UNIVERSIDADE ESTADUAL DE CAMPINAS
FACULDADE DE ODONTOLOGIA DE PIRACICABA

CAIO VIEIRA DE BARROS ARATO

ASSOCIAÇÃO DO PROGRAMA PREVINE BRASIL NO PRÉ-NATAL E NA MORTALIDADE MATERNO-INFANTIL

ASSOCIATION OF THE PREVINE BRAZIL PROGRAM IN PRENATAL CARE AND MATERNAL-CHILD MORTALITY

Piracicaba
2024

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Orientadora: Profa. Dra. Livia Fernandes Probst

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DEDICATÓRIA

Dedico esta pesquisa a todos que ajudarei com ela.

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RESUMO

O Brasil registrou uma redução importante na mortalidade materno-infantil com a instituição do Sistema Único de Saúde. Contudo, os índices permanecem elevados e devem ser mitigados através de políticas públicas eficazes que compreendam os fatores envolvidos nas altas taxas. O objetivo dessa pesquisa foi investigar o impacto do pré-natal na redução da mortalidade materno-infantil dos municípios do Brasil, após o novo modelo de financiamento da Atenção Primária à Saúde Previne Brasil. Métodos: Este estudo consistiu em uma análise observacional transversal de abrangência nacional, utilizando dados secundários provenientes do sistema público brasileiro. Foram realizados os cálculos das medianas das taxas de mortalidade materna, infantil e pré-natal nos municípios brasileiros de 2016 a 2022. Para avaliar as associações entre as variáveis independentes (cobertura de atenção básica, população, Produto Interno Bruto e índice Gini) e os desfechos (variação nas taxas de óbito materno e infantil), foram conduzidas análises de regressão logística. Odds ratios brutos e ajustados foram estimados, sendo o nível de significância adotado de 5%. Resultados: A taxa de pré-natal aumentou em 86,7%, e a taxa de óbito materno diminuiu em 30,9%, sem associação significativa entre elas ($p>0,05$). A região, cobertura da Atenção Básica, Produto Interno Bruto municipal e população apresentaram associação significativa ($p<0,05$) com a variação na taxa de óbito materno. A região Sul teve maior chance de redução na taxa de óbito materno. Não houve associação significativa entre aumento na taxa de pré-natal e diminuição na taxa de óbito infantil ($p>0,05$). A região do país, cobertura de Atenção Básica, população e índice Gini foram associados significativamente ($p<0,05$) à variação na taxa de óbito infantil, com maior chance de redução nos municípios mais populosos e nas regiões Nordeste, Sudeste e Centro-Oeste. Conclusão: O Programa Previne Brasil levou ao aumento das consultas de pré-natal nos municípios do Brasil, mas não impactou significativamente na redução da mortalidade materno-infantil.

Palavras-chave: Mortalidade Infantil. Mortalidade Materna. Fatores Socioeconômicos. Atenção Primária.

ABSTRACT

Brazil recorded an important reduction in maternal and child mortality with the establishment of the Unified Health System. However, the rates remain high and must be mitigated through effective public policies that understand the factors involved in the high rates. The objective of this research was to investigate the impact of prenatal care on reducing maternal and child mortality in Brazilian municipalities, following the new Previne Brasil Primary Health Care financing model. Methods: This study consisted of a nationwide, cross-sectional observational analysis, using secondary data from the Brazilian public system. Calculations were made of the median maternal, infant and prenatal mortality rates in Brazilian municipalities from 2016 to 2022. To evaluate the associations between the independent variables (primary care coverage, population, Gross Domestic Product and Gini index) and the outcomes (variation in maternal and infant death rates), logistic regression analyzes were conducted. Gross and adjusted odds ratios were estimated, with a significance level of 5%. Results: The prenatal rate increased by 86.7%, and the maternal death rate decreased by 30.9%, with no significant association between them ($p>0.05$). The region, Primary Care coverage, municipal Gross Domestic Product and population showed a significant association ($p<0.05$) with the variation in the maternal death rate. The South region had a greater chance of reducing the maternal death rate. There was no significant association between an increase in the prenatal rate and a decrease in the infant death rate ($p>0.05$). The region of the country, Primary Care coverage, population and Gini index were significantly associated ($p<0.05$) with the variation in the infant death rate, with a greater chance of reduction in the most populous municipalities and in the Northeast, Southeast and Center regions. West. Conclusion: The Previne Brasil Program led to an increase in prenatal consultations in Brazilian municipalities, but did not significantly impact the reduction of maternal and child mortality.

Keywords: Infant mortality. Maternal mortality. Socioeconomic factors. Primary healthcare.

LISTA DE ABREVIATURAS E SIGLAS

AB	-	Atenção Básica
AIC	-	Critério de Informação Akaike
APS	-	Atenção Primária à Saúde
CEP	-	Comitê de Ética em Pesquisa
CO	-	Centro-Oeste
DSS	-	Determinantes Sociais da Saúde
ESF	-	Estratégia Saúde da Família
IBGE	-	Instituto Brasileiro de Geografia e Estatística
IC95%	-	Intervalo de Confiança de 95%
MI	-	Mortalidade Infantil
MM	-	Mortalidade Materna
N	-	Norte
NE	-	Nordeste
ODM	-	Objetivos de Desenvolvimento do Milênio
OMS	-	Organização Mundial da Saúde
ONU	-	Organização das Nações Unidas
PB	-	Previne Brasil
PIB	-	Produto Interno Bruto
S	-	Sul
SE	-	Sudeste
SINASC	-	Sistema de Informação sobre Nascidos Vivos
SISAB	-	Sistema de Informação em Saúde para a Atenção Básica
STROBE	-	*STrengthening the Reporting of OBservational studies in Epidemiology*
SUS	-	Sistema Único de Saúde

SUMÁRIO

1 INTRODUÇÃO

A ocorrência de mortalidade materna (MM) e infantil (MI) constitui um sério desafio no âmbito da saúde pública, sendo suas principais causas passíveis de prevenção durante as consultas de pré-natal. Tais eventos são tradicionalmente considerados indicadores primordiais do padrão de vida e do bem-estar social de uma população. As taxas de MM são definidas como o número anual de óbitos de mulheres decorrentes de causas relacionadas ou agravadas pela gestação, parto ou complicações pós-parto, expressas por 100.000 nascidos vivos (Lawrence, Klein & Beyuo, 2022). Por outro lado, a MI abrange não apenas a probabilidade de óbito de um lactente no primeiro ano de vida por 1.000 nascidos vivos, mas também compreende a taxa de mortalidade neonatal (de 0 a 27 dias de vida) e pós-neonatal (de 28 dias a 1 ano de idade), ambas expressas por 1.000 nascidos vivos (Bugelli et al., 2021).

