

Maternal mortality in the state of Paraíba-Brazil: association between variables

MORTALIDADE MATERNA NO ESTADO DA PARAÍBA: ASSOCIAÇÃO ENTRE VARIÁVEIS

MORTALIDAD MATERNA EN EL ESTADO DE PARAÍBA-BRASIL: ASOCIACIÓN ENTRE VARIABLES

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ABSTRACT

Maternal mortality has been established as one of the priority problems of public health, directly affecting women in the pregnant puerperal cycle and belonging to underprivileged social classes. Considering this situation, the aim of the present study was to identify associations between the race of women living in the state of Paraíba and age, educational level and type of death of women who died of maternal death in the period 2000 to 2004. This cross-sectional study used as a source of data declarations of 109 maternal deaths. Bivariate and multivariate statistical analyses were performed to evaluate the association between variables using multiple logistic regression. The odds ratio to investigate the association between variables was calculated. It was observed that there was no statistical significance between race and age variables or with educational level, but there was significant evidence that non-white women from Paraíba were more likely to die from direct obstetric death than white women, (OR = 3.55; IC: 1,20-10,5). The results showed that the risk of maternal mortality in Paraíba was higher among non-white women, revealing an important expression of social inequality.

KEY WORDS

Maternal mortality.
Ethnic group and health.
Social inequity.
Public health.

RESUMO

A mortalidade materna tem se constituído em um dos problemas prioritários de saúde pública, afetando diretamente as mulheres no ciclo grávido puerperal pertencentes às classes sociais menos favorecidas. Diante desta situação o objetivo deste estudo consistiu em identificar associações entre a raça de mulheres residentes no estado da Paraíba, e as variáveis grupo etário, escolaridade e tipo de óbito das mulheres que foram a óbito por morte materna no período de 2000 a 2004. Trata-se de um estudo transversal, cuja fonte de dados constituiu-se de 109 declarações de óbitos maternos. Procedeu-se a uma análise estatística bivariada e multivariada, para avaliar a associação existente entre as variáveis através da regressão logística múltipla. Calculou-se o odds ratio para investigar a associação entre as variáveis. Observou-se que não houve significância estatística entre as variáveis raça e idade, bem como por escolaridade, mas houve indícios significativos de que as mulheres não brancas da Paraíba tiveram mais chance de morrer por morte obstétrica direta (OR=3,55; IC:1,20-10,5). Os resultados mostraram que o risco de mortalidade materna na Paraíba foi maior entre as mulheres não brancas, configurando-se em importante expressão de desigualdade social.

DESCRIPTORES

Mortalidade materna.
Etnia e saúde.
Iniquidade social.
Saúde pública.

RESUMEN

La mortalidad materna se ha constituido en uno de los problemas prioritarios de la salud pública, afectando directamente a mujeres en el ciclo grávido-puerperal, pertenecientes a las clases sociales menos favorecidas. Ante esta situación, el objetivo de este estudio consistió en identificar asociaciones entre la raza de mujeres residentes en el estado de Paraíba - Brasil y las variables de grupo etario, escolaridad, y tipo de defunción de las mujeres que fallecieron por muerte materna en el período de 2000 a 2004. Se trata de un estudio transversal, en el que se utilizaron como fuente de datos 109 partidas de defunción maternas. Se procedió a un análisis estadístico bivariado y multivariado para evaluar la asociación existente entre las variables a través de la regresión logística múltiple. Se calculó el odds ratio para investigar la asociación entre las variables. Se observó que no hubo significatividad estadística entre las variables raza y edad, así como con escolaridad, pero existieron indicios significativos de que las mujeres no blancas de Paraíba tuvieron mayores posibilidades de fallecer por muerte obstétrica directa (OR=3,55, IC: 1,20-10,5). Los resultados demostraron que el riesgo de mortalidad materna en Paraíba fue mayor entre las mujeres no blancas, dando forma así a una importante expresión de desigualdad social.

DESCRIPTORES

Mortalidad materna.
Etnia e salud.
Inequidad social.
Salud pública.

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INTRODUCTION

The World Health Organization (WHO) (1975) defined maternal death as

the death of a woman while pregnant or within 42 days after termination of pregnancy, irrespective of the duration or 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⁾.

