipalities, providing two significant contributions: i) practical insights for enhancing public policies and ii) theoretical advancements in the analysis of public health policy models.

This research stands out from existing literature by elucidating the pathways for enhancing maternal and child health performance. Unlike previous studies, it establishes the specific sequence and interactions of these determinants.

## THEORETICAL FRAMEWORK

### STATE CAPACITY AND ITS INFLUENCE ON PUBLIC MATERNAL AND CHILD HEALTH POLICIES

A notable discrepancy persists in the accessibility of maternal and infant health policies across various regions in Brazil, particularly in the North and Northeast, leading to a sluggish improvement in maternal and infant morbidity and mortality indicators. The literature has pointed to several factors hindering the achievement of better maternal and infant health outcomes, notably encompassing inadequate management of physical, human, and budgetary resources (BRASIL, 2011a). Studies such as those conducted by Ruiz-Rodríguez, Wirtz, and Nigenda (2009) have revealed that management

and planning mechanisms play a crucial role in determining access to assistance services and maternal mortality rates, thereby underscoring the pivotal involvement of the state in resource administration and healthcare delivery pertaining to maternal and infant health.

These resources constitute elements that compose state capacity, a conceptual framework that denotes the government's ability to manage and provide human, physical, financial, and informational resources with the aim of fulfilling governmental objectives (Ingraham, Joyce, & Donahue, 2003) and implementing public policies to address the social welfare of its citizens (Cunha, Pereira, & Gomide, 2017).

The notion of state capacity is conventionally expounded in a multifaceted manner. As posited by Grindle (1996), state capacity encompasses four key dimensions: Administrative, Technical, Institutional, and Political. Administrative capacity pertains to the evaluation of the organizational structure aimed at executing essential tasks in the delivery of public services. Within the realm of maternal and infant public health, this dimension primarily involves the provision of human resources to cater to the needs of expectant mothers during pregnancy, childbirth, and the postpartum period, as well as rendering support for the well-being of newborns throughout gestation and after birth.

Technical capacity pertains to the individual skills and competencies necessary for the formulation and management of maternal and infant health policies, involving a diverse range of stakeholders, including human resources. Moreover, it encompasses the realm of municipal planning, integrating the fiscal capability of the locality to generate financial resources dedicated to the development and effective administration of these policies (Grindle, 1996).

The third dimension addresses institutional capacity, which involves economic, behavioral, and political regulations. In the context of maternal and infant health, a thorough examination of the *Sistema Único de Saúde* - SUS (Unified Health System's) structure and service delivery is warranted. Maternal and infant health services are initially accessed through Primary Care within the SUS, which involves visits from *Agentes Comunitários de Saúde - ACS* (Community Health Agents - CHA), nurses, and physicians at the woman's residence. Furthermore, prenatal care is provided by obstetric gynecologists, while newborn care is entrusted to pediatricians.

As noted by Sá e Silva, Lopez, and Pires (2010), this institutional framework comprises three systems: the representative, the participatory, and the bureaucracy controls. The representative system

aims to convey individual and collective preferences to the political apparatus through representations for policymaking. However, the formulation and implementation of public policies are intrinsically linked to the availability of resources, encompassing human, administrative, and budgetary aspects, with the allocation of these resources predominantly overseen by the federal government. The dissemination of resources to the local level, closer to the citizens, may be influenced by political considerations and advantages (Pires & Gomide, 2016), leading to divergent allocations among municipalities, resulting in disparities in policy implementation and distinct outcomes across various regions.

The second system, known as the participatory system, encompasses diverse avenues for citizen engagement and civil society involvement in public policy decision-making. These participatory mechanisms include municipal, state, and federal health management councils, public hearings and conferences, and participatory budgeting (Avritzer, 2008).

However, in order for citizens to actively engage and advocate for resources and public policies from governmental bodies, unrestricted access to public information through transparent channels and regular data dissemination is essential. In Brazil, data pertaining to maternal and infant health can be accessed either through the Department of Informatics of the Unified Health System - DATASUS or via *Lei de Acesso à Informação* (Access to Information Law), enacted in 2011.