Ao longo do tempo, a Organização Mundial da Saúde (OMS) e as Nações Unidas (ONU) têm coordenado esforços globais para mitigar tais números, observando uma redução substancial em escala mundial. Contudo, apesar da diminuição em torno de 45% na MM e mais de 50% na MI, os Objetivos de Desenvolvimento do Milênio (ODM) não foram integralmente alcançados. As reduções ocorreram de maneira heterogênea, com grupos mais vulneráveis apresentando diminuições menos expressivas (Alkema et al., 2016). No cenário brasileiro, nas últimas décadas, intensificaram-se as iniciativas para combater a MM e MI, com a implementação de políticas públicas e maior aporte de recursos. Contudo, políticas com vieses quantitativos e de pagamento por desempenho têm demonstrado pouca eficiência na contenção dessa problemática (Morosini, Fonseca & Baptista, 2020).

Em 2004, o Brasil estabeleceu o "Pacto Nacional pela Redução da Mortalidade Materna e Neonatal", visando a coordenação de diversos setores para aprimorar a qualidade de vida de mulheres e crianças. Este pacto fundamenta-se no respeito aos direitos humanos, consideração de questões de gênero, aspectos étnicos, raciais, e desigualdades sociais e regionais, além de decisões políticas voltadas para o aprimoramento do cuidado obstétrico e neonatal, com ampla mobilização e participação de gestores sociais e organizações (Brasil, 2004). Tais

ações resultaram em avanços notáveis na redução da taxa de MI, atingindo 13,3 óbitos por mil nascidos vivos em 2019, superando o ODM 4 (Brasil, 2021). Contudo, ao analisar a mortalidade neonatal, verifica-se que o país ainda mantém níveis elevados, com uma taxa de 6,76 mortes por mil nascidos vivos em 2018 (Prezotto et al., 2021).

Apesar das reduções observadas na MM, os resultados são menos otimistas. Embora tenha havido uma queda de 141 por 100.000 nascidos vivos em 1990 para 68 por 100.000 nascidos vivos em 2010, a meta de redução em ¾ até 2015 não foi plenamente alcançada. A razão de MM diminuiu 8,4% entre 2017 e 2018, passando de 64,5 para 59,1 óbitos para cada 100 mil nascidos vivos, evidenciando melhorias, mas ainda com desafios a serem enfrentados. Na última década, estudos destacaram a relação entre as taxas de MM e MI com variáveis contextuais, como aspectos demográficos e socioculturais (Brasil, 2020). Dessa forma, intervenções eficazes na Atenção Primária à Saúde (APS) foram associadas à redução significativa da MI nos Estados Unidos. Entretanto, poucos estudos abordaram como contextos políticos e econômicos moldam os efeitos na saúde, considerando que sociedades em processo de desenvolvimento podem enfrentar dificuldades na definição de políticas equânimes para implementar medidas eficazes de cuidado à saúde centrado na pessoa (Noronha et al., 2018).

No contexto brasileiro, com o intuito de tentar mitigar os altos índices de MM e MI, foram implementadas políticas que modificam o financiamento da APS do Sistema Único de Saúde (SUS), incorporando metas quantitativas e outros parâmetros de incentivo por ações estratégicas. O Previne Brasil (PB), novo paradigma de financiamento do Governo Federal para suportar a APS nos municípios, estabelecido por meio da Portaria nº 2.979, de 12 de novembro de 2019, fundamenta-se em seu indicador de desempenho número 1, preconizando a "Proporção de gestantes com pelo menos seis consultas pré-natal realizadas, sendo a 1ª até a 12ª semana de gestação". Dito indicador estabelece uma meta de 45% para os municípios incrementarem o número de consultas de pré-natal, sem considerar a qualidade do serviço prestado, e adotando uma abordagem predominantemente quantitativa, desconsiderando outros contextos passíveis de influenciar diretamente o desfecho da mortalidade. Tal abordagem tem como objetivo a redução dos índices

de MM e MI, recompensando os municípios que alcançarem os parâmetros por meio de repasses quadrimestrais (Massuda, 2020).

Assim, essa pesquisa objetiva analisar o impacto e os desdobramentos práticos desta abordagem quantitativa, focalizando nas taxas de pré-natal pela APS e seu papel na redução dos índices de MM e MI nos municípios brasileiros, especialmente no contexto pós-implementação do PB. Ao se concentrar em tais resultados, a pesquisa busca preencher lacunas no entendimento atual sobre como as metas quantitativas impactam efetivamente os resultados em saúde. Especificamente, o contexto pós-implementação do PB é de grande interesse, uma vez que oferece uma janela para avaliar como as mudanças no financiamento da APS podem influenciar as práticas de pré-natal e, por conseguinte, interferir na redução das taxas de mortalidade nos municípios brasileiros.

2 ARTIGO: ASSOCIATION OF THE PREVINE BRASIL PROGRAM IN PRENATAL CARE AND MATERNAL-CHILD MORTALITY

Association of the Previne Brasil Program in prenatal care and maternal-child mortality

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Abstract

Background: Brazil has witnessed a significant reduction in maternal-child mortality with the establishment of the Unified Health System. However, the rates remain high and should be mitigated through effective public policies that comprehend the factors involved in these elevated rates. **Objective**: To investigate the impact of prenatal care on the reduction of maternal-child mortality in Brazilian municipalities following the new financing model of Primary Health Care, the Previne Brasil program. **Methods**: This study comprised a nationwide cross-sectional observational analysis, utilizing secondary data from the Brazilian public health system. Medians of maternal mortality, infant mortality, and prenatal care rates were calculated for Brazilian municipalities from 2016 to 2022. Logistic regression analyses were conducted to assess associations between independent variables (primary care coverage, population, Gross Domestic Product, and Gini index) and outcomes (variation in maternal and infant death rates). Raw and adjusted odds ratios were estimated, with a significance level set at 5%. **Results**: Prenatal care rates increased by 86.7%, while maternal death rates decreased by 30.9%, with no significant association between them ($p>0.05$). Region, primary care coverage, municipal GDP, and population showed significant associations ($p<0.05$) with the variation in maternal death rates. The Southern region had a higher chance of reducing maternal death rates. No significant association was found between an increase in prenatal care rates and a decrease in infant death rates ($p>0.05$). The country's region, primary care coverage, population, and Gini index were significantly associated ($p<0.05$) with the variation in infant death rates, with a

greater chance of reduction in more populous municipalities and in the Northeast, Southeast, and Midwest regions. **Conclusion**: The Previne Brasil Program led to an increase in prenatal care consultations in Brazilian municipalities but did not significantly impact the reduction of maternal-child mortality.
Keywords: Infant mortality. Maternal mortality. Socioeconomic factors. Primary healthcare.

Background

The occurrence of maternal mortality (MM) and infant mortality (IM) poses a significant challenge to public health, being preventable through care during the prenatal period. These events are traditionally considered crucial indicators of the standard of living and social well-being of a population. MM is defined as the annual number of deaths of women related to pregnancy, childbirth, or postpartum complications per 100,000 live births [1]. IM encompasses the probability of an infant's death in the first year of life per 1,000 live births, including neonatal mortality (from 0 to 27 days of life) and post-neonatal mortality (from 28 days to 1 year of age), both expressed per 1,000 live births [2].

