ORIGINALES

Epidemiological aspects of child mortality in a state in Northeastern Brazil

Aspectos epidemiológicos da mortalidade infantil em um estado do Nordeste do Brasil
Aspectos epidemiológicos de la mortalidad infantil en un estado del Nordeste de Brasil

Augusto Cezar Antunes de Araujo Filho [1]
Priscilla Dantas Almeida [2]
Anna Karolina Lages de Araujo[3]
Isabela Maria Magalhães Sales [3]
Telma Maria Evangelista de Araújo [4]
Silvana Santiago da Rocha [4]

[1] Nurse. Master and PhD student in Nursing from the Federal University of Piauí (UFPI). Teresina, Piauí, Brazil.
[2] Nurse. Master in Health and Community at the Federal University of Piauí (UFPI). Teresina, Piauí, Brazil.
[3] Nurse. Master in Nursing from the Federal University of Piauí (UFPI). Brazil.
[4] PhD in Nursing from the Federal University of Rio de Janeiro (UFRJ); Associate Professor of the Undergraduate Program and Postgraduate Program in Nursing, Master's and Doctorate Level, Federal University of Piauí (UFPI).Brazil.

E-mail: araujoaugusto@hotmail.com

ABSTRACT:
Objective: To analyze infant mortality in the State of Piauí, during the period 2004-2014.
Methods: Epidemiological, descriptive study with secondary data extracted from DATASUS, in which the population was composed of all infant deaths of mothers residing in Piauí, in the period 2004-2014.
Results: Despite the fluctuations, there was a decline in the infant mortality coefficient and its components, neonatal and post-neonatal. In addition, most deaths could be minimized through actions directed at women in the pregnancy-puerperal cycle and the newborn.
Conclusion: It has been shown that there is a need for improvement in maternal and child health care in Piauí so that infant mortality reaches the levels of more developed world regions

Keywords: Infant Mortality; Epidemiology; Maternal-Child Nursing.

RESUMO:
Objetivo: Analisar a mortalidade infantil no Estado do Piauí, no período de 2004-2014.
Métodos: Estudo epidemiológico, descritivo, com dados secundários extraídos do DATASUS, em que a população foi composta por todos os óbitos infantis de mães residentes no Piauí, no período de 2004-2014.

Resultados: Apesar das flutuações, houve declínio no coeficiente de mortalidade infantil e nos seus componentes, neonatal e pós-neonatal. Ademais, a maioria dos óbitos poderia ser minimizada através de ações voltadas à mulher no ciclo gravídico-puerperal e ao recém-nascido.
Conclusão: Evidenciou-se que existe a necessidade de melhoria na atenção à saúde materno-infantil no Piauí para que a mortalidade infantil atinja níveis de regiões mundiais mais desenvolvidas.

Palavras chave: Mortalidade infantil; Epidemiologia; Enfermagem Materno-Infantil.

RESUMEN:
Objetivo: Analizar la mortalidad infantil en el estado de Piauí, en el período 2004-2014.
Métodos: Estudio epidemiológico, descriptivo, utilizando datos secundarios extraídos de DATASUS, donde la población se compone de todos las óbitos infantiles de madres que viven en Piauí, en el período 2004-2014.
Resultados: A pesar de las fluctuaciones, se produjo una disminución en la tasa de mortalidad infantil y sus componentes, neonatal y la mortalidad post-neonatal. Por otra parte, la mayoría de las muertes podrían minimizarse a través de acciones dirigidas a las mujeres durante el embarazo y el parto y el cuidado del recién nacido.
Conclusión: Se ha demostrado que existe una necesidad de mejora en la atención a la salud maternoinfantil en Piauí para que la mortalidad infantil alcance niveles de las regiones del mundo más desarrolladas:

Palabras clave: Mortalidad Infantil; Epidemiología; Enfermería Maternoinfantil.

INTRODUCTION

In the worldwide mortality measures are used as indicators of health and, therefore, assist in the evaluation and planning of public health policies in order to improve health care. Among these measures, the coefficient of infant mortality is one of the main indicators of the health situation, because it is related to socioeconomic and health conditions of the population, and also because it refers to early deaths, largely preventable[1-3].

