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The Covid-19 Pandemic's Influence on Maternal Mortality in São Paulo

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ABSTRACT

OBJECTIVE

To understand the epidemiological profile of maternal mortality in São Paulo from 2017 to 2021, considering the impact of the COVID-19 pandemic on maternal mortality rates.

METHODS

Longitudinal research based upon epidemiologic data and conducted through TabNet electronic database from 2017 to 2021. Pre-defined aspects of interest to the study were selected: the number of maternal deaths per month in the state of São Paulo.

RESULTS

There was no statistically significant difference in maternal mortality between the analyzed years and months. Of the total maternal deaths (26.5%) in the analyzed years, 2021 has the highest percentage of maternal mortality compared to the other 4 years analyzed, followed by 2017 (20.19%), 2020 (19.26%), 2018 (17.58%), and 2019 (16.42%).

CONCLUSION

Despite the expected increase, the data did not show a statistically significant rise in these cases in the following years.

DESCRIPTORS

Maternal Mortality, COVID-19, Pregnancy.

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INTRODUCTION

Maternal mortality is highly prevalent in Brazil, making it a public health issue. It is known that mortality rates for this group increased during 2020, which has coincided with the start of the Covid-19 pandemic[1]. In Brazil, direct obstetric maternal deaths account for 66% of maternal deaths. The main causes include hypertensive syndromes, hemorrhages, puerperal infections, and complications from abortion[1].

In 2010, at the United Nations General Assembly in New York, Ban Ki-moon, the then Secretary-General of the United Nations (UN), proposed a global intervention in the health of women, children, and adolescents and launched the "Every Woman, Every Child" movement. In 2015, he presented the updated document "Global Strategy for Women's, Children's and Adolescents' Health 2016-2030"[2]. This document sets goals and targets to prevent avoidable maternal deaths by addressing inequalities that interfere with access and quality of health services in this field. Thus, promoting greater health coverage and addressing causes of maternal mortality, reproductive and maternal morbidities, and related disabilities to strengthen data collection systems, with the aim of directing resources by prioritizing areas of greatest need[2].

In response to the international situation regarding maternal mortality, more specifically to one of the leading causes of maternal death in the Americas being hemorrhage, the Pan American Health Organization (PAHO) created the "Zero Maternal Death from Hemorrhage Strategy" in 2014 in collaboration with other organizations[6]. This project focuses mainly on "strengthening health services, eliminating barriers to access, training personnel to deal with obstetric hemorrhage, and ensuring the availability of essential medicines and safe blood for transfusions"[6]. The intervention covers countries such as Bolivia, Guatemala, Haiti, Peru, and the Dominican Republic. It was implemented in Brazil in 2015, in partnership with the Ministry of Health (MS), promoting a series of professional training workshops contemplating, among other states, São Paulo with 220 trained professionals[6]. These interventions were created before the Covid-19 pandemic, making them valid but outdated and unspecific in this scenario. Therefore, it is important to assess the context.

Maternal Mortality

According to the World Health Organization (WHO), the definition of maternal death, in the 10th revision of the International Classification of Diseases (ICD-10), is: "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes"[1]. Based on this, the Brazilian Ministry of Health's Manual of Maternal Death Committees classifies the types of maternal death as direct, if it occurs due to obstetric complications during pregnancy, childbirth, or puerperium, and indirect, if it occurs due to diseases existing before the gestational period or developed during this time and aggravated by the physiological effects of pregnancy on the woman's body[1].

One of the leading causes of death in women of reproductive age is related to pregnancy[5]. Maternal mortality (MM) reflects the availability and quality of health services in a country and is considered an avoidable cause of death in most cases. This occurs when women's human rights are ignored, and the sexual and reproductive health of this population is neglected[8].

Maternal Mortality in Brazil

The maternal mortality rate in Brazil has been increasing every year. The study "Maternal Mortality in Brazil: A Reality That Needs Improvement"[3] concluded that maternal mortality rates in Brazil point to regional inequalities, presenting a reality that requires health interventions to improve these numbers. However, these conclusions were reached before the pandemic, and may or may not have changed since then.

COVID-19 and Maternal Mortality in Brazil

In late December 2019 and early 2020, a new virus (SARS-CoV-2) emerged, causing severe respiratory syndromes with high transmission rates. The COVID-19 pandemic caused several global consequences in three sectors: state, market, and civil society, leading to a crisis especially in the health sector, and not only for individuals who contracted the virus[7].