Despite coordinated global efforts led by the World Health Organization (WHO) and the United Nations (UN), reductions in maternal mortality (MM) and infant mortality (MI) have been heterogeneous, with vulnerable groups experiencing less significant decreases [3]. In the Brazilian context, despite initiatives and public policies implemented in recent decades, the effectiveness of quantitative approaches and performance-based payment has been limited [4].

In 2004, Brazil launched the "National Pact for the Reduction of Maternal and Neonatal Mortality," based on human rights, gender considerations, ethnic aspects, and social inequalities [5]. Although there have been advances in reducing the MI rate, the neonatal mortality rate remains high. In MM, there have been improvements, but the reduction goal by 2015 was not fully achieved [6, 7].

Despite observed reductions in MM, the outcomes are not entirely optimistic. Between 1990 and 2010, there was a decrease from 141 to 68 deaths per 100,000 live births. However, the target of a ¾ reduction by 2015 was not fully achieved. The MM ratio decreased by 8.4% between 2017 and 2018, dropping from 64.5 to 59.1 deaths per 100,000 live births, indicating improvements but still facing challenges.

Recent studies have highlighted the relationship between MM and MI rates and contextual variables, such as demographic and sociocultural aspects [8]. Effective interventions in Primary Health Care (PHC) have been associated with a significant reduction in MI in the United States. However, few studies have addressed how political and economic contexts shape health effects, considering that developing societies may struggle to define equitable policies to implement effective person-centered healthcare measures [9].

In Brazil, to address high MM and MI rates, policies modifying the financing of PHC within the Unified Health System (SUS) have been implemented. The Previne Brasil (PB), established through Ordinance No. 2,979 on November 12, 2019, is based on its performance indicator number 1, advocating for the "Proportion of pregnant women with at least six prenatal visits, with the first visit by the 12th week of pregnancy." This indicator sets a goal for municipalities to increase the number of prenatal visits by 45%, without considering the quality of the service provided, adopting a predominantly quantitative approach and disregarding other contexts that may directly influence the mortality outcome. This approach aims to reduce MM and MI rates, rewarding municipalities that meet the parameters through quarterly transfers [10].

Thus, this research aims to analyze the impact and practical implications of this quantitative approach, focusing on prenatal care rates by PHC and its role in reducing MM and MI rates in Brazilian municipalities, especially in the post-implementation context of PB. By concentrating on these results, the research seeks to fill gaps in the current understanding of how quantitative goals effectively impact health outcomes. Specifically, the post-implementation context of PB is of great interest, as it provides a window to assess how changes in PHC financing can influence prenatal care practices and, consequently, interfere with the reduction of mortality rates in Brazilian municipalities.

METHODS

Study design

This was an ecological-type epidemiological study of a national scope, employing secondary data and reported in accordance with the *STrengthening the Reporting of OBservational studies in Epidemiology* (STROBE) guidelines.

Ethical Aspects

This ecological study underwent review by the Research Ethics Committee (CEP) of the Piracicaba Dental School at the Universidade Estadual de Campinas (FOP/UNICAMP), in accordance with Resolution No. 466/12 of December 12, 2012, from the National Health Council, and complementary resolutions (240/97, 251/97, 292/99, 303/2000, 304/2000, 340/2004, 346/2005, and 441/2011). However, as secondary data from public databases were utilized, this study was exempt from CEP evaluation, as per CEP Official Letter 05/2023.

Outcome Measurement and Data Source

Individual spreadsheets and searches in databases were initially created on the websites of the responsible organizations (described below) for each variable under study. Following the research, data were transferred to an Excel spreadsheet using the PROCV command for database management. For municipalities lacking data provided by the aforementioned responsible organizations, a period symbol (.) was assigned to their box (a method utilized for the SAS program to generate the analysis).

Following are the definitions and categorizations of the variables studied:

MM Rate (MM): Calculated as the number of deaths of women due to causes related to pregnancy, childbirth, and postpartum, divided by the number of live births from resident mothers multiplied by 1,000. Data provided by DATASUS [11].

IM Rate : Corresponding to the number of children who died between birth and 1 year of age per 1,000 live births. Data obtained from the Mortality Information System (SIM) and collected by the Live Birth Information System (SINASC) of DATASUS [11].

Prenatal Care Rate: Calculated by the gross total of prenatal care in the municipality over the number of pregnant women in the municipality. Data obtained from the Primary Health Care Information System (SISAB) [12].

Primary Health Care Coverage: Proportion of the population covered by the health team at the primary care level. Data obtained from SISAB [12].

Municipal Gross Domestic Product (GDP): Raw data from the Brazilian Institute of Geography and Statistics (IBGE) [13].

Population: Description of the total population number according to census and projections from IBGE [13]. Raw data provided by the agency.

Gini Index: Raw data from IBGE [13].

After all adjustments and data verification in the spreadsheets, they were sent to the statistician responsible for conducting the analysis and creating the tables.

Statistical Analysis

Initially, the medians of maternal, infant, and prenatal mortality rates for all municipalities in Brazil were calculated for the years preceding (2016 to 2018) and following (2019 to 2022) the implementation of the new Primary Health Care (APS PB) financing model. The median was chosen as a measure of central tendency due to its robustness against outliers. Subsequently, municipalities were categorized based on whether they experienced a reduction in the mortality rate after the program's implementation. Similarly, municipalities were categorized according to whether they experienced an increase in the prenatal care rate after program implementation. Additionally, medians were calculated for primary health care coverage, municipal population, municipal GDP, and the Gini index, enabling the categorization of municipalities based on these potential confounding variables. Table 1 presents information on the categorizations of the analyzed variables.

Logistic regression analyses were then conducted between each independent variable and the outcomes. From these analyses, crude odds ratios with respective 95% confidence intervals (CI) were estimated. Variables with $p<0.20$ in individual analyses were included in multiple logistic regression models. The final model retained variables with $p\leq0.05$ after adjustments for other variables. Adjusted odds ratios with respective 95% CI were estimated from the multiple models. Model fit was assessed using the Akaike Information Criterion (AIC). All analyses were conducted using the R program (R Core Team, 2023), with a significance level of 5%.

RESULTS

Data from 5,570 municipalities in Brazil were evaluated both before and after the implementation of the new financing model for APS PB. As observed in Table 1,

following the implementation of the new financing model, there was an increase in the prenatal care rate in 86.7% of the country's municipalities. However, a decrease in the maternal mortality rate occurred in only 30.9% of the municipalities. There was no statistically significant association between the increase in the prenatal care rate and the decrease in the maternal mortality rate ($p>0.05$). Among the municipalities that experienced an increase in the prenatal care rate, 30.7% had a decrease in the maternal mortality rate, whereas among the municipalities that did not experience an increase in the prenatal care rate, 32.5% had a decrease in the maternal mortality rate.

