RU Revista Uningá

Revista Uningá, v. 59, eUJ4394, 2022
doi.org/10.46311/2318-0579.59.eUJ4394

ISSN 2318-0579

Health Sciences and Biological I, II, III

Infant mortality due to preventable causes

Mortalidade infantil por causas evitáveis

Katiane da Silva Mendonça, Ana Carolyna da Silva Rocha, Karen Samylle Calado de Melo Marques, Lais Valeria da Silva Bispo, Roberta Zaninelli do Nascimento, Christefany Régia Braz Costa*

Nursing School at the Federal University of Alagoas, Maceió, AL, Brazil.
*christefany.enf@hotmail.com

ABSTRACT

Infant mortality refers to deaths of children under one year of age, subdivided into neonatal mortality (early and late neonatal) and post-neonatal mortality, being considered an indicator for assessing the population's health situation. The study aimed at describing the infant mortality rates due to preventable causes, in children under one year of age and in the state of Alagoas, during 2017. A descriptive and cross-sectional ecological study was carried out, with a quantitative approach on mortality rates in the age group of children under one year old, based on secondary data available in the Mortality Information System, by the Informatics Department of the Unified Health System (*Departamento de Informática do Sistema Único de Saúde*, [DATASUS]). This study was carried out from November to December 2019. During this period, in the state of Alagoas, 793 deaths due to preventable causes among children under five years of age were recorded in the Informatics Department of the Unified Health System. 83.98% (n=666) of these deaths corresponded to children under one year of age, with death cases in the early neonatal period being the most prevalent, followed by deaths in the post-neonatal and late neonatal periods. Among the cities in Alagoas, Maceió ranks first and Arapiraca is in second place in relation to the infant mortality rate. Deaths due to preventable causes in children are a strong indicator, as they evidence the quality of the health service offered, and it is possible to note that, although it presents a decreasing trend, this indicator is still alarming and that public health measures should be adopted.

Keywords: Basic health indicators. Cause of death. Child mortality. Descriptive epidemiology.

RESUMO

A mortalidade infantil refere-se aos óbitos de menores de um ano de vida, subdividindo-se em mortalidade neonatal (neonatal precoce e tardio) e mortalidade pós-neonatal, sendo considerado um indicador para avaliação da situação de saúde da população. O estudo objetivou descrever os índices de mortalidade infantil por causas evitáveis, em crianças menores de um ano de idade, no estado de Alagoas que ocorreram no ano de 2017. Foi realizado um estudo descritivo e transversal, de abordagem quantitativa sobre as taxas de mortalidade na faixa etária de crianças menores de um ano, baseado em dados secundários disponíveis no Sistema de Informações sobre Mortalidade, via Departamento de Informática do Sistema Único de Saúde (DATASUS), realizado novembro a dezembro de 2019. Nesse período no estado de Alagoas, foram registrados no Departamento de Informática do SUS, 793 óbitos por ocorrência em crianças menores de cinco anos de idade por causas evitáveis. 83,98% (n=666) desses óbitos ocorreram em crianças menores de um ano de idade, sendo os casos de óbitos em neonatal precoce o mais prevalente, seguido de óbitos em pós neonatal e neonatal tardio. Dentre os municípios alagoanos, Maceió ocupa o primeiro lugar e Arapiraca o segundo lugar em relação à taxa de mortalidade infantil. As mortes infantis por causas evitáveis são um forte indicador, pois transparecem a qualidade do serviço de saúde ofertado, sendo possível notar que, embora este indicador encontra-se em redução, ele ainda é alarmante e que medidas de saúde públicas devem ser adotadas.

Palavras-chave: Causa de morte. Epidemiologia descritiva. Indicadores básicos de saúde. Mortalidade infantil.

Received: February, 17th, 2022. Accepted: August, 16th, 2022.