In this context, national and international entities have sought to formulate public health policies more effective, which aim at the reduction of this indicator through actions that make opportune the fight against infant mortality. In the international arena can be highlighted the Millennium Development Goals (MDG), which has as its goal, the reduction of two-thirds in the mortality of children under five years of age between 1990 and 2015. On the national scene can cite the Covenant for the reduction of maternal and Child Mortality; the compromise Agenda for comprehensive care of children and reducing child mortality and the Stork Network[2,4].

Despite all these public policies aimed at reducing child mortality, Brazil currently has values incompatible with your level of technological and economic development[5], and, furthermore, it is observed that there are inequalities between the regions Brazil[4,6]. In 2010, the average of the coefficient of infant mortality to the Brazil was 16.0/1000 live births (LB), still far from the reality found in developed countries. In this same year the north and northeast regions presented the highest rates, respectively, 19.1/1000 LB and 21.0/1000 LB[7]. Thus, the reduction of child mortality is still a challenge for health services, but also for society as a whole [4].

Thus, this study aimed to analyze the infant mortality in the State of Piauí, in the 2004-2014 periods. It is believed that the results will show the situation of maternal and child health care in Piauí and will contribute to the planning of a maternal and child health care and humane, which the improvement of the living conditions of the population.

MATERIAL AND METHOD

This is a descriptive epidemiological study, conducted from secondary data about deaths and of live births, reported by the Mortality Information Systems (SIM) and live births (SINASC) of the Ministry of Health, provided in order online and free of charge by the Department of Informatics of the Unified Health System (DATASUS), referring to the territories of development of the State of Piauí in the northeast region, for the period 2004 to 2014.

The study population consisted of all cases of infant deaths registered in the SIM and all the LB registered in SINASC, during the period from 2004 to 2014, in the State of Piauí, available on the website (www.datasus.gov.br). Piauí is one of the 27 federative units of Brazil, located in the northeast region, has an area of 251,611,932 Km² and a population of 3,188,360 people. This state has 224 municipalities, being Teresina the capital and most populous city.

The data were extracted from the DATASUS in December 2016, however relate to the period of 2004-2014. The coefficient of infant mortality was calculated by dividing the number of deaths of children under one year by the total number of LB of mothers resident in Piauí, multiplying the result by 1,000. To calculate the coefficient of neonatal mortality (CNM) using the ratio between the number of deaths of minors of 28 days and the total of LB in the same year, multiplying the result by 1,000; and, finally, to the calculation of the coefficient of post neonatal mortality (CPNM), divided the number of deaths of children from 28 to 364 days old and the total of LB in the same year, multiplying by 1,000. The tabulation of the data occurred from TABNET program, which then were exported to the EXCEL program in which was held the descriptive analysis.
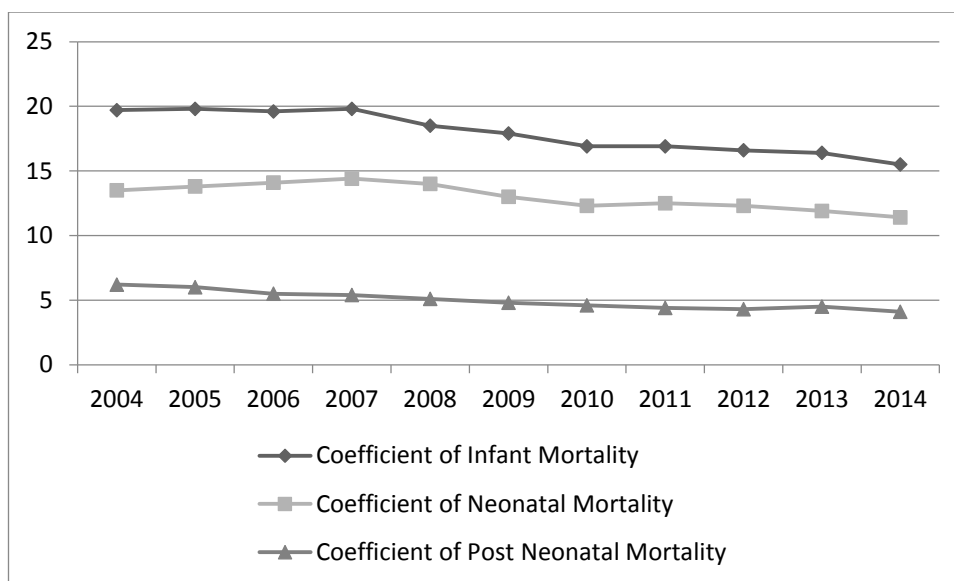
This study was not submitted to the Research Ethics Committee, considering that uses data from a platform in the public domain. However, it should be noted that during the search there were observed aspects contained in the resolution of the National Health Council 466/12, which regulates research involving human beings.