The country's region, primary health care coverage, municipal GDP, and population size showed a significant association with the variation in maternal mortality rate ($p<0.05$). The Southern region exhibited a higher likelihood of decreasing the maternal mortality rate compared to the Northern region ($p<0.05$), as depicted in Figure 1. Furthermore, municipalities with 100% primary health care coverage, lower GDP, and smaller population had a greater likelihood of decreasing the maternal mortality rate ($p<0.05$). It is noteworthy that among municipalities with 100% primary health care coverage, 33.6% experienced a decrease in the maternal mortality rate, whereas this percentage was 24.5% among those with lower coverage. Additionally, among municipalities with smaller populations, 36.5% saw a decrease in this rate, while among those with larger populations, this percentage dropped to 25.2%.

Similarly, there was no statistically significant association between the increase in prenatal care rate and the decrease in infant mortality rate ($p>0.05$), as indicated in Table 2. 42.6% of the municipalities experienced a decrease in the infant mortality rate. Among municipalities with an increase in the prenatal care rate, 43.2% had a decrease in the infant mortality rate, while among those without an increase, this percentage was 40.0%. The variation in infant mortality rate showed a significant association with the country's region, primary health care coverage, population size, and the Gini index ($p<0.05$), with a higher likelihood of decrease in more populous municipalities, as illustrated in Figure 2. The Northeast, Southeast, and Midwest regions had higher odds of decreasing the infant mortality rate compared to the Southern region ($p<0.05$). Among municipalities with a larger population, 54.8% experienced a decrease in the infant mortality rate, whereas this rate was 30.5% among those with a smaller population. Furthermore, among municipalities with 100%

primary health care coverage, 39.3% had a decrease in the infant mortality rate, while among those with lower coverage, this percentage was 50.6%.

DISCUSSION

The implementation of the APS-centered PB program revealed significant implications for Brazilian municipalities according to the findings of this research. Our study demonstrated that the program, grounded in quantitative goals with a focus on the proportion of pregnant women with at least six prenatal consultations as its primary performance indicator, showed a positive impact by being associated with an increase in the prenatal care rate in 86.7% of the studied municipalities. This result suggests that the quantitative approach, by establishing specific goals and linking financial incentives to these objectives, effectively motivated health units to improve the access and frequency of prenatal consultations, reflecting a response to financial incentives and clear goal definition. These findings align with Schönholzer's observations on the increasing trend in indicators following policy implementation [14]. On the other hand, it is worth noting that other authors, such as Massuda, have raised concerns about the emphasis on financing public systems based on production, which, despite generating a quantitative increase, may restrict the quality of the treatment offered [10].

Despite the positive increase in the prenatal care rate, as demonstrated by the results of this research, the introduction of the new financing model from 2019 did not correlate with significant reductions in MM and MI. The 30.9% decrease in maternal mortality rate in some municipalities does not exhibit a significant relationship ($p>0.05$) with the increased prenatal consultations proposed by the program. This lack of correlation aligns with systematic reviews, such as those by Scott et al., and Witter et al., suggesting that despite the rising trend of using performance-based financial incentives to improve the quality of primary health care, there is insufficient evidence to support their application in enhancing the quality of health services [15, 16].

This raises questions about the hypothesis that an increase in prenatal consultations alone can reduce maternal deaths, emphasizing the need to assess structural, contextual, and vulnerability conditions for the formulation of more effective public policies in mitigating maternal mortality. An analysis of maternal mortality in Brazil, in line with the data from this study, demonstrated that rates were higher for women in situations of social vulnerability, such as low-income and non-white women,

implying the crucial need to tailor public health policies considering disparities and situational context [17]. This contrasts with a policy that overlooks the differences and variability among Brazilian municipalities for a payment based on productive goal-setting.

Furthermore, according to the results of this research, the implementation of the program was also not associated with a decrease in the infant mortality rate in 42.6% of the analyzed municipalities. The lack of correlation does not allow us to suggest that an increase in prenatal consultations can positively influence infant mortality rates. This aligns with previous research emphasizing the importance of adequate prenatal care in preventing complications and promoting healthier births. These results are consistent with a study published by Chuang and colleagues, which discusses how contextual characteristics, such as socioeconomic disposition in a broader sense, directly impact infant mortality rates in developing countries [18]. These findings suggest that while the quantitative increase in prenatal consultations is relevant for municipal funding, other factors, such as the quality of care, continuity of postpartum care, access to specialized services, and a more equitable income distribution, play crucial roles in reducing infant mortality.

Exploring the demographic and socioeconomic characteristics of Brazilian municipalities through independent variables revealed that in municipalities with smaller populations, lower GDP, and 100% primary health care coverage, there was a higher likelihood of decreasing the maternal mortality rate. This finding suggests that in less complex and more socially cohesive contexts, the effective implementation of policies may have a more significant impact. Nevertheless, it is inferred that correlating these findings with other research suggesting that the organization of the chosen model for primary health care, such as the Family Health Strategy (FHS), can directly contribute to the reduction of infant mortality [19]. However, the differentiation of municipalities according to the primary health care model was not considered in the present study, raising the possibility that municipalities with higher ESF coverage, consistent with the research by Guerra and colleagues, may have greater chances of reducing mortality.

Nevertheless, the results of this study emphasize that in municipalities with larger populations, higher Gini index, and lower primary health care coverage, the increased likelihood of decreasing the infant mortality rate indicates that the impact of

APS PB may vary in different socioeconomic contexts. This observation underscores the importance of tailored approaches to address socioeconomic disparities, highlighting the need to consider the diversity of contexts when implementing health policies focused on health promotion and disease prevention. This implies treating municipalities equitably, taking into account their unique characteristics.

Validating these findings, Oliveira & Wendland presented a positive association between economic aspects, such as the Gini index, and infant mortality rates [20]. Additionally, particularly regarding the availability of professionals in primary health care, despite lower coverage, Russo and colleagues suggest in their research that an increase of one primary care physician per 10,000 inhabitants was associated with 7.08 fewer infant deaths per 10,000 live births. This suggests that, in addition to other determinants, the presence of a professional adequately aligned with the population size may play a crucial role in reducing infant mortality rates [21].

This analytical epidemiological study on a national scale has some limitations that merit consideration. Firstly, the use of secondary data from sources such as DATASUS, SIM, SINASC, and SISAB may imply potential limitations related to the quality and reliability of the data. The accuracy of the results depends on the accuracy and completeness of the information contained in these databases, and any underreporting or inconsistencies may influence the study's conclusions. Additionally, the use of aggregated data by municipality may not capture intra-urban variations that could be relevant for understanding the relationships between the studied variables.

Another limitation relates to the study's focus on quantitative variables, especially in the evaluation of the prenatal care rate as a key indicator, disregarding qualitative aspects of maternal and child health care. The exclusive emphasis on quantitative goals, such as the proportion of pregnant women with prenatal consultations, may not fully reflect the quality of care provided, overlooking important nuances that can impact mortality outcomes.

While these limitations do not invalidate the study's results, they should be considered when interpreting and generalizing the conclusions. Future research should address these gaps by incorporating longitudinal approaches, a more detailed assessment of data quality, and consideration of multiple determinants for a more holistic understanding of the complex dynamics associated with maternal and infant mortality.