In 1995, WHO introduced the concept of late maternal death as *the death of a woman due to direct or indirect obstetrical causes more than 42 days but less than one year after termination of pregnancy*, through the 10th Revision of the International Classification of Diseases (ICD) (1994)⁽²⁾, taking into account that not all women are exposed to similar risks, even women in the same social class: some present a higher probability of dying or suffering negative health conditions than others. Several biological factors and those related to life style increase the chances of complications that can put the life of a woman at risk⁽³⁾.

Based on the cause, maternal death is classified as *direct* or *indirect*. Direct deaths result from obstetrical complications related to pregnancy, labor and puerperium due to interventions, omissions, incorrect treatment or due to a chain of events resulting from any of these (i.e. bleeding, puerperal infection, hypertension, thromboelism, anesthetic accident). Indirect deaths result from preexistent conditions or those that develop during pregnancy (intercurrent) and which do not result from direct obstetric causes but were aggravated by the pregnancy's physiological effects (i.e. heart disease, collagen diseases and other chronic diseases)⁽⁴⁾.

Maternal mortality is also considered an important indicator of a country's social state. Hence, the conditions that cause the death of women reflect the population's level of human development. Consequently, a high rate of maternal mortality indicates poor socioeconomic conditions that culminate in difficulties of access to health services⁽⁵⁾. In the context in which the roles of women as social beings are valued, maternal death becomes even more significant due to the problems it generates for the family, both in the emotional sphere – manifested by shock, despair, surprise, uncertainty, non-acceptance, fear of the future – and in the social sphere – the family faces conflicting relationships, lack of support in the transmission of moral and social rules and imbalance in the family economic condition.

Coupled with socioeconomic and demographic issues is the racial issue. This is a difficult issue to analyze given the concept and classification of race/ethnicity. There are several trends such as: classification by color, parentage, social strata and there are even people who believe there

should be no classification. However, regardless of the data used, it seems that ethnic minorities have less access to education, lower social and economic status, have worse living conditions and, concerning reproductive life, have less access to contraceptive methods and more chances of becoming pregnant even when a pregnancy is unwanted. Given these reasons, it is not a mere coincidence that the North, Northeast and Midwest concentrate most of the deaths of black women resulting from intercurrents during pregnancy, labor and puerperium and also most of the global maternal deaths in the country⁽⁶⁾.

Some studies⁽⁷⁻⁸⁾ also evidence that the maternal mortality rate is a concern and a great part of them occur among the less favored classes in some regions such as the state of Paraíba, marked by scarcity of resources in the health field.

Based on these data, it is important to stress that nursing interventions in the obstetrical field are based on women's care, especially during the pregnancy-puerperal cycle, so that this practice is also related to reduced maternal mortality. Such care has existed from the most remote times, though studies evidence that the number of maternal

deaths is alarming in certain Brazilian regions, mainly in the state of Paraíba, a region marked by scarce resources in the health field and a great part of them occur among the less privileged classes and are considered, in the main, avoidable.

Therefore, some research questions are posed: is the risk of maternal death higher among non-white women than among white women? Did the non-white women who died have more chances to die due to direct or indirect obstetrical causes? What are the chances of dying for non-white women with

a low level of education?

Seeking answers to these questions, this study identifies associations between the race of women living in the state of Paraíba and the following variables: age group, schooling and type of death of women who had maternal death between 2000 and 2004.

METHOD

This cross-sectional study was carried out with 116 maternal Death Certificates (DC) of female residents of the state of Paraíba, Brazil between 2000 and 2004. Only 109 DCs were used due to the incompleteness of seven certificates. These years were chosen because the State Health Department (SHD), the Mortality Information System (MIS) 2004⁽⁹⁾ and the National Information System of Live Births SINASC 2004⁽¹⁰⁾ provided the most recent data for this period at the time of data collection. Data concerning maternal deaths were collected through a form at the Division of Informatics at the Department of Health of the state of Paraíba.

Maternal mortality is also considered an important indicator of a country's social state.

Hence, the conditions that cause the death of women reflect the population's level of human development.

The following variables obtained in the DCs were considered in the study: age, schooling, race and type of death. It is important to highlight that these variables were complete in all the 109 maternal deaths provided by the State Department.

Age group was categorized as 19 years old or younger, between 20 and 34 years old, the age range in which the largest number of women are exposed to the risk of maternal death because it is the period of highest fecundity, and 35 years old or older, which is the period that corresponds to the age group with the highest obstetrical risk and which can determine negative effects in maternal mortality⁽¹¹⁾.