INTRODUCTION

Infant mortality refers to deaths of children under one year of age, subdivided into neonatal mortality comprising two periods, early neonatal (from 0 to 6 days of life) and late neonatal (from 7 to 27 days of life), and post-neonatal mortality (deaths from 28 to 364 days of life) (Brazil, 2019). It is considered an indicator to assess the health situation of the population because it stratifies many early deaths that could be preventable (França et al., 2017).

Most of the deaths during childhood are concentrated in the first years of life, especially in the first month, affecting preterm neonates. The following factors stand out out among the causes: prematurity, congenital malformation, intrapartum asphyxia and perinatal infections. A large percentage of these causes are preventable through good quality health care during pregnancy, delivery and postpartum (Lansky et al., 2014).

According to the 10th Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) of the World Health Organization (WHO), death due to preventable causes is a disease, or situation, that can be avoided with good performance of the health services (WHO, 2018). Deaths due to preventable causes during childhood represent a global public health problem because they are one of the leading causes of death in this age group (Matos & Martins, 2013).

These events are unevenly distributed, being concentrated in low-income countries and in populations with lower socioeconomic levels. Underreporting is also a major obstacle, as lack of records limits knowledge on the actual magnitude of the problem, so that viable measures may be implemented (Malta et al., 2019).

Worldwide, reduction in infant mortality has progressed rapidly between 2000 and 2016 when compared to the 1990s. The global mortality rate dropped from 93 deaths for every 1,000 live births in 1990 to 41 in 2016 (World Health Organization [WHO], 2017). Brazil presented a reduction in its mortality rates throughout the national territory, positively highlighting the Northeast region, which in 1990 presented the highest infant mortality rate in the country, with 75.8 deaths for every 1,000 live births, whereas in 2012 this rate dropped to 17.1 infant deaths for every 1,000 live births (United Nations International Childhood Emergency Fund [UNICEF], 2012). In addition, Brazil stood out for significantly reducing infant mortality and during childhood (up to 5 years old) between 1990 and 2015. The infant mortality rate dropped from 47.1 to 13.3 deaths for every 1,000 live births. However, this rate rose again in 2016, with a 5.3% increase in the child mortality rate between 2015 and 2016 (UNICEF, 2018).

The state of Alagoas, located in the Brazilian Northeast region, presented the highest infant mortality rate in Brazil: 63.7 deaths for every 1,000 live births in 2000, which more than doubled the national mean. In turn, improvements were noticed in the infant mortality rate during the last decade (Sanders et al., 2017). According to the Basic Data Indicators (BDIs) for Health, the rate reached 41.4 deaths for every 1,000 live births in 2007 and dropped to 21.5 the following year, representing a 48.3% variation. Thus, in absolute numbers, 1,238 deaths were prevented in 2008. The reduction was even greater in 2009, with 20.05 deaths for every 1,000 live births (UNICEF, 2012).

Given the above and considering the relevance of the theme, the study aims at describing the infant mortality rates due to preventable causes in the state of Alagoas during 2017. Identification of the data and statistical survey may contribute so that actions aimed at reducing infant mortality, established in recent years, can be maintained and improved, preventing the repetition of higher rates found in previous years.

MATERIAL AND METHODS

This is a descriptive and cross-sectional study with a quantitative approach (Fontelles et al., 2009; Aragão, 2013) on the mortality rates in children under one year old, based on

secondary data available in the Mortality Information System (*Sistema de Informações sobre Mortalidade*, SIM) via the Informatics Department of the Unified Health System (DATASUS).

The data selected referred to deaths of children aged up to one year old recorded in Alagoas from January to December 2017. The reason for choosing this year was linked to being the lowest mortality rate recorded between 2007 and 2017, according to the data available in DATASUS. The diverse information available in this year might signal factors related to the reduction in the rate.