Aside from social control, the third system includes bureaucratic checks, which encompass mechanisms of horizontal accountability, such as internal and external supervision, judicial examination, and parliamentary oversight (Arantes et al., 2010).

Finally, the fourth dimension, known as political capacity, pertains to the municipality's ability to establish communication channels that bridge civil society and policymakers to address the demands raised by the public (Grin et al., 2018). These communication channels are facilitated through various means, such as councils, conferences, and intermunicipal health consortia, with a specific focus on matters concerning maternal and infant health policies.

In a democratic context, the concept of the common good involves ensuring the availability of instruments that facilitate freedom, citizenship, and well-being. It is incumbent upon public authorities to harness their capabilities in order to enact public policies that promote the realization of these fundamental elements.

The underlying assumption is that a higher state capacity is likely to culminate in the creation of a public environment that fosters the well-being of the common good. This capacity can be constructed and/or augmented by utilizing various elements such as material, human, and financial resources. Moreover, it thrives in an environment that allows for enhanced access to entities promoting economic, social, and environmental advancements. Additionally, political forces, including the influence of societal entities, policies, and public authorities, play a crucial role in shaping this capacity.

Thus, in this study, state capacity encompasses the socioeconomic conditions, the municipality's support for social control initiatives, and the human and physical resources available for implementing and developing maternal and infant health public policies and ensuring their effective delivery of services. In essence, it pertains to the municipal capabilities directed towards achieving the common good, enhancing the efficacy of public policies, and consequently promoting improved health and quality of life for the nation's citizens.

## PATHWAYS TO MATERNAL AND CHILD HEALTH PERFORMANCE

It is well-established that the performance of maternal and infant health is influenced by diverse determinants. However, it is crucial to explore the interplay among these determinants, specifically the system constructed by state capacities to effectively promote maternal and infant health.

Initially, it is evident that societal involvement in overseeing public endeavors has proven to be a potent means of strengthening the overall impact and efficiency of public policies (Martin et al., 2018). Involving citizens in public initiatives enables the consideration of more contextually appropriate solutions. Additionally, this practice fosters a more efficient allocation of the resources at hand (Fischer, 1992; Torres, 2004; Arantes et al., 2007). Consequently, social control plays a significant role in enhancing the performance of maternal and infant health programs by actively engaging mothers in the decision-making process concerning the provision of healthcare resources.

According to Rodrigues and Siqueira (2003), the rise in society's engagement in State Committees stemmed from the realization that maternal mortality rates involve issues where social control plays a crucial role in effective intervention. Essentially, it is imperative for society to exercise oversight over the quality of health services provided to expectant mothers and their children to ensure a satisfactory

performance in maternal and infant health.

Furthermore, citizen participation in assisting with the distribution and oversight of public resources results in the improvement of social conditions for a specific population (Justice, Melitski, & Smith, 2006). Democratic environments tend to foster the development of a country and its citizens (Sem, Motta, & Mendes, 2000).

Likewise, the active involvement of citizens and social oversight play a pivotal role in bringing about advancements in a country's socioeconomic conditions. These very conditions constitute the primary determinants that lead to improvements in the health status of a community. It is reasonable to assert that socioeconomic factors wield a greater influence on the health of a population than the mere advancements in medical technology (Diderichsen, Evans, & Whitehead, 2001; Viacava et al., 2011). Consequently, the significance of social control in enhancing the socioeconomic conditions of a community becomes apparent. The amelioration of these conditions, in turn, fosters a rise in the population's overall health level.

In the domain of maternal and infant health, various socioeconomic conditions significantly impact the infant mortality rate. These conditions encompass factors such as the educational level of parents, the marital status of mothers, and maternal employment status outside the home (Martins; Velásquez-Meléndez, 2004). Additionally, income (Gonçalves, Cesar, & Mendoza-Sassi, 2009; Tomasi et al., 2017), maternal age, and the presence or absence of a partner also shape this critical health indicator (Coimbra et al., 2003; Gonçalves, Cesar, & Mendoza-Sassi, 2009; Viellas et al., 2014).