Schooling: categorical, polychotomous variable observed in years of education, classified according to the information obtained from the DCs: None, from 1 to 3 years, from 4 to 7 years, from 8 to 11, 12 and more years of schooling, and Ignored. To facilitate the statistical analysis we opted to categorize these variables as < 8 years and = 8 years.

Race: categorical variables classified according to information available on DCs: white, black, Asian, mixed and indigenous. For statistical analysis purposes, race was categorized as white and non-white; the latter includes mixed and black. The remaining classifications of race were not considered due to the inexpressive total number in Paraíba.

Type of maternal death: The determination of type of death followed the International Classification of Diseases (10th revision)⁽²⁾. The Maternal Mortality Ratio (MMR) was computed based on data of live births in each studied year for the entire state of Paraíba (provided by the Health Department) according to the following standard formula:

$$\text{MMR} = \frac{\text{maternal deaths}}{\text{number of live births in the period}} \times 100,000$$

Data were stored in a specific file in the Epi-Info 2000 for Windows generating a database that was later used for statistical analysis through the SPSS; Chi-square and Odds Ratio tests were used.

Associations with variables were obtained from the original data, which were obviously underestimated. However, we assume these data have the potential to represent the true relationship between maternal mortality and the study variables, thus keeping the characteristics and power of true associations.

This study complied with resolution n° 196/96 of the National Council of Health guiding research with human subjects and was also approved by the Research Ethics Committee at the State University of Paraíba (Protocol 1099.0.133.752-05)

RESULTS

According to the studied data (Table 1), 109 maternal deaths were identified between 2000 and 2004 by SHD while MIS identified 116. MIS more thoroughly collected data in 2000 and 2002, especially in 2000. SINASC also identified more live births in all the years in the series with a difference of more than 7,000 live births in the period. The compensating effect of the divergent information in the two systems generated approximated MMR except for data from SHD in 2000. When corrected, MMR were around 59/100,000 live births for SDH and 62/100,00 live births MIS and SINASC in the period. The MMR tendency shows an increase in 2001 and 2003 and then a decrease in 2004. A possible explanation for this increase was a better investigation on the part of the maternal mortality committee. The compensating effect of the divergent collection of data in the two systems resulted in similar observed MMR, except for the SHD in 2000.

Table 1 - Number of maternal deaths and live births and MMR according to data sources and years - State of Paraíba, Brazil - 2000/2004

Year	Number				Razão de mortalidade (p/100,000nv) p/materna*			
	Deaths		Live Births		Observed		Corrigido*	
	SDH	MIS	SDH	SINASC	SHD	MIS/SINASC	SHD	MIS/SINASC
2000	14	20	56045	57427	24.9	34.8	41.6	58.1
2001	18	18	63400	64957	28.4	27.7	47.4	46.2
2002	25	26	62499	64006	40.0	40.6	66.8	67.8
2003	31	31	62680	64115	49.5	48.3	82.6	80.6
2004	21	21	60657	62200	34.6	33.7	57.7	56.3
Total	109	116	305281	312705	35.7	37.1	59.2	61.9

Source: State Health Department, Paraíba, 2004 - * The MMR was corrected(12) by the factor 1.67

Table 2 shows that 72 deaths occurred among non-white women, the majority of which, 44 (61.1%), were women between 20-34 years of age; this is twice as many as for white women (21), which is an important differential. No significant association ($\alpha=5\%$) was found between race and maternal age (age groups) according to the calculated Chi-square statistic $\chi^2_{cal}=0.61$ (Table 3), that is, there is no statistical evidence that non-white women were more

likely to die between 20 and 34 years of age than white women were in the state of Paraíba. The multiple logistic regression analysis, 1.22 (CI 95% 0.35-4.18; p-value 0.75), did not indicate statistical significance either. This result suggests that age was not a confounding variable, dispensing with the need for stratification of this variable in the analysis of relationship between race and other variables in this study.