CONCLUSION

It was concluded that the new financing model of the PHC Program PB led to an increase in prenatal consultations in Brazilian municipalities. However, it did not demonstrate a significant association with the reduction of maternal and infant mortality between the years 2019 and 2022.

List of abbreviations:

AB: Basic Attention
AIC: Akaike Information Criterion
CEP: Research Ethics Committee
CO: Midwest
DSS: Social Determinants of Health
FHS: Family Health Strategy
FOP/UNICAMP: Piracicaba Dental School of the Universidade Estadual de Campinas
GDP: Gross Domestic Product
IBGE: Brazilian Institute of Geography and Statistics
IC95%: 95% Confidence Interval
IM: Infant Mortality
MM: Maternal Mortality
N: North
NE: Northeast
ODM: Millennium Development Goals
PB: Previne Brasil
PHC: Primary Health Care
S: South
SE: Southeast
SINASC: Information System on Live Births
SISAB: Health Information System for Basic Attention
STROBE: STrengthening the Reporting of OBservational studies in Epidemiology
SUS: Unified Health System
UN: United Nations
WHO: World Health Organization

Declarations

Ethics approval and consent to participate

The microdata used in this research were obtained from national information systems of public and unrestricted access. Therefore, submission to the Research Ethics Committee was not necessary.

Consent for publication

Not applicable.

Availability of data and materials

Public data from DATASUS is available at https://datasus.saude.gov.br/informacoes-de-saude-tabnet/. Public data from SISAB is available at https://sisab.saude.gov.br/. Public data from IBGE is available at https://cidades.ibge.gov.br/.

All secondary data were organized in spreadsheets that comprised the researcher's own database, using the Microsoft Excel program. The researcher's own database used and analyzed during the current study is available from the corresponding author upon reasonable request.

Competing interests

The authors declare they have no competing interests.

Funding

No funding was received for this study.

Authors' contributions

CVBA: Contributed to the study concept, design, acquisition and interpretation of data for the research and drafting of the manuscript. LFP: Contributed to the study concept, design, acquisition and interpretation of data for the research and drafting of the manuscript. LMG: Contributed to the study concept, design, acquisition and interpretation of data for the research and drafting of the manuscript. ACP: Contributed to the study concept, design, and critically revised the manuscript.

All authors approved the final version of the manuscript to be published and agree to be accountable for all aspects of the research by ensuring that questions related to the accuracy or integrity of any part of the research are appropriately investigated and resolved.

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Not applicable.

REFERENCES

1. Lawrence ER, Klein TJ, Beyuo TK. Maternal Mortality in Low and Middle-Income Countries. Obstet Gynecol Clin North Am. 2022;49(4):713-733.

2. Bugelli A, Borgès Da Silva R, Dowbor L, Sicotte C. The Determinants of Infant Mortality in Brazil, 2010-2020: A Scoping Review. Int J Environ Res Public Health. 2021;18(12):6464.

3. Alkema L, Chou D, Hogan D, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. Lancet. 2016;387(10017):462-474.

4. Morosini MVGC, Fonseca AF, Baptista TWF. Previne Brasil, the Agency for the Development of Primary Healthcare, and the Services Portfolio: radicalization of privatization policy in basic healthcare?. Previne Brasil, Agência de Desenvolvimento da Atenção Primária e Carteira de Serviços: radicalização da política de privatização da atenção básica?. Cad Saude Publica. 2020;36(9):e00040220.

5. Brasil. Ministério da Saúde. Pacto Nacional pela redução da Mortalidade Materna e Neonatal. 2004.

6. Brasil. Ministério da Saúde. Boletim Epidemiológico da Mortalidade infantil no Brasil. 2021.

7. Prezotto KH, Oliveira RR, Pelloso SM, Fernandes CAM. Tendência da mortalidade neonatal evitável nos Estados do Brasil. Revista Brasileira de Saúde Materno-Infantil. 2021;21(1):291-299.

8. Brasil. Ministério da Saúde. Brasil reduziu 8,4% a razão de mortalidade materna e investe em ações com foco na saúde da mulher. 2020. Disponível em: https://shre.ink/TVCC

9. Noronha JC, Noronha GS, Pereira TR, Costa AM. The future of the Brazilian Health System: a short review of its pathways towards an uncertain and discouraging horizon. Notas sobre o futuro do SUS: breve exame de caminhos e descaminhos trilhados em um horizonte de incertezas e desalentos. Cien Saude Colet. 2018;23(6):2051-2059.
10. Massuda A. Primary health care financing changes in the Brazilian Health System: advance ou setback?. Mudanças no financiamento da Atenção Primária à Saúde no Sistema de Saúde Brasileiro: avanço ou retrocesso?. Cien Saude Colet. 2020;25(4):1181-1188.
11. Brasil. Ministério da Saúde. Departamento de Informática do SUS (DATASUS). 2023. http://datasus.saude.gov.br/. Accessed 30 Nov 2023.
12. Brasil. Ministério da Saúde. Sistema de Informação em Saúde para Atenção Básica (SISAB). 2023. https://sisab.saude.gov.br/. Acessed 30 Nov 2023.
13. Brasil. Instituto Brasileiro de Geografia e Estatística (IBGE). Estados@. 2015. https://www.ibge.gov.br/. Acessed 30 Nov 2023.
14. Schönholzer TE, Zacharias FCM, Amaral GG, Fabriz LA, Silva BS, Pinto IC. Performance indicators of Primary Care of the Previne Brasil Program. Indicadores de desempeño de la Atención Primaria del Programa Previne Brasil. Rev Lat Am Enfermagem. 2023;31:e4007.
15. Witter S, Fretheim A, Kessy FL, Lindahl AK. Paying for performance to improve the delivery of health interventions in low- and middle-income countries . Cochrane Database Syst Rev. 2012;(2):CD007899.
16. Scott A, Sivey P, Ait Ouakrim D, et al. The effect of financial incentives on the quality of health care provided by primary care physicians. Cochrane Database Syst Rev. 2011;(9):CD008451.
17. Arruda CL, Ferreira D'Agostini Marin D, Depieri Michels B, Martins Rosa V, Iser BPM. Maternal mortality in South region of Brazil: an analysis from 2000 to 2018. J Obstet Gynaecol. 2022;42(7):2715-2721.
18. Chuang KY, Sung PW, Chang CJ, Chuang YC. Political and economic characteristics as moderators of the relationship between health services and infant mortality in less-developed countries. J Epidemiol Community Health. 2013;67(12):1006-1012.

19. Guerra AB, Guerra LM, Probst LF, et al. Can the primary health care model affect the determinants of neonatal, post-neonatal and maternal mortality? A study from Brazil. BMC Health Serv Res. 2019;19(1):133.
20. De Oliveira H, Wendland E. Changes in the Infant Mortality Rate in Twin Towns of Brazil: An Ecological Study. Children (Basel). 2022;9(11):1662.
21. Russo LX, Scott A, Sivey P, Dias J. Primary care physicians and infant mortality: Evidence from Brazil. PLoS One. 2019;14(5):e0217614

Table 1 Variables Used in the Study.