Social conditions also impact an individual's access to healthcare services and the benefits derived from such access (Esposti et al., 2019). It is evident that social factors related to geographic location, race, and ethnicity play a role in creating disparities in the quality of healthcare coverage. Notably, less qualified coverage is observed in the Northern region of the country, among black or indigenous women, women with previous pregnancies (Viellas et al., 2014), and children from rural and *quilombo* communities (Marques et al., 2014).

Throughout gestation, women experience various physiological changes, including metabolic, physical modifications, increased nutritional demands, and hormonal transformations that impact emotional well-being. These factors have implications for the health and well-being of both the mother

and the fetus (Melson, Jaffe, & Amlung, 2002). Thus, early prenatal monitoring is crucial, with the initial visit in the first trimester. Additionally, expectant mothers must have a minimum of six prenatal check-ups, complemented by lab tests and ultrasounds for comprehensive healthcare oversight (Brasil, 2006b).

To address all these changes, primary care serves as the main gateway for pregnant women to access healthcare services. Within primary care, prenatal care is offered, encompassing support, health education, guidance on self-care and infant health, breastfeeding counseling, nutritional advice, and the promotion of maternal autonomy and empowerment (Brasil, 2012; Quental et al., 2017).

Pregnant women receive their initial care and continuous monitoring through primary care, which is administered by nurses and physicians within the *Estratégia Saúde da Família- ESF* (Family Health Strategy - FHS), critical human resources for advancing maternal and infant health (Duarte & Andrade, 2008). The introduction of the *Rede Cegonha* (Stork Network) has made obstetric nurses essential in countering medicalization practices that emerged from the institutionalization of childbirth in the mid-20th century. These nurses offer a more person-centered approach, honoring women's choices and decreasing the probability of obstetric violence during childbirth (Gama et al., 2021).

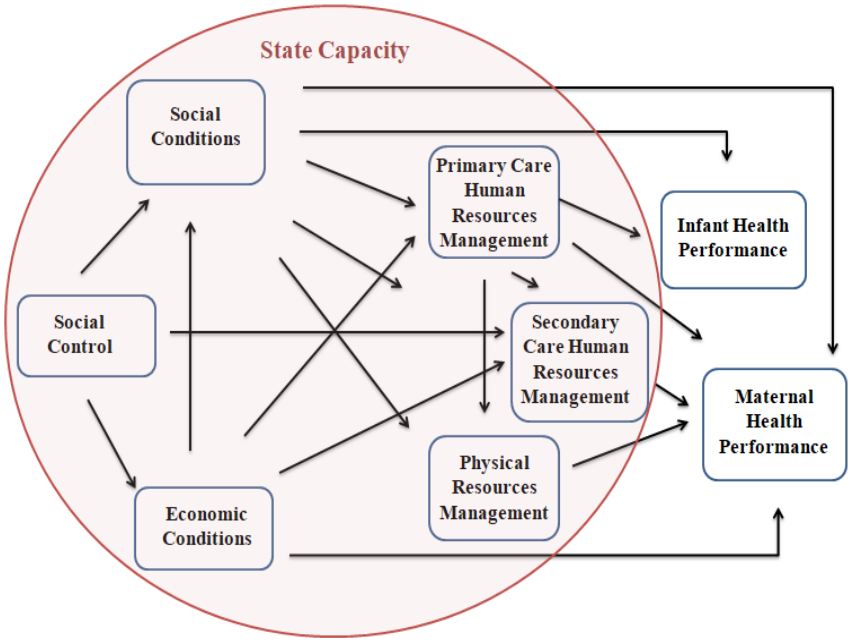
In addition to primary care, the resources of secondary care also play an important role in promoting maternal and infant health, thus leading to a reduction in maternal and child mortality (Andrade et al., 2015). Secondary care is responsible for managing the more critical health issues that go beyond the purview of primary care, encompassing specialized outpatient and hospital services. At this level, focus is on pregnant women who require procedures of moderate complexity or urgent care (Medeiros et al., 2019).

Just as human resources are essential to the effectiveness of maternal and infant health, healthcare professionals rely on appropriate physical resources to optimize their work in prevention, diagnosis, and treatment. The accessibility of pregnant women to *Unidade Básica de Saúde - UBS* (Basic Health Units - BHU), consultations, examinations, and medications serves as a crucial indicator of the quality of maternal and infant care, as it enables regular and continuous monitoring of expectant mothers (Sanine et al., 2019), aiding in the prevention of health issues and enhancing the well-being of both mothers and their children.