The impact of this virus in Brazil was wide-ranging, mainly affecting public health and its functionalities. To stop the spread of the virus, public health in Brazil neglected other important factors, such as maternal health. At SUS (Unified Health System) and primary care, pregnant women experienced a lack of proper prenatal care due to quarantine restrictions.

This study aims to investigate the influence of Covid-19 pandemic on maternal mortality in São Paulo.

METHODS

The research has had a longitudinal epidemiological design and was conducted using data available in the TabNet system through the DATASUS platform, specifically from the "Vital Statistics" section. Information related to mortality was used, more specifically deaths of women of childbearing age and maternal deaths, selecting the state of São Paulo.

For this purpose, the following categories were used:

- Section: Vital Statistics
- Subcategory: Mortality - since 1996 by ICD-10
- Variables: Deaths of women of childbearing age and maternal deaths
- Geographic location: State of São Paulo

Data were collected from the years 2017 to 2021, covering a pre-pandemic period and the period of the Covid-19 pandemic. The data were collected month by month, using the variable "Month of death". The number of maternal deaths recorded for each month in the analysis period was verified. Deaths not related to maternal health (accidents, homicides etc.), incomplete or missing data, and duplicates were excluded.

A descriptive analysis of the collected data was performed. Absolute numbers and maternal mortality rates were calculated for each year and month. Data were compared between years and possible variations, and trends were analyzed by using the Friedman Test. The Kruskal-Wallis Test was also used to compare the means of three or more independent groups.

RESULTS

Data were collected from the Vital Statistics section of the TabNet platform and the SIM (Mortality Information System), covering the variables of deaths of women of childbearing age and maternal deaths, during monthly periods between 2017 and 2021. The place of residence (state of São Paulo) of the deceased was considered.

In case of inconsistency between the declared maternal cause and the time of death (including the puerperal period, gestation, or time of delivery), priority was given to the information about the cause to determine whether the death would be classified as maternal or of women of childbearing age.

Table 1 - Maternal deaths in São Paulo from 2017 to 2021.

Months	Years				
	2017	2018	2019	2020	2021
January	26	24	31	25	33
February	32	19	26	26	30
March	36	27	36	23	69
April	34	26	19	36	75
May	21	25	21	38	62
June	38	22	11	36	61
July	40	28	21	32	31
August	29	25	21	19	27
September	29	32	22	30	17
October	21	22	21	27	16
November	19	18	28	26	15
December	23	35	26	14	21
TOTAL	348	303	283	332	457

Source: MS/SVS/CGIAE - Sistema de Informações sobre Mortalidade - SIM

Friedman Test X^2 = 3,58 p= 0,4653

Kruskal-Wallis H Test = 482 p = 0,3061

The value of the test statistic X^2 = 3.58 indicates the magnitude of the difference between the conditions or test moments. However, the obtained p-value (p = 0.4653) indicated that there was no statistically significant difference in maternal mortality between the years and months analyzed. This means that there is no statistical evidence of a significant difference in maternal mortality during this period.

The test statistic H = 482 indicates the size of the difference between the samples. However, the obtained p-value (p = 0.3061) indicated that there was no statistically significant difference in maternal mortality between the analyzed groups. Therefore, it is not possible to conclude that there is a significant difference in maternal mortality between the study groups.

Of the total maternal deaths in the years expressed on Table 1 (1723 deaths), 2021 had the highest percentage mortality rate compared to the other 4 years analyzed by this study (26.5%), followed by 2017 (20.19%), 2020 (19.26%), 2018 (17.58%), and 2019 (16.42%).

Figure 1 - Percentage of deaths of women of childbearing age and maternal deaths per month in 2021.
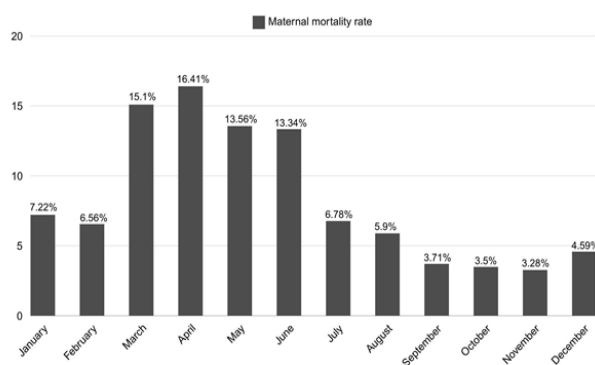
Source: Authors

The month with the highest percentage of MM was April with 75 deaths (Table 1) in 2021, corresponding to 16.41% of the total percentage in this year (Figure 1). In the crude analysis of maternal characteristics, none of the variables in this group showed statistically significant association with the cause of death (see Table 1) when compared to the pre-pandemic and pandemic periods.