Table 2 - Number and percentage of maternal deaths by race/color according to age group, schooling and type of death - state of Paraíba, Brazil - 2000/2004

Variable	Race/Color					
	Non-white		White		Total	
	N	%	N	%	N	%
Age						
≤ 19	13	18.1	05	13.5	18	16.5
20-34	44	61.1	21	56.7	65	59.7
≥ 35	15	20.8	11	29.7	26	23.8
Total	72	100.0	37	100.0	109	100.0
Schooling						
< 8 years	54	75.0	31	83.7	85	77.9
≥ 8 years	18	25.0	06	16.3	24	22.1
Total	72	100.0	37	100.0	109	100.0
Type of death						
Directo obstetrical	65	90.2	27	72.9	92	84.4
Indirect obstetrical	07	9.8	10	27.1	17	15.6
Total	72	100.0	37	100.0	109	100.0

Source: State Health Department, Paraíba, 2004.

In relation to schooling, Table 2 shows that 75% of non-white women had less than eight years of education. With an evident majority of non-white women with a low level of education, the test for independence was applied (Table 3), which indicated no statistical significance between race and schooling, $\chi^2_{cal} = 0.93$. Multiple logistic regression with an odds ratio of 1.55 (CI 95% 0.55-4.39; p-value 0.41) did not indicate statistical association of the remaining variables.

Table 2 also shows that 90.2% of the 65 non-white women died due to direct obstetrical causes, while 72.9% of the 10 white women died of direct obstetrical causes,

which indicates a certain differential. With an evident majority of non-white women who died by direct obstetrical causes, the test for independence was applied, $\chi^2_{cal} = 5.25$ (Table 3), which evidenced a significant association between race and type of death. The non-adjusted odds ratio (OR=3.55;1.20-10.5) reinforces the view that non-white women were more at risk of death than white women by a 3.5 times greater chance. The multiple logistic regression revealed an odds ration of 2.09 (CI 95% 1.008-4.31; p-value 0.04) evidencing statistically significance association between race and type of death.

Table 3 - Odds ratio, confidence interval, Chi-square and significance, non-adjusted and adjusted according to sociodemographic variables of women resident in the state of Paraíba, Brazil - 2000/2004

Variable	Odds ratio (non-adjusted)	Confidence Interval (95%)	Chi-square	Odds ratio (adjusted)	Confidence Interval (95%)	p value
Age						
≤ 19	-	-	-	1.0	-	-
20-34	1.70	0.45-6.47	0.61	1.22	0.35-418	0.75*
≥ 35	1.51	0.57-4.0	0.68	1.04	0.46-2.33	0.92*
Schooling						
≥8 years	1.00	-	-	1.00	-	-
<8 years	1.69	0.58-4.9	0.93	1.55	0.55-4.39	0.41*
Type of death						
Indirect	1.00	-	-	1.00	-	-
Direct	3.55	1.20-10.5	5.25	2.09	1.008-4.31	0.04*

Source: State Health Department, Paraíba, 2004. - * Significant at p=0.05

DISCUSSION

Maternal mortality ratio calculated for the period between 2000 and 2004 in the state of Paraíba, Brazil for both

the observed (35.7 p/100,000 live births) and the corrected ratios (59.2 p/100,000 live birth), is considered very high and beyond that tolerated by the United Nations, whose parameter is between 10 and 20 deaths per 100,000 live births⁽¹³⁾.

According to data from MIS concerning the first semester of 2002, the MMR based on the original data from the Brazilian capitals was 38.9 per 100,000 live births, which after correction was 54.3 per 100,000 live births⁽¹⁴⁾. The non-corrected MIS data show a decline in maternal mortality in several Brazilian states, including São Paulo. Corrected data from the state of Paraná show that maternal mortality declined from 105 to 57 per 100,000 live births from 1990 to 2002, a decline of 46%. Non-corrected data show that maternal mortality declined from 69.7 to 33.4 per 100,000 live births or 52%⁽¹⁵⁾.

The MMRs of other states are between 42 and 75/100,000 live births: maternal mortality in the northeast was 73.2 and the MMR found in Paraíba (59.2) was above 50/100,000 live births. These data varied with an ascendant trend between 24.9 and 49.5 per 100,000 live births from 2000 to 2003. In 2004 this trend was interrupted and declined to 34.6 per 100,000 live births. The corrected coefficients obviously follow this same behavior.