Having considered the determinants of maternal and infant health and their interconnections, as highlighted in the existing literature, we have devised Figure 1. This figure delineates the pathways through

which these determinants converge to influence maternal and infant health performance. It is crucial to acknowledge that these determinants stem from the capacity of the Union, States, and Municipalities - referred to as State Capacity.

**Figure 1** | Pathways to maternal and child health performance




Source: elaborated by the authors.

## METHODOLOGICAL PROCEDURES

In order to accomplish the goal of assessing the impact of state capacity (available resources) on the maternal and infant health performance of Brazilian municipalities, we utilized Structural Equation Modeling (SEM). This method is designed to examine theoretical models that incorporate causal relationships between variables, thereby scrutinizing the interrelated structure inherent in the equations and effectively describing the associations among the constructs under investigation (Hair Jr et al., 2009).

In the present study, eight indicators were analyzed, which were created from construct validations using Cronbach's Alpha. During this stage, the variables were standardized on a single scale using the "z-score." Subsequently, a Bivariate Correlation Analysis was conducted to identify positive and moderate to strong correlations among the variables of the same construct. Finally, the construct validation process was performed.

In this study, we utilized secondary data from 2014 to 2018, obtained from diverse sources, encompassing a wide range of Brazilian municipalities. The dataset consisted of 1458 observations, as a substantial number of the 5568 Brazilian municipalities did not possess data related to maternal and infant health resources, which constitutes the primary focus of this research. The composition of variables for each indicator can be observed in Table 1. We selected the municipality as the unit of analysis, recognizing it as the place where citizens express their daily demands for maternal and infant health services.

The process of creating the indicators involved the following steps: for each construct, reparameterizations were carried out using the minimum and maximum observed values of each variable, which were then associated with the Brazilian municipalities, through the following equation:

$$V_{ij} = \frac{(V - V_{min})}{(V_{max} - V_{min})}$$

In which $V_{max}$ e $V_{min}$ are the maximum and minimum observed values. Afterwards, the averages of the values for each construct were computed and then multiplied by 100 to obtain a comparative percentage.

To measure state capacity, several indicators were created: the Physical Resources Management Indicator (PRMI), which assesses the availability of physical resources in maternal and infant health; the Primary Care Human Resources Management Indicator (PCHRM) and the Secondary Care Human Resources Management Indicator (SCHRM), both reflecting the utilization of human resources in maternal and infant health; the Social Conditions Indicator (SCI) and the Economic Conditions Indicator (ECI), which gauge the socioeconomic capacity of the municipality and its resident mothers; and finally, the Social Control Perception Indicator (SCPI), which measures the municipality's capacity to enable societal control over public actions.

Furthermore, to represent the performance of maternal and infant health, the following indicators were used: the Maternal and Infant Health Performance Indicator - Child Situation (MIHPI - Child Situation) and the Maternal and Infant Health Performance Indicator - Maternal Care (MIHPI - Maternal Care).