DISCUSSION

Considering that maternal mortality has a high incidence in Brazil[18],[19] along with the concerning public health context of the years succeeding the Covid-19 pandemic and the unequal panorama of each of the country's regions, it was expected that the maternal mortality rate would be even higher when compared to the years before the pandemic (2017, 2018, and the last months of 2019). That is because this virus caused a great deal of damage to the population, with more than 35 million accumulated cases and more than 712 thousand deaths[20]. Contrary to what was expected, in the years following the pandemic (2019, 2020, and 2021) compared to 2017 and 2018, there were no statistically significant data indicating an increase in the number of maternal deaths (Table 1).

This result may raise discussions about the reason why the differences in maternal deaths over the analyzed years were not significant. One can reflect on the amount of underreporting of maternal deaths during the pandemic period in Brazil[11], since it is necessary to consider regions where notification protocols and obligations are not carried out efficiently, such as rural areas of the country, added to the epidemiological, socioeconomic circumstances and the problematic national public health crisis in which the country found itself in that context. These data may be incomplete or inconclusive to the accuracy in the diagnosis of maternal death (disregarding deaths related to accidents and homicides, for example)[21],[22].

In this context, health professionals in hospital settings and patients under quarantine policies during the pandemic period can reflect, as an aggravating factor, on the underreporting of maternal deaths, given the "misdiagnosis syndrome" - that is, prone to making incorrect diagnoses due to excessive prevalence or a focus on a specific disease. Furthermore, due to quarantine policies, there is a greater difficulty in accurate reporting, as prenatal care was neglected in view of the crisis. Therefore, since during the Covid-19 pandemic, pregnancy brought feelings of surprise, concern, and fear to women, considering the instability of the health scenario, resulting in a delay in the start of prenatal care. This problem occurred due to the fear of being pregnant during the pandemic, the delay in noticing the signs of pregnancy, or postponements in confirming the pregnancy. When these prenatal consultations had sanitary conditions to happen, pregnant women, in turn, missed prenatal appointments for fear of infection or had appointments postponed due to suspected Covid-19 infection (of themselves or health professionals), or even due to suspension of care related to the epidemiological condition of the disease. In addition, the lack of available professionals in primary health care for this population should be contemplated, considering the high demand that the pandemic required, concentrating many health professionals, which, in the end, further aggravates the accuracy of the diagnosis[31].

In addition to these observations, it was possible to verify that in 2021 there was an unexpected rate of a higher percentage of maternal mortality than all the other four years, with April being the month with the highest percentage of MM (Table 2), which can be explained by interruptions in primary care25, vaccine delays[26], and unjustifiable delay in recognizing pregnant women as a risk group. In this view, the importance of primary health care (PHC) as a foundation for facing health and sanitary crises stands out. Maternal deaths occurred more frequently in low- and middle-income countries and were due to health system failures combined with the social determinants of the health-disease process[28],[29], such as studies that demonstrated the disproportionate impact of structural racism on maternal deaths from COVID-19[28],[30].

Furthermore, regarding PHC, we can also mention the creation of the Maternal-Child Health Services (Rede Cegonha - RC), a care model for improving childbirth care, an investment made in 2011 by the Ministry of Health in partnership with SUS (the Brazilian Unified Health System). The RC aimed to promote the implementation of a new model of women's and children's health care, focusing on childbirth, birth, growth, and development of children from zero to twenty-four months. It also sought to organize the Maternal and Child Health Care Network to ensure access, reception, and resolution, and to reduce maternal and child mortality, with an emphasis on the neonatal component. In addition, it encompassed comprehensive care for pregnancy planning, reproductive health, and abortion. This model aimed to optimize pregnancy outcomes and, consequently, reduce maternal mortality rates. The RC's guidelines include ensuring reception with risk and vulnerability assessment and classification, expanding access and improving the quality of prenatal care, guaranteeing the linkage of pregnant women to the reference unit and safe and effective transportation, and ensuring safe practices in childbirth care[32],[33]. However, despite the existence of this tool within the Brazilian Unified Health System to expand consultations with pregnant women and provide comprehensive care throughout pregnancy, the program did not prove effective, given the highest maternal mortality rate in 2021 during RC's operation period. Due to failures in the program's management, RC was discontinued in February 2022 and is expected to be replaced by the Maternal and Child Health Care Network (Rede de Atenção Materno Infantil - RAMI) program, whose planning was finalized in February 2023.