RESULTS

The SIM database registered in deaths under 10,210 a year of mothers resident in the State of Piauí in the period 2004 to 2014. The SINASC, for its time, 565,719 registered live births in the period analyzed.

The coefficient of infant mortality had a decline of 19.7 in 2004 to 15.5/1,000 LB, in 2014, representing a decrease of 21.3%. The post-neonatal component was primarily responsible for this decline, rising from 6.2 to 4.1/1,000 LB between 2004 and 2014, representing a decrease of 33.3%. The neonatal component registered a decrease of 15.8%, during the studied period, in which the coefficient decreased from 13.5 to 11.4/1,000 LB (Figure 1).

Figure 1: Infant mortality, neonatal coefficients and post-neonatal in the State of Piauí in the northeast region of 2004-2014. Teresina, Piauí, Brazil, 2016.

Source: Department of computer science of the unified health system (DATASUS). Data extracted in December 2016, subject to changes.

Notes, in the table 1 that, in the period under examination, the most preventable infant deaths could be reduced if they were conducted healthcare more effective actions for the attention to women in pregnancy (30.4%), assistance to the newborn (14.5%) and the woman in childbirth (13.6%). With respect to other causes, 24.2% were characterized as clearly not preventable and 5.6% of the deaths were characterized as ill-defined cause.

Table 1: Infant deaths according to classification of Reducibility of root cause for health care measures in the period of 2004-2014, in the State of Piauí in the northeast region. Teresina, Piauí, Brazil, 2016. (n = 10,210)

Classification of deaths	20 04	20 05	20 06	20 07	20 08	20 09	20 10	20 11	20 12	20 13	20 14	To tal
Shrinkable												
By adequate attention to women in pregnancy	18.5	21.3	28.5	33.5	36.1	34.4	32.7	34.6	30.5	33.5	30.7	30.4
By adequate attention to the woman in childbirth	9.8	10.6	12.3	14.3	14.5	14.1	13.2	15.1	16.3	14.5	14.9	13.6
By adequate attention to newborn	22.2	21.0	14.9	12.8	10.0	11.7	13.3	11.6	13.8	12.4	15.6	14.5
For proper diagnosis and treatment actions	7.1	7.5	6.3	5.6	4.5	5.6	4.3	5.5	5.5	5.9	5.1	5.7
By appropriate health promotion actions	7.1	7.9	7.7	6.0	8.2	4.6	5.8	4.8	5.3	4.2	4.0	6.0
Immunization action	-	-	-	-	-	-	-	0.2	-	-	-	-
Poorly defined	13.7	12.4	5.3	3.9	3.7	6.1	4.0	2.2	3.1	2.8	4.8	5.6

Other causes (not clearly preventable)	21.6	19.3	25.0	24.0	22.9	23.4	26.8	25.9	25.5	26.8	24.8	24.2
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Department of Computer Science of the Unified Health System (DATASUS). Data extracted in December 2016, subject to changes.

In table 2, with regard to maternal characteristics, it can be observed that the age group between 20 and 29 years presented the highest record of deaths in children less than one year (41.8%), and educated mothers between four and seven years of study had a higher frequency (26.2%). With respect to the place of occurrence, the hospital was the most frequent (85.0%). As to the type of delivery, there was a predominance of vaginal (55.6%). According to the birth weight was observed more frequently among newborns with low birth weight (32.6%). Age of death, there was a higher concentration in the first week of life (57.1%).