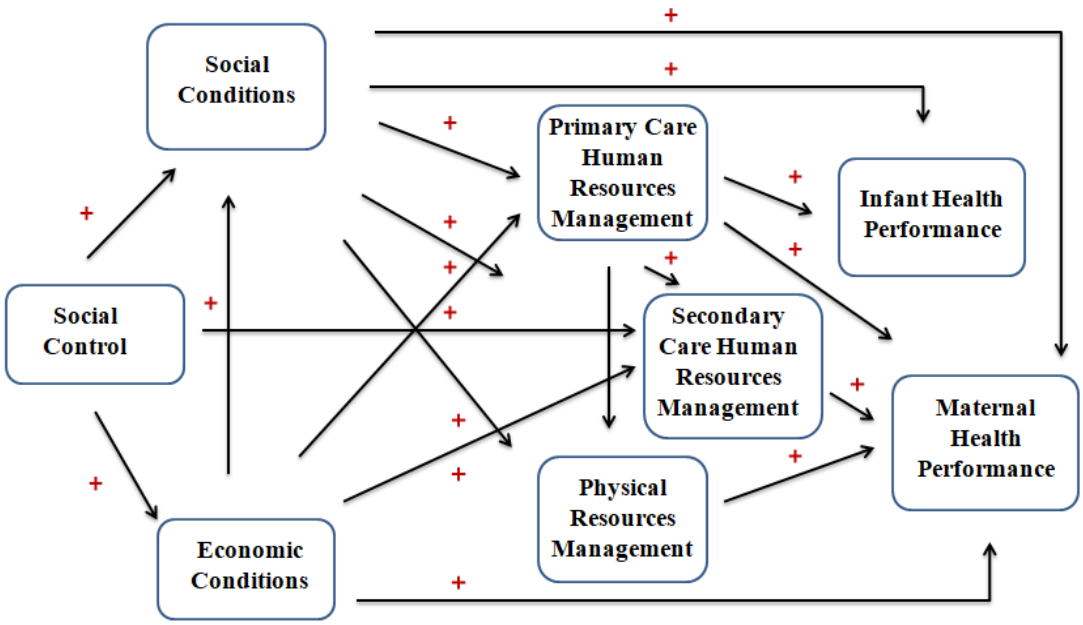
**Table 1** | Indicators and their respective variables

| **SCPI** | **PRMI** |
|---|---|
| Access to Public Information | Number of BHUs |
| Digital Inclusion | Vaccination Coverage - BCG |
| Services on the Municipal Website | Vaccination Coverage - Meningococcus C |
| Remote Assistance | Vaccination Coverage - D1 Viral Triplets |
| Municipal Conferences | Vaccination coverage - DTPa pregnant woman |
| Municipal Councils | Number of obstetric beds |
| Internet Users | Number of pediatric beds |
| | Quantity of ultrasound equipment |
| **PCHRM** | **SCHRM** |
| Number of FHS nurses | Number of pediatricians |
| Number of FHS doctors | Number of obstetrician-gynecologists |
| Community Health Agents Rate | |
| **SCI** | **ECI** |
| Maternal Schooling > 12 years | Non-*Bolsa Família* Program Beneficiary Rate |
| Mother's marital status (married) | Municipal GDP (Ln GDP) |
| Mothers > 20 years | Fund to Fund Transfer |
| Water Supply Rate | Current Revenue Per Capita |
| White Mothers | |
| **MIHPI - Maternal Care** | **MIHPI - Child Situation** |
| Inadequate Prenatal Care Rate (< 7 visits) | Low Birth Weight Live Birth Rate |
| Non-Cesarean Delivery Rate | Premature Birth Rate |
| Infant Mortality Rate | |

Source: research data.

The employment of the path diagram in Structural Equation Modeling allows for a clearer visualization of the model. In this analysis, relationship strengths are calculated using only an input correlation or covariance matrix (Hair Jr. et al., 2009, p. 581). Figure 2 depicts the path diagram proposed for estimation in this study, whereby the relationships among each construct are considered as hypotheses to be tested. The analysis was conducted using the STATA software.

**Figure 2** | Path diagram for the structural model




Source: elaborated by the authors.

Thus, absolute fit measures, comparative fit measures, and parsimony measures were utilized as indicators. Additionally, the responsiveness of the model was examined through the $R^2$ statistic. The Root Mean Square Error of Approximation (RMSEA) was employed for the absolute fit measures. As for the comparative fit measures, which compare the proposed model to the null model, the Tucker-Lewis Index (TLI) and the Comparative Fit Index (CFI) tests were applied. Finally, the Square Root Mean Square Residual (SRMR) test was conducted for the parsimony measures.

## RESULTS AND DISCUSSIONS

### DATA DESCRIPTION

Table 2 presents the descriptive statistics of the indicators, emphasizing the disparities that exist among Brazilian municipalities concerning the determinants studied for maternal and infant health performance.