Type	Variable	Categorization
Outcome 1	Variation in MM Rate	Decreased / Remained the same or Increased
Outcome 2	Variation in IM Rate	Decreased / Remained the same or Increased
Independent Variable 1	Regions of the country	N / NE / S / SE / CO
Independent Variable 2	Variation in Prenatal Care Rate	Remained the same or decreased / Increased
Independent Variable 3	Basic Attention Coverage	<100% / 100% (median)
Independent Variable 4	Municipal GDP	≤20.159 / >20.159 (median)
Independent Variable 5	Population	≤11.584 / >11.584 (median)
Independent Variable 6	Gini Index	≤0,5 / >0,5 (median)

N: North. NE: Northeast. S: South. SE: Southeast. CO: Midwest.

Table 1. Analyses (unadjusted and adjusted) of associations with the variation in MM rate in Brazilian municipalities, following the new financing model of the PHC Program PB.

Variables	Category	n (%)	Variation		OR unadjusted (CI95%)	p-value	OR adjusted (CI95%)	p-value
			*Decreased	Remained the same or Increased				
			n (%)	n (%)				
Global	-	5.570 (100,0%)	1.721 (30,9%)	3.849 (69,1%)	-	-	-	-
Regions of the country	North	450 (8,1%)	121 (26,9%)	329 (73,1%)	Ref		Ref	
	Northeast	1.794 (32,2%)	544 (30,3%)	1.250 (69,7%)	1,18 (0,94-1,49)	0,1540	1,04 (0,82-1,32)	0,7302
	South	1.191 (21,4%)	403 (33,8%)	788 (66,2%)	1,39 (1,09-1,77)	0,0072	1,46 (1,12-1,89)	0,0047
	Southeast	1.668 (30,0%)	511 (30,6%)	1.157 (69,4%)	1,20 (0,95-1,52)	0,1235	1,20 (0,95-1,52)	0,1277
	Midwest	467 (8,4%)	142 (30,4%)	325 (69,6%)	1,19 (0,89-1,58)	0,2392	1,23 (0,91-1,66)	0,1783
Variation in Prenatal Care Rate	Remained the same or decreased	738 (13,3%)	240 (32,5%)	498 (67,5%)	Ref		-	-
	Increased	4.805 (86,7%)	1.476 (30,7%)	3.329 (69,3%)	0,92 (0,78-1,09)	0,3242		
Basic Attention Coverage	<100%	1.640 (29,4%)	402 (24,5%)	1.238 (75,5%)	Ref		Ref	
	100%[#]	3.930 (70,6%)	1.319 (33,6%)	2.611 (66,4%)	1,56 (1,36-1,77)	<0,0001	1,27 (1,10-1,47)	0,0014
Municipal GDP	≤20.159[#]	2.785 (50,0%)	906 (32,5%)	1.879 (67,5%)	1,16 (1,04-1,31)	0,0083	1,33 (1,14-1,55)	0,0002
	>20.159	2.785 (50,0%)	815 (29,3%)	1.970 (70,7%)	Ref		Ref	
Population	≤11.584[#]	2.786 (50,0%)	1.018 (36,5%)	1.768 (63,5%)	1,70 (1,52-1,91)	<0,0001	1,51 (1,33-1,72)	<0,0001

Variables	Category	n (%)	Variation		OR unadjusted (CI95%)	p-value	OR adjusted (CI95%)	p-value
			*Decreased	Remained the same or Increased				
			n (%)	n (%)				
	>11.584	2.784 (50,0%)	703 (25,2%)	2.081 (74,8%)	Ref		Ref	
Gini Index	≤0,5[#]	2.711 (48,7%)	848 (31,3%)	1.863 (68,7%)	1,04 (0,92-1,16)	0,5389	-	-
	>0,5	2.854 (51,3%)	871 (30,5%)	1.983 (69,5%)	Ref			

*Outcome Event. Ref: Reference category for independent variables. OR: Odds ratio. CI: Confidence Interval. [#]Median. AIC (empty model)=6,889.63; AIC (final model)=6,790.52

Figure 1 *Odds ratios* and confidence intervals (CI95%) of the associations with the decrease in MM rate in Brazilian municipalities following the new financing model of the PHC Program PB.