Collection of the data referring to the infant deaths was conducted from November to December 2019. The following variables were extracted with the aid of the Tabnet program: deaths due to preventable causes according to the 10th Revision of the International Classification of Diseases (ICD-10) used by the Ministry of Health, which subdivides them into the following categories: Reducible deaths through immunization actions; Reducible deaths through proper health promotion actions linked to adequate health care actions; Reducible deaths through adequate care for newborns; Reducible deaths through care for women during pregnancy; Reducible deaths through diagnostic actions and adequate treatment; Reducible deaths through adequate care for women during delivery; Incorrectly defined causes; and Other causes (not clearly preventable) (DATASUS, 2019); in addition to neonate's age from 0 to 6 days old (early neonatal period), from 7 to 27 days old (late neonatal period) and from 28 to 364 days old (post-neonatal period); gender (male or female), city, state and deaths recorded by occurrence.

The study followed the recommendations set forth in Resolution No. 466/12 of the National Health Council (*Conselho Nacional de Saúde*, CNS). The data used are available in the official Ministry of Health websites (Brazil, 2012). Consequently, all the information collected is secret and respects integrity of the individuals.

RESULTS AND DISCUSSION

In 2017, in the state of Alagoas, 793 deaths due to preventable causes in children under five years of age were recorded in DATASUS; 83.98% (n=666) of these deaths corresponded to children under one year of age, with early neonatal deaths being the most prevalent (51.35% [342 cases]), followed by post-neonatal (33.03% [220 cases]) and late neonatal (15.61% [104 cases]) deaths.

Table 1
Characterization of the deaths among children aged less than one year old, according to the "gender" and "child development stage" variables. Alagoas, 2020.

Period	Male (%)	Female (%)	Unknown/ Blank (%)	Total
Early neonatal	186 (28%)	147 (22.1%)	09 (1.3%)	342 (51.4%)
Late neonatal	60 (9%)	42 (6.3%)	02 (0.3%)	104 (15.6%)
Post-neonatal	132 (19.8%)	88 (13.2%)	00 (0.0%)	220 (33%)
Total	378 (56.8%)	277 (41.6%)	11 (1.6%)	666 (100%)

Source: Mortality Information System (SIM) via the Informatics Department of the Unified Health System (DATASUS).

Distribution of the death cases among children (Table 1) indicates prevalence of the male gender in all three periods, with more deaths during the early neonatal period. In addition to these, there are 11 cases in which gender was unknown/blank, with 9 and 2 of them corresponding to the early and late neonatal periods, respectively.

Among the 102 municipalities in Alagoas, Maceió, capital of the state, is the city with the highest number of infant deaths in all three periods (early neonatal, late neonatal and post-neonatal), which corresponds to 57.50% of the 666 cases recorded in the state, with 30.63% referring to early neonatal, 8.85% to late neonatal and 18.31% to post-neonatal deaths. Of these cases, 217 (56.36%) are male and 157 (40.77%) are female, with 11 (2.85%) lacking information on gender. Second to Maceió is the municipality of Arapiraca with 102 cases (15.31%) out of the total of 666, of which 44 are early neonatal (43.14%), 30 are late neonatal (29.41%) and 28 (27.45%) are post-neonatal deaths. Of the 102 cases recorded in Arapiraca, 63 (61.76%) correspond to the male gender and 39 (38.24%) to the female gender.

According to the current study, after evaluating the years from 2008 to 2017 in the DATASUS database, Alagoas presented the lowest infant mortality rate per occurrence in 2017. It can be observed that, although 2017 was the year with the fewest deaths in the state of Alagoas, there is certain lag in relation to other northeastern states, as well as in relation to the Brazilian mean (DATASUS, 2019). The aforementioned emphasizes the challenges that Alagoas had to overcome to progress in the area of infant mortality due to preventable causes.

In the same year, a reduction in the number of cases was also observed in other Brazilian states, which can be related to the advancement of medical technologies and to improvements in the assistance provided to women (in pregnancy and during delivery) and to newborns (Mombelli, Sass, Molena, Téston & Marcon, 2012; Gaíva, Lopes, Ferreira, Mufato, 2018).