**Table 2** | Descriptive analysis of indicators (%) according to Brazilian municipalities

| Indicator | Minimum | Maximum | Mean | Standard Deviation | Coefficient of Variation |
|---|---|---|---|---|---|
| Social Control Perception Indicator (SCPI) | 7.37 | 81.08 | 43.37 | 11.40 | 26.28 |
| Social Conditions Indicator (SCI) | 3.69 | 91.80 | 48.65 | 17.13 | 35.21 |
| Economic Conditions Indicator (ECI) | 7.11 | 72.26 | 33.84 | 10.63 | 31.41 |
| Physical Resources Management Indicator (PRMI) | 4.05 | 48.70 | 20.60 | 5.36 | 26.04 |
| Primary Care Human Resources Management Indicator (PCHRM) | 0.00 | 80.78 | 27.77 | 11.25 | 40.51 |
| Secondary Care Human Resources Management Indicator (SCHRM) | 0.00 | 83.01 | 12.72 | 12.73 | 100.07 |
| Maternal and Infant Health Performance Indicator - Child Situation (MIHPI - Child Situation) | 24.76 | 100.00 | 57.73 | 9.51 | 16.47 |
| Maternal and Infant Health Performance Indicator - Maternal Care (MIHPI - Maternal Care | 4.83 | 93.26 | 67.15 | 11.75 | 17.49 |

Source: research data.

Concerning the coefficient of variation, it was observed that the SCHRM had the highest coefficient, indicating a substantial variation in human resources for secondary care across municipalities. The subsequent indicators in descending order were PCHRM, SCI, ECI, SCPI, PRMI, MIHPI - Maternal Care, and finally, MIHPI - Child Situation. Notably, significant disparities in healthcare resources are commonly found in studies, as exemplified by Fonseca and Ferreira's (2009) investigation of the level of efficiency in managing public health resources in micro-regions of Minas Gerais.

Paschoalotto et al. (2022) further demonstrate this disparity by observing that the Northern region, for instance, presents the most adverse conditions in terms of structural aspects, financing performance, healthcare quality, and human resources. In contrast, the Southeast and Northeast regions boast superior healthcare coverage and quality.

## THE MATERNAL AND CHILD HEALTH PERFORMANCE SYSTEM

Through the analysis of structural equation modeling, the researchers noted that the model fit indices exhibited reliability, as clearly illustrated in Table 3. The resultant model estimation yielded an $R^2$ value of 0.374, denoting that the variables and pathways utilized within the proposed model account for 37.4% of its explanatory capacity.

**Table 3** | Model fit indices

| Criteria | Desirable Parameters | Suggested Model |
|---|---|---|
| $X^2$ | - | 128.31 |
| g.l. | - | 10 |
| CFI | ≥0.800 | 0.973 |
| TLI | ≥0.900 | 0.926 |
| SRMR | ≤0.080 | 0.039 |
| RMSEA | ≤0.090 | 0.090 |

Source: research data, and parameters based on Hair Jr. et al. (2009), Marôco (2010), and Acock (2013).

The estimated model (Table 4) reveals numerous aspects that exert direct and indirect influences on the performance of maternal and child health within Brazilian municipalities. These aspects encompass social control, social and economic conditions, human resources in primary and secondary healthcare, and physical resources. Moreover, an observable interrelationship exists among these determinants.

**Table 4** | Estimated Structural Equation Model

| Indicators | Coefficient | Robust standard error | P>\|z\| |
|---|---|---|---|
| **Social Conditions Indicator (SCI)** | | | |
| ECI | 1.090 | 0.031 | 0.000 |
| SCPI | 0.274 | 0.028 | 0.000 |
| Constant | -15.967 | 1.128 | 0.887 |
| **Economic Conditions Indicator (ECI)** | | | |
| SCPI | 0.523 | 0.020 | 0.000 |
| Constant | 11.154 | 0.906 | 0.000 |
| **Secondary Care Human Resources Management Indicator (SCHRM)** | | | |
| SCI | 0.097 | 0.026 | 0.000 |