According to the census in 2000, Brazil had a population of 170 million inhabitants, of which 36 million were black women, the majority of whom lived in urban areas⁽¹⁶⁾. According to the Institute of Applied Economic Research (IPEA) the female population accounts for 51% of the population and black women represent 30% of the female population. According to most recent data provided by the Brazilian Institute of Geography and Statistics (IBGE)⁽¹⁶⁾, the Brazilian white population presented an average rate of growth of 2.12%, the black population 4.17% and, mixed 0.53%.

It is believed that because Brazil is characterized as being considerably interracial⁽¹⁷⁾, many people, identified as white by the professional who filled out data on the medical files used in studies addressing maternal death, present more marked characteristics of other races. It is possible that racial delimitation hindered a significant association between race and age in the study and might explain the different result obtained in the literature⁽³⁾.

We also observed that even though a statistically significant association was not found between age and race, maternal deaths occurred much more frequently among non-white women than among white women between 20 and 34 years of age. This is important information since it shows there are still age/racial inequalities in the state of Paraíba. These differences are often expressed by poor quality healthcare and/or lack of information, especially among women with the low socioeconomic status that is predominant among non-white women.

According to IBGE⁽¹⁶⁾, the population in the state of Paraíba was 3.4 million inhabitants in 2000, of which 29.7% under 15 years of age were illiterate. This indicator reached 26.3% in the Northeast and 13.6% in Brazil as a whole. Illiteracy remains latent, far from being eradicated and this certainly has implications not only for job opportunities, employment and income, but also for health, considerably affecting women at the peak of their reproductive lives.

In the analysis of the association between race and schooling, the statistical tests indicate that no significant association was found between the two, however non-white women with a low level of schooling had a chance of dying 1.55 times higher than white women. The variable *schooling* is not deemed valuable when completing the maternal death certificates in many studies. Several studies⁽¹⁸⁻¹⁹⁾ have shown risks to be proportionally inverse to the number of years of education. The illiteracy rate among black women is double the illiteracy rate among white women. The situation in regard to risk is due to their low level of education, thus do not implement information provided by the health care team during prenatal and puerperium. It is also important to stress that the lower the level of education, the poorer the access to information and knowledge concerning health habits, especially in relation to reproductive life.

This study's results reveal an association between race and type of death. Other studies⁽²⁰⁻²¹⁾ also indicate that direct obstetrical maternal deaths are more frequent among black women. The explanation is that the causes of maternal deaths are related to the biological predisposition of black women to hypertension/preeclampsia, factors related to difficulty of access, low quality care and lack of actions and qualification of health professionals directed to specific risks to which black women are subject.

One study evidenced that direct obstetrical deaths, mainly those related to hypertensive syndromes, are accountable for about one quarter of maternal deaths in Brazil, which suggest there are problems in the quality of health care delivery or lack of prenatal care⁽²²⁾. In addition to problems related to the quality of care delivery, a study carried out in Paraná, Brazil addressing maternal mortality among black and mixed race women compared to other races showed that hypertension is a risk factor for a higher risk of maternal death among black and Asian women.

Further studies are needed to investigate this association in the state of Paraná, such as determining more precisely the quality and accuracy of information provided in the DCs concerning these variables. A search of death records can provide more reliable answers for the occurrence of or lack of such relationships.

FINAL CONSIDERATIONS

This study's results showed through tests for independence that no statistical evidence was found showing that non-white women from Paraíba were more likely to die than white women between 20 and 34 years of age; no association was either found in relation to schooling. It showed significant association in direct obstetrical deaths; odds ratio was carried out to check this association and the value found confirms that non-white women had a chance of dying in direct maternal death 3.55 times greater in comparison to white women.

Taking into account the obtained results we ask: Why did the state of Paraíba, marked by prevalent interracial relationships, not show an association between race/color with age and level of education? Potential causes for this independence could be peculiarities of the region itself or deficiency in the quality of data; the latter seems more likely. In this context, some problems are evidenced in completing these variables and their true classification in the death certificates. The system presented failures in the various stages of completing the certificates and confirmation of information by the part of those collecting data.

Given these considerations we stress that there is a deficiency in death certificates concerning information provided related to variables; maternal mortality needs to be drastically reduced in the state of Paraíba; women of reproductive age suffer from a set of social difficulties, which expose non-white women to a risk of maternal death different from that to which white women are exposed. Hence, not only do maternal mortality committees need to pay more attention to the issue but so also do the public and private sectors need to care for and recover the health of black women in the state of Paraíba, Brazil.

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