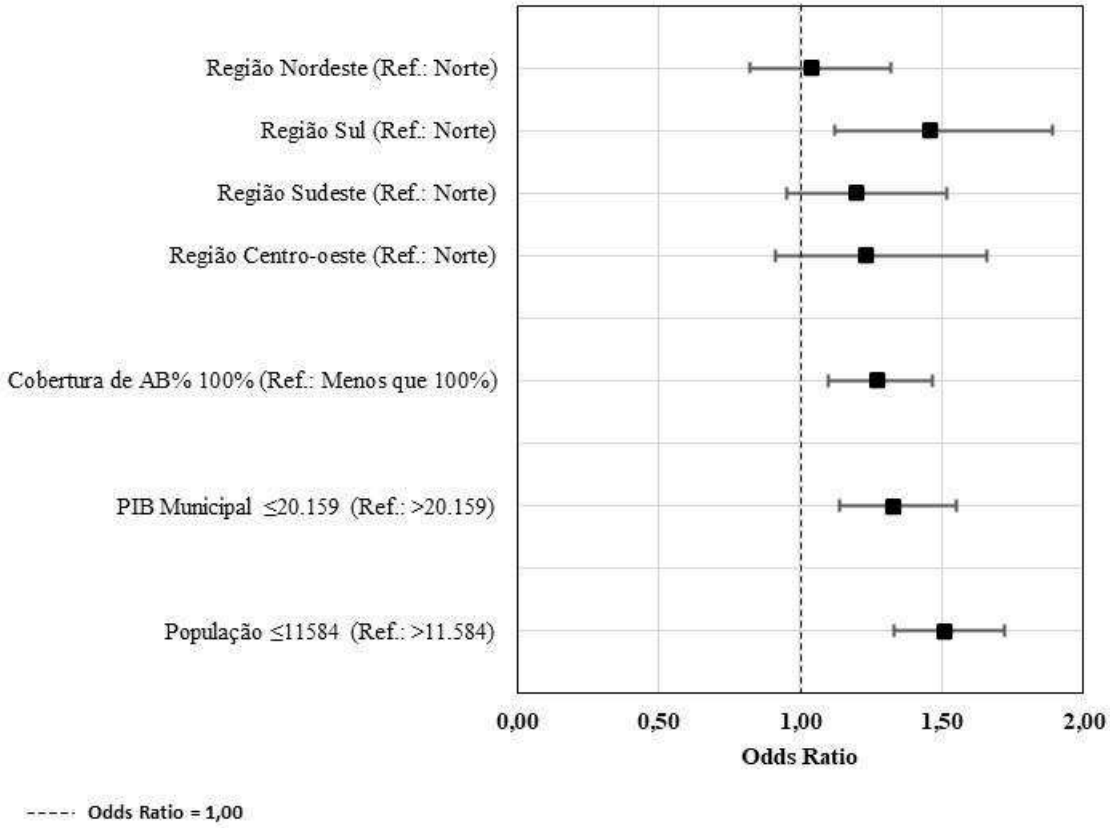


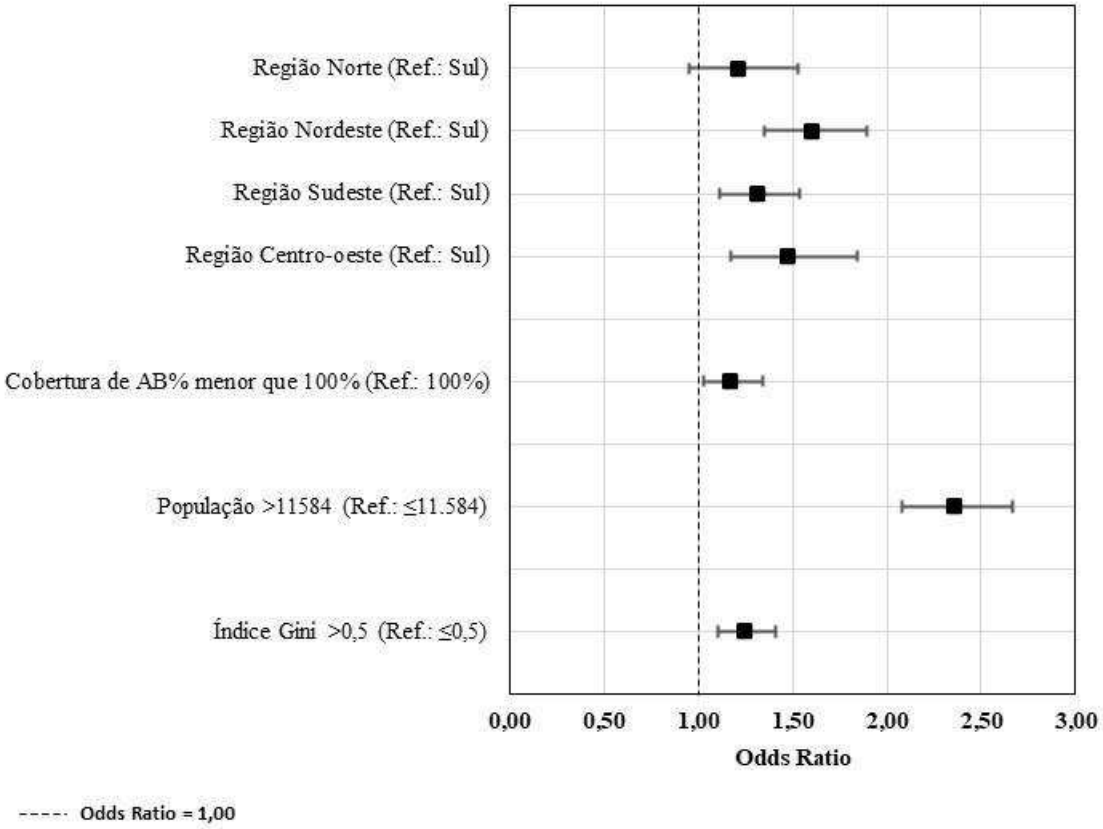
Table 2 Analyses (unadjusted and adjusted) of associations with the variation in IM rate in Brazilian municipalities following the new financing model of the PHC Program PB.

Variables	Category	n (%)	Variation		OR unadjusted (CI95%)	p-value	OR adjusted (CI95%)	p-value
			*Decreased	Remained the same or Increased				
			n (%)	n (%)				
Global	-	5.570 (100,0%)	2.375 (42,6%)	3.195 (57,4%)	-	-	-	-
Regions of the country	North	450 (8,1%)	203 (45,1%)	247 (54,9%)	1,71 (1,37-2,13)	<0,0001	1,21 (0,95-1,53)	0,1266
	Northeast	1.794 (32,2%)	894 (49,8%)	900 (50,2%)	2,06 (1,77-2,40)	<0,0001	1,60 (1,35-1,89)	<0,0001
	South	1.191 (21,4%)	387 (32,5%)	804 (67,5%)	Ref		Ref	
	Southeast	1.668 (30,0%)	688 (41,2%)	980 (58,8%)	1,46 (1,25-1,70)	<0,0001	1,31 (1,11-1,54)	0,0011
	Midwest	467 (8,4%)	203 (43,5%)	264 (56,5%)	1,60 (1,28-1,99)	<0,0001	1,47 (1,17-1,84)	0,0010
Variation in Prenatal Care Rate	Remained the same or decreased	738 (13,3%)	295 (40,0%)	443 (60,0%)	Ref		-	-
	Increased	4.805 (86,7%)	2.074 (43,2%)	2.731 (56,8%)	1,14 (0,97-1,34)	0,1030		
Basic Attention Coverage	<100%	1.640 (29,4%)	830 (50,6%)	810 (49,4%)	1,58 (1,41-1,78)	<0,0001	1,17 (1,03-1,34)	0,0186
	100%[#]	3.930 (70,6%)	1.545 (39,3%)	2.385 (60,7%)	Ref		Ref	
Municipal GDP	≤20.159[#]	2.785 (50,0%)	1.272 (45,7%)	1.513 (54,3%)	1,28 (1,15-1,43)	<0,0001	-	-
	>20.159	2.785 (50,0%)	1.103 (39,6%)	1.682 (60,4%)	Ref			

Variables	Category	n (%)	Variation		OR unadjusted (CI95%)	p-value	OR adjusted (CI95%)	p-value
			*Decreased	Remained the same or Increased				
			n (%)	n (%)				
Population	≤11.584#	2.786 (50,0%)	849 (30,5%)	1.937 (69,5%)	Ref		Ref	
	>11.584	2.784 (50,0%)	1.526 (54,8%)	1.258 (45,2%)	2,77 (2,48-3,09)	<0,0001	2,36 (2,08-2,67)	<0,0001
Gini Index	≤0,5#	2.711 (48,7%)	979 (36,1%)	1.732 (63,9%)	Ref	<0,0001	Ref	0,0007
	>0,5	2.854 (51,3%)	1.395 (48,9%)	1.459 (51,1%)	1,69 (1,52-1,88)		1,24 (1,10-1,41)	

*Outcome Event. Ref: Reference category for independent variables. OR: Odds ratio. CI: Confidence Interval. #Median. AIC (empty model)=7,562.74; AIC (final model)=7,183.30.

Figure 2 *Odds ratios* and confidence intervals (CI95%) of the associations with the decrease in MI rate in Brazilian municipalities following the new financing model of the PHC Program PB.