| | | | |
|---|---|---|---|
| ECI | 0.334 | 0.043 | 0.000 |
| PCHRM | -0.061 | 0.021 | 0.030 |
| SCPI | 0.204 | 0.031 | 0.000 |
| Constant | -10.508 | 1.793 | 0.000 |
| **Primary Care Human Resources Management Indicator (PCHRM)** | | | |
| SCI | -0.090 | 0.024 | 0.000 |
| ECI | -0.329 | 0.039 | 0.000 |
| Constant | 43.323 | 0.901 | 0.000 |
| **Physical Resources Management Indicator (PRMI)** | | | |
| SCI | 0.087 | 0.007 | 0.000 |
| PCHRM | 0.219 | 0.012 | 0.000 |
| Constant | 10.243 | 0.615 | 0.000 |
| **Maternal and Infant Health Performance Indicator (MIHPI) - Maternal Care** | | | |
| SCI | 0.441 | 0.019 | 0.000 |
| ECI | 0.184 | 0.032 | 0.000 |
| SCHRM | -0.093 | 0.018 | 0.000 |
| PCHRM | 0.101 | 0.022 | 0.000 |
| PRMI | 0.359 | 0.042 | 0.000 |
| Constant | 30.418 | 1.191 | 0.000 |
| **Maternal and Infant Health Performance Indicator (MIHPI) - Child Situation** | | | |
| SCI | -0.078 | 0.015 | 0.000 |
| PCHRM | 0.053 | 0.023 | 0.024 |
| Constant | 60.066 | 1.195 | 0.000 |
| var(e.SCI) | 108.581 | 4.021 | |
| var(e.ECI) | 77.378 | 2.865 | |
| var(e. SCHRM) | 113.558 | 4.205 | |
| var(e. PCHRM) | 103.363 | 3.828 | |
| var(e.PRMI) | 23.226 | 0.860 | |
| var(e.MIHPI Maternal Care) | 61.074 | 2.262 | |
| var(e.MIHPI Child Situation) | 87.560 | 3.242 | |

Source: research data.

The results are consistent with a wealth of research in the international literature, revealing the interrelation between poverty, underdevelopment, and diminished indicators of maternal and child health (Barker, 1991; Richter, 2003; Reno et al., 2018; Dagher et al., 2022).

In Brazil, the economic conditions of a municipality, primarily derived from industrial and agricultural activities, intergovernmental transfers, and local revenues, constitute essential elements for human development. This progress is a consequence of enhanced employment opportunities, resulting in higher household income and thereby facilitating better investments in education, healthcare, and housing (Mendes et al., 2018). Comparable outcomes have been documented in research conducted by Ranis, Stewart, and Ramirez (2000), as well as by Suri et al. (2011).

Further research indicates a boost in health performance in larger municipalities with higher levels of education and per capita income (Albuquerque & Martins, 2017; Paschoalotto et al., 2018; Paschoalotto et al., 2022). Viana et al. (2015) also point out a concentration of associations between elevated local socioeconomic conditions and an abundant supply of health services in the South and Southeast regions.

Likewise, the active participation of society in public endeavors is inclined to enhance the social and economic conditions of expectant mothers, given that their engagement facilitates more effective allocation and oversight of available public resources (Sem, Motta, & Mendes, 2000; Justice, Melitski, & Smith, 2006). In other words, pregnant women directly contribute to addressing the challenges that affect them (Ali & Pirog, 2019). This discovery further underscores the significance of councils and citizen engagement, aligning with the existing international literature that recognizes control and participation as pivotal determinants of healthcare performance (Boivin et al., 2014; George, et al., 2015).

Besides its role in improving public policies, social control can also have both direct and indirect impacts on the delivery of secondary healthcare. Social participation has been demonstrated to be critical in refining social policies overall (Nabatchi, et al., 2012), and it can even lead to indirect enhancements in local health services (Matos, 2011), as highlighted in the international literature.

The research reinforces the current body of literature by empirically recognizing the influence of socioeconomic conditions on allocative equity (Woolf, et al., 2011; Marmot, 2014), consequently generating unequal opportunities for individuals to access healthcare services and reap associated benefits (ESPOSTI et al., 2019). As a result, it exposes the State's inefficiency in delivering human and physical resources for primary and secondary healthcare, thereby leading to asymmetrical access to healthcare for pregnant women and children across diverse social and economic contexts within the country.

Of particular significance is the observation that municipalities grappling with the most arduous socioeconomic conditions also exhibit a greater need for human resources in primary care, consequently leading to an inverse correlation of the indicators. In contrast, higher-income expectant mothers experience enhanced access to secondary care from obstetricians and pediatricians during childbirth, thereby fortifying the prevailing allocative inequity (Gonçalves, Cesar, & Mendoza-Sassi, 2009).