Regarding gender, the higher prevalence of death cases in male newborns is similar to what was observed by other authors (Camilo, Silva, Oliveira, Resende & Reis, 2018; Gaíva et al., 2018). This fact can be explained, on the one hand, by the earlier pulmonary maturation in the female gender, which reduces the chances of respiratory complications, an important cause of death in children under one year of age (Camilo et al., 2018; Gaíva et al., 2018). In addition to that, it can also be related to the fact that males present slower overall fetal maturation than females due to the influence of the Y chromosome (Gaíva et al., 2018). On the other hand, according to data from DATASUS (2019), a factor to be taken into account is the overall number of male live births in the year under study (25,576), when compared to the female gender (24,157).

The aforementioned data have similar characteristics when compared to the study carried out in Cuiabá/MT, Midwest region of the country, which showed that there is predominance of deaths in the early neonatal period, especially among extremely low birth weight (ELBW) newborns, and to the one conducted in Fortaleza, Northeast region, which showed that these cases are still prevalent in males (Nascimento, Leite, Almeida, Almeida & Silva, 2012).

Regarding the profile of preventable causes of infant deaths in Alagoas from January to December 2017 (Table 2), the Reducible deaths through adequate care for the newborns were the most prevalent, corresponding to 28.37%, followed by other causes (not clearly preventable) with 25.07%, and by Reducible deaths through care for women during pregnancy with 22.37%.

The death rates observed in the current study were higher among preterm neonates. Taking birth weight into account, the data indicate a strong relationship with mortality, showing that this factor increases the probability of death at lower ages (Camilo et al., 2018). Prematurity, and consequently low birth weight, significantly increases immediate and late neonatal morbidity, being related to various health problems that can lead to death (Nascimento et al., 2012).

Most early deaths are due to pregnancy and delivery complications and are associated with the precarious assistance offered to the mothers during prenatal care and childbirth, together with inadequate care for the newborns, especially those with low birth weight, causes that could be prevented with good health care (Nascimento et al., 2012; Camilo et al., 2018).

It is also be noted that there is difficulty analyzing the association between duration of pregnancy and birth weight as a risk factor for infant death, as these data are neglected in death certificates. Actions aimed at improving the quality of the data on the characteristics of infant deaths in the Mortality Information System (SIM) should also be a constant (Mombelli et al., 2012).

Table 2
Profile of preventable causes of death among children in Alagoas from January to December 2017. Alagoas, 2020.

PREVENTABILITY	N	%
1. Preventable deaths		
1.1. Reducible deaths through immunization actions	0.1	0.15
1.2.1. Reducible deaths through care for women during pregnancy	149	22.37
1.2.2. Reducible deaths through adequate care for women during delivery	56	8.40
1.2.3. Reducible deaths through adequate care for newborns	189	28.37
1.3. Reducible deaths through diagnostic actions and adequate treatment	47	7.05
1.4. Reducible deaths through proper health promotion actions linked to adequate health care actions	45	6.75
2. Incorrectly defined causes	12	1.80
3. Other causes (not clearly preventable)	167	25.07
Total	666	100

Source: Mortality Information System (SIM) via the Informatics Department of the Unified Health System [DATASUS].

Faced with the need to expand efforts to reduce the maternal, perinatal and neonatal morbidity and mortality rates still recorded in the country, Ordinance No. 569 of the Ministry of Health, dated June 1st, 2000, established the Humanization Program in Prenatal Care and Birth (*Programa de Humanização no Pré-natal e Nascimento* [PHPN], 2000). The PHPN favors greater adherence to prenatal care. Adequate prenatal assistance exerts a direct impact on the reduction of morbidity and mortality rates in the mother, fetus and newborn because, during prenatal care, it is possible to identify obstetric pathologies and complications, for an accurate management of these clinical conditions (Silva, Mendes, Miranda & Santos Neto, 2016). Despite the mobilization of programs that encourage adherence to this prenatal care and emphasize its importance, there are still gaps to be solved. In Brazil, lower prenatal care coverage is observed in the most vulnerable population groups, such as the following: indigenous women, puerperal women from the North region, low schooling level, single motherhood, multiparous women, unplanned pregnancies, and those who had previous obstetric complications or tried to terminate their current pregnancy (Viellas et al., 2014).