Table 2. Deaths in children less than one year according to age and maternal education, place of occurrence, type of birth and birth weight in the period of 2004-2014 in the State of Piauí in the northeast region. Teresina, Piauí, Brazil, 2016. (n=10.210)

Variables	n	%
Age of mother (years)		
10 to 14	160	1.6
15 to 19	2204	21.6
20 to 29	4265	41.8
30 to 39	1696	16.6
40 to 49	231	2.3
Ignored	1654	16.2
Years of education of mother		
None	821	8.0
1 to 3 years	1391	13.6
4 to 7 years	2670	26.2
8 to 11 years	2316	22.7
12 years and over	614	6.0
Ignored	2398	23.5
Place of occurrence		
Hospital	8674	85.0
Other health establishment	69	0.7
Domicile	1161	11.4
Public road	177	1.7
Other	111	1.1
Ignored	18	0.2
Birth type		
Vaginal	5672	55.6
Cesarean	3238	31.7
Ignored	1300	12.7
Birth weight		
Extreme low weight (< 1000g)	1814	17.8
Low weight (1000-2499g)	3329	32.6
Normo weight (2500-3999g)	3211	31.4
Human (4000g or more)	245	2.4
Ignored	1611	15.8

Age of death (days)		
0 to 6 days	5830	57.1
7 to 27 days	1534	15.02
28 to 364 days	2842	27.84
Ignored	4	0.04

Source: Department of computer science of the unified health system (DATASUS). Data extracted in December 2016, subject to changes.

DISCUSSION

Throughout the world there has been a decrease in the coefficient of infant mortality since the 1990, however it occurs unevenly, as the level of development of each country, which reflects existing social inequalities. In Brazil, the largest coefficient of infant mortality is also in the North and Northeast and the lower in the South and Southeast. The Brazilian goal, according to the MDG, was accomplished in 2011, presenting a coefficient of infant mortality of 15.3 ‰ LB. Also in 2011, in the State of São Paulo, the coefficient of infant mortality was 11.6 ‰ LB[8], while in the Piauí the coefficient of infant mortality registered, in the same year, was 16.9‰. In this way, one can observe the unevenly of reduction of the coefficient of infant mortality in Brazil, reality was evidenced in other studies[4,6].

Notes on the results that the group, which gathers the causes for proper attention to the shrinkable woman in pregnancy and childbirth and newborn, accounted for more than half of infant deaths in the analysis period, corroborating with studies conducted in São Paulo[6] and Pernambuco[9]. As well as in study in Cuiabá-MT[10], the results related to the pattern of unavoidability, imply the existence of problems related to mother and child assistance and indicate the need for improvement of health actions and attention to the woman in the cycle gravid-puerperal and newborn, because most deaths in this study could have been avoided if more effective health action were dismissed during pregnancy, to focus on childbirth and the puerperium and the newborn.

During the period under examination, although there have been fluctuations, there has been a reduction of 15.8% and 33.3%, neonatal and post-neonatal components, respectively. Despite the decline, the neonatal component still occupies a prominent position on infant mortality, corroborating with study in Rio Grande do Sul[11], highlighting the need to improve the quality of prenatal and obstetric attention.

The conditions of child health is a classic indicator of public health and is associated with many factors, such as access to health services, health situation in the region, education level of the mother, provided housing and food that are associated to the risk factors infant death[7]. In this study, identified that most mothers are young and with relatively low education, which can be directly related to the high registered coefficient of infant mortality in Piauí, in order that it is possible to find positive associations between the reduction of child mortality and the increase in schooling[6]. In addition, it is known that neonatal mortality, one of the major components of infant mortality, associated with maternal age, considering that extreme age groups such as adolescents or women aged 35 or older are more records of neonatal deaths [12].