3 CONCLUSÃO

Concluiu-se que o novo modelo de financiamento da APS Programa PB levou ao aumento das consultas de pré-natal nos municípios do Brasil, porém, não demonstrou impacto significativo na redução da mortalidade materna e infantil no período entre 2019 e 2022.

REFERÊNCIAS[1]

Alkema L, Chou D, Hogan D, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. Lancet. 2016;387(10017):462-474.

Arruda CL, Ferreira D'Agostini Marin D, Depieri Michels B, Martins Rosa V, Iser BPM. Maternal mortality in South region of Brazil: an analysis from 2000 to 2018. J Obstet Gynaecol. 2022;42(7):2715-2721.

Brasil. Instituto Brasileiro de Geografia e Estatística (IBGE). Estados@. 2015. https://www.ibge.gov.br/. Acessed 30 Nov 2023.

Brasil. Ministério da Saúde. Boletim Epidemiológico da Mortalidade infantil no Brasil. 2021.

Brasil. Ministério da Saúde. Brasil reduziu 8,4% a razão de mortalidade materna e investe em ações com foco na saúde da mulher. 2020. Disponível em: https://shre.ink/TVCC

Brasil. Ministério da Saúde. Departamento de Informática do SUS (DATASUS). 2023. http://datasus.saude.gov.br/. Accessed 30 Nov 2023.

Brasil. Ministério da Saúde. Pacto Nacional pela redução da Mortalidade Materna e Neonatal. 2004.

Brasil. Ministério da Saúde. Sistema de Informação em Saúde para Atenção Básica (SISAB). 2023. https://sisab.saude.gov.br/. Acessed 30 Nov 2023.

[1] De acordo com as normas da UNICAMP/FOP, baseadas na padronização do International Committee of Medical Journal Editors - Vancouver Group. Abreviatura dos periódicos em conformidade com o PubMed.

Bugelli A, Borgès Da Silva R, Dowbor L, Sicotte C. The Determinants of Infant Mortality in Brazil, 2010-2020: A Scoping Review. Int J Environ Res Public Health. 2021;18(12):6464.

Chuang KY, Sung PW, Chang CJ, Chuang YC. Political and economic characteristics as moderators of the relationship between health services and infant mortality in less-developed countries. J Epidemiol Community Health. 2013;67(12):1006-1012.

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Morosini MVGC, Fonseca AF, Baptista TWF. Previne Brasil, the Agency for the Development of Primary Healthcare, and the Services Portfolio: radicalization of privatization policy in basic healthcare?. Previne Brasil, Agência de Desenvolvimento da Atenção Primária e Carteira de Serviços: radicalização da política de privatização da atenção básica?. Cad Saude Publica. 2020;36(9):e00040220.

Noronha JC, Noronha GS, Pereira TR, Costa AM. The future of the Brazilian Health System: a short review of its pathways towards an uncertain and discouraging horizon. Notas sobre o futuro do SUS: breve exame de caminhos e descaminhos trilhados em um horizonte de incertezas e desalentos. Cien Saude Colet. 2018;23(6):2051-2059.

Prezotto KH, Oliveira RR, Pelloso SM, Fernandes CAM. Tendência da mortalidade neonatal evitável nos Estados do Brasil. Revista Brasileira de Saúde Materno-Infantil. 2021;21(1):291-299.

Russo LX, Scott A, Sivey P, Dias J. Primary care physicians and infant mortality: Evidence from Brazil. PLoS One. 2019;14(5):e0217614.

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Scott A, Sivey P, Ait Ouakrim D, et al. The effect of financial incentives on the quality of health care provided by primary care physicians. Cochrane Database Syst Rev. 2011;(9):CD008451.

Witter S, Fretheim A, Kessy FL, Lindahl AK. Paying for performance to improve the delivery of health interventions in low- and middle-income countries . Cochrane Database Syst Rev. 2012;(2):CD007899.A

ANEXOS

ANEXO 1 – SUBMISSÃO MANUSCRITO BMC PUBLIC HEALTH

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Sex, 16/02/2024 11:56

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Dear Dr Vieira de Barros Arato,

Thank you for submitting your manuscript to BMC Public Health.

Your manuscript is now at our initial Technical Check stage, where we look for adherence to the journal's submission guidelines, including any relevant editorial and publishing policies. If there are any points that need to be addressed prior to progressing we will send you a detailed email. Otherwise, your manuscript will proceed into peer review.

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Kind regards,

Peer Review Advisors
BMC Public Health

ANEXO 2 – DISPENSA DO COMITÊ DE ÉTICA FOP/UNICAMP

Faculdade de Odontologia de Piracicaba
UNICAMP

OF. CEP/FOP N. º 05/2023

Piracicaba, 17 de Abril de 2023.

Ilmo. **Caio Vieira de Barros Arato**
Mestrando no Mestrado Profissional em Gestão e Saúde Coletiva da
Faculdade de Odontologia de Piracicaba, FOP/UNICAMP

Após analisar a documentação apresentada ao CEP-FOP, contendo o projeto de pesquisa "**Impacto do programa Previne Brasil no pré-natal habitual e na mortalidade materna infantil"**, dos autores "**Caio Vieira de Barros Arato"** (Mestrando) e Prof. Dr. **Antônio Carlos Pereira"** (orientador), informo que **este projeto não necessita**, em princípio e de acordo com as informações oferecidas no material encaminhado, **serem submetidos à apreciação, por meio da Plataforma Brasil, de um Comitê de Ética em Pesquisa com Seres Humanos no Brasil**.

As informações enviadas em troca de e-mails no dia 17/04/2023 e em dois arquivos anexados aos mesmos ("PROJETO CAIO ARATO FOP MP.PDF" e "CARTA DISPENSA CEP CAIO.PDF") indicam que a pesquisa será realizada com dados secundários de acesso público provenientes do Departamento de Informática do SUS (DATASUS), do Instituto Brasileiro de Geografia e Estatística (IBGE), do Instituto de Pesquisa Econômica Aplicada (IPEA) e do Sistema de Informação em Saúde para a Atenção Básica (SISAB).

Esclareço que as informações fornecidas sobre este projeto serão arquivadas pelo CEP-FOP-UNICAMP por cinco anos. Colocamo-nos à disposição para qualquer informação adicional que julgar necessária.

Cordialmente,

Prof. Jacks Jorge Junior
Coordenador

Av. Limeira, 901 - Bairro Areão - PIRACICABA /SP - CEP 13.414.903 - Caixa Postal 52
Fone/Fax: (19) 2106.5349 - E-Mail: cep@fop.unicamp.br
Home Page: http://www.fop.unicamp.br/cep

ANEXO 3 – VERIFICAÇÃO DE ORIGINALIDADE E PREVENÇÃO DE PLÁGIO

caio arato

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7	Paulo Eduardo Guedes Sellera, Lucas Alexandre Pedebos, Erno Harzheim, Olivia Lucena de Medeiros et al. "Monitoramento e avaliação dos atributos da Atenção Primária à Saúde em nível nacional: novos desafios", Ciência & Saúde Coletiva, 2020 Publicação	1%