Prenatal care plays a fundamental role in protecting the life and health of pregnant women and newborns, when there is guarantee of good quality access to prenatal care. Such care can circumvent obstetric problems, with early diagnosis and adequate treatment, preventing harms and favouring healthy deliveries and births (Maia, Souza & Mendes, 2020).

In this sense, delivery care also represents an important contributing factor for infant mortality. It is noted that such care has been carried out in a way focused on secondary and tertiary care, using two technologies and medication to speed up labor; in addition to the weakness of the referral and counter-referral process and the impaired access to care among these women (Silva et al., 2016).

Another resource to reduce the infant mortality rates is the Kangaroo Method (KM), a care model for newborns that allows early skin contact between mothers, fathers and premature and low

birth weight newborns. The method has promotion of a greater affective bond and thermal stability as its principle, prevents hypothermia, and contributes to reducing the risk of in-hospital infections and to reducing stress and pain in the newborn (NB). In this sense, in addition to increasing the breastfeeding rates and improving development of the neurobehavioral and psychological impact, KM also reduces the number of hospital readmissions (Ferreira et al., 2019). In the maternity hospitals from the capital of Alagoas, Maceió, treatment with this method is used, generating positive results such as increased mother-child affective bond, favoring that, even after being discharged from the hospital, parents feel more capable and more confident to take care of their children (Araujo et al., 2016).

In this context, the Ministry of Health also recognizes that breastfeeding is an essential strategy to reduce mortality; in addition to that, colostrum is considered the newborn's first immunity barrier due to the presence of immunoglobulins, proteins and vitamin A (Andrade, 2015). Childcare, which represents a way of promoting health in the maternal and child context, aims at favoring proper growth of children in all its nuances, that is, physically, socioculturally and psychologically. The guidelines about the benefits of breastfeeding are also provided in this phase (Malaquias, Gaiva & Higarashi, 2015).

In addition, vaccines are one of the instruments that present the best cost-benefit ratio and high safety levels, favoring protection for the individuals and the community in which they are inserted. Immunization is one of the public health interventions aimed at children that most assisted in reducing infant mortality (Martins, Santos & Álvares, 2019; Mangiavacchi, Oliveira, Rangel, Rodrigues & Jacomini, L. S., 2021).

When necessary, neonatal resuscitation is also among the actions that can be employed in order to reduce infant mortality. It is employed when pregnancies are not at term, when there is no breathing or crying, and when there is no flexed muscle tone. Thus, the initial resuscitation steps are based on the following: avoiding hypothermia, proper head positioning, and airway and oral aspiration, which should be performed in a maximum of 30 seconds. Warming the newborn is very important because it reduces the comorbidity and death rates; in addition to that, maintaining body temperature between 36.5°C and 37.5°C whenever possible, corresponding to normothermia, was established as a quality indicator for the institutions that provide this care until discharge or transfer from this unit (*Sociedade Brasileira de Pediatria* [SBP], 2016).

In view of the above, *Rede Cegonha* reinforces the PHPN proposal of adopting strategies aimed at the quality of care for women in the pregnancy-puerperal cycle, as well as care for children up to 24 months of age, with the objective of reducing infant and maternal mortality with emphasis on the neonatal component (Marques, 2015).

CONCLUSION

The rates corresponding to infant mortality due to preventable causes that were recorded during 2017 in the state of Alagoas showed that the most affected newborns were preterm neonates. These deaths are a strong health indicator and reflect the quality of the services offered in the gestational and puerperal period, as well as in newborn care.