The highest occurrence of deaths in Brazil is among the children born of mothers who have low level of schooling[13], whereas mothers with higher education have higher chance to refuse inefficient practices and/or harmful in relation to diseases, choose to

preventive and therapeutic measures more effective, have greater access to health services, providing that the child receive assistance[14]. Maternal schooling, in a study of Rio Grande do Norte, was considered a protective variable, because it was found that mothers with higher education to eight years is a positive factor in reducing child mortality[15]. Another study shows that education represents an important Socioeconomic marker, because the mothers with the highest level of education more efficiently to ensure child survival, offering better housing conditions, access/use of services health, and more quality in the feeding of their children[5].

Most of the children's deaths, which occurred in the period studied were in newborns with weight below 2,500 grams. It is known that low birth weight is considered the main predictor of child mortality and neonatal isolated[16], i.e., another determining factor, since children born in these conditions presenting increased risk significantly, for mortality, and those with extreme low weight present vulnerabilities, even greater, predisposing to death[12]. Therefore, the birth weight can determine the living conditions of a child and, in particular, the need for a better attention to the pregnant woman and the newborn, aimed at reducing child mortality.

Currently, the main component of child mortality is the early neonatal (0-6 days) and most of the children's deaths in first 24 hours[17]. You can see the results that in the analysis period, the majority of deaths was in newborns with 0 to 6 days of life, they were born via vaginal birth, and most of the deaths occurred in hospitals, which reflects the need for improved attention to labor and birth producer. A cohort study, neonatal mortality, research was born in Brazil, points out the need for the consolidation of a network integrated, hierarchical and regionalized perinatal, and qualification of social processes, especially in relation to labor and birth to occurring advances in neonatal mortality reduction and, therefore, on infant mortality[17].

According to the results, in the same way as happens in Brazil [7], the coefficient of infant mortality in Piauí is in decline. This corroborates with studies carried out in Bahia in the period 2000 to 2012[3], in São Paulo in the period from 1996 to 2012[8] and in the State of Minas Gerais in the period from 2003 to 2012[6], which, although they have different periods of this study, presented the same situation of decreased coefficient of infant mortality over the years.

In Piauí, coefficient of infant mortality presents still higher than the national average, given different checked in study of Minas Gerais, in the coefficient of infant mortality was smaller than the brazilian average[6]. This fact highlights the fateful territorial inequality in Brazil[4,6], i.e., the marked social inequalities, revealing regional, therefore, the need for overcoming of these particularities through the adoption of policies that contribute to the improvement of quality of life of the population.

Thus, it is essential to identify the regions where population groups are at high risk of infant mortality, and, in addition, correlate this risk to socioeconomic variables and health assistance[4], for the reduction of child mortality is associated with improved health care, through the expansion of vaccination coverage, access to prenatal care and basic health services in early childhood, and a better distribution of income or even your increase, through income transfer programs, that is, understands that reducing child mortality is closely related to the improvement of living and health of the population[6].

Thus, the need for implementation of actions which integrate health promotion, health protection and recovery in the early years of the child's life during childcare and queries on home visits. Among the actions, you can highlight the geared to promoting healthy birth, monitoring of growth and development, immunization, breastfeeding and healthy eating, with priority focus for surveillance of the health of children most at risk, enabling, thus, improving the quality of life of this population group, and, therefore, your mortality reduction[18].

CONCLUSION

It was in this study that the coefficient of infant mortality and its components showed a decline in the period studied in Piaui. It was noted, however, that most of the deaths could be avoided through appropriate actions in attention to the woman in the gravid-puerperal cycle and to the newborn, highlighting the need for improvements in the quality of maternal and child health care. It was identified that the following variables in the analysis period, presented a higher frequency of infant deaths, such as maternal age between 20 and 29 years old, maternal schooling from four to seven years, through normal birth, low birth weight, occurrence of death in context Hospital and that most of the deaths have occurred in the first week of life.

Despite using secondary data, limiting factor, since it depends on the accuracy and completeness of the records, it is believed that this study can contribute to the improvement of maternal and child health care, assisting in the planning of actions effective, as well as in the elaboration of policies to assist in the restructuring and improvement of the assistance offered to reduce infant mortality to levels of the world's most developed regions.

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