The works of Diderichsen, Evans, and Whitehead (2001), and Viacava et al. (2011) expose that the presence of favorable socioeconomic conditions in a population plays a pivotal role in driving improvements in their overall health conditions. It is noteworthy that socioeconomic factors hold a stronger sway over health outcomes than advancements in medical technology.

Intergovernmental transfers, for example, play a vital role as a significant funding source for public policies (Lu, 2015). Notably, for municipalities with constrained revenue, such transfers can be instrumental in fostering equitable access to healthcare (Baião, 2013).

Furthermore, the results reveal contrasting relationships between human resources in primary care and secondary care. As highlighted by Padoveze and Figueiredo (2014, p.1138), primary care is an "integrating element of the healthcare system". Primary Health Care (PHC) serves as a preventive measure against illnesses, thereby reducing the need for unnecessary hospitalizations among the population. Consequently, increased investment in human resources for primary care results in reduced reliance on secondary care. PHC facilitates more effective interventions and community-based coverage, contributing to the State's broader outreach and alignment with the universal principles of the Unified Health System (SUS) (Macinko, et al., 2015).

Thus, the primary care comprises preventive care, and its appropriate implementation results in a decline in maternal and child comorbidities, thereby eliminating the necessity of transferring the pregnant woman to a specialized human resource in secondary care.

On the other hand, secondary care presented a divergent pattern in relation to the MIHPI – Maternal Care. Secondary care is utilized for cases of moderate and high complexity, implying that its impact may oppose the Maternal and Child Health Performance, as superior performance is more dependent on primary care and its physical resources (preventive attention within the Unified Health System, which emphasizes prenatal care for pregnant women) rather than on secondary care (specialized attention).

## FINAL CONSIDERATIONS

In this study, it has been ascertained that the well-being of maternal and child health hinges upon a multitude of capacities bestowed by the State. Noteworthy among these capacities are the proficiency in providing appropriate settings and information, thereby fostering social involvement and public engagement. Additionally, the State's potential to impact the social and economic circumstances of the populace, with a particular focus on expectant mothers and their offspring, is facilitated through directly and indirectly targeted policies. Equally significant is the technical-administrative aptitude, which bears the responsibility for managing the human and physical resources pertaining to maternal and child health.

The results demonstrate that enhancing maternal and child health requires investments, especially in primary care, and efforts to address disparities in healthcare conditions and access. To diminish inequalities in accessing and achieving optimal maternal and child health outcomes, intergovernmental investments and transfers should introduce mechanisms for allocative corrections, prioritizing regions with greater socioeconomic vulnerabilities. The study clearly highlights that these specific locations, where the most pronounced social and economic challenges are evident, demand an improvement in the capacities of maternal and child health delivery.

Improving existing resources is essential as it boosts the efficiency and outcomes of governmental efforts. Consequently, providing training and fostering dedication among the key stakeholders engaged in prenatal care, namely nurses, community health agents, and primary care physicians, constitutes one of the crucial strategies for achieving short-term enhancements in maternal and child health performance. These professionals are vital in delivering high-quality information during pregnancy, postpartum, and maternity, thus contributing significantly to the overall improvement of maternal and child health outcomes.

In a similar vein, fostering and promoting a participatory culture within Brazilian society regarding public endeavors, especially in maternal and child health, holds the promise of ameliorating the socio-economic circumstances of expectant mothers and their children. Active public involvement facilitates a fairer distribution, utilization, and oversight of the currently accessible public resources.

For future research, we advise exploring whether the integration of maternal and child health has been accomplished under the new *RAMI* policy and assessing potential improvements in the performance of this healthcare domain, taking into account its modifications relative to the *Rede Cegonha* policy.

Furthermore, conducting a qualitative investigation with benchmarking municipalities in terms of maternal and child health performance is of utmost importance, analyzing the strategies employed to achieve such outcomes. Additionally, a more regionalized approach to examining maternal and child health data, such as by considering microregions, states, and clusters of municipalities, would yield valuable insights.

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