The severity of COVID-19 can be greater during pregnancy than in the general population, given that during pregnancy there are physiological changes involving the cardiovascular, respiratory, and immune systems[15].

The REBRACO prospective cohort study, which studied Covid-19 in pregnancy in Brazil, concluded that about one in six women diagnosed with Covid-19 had severe acute respiratory syndrome (SARS) (16.3%) and required admission to an intensive care unit (16.7%). The mortality rate from Covid-19 in the obstetric population is 4.7%. Also, approximately one in five women had severe maternal outcomes, including SARS, ICU admission, or maternal death[16].

Among the limitations of this study are information biases, as the data used (such as death records) may be incomplete, affecting the validity of the conclusions. In addition, the reliability of the data collected, the diagnostic accuracy of maternal death, the quality of population data, and the generalization of results to other populations or time periods are aspects that must be carefully considered.

Another risk that needs to be addressed is the presence of confounding factors, such as socioeconomic factors and access to health services, which interfere with the results and need to be adequately controlled. Additionally, exposure selection bias, sample bias, survival bias, registration bias, memory bias, and outcome selection bias are potential biases that also need to be considered in this study. Nevertheless, the heterogeneity of Brazilian territory itself is highlighted, as some local studies show discrepancies between increases and decreases in maternal mortality[27].

Considering the presented results, it can be concluded that the influence of the Covid-19 pandemic on maternal mortality in São Paulo during the studied period presented complex and inconclusive aspects. Although a significant increase in the maternal mortality rate was expected due to the public health crisis, the data did not show a significant increase in the years following the start of the pandemic when compared to previous years. This apparent stability can be attributed to several factors. One is the possibility of underreporting of cases, especially in regions with inefficient or overloaded notification systems, due to the prioritization of emergency care and the lack of resources for epidemiological surveillance[23]. In addition, changes in health-seeking behaviors by pregnant women, motivated by fear of contamination, may have resulted in fewer formal records of complications and maternal deaths. Another aspect is that pandemic mitigation measures, such as the use of masks and social distancing, may have indirectly benefited pregnant women by reducing exposure to other pathogens[24]. In summary, the analysis reveals that the stability in maternal mortality rates can be explained by a combination of underreporting, changes in health-seeking behavior, and the indirect effects of pandemic control measures.

However, it is noteworthy that the year 2021 presented a higher rate of maternal mortality compared to the other years analyzed. Despite the lack of data collected and studies conducted during the pandemic period, it is possible to deduce possible factors associated with this data. The unexpected increase may be associated with the interruption of primary care, including prenatal consultations, routine exams, and delays in vaccination for these women. In addition, the lack of availability of appointments, especially in-person ones, hindered the public health system's flow of care, which allows for the identification of high-risk pregnancies and the appropriate referral to the medical specialties indicated in each case, for example, with monitoring by an infectious disease specialist in addition to the obstetrician in cases of toxoplasmosis. In this sense, the importance of primary health care is emphasized, as it is the gateway that allows for longitudinal follow-up, assessment of each case, and access through the flow to other specialized levels of care when necessary. As a reference to reduce maternal mortality statistics, initiatives such as the Mãe Paulistana Program stand out, which aimed to improve care for the entire pregnancy cycle, including prenatal care, childbirth, postpartum care, and up to the second year of the newborn's life, which can be applied in similar contexts as a reinforcement to primary care[14]. In light of this, it is essential that measures be taken to improve the notification and proper registration of maternal deaths, as well as to strengthen primary health care during public health crises. Investments in policies and programs that guarantee continuous access to maternal health care, even in challenging contexts, are essential to reduce maternal mortality and ensure the well-being of pregnant women. Additionally, it is important that actions be implemented to reduce social inequalities and improve the quality of maternal care to achieve better results and guarantee the health and safety of women during the pandemic and beyond.

CONCLUSION

Based on the data analysis, there was not a significant increase in the maternal mortality rate during the years following the start of the pandemic. This stability may be the result of an interaction of several factors, such as public health measures implemented, adaptations in health systems, and changes in health-seeking behaviors during the pandemic.

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