Although this indicator presents a decreasing trend when evaluating the period from 2008 to 2017, the state still has alarming data. In addition to that, underreporting cases are not uncommon. In this way, the importance of properly filling in the Infant Death Declarations is evidenced, so that more assertive strategies can be devised to reduce these deaths.

REFERENCES

Andrade, I. S. N. (2015). Aleitamento materno e seus benefícios: primeiro passo para a promoção da saúde. *Revista Brasileira de Promoção da Saúde*, *27*(2), pp. 49-150. doi: 10.5020/18061230.2014.p149

Aragão, J. (2013). Introdução aos estudos quantitativos utilizados em pesquisas científicas. *Revista práxis*, *3*(6), pp. 01-04. doi: 10.25119/praxis-3-6-566

Araujo, A. M. G., Melo, L. S., Souza, M. E. C. A., Freitas M. M. S. M., Lima, M. G. L., & Lessa, R. O. (2016). A experiência do método canguru vivenciada pelas mães em uma maternidade pública de Maceió/AL. *Revista Iberoamericana de Educación e Investigación en Enfermería*, *6*(3), pp. 19-29. Recuperado de https://www.enfermeria21.com/revistas/aladefe/articulo/210/

Brasil. Ministério da Saúde. (2012). *Resolução n.º 466, de 12 de dezembro de 2012.* Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Brasília: DF. Recuperado de https://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html

Brasil. Ministério da Saúde. (2019). *Manual de vigilância do óbito infantil e fetal e do comitê de prevenção do óbito infantil e fetal*. Brasília: Ministério da Saúde. Recuperado de https://bvsms.saude.gov.br/bvs/publicacoes/vigilancia_obito_infantil_fetal.pdf

Camilo, A. D., Silva, C. C., Oliveira, C. G. J., Resende, M. A., & Reis, T. M. (2018) Ações de enfermagem frente ao desconforto e à dor do recém-nascido. *Revista Eletrônica Acervo em Saúde, 11,* pp. S1045-S1052. Recuperado de https://acervosaud.dominiotemporario.com/doc/REAS125.pdf

Departamento de Informática do Sistema Único de Saúde. Recuperado de tabnet.datasus.gov.br/tabnet/tabnet.htm

Ferreira, D. O., Silva, M. P. C., Galon, T., Goulart, B. F., Amaral, J. B., & Contim, D. (2019). Kangaroo method: perceptions on knowledge, potencialities and barriers among nurses. *Escola Anna Nery*, *23*(4), e20190100. doi: 10.1590/2177-9465-ean-2019-0100

Fontelles, M. J., Simões, M. G., Farias, S. H., & Fontelles, R. G. S. (2009). Metodologia da pesquisa científica: diretrizes para a elaboração de um protocolo de pesquisa. *Revista Paraense de Medicina*, *23*(3), pp. 1-8. Recuperado de https://pesquisa.bvsalud.org/portal/resource/pt/lil-588477

França, E. B., Lansky, S., Rego, M. A. S., Malta, D. C., França, J. S., Teixeira, R., ... Vasconcelos, A. M. N. *(*2017). Principais causas da mortalidade na infância no Brasil, em 1990 e 2015: estimativas do estudo de Carga Global de Doença. *Revista Brasileira de Epidemiologia*, *20*(supl. 1). doi: 10.1590/1980-5497201700050005

Fundo das Nações Unidas para a Infância. (2012). *Avanços e desafios: Redução da mortalidade infantil em alagoas.* 1ed. Brasília: Ministério da saúde. Recuperado de http://www.conselhodacrianca.al.gov.br/sala-de-imprensa/publicacoes/avancos_e_dasafios_mortalidade_alagoas.pdf

Fundo das Nações Unidas para a Infância. (2018) *Eleições 2018: Mais que promessas, compromissos reais com a infância e adolescência no Brasil*. Brasília: Ministério da saúde. Recuperado de https://www.unicef.org/brazil/media/3051/file/Mais_que_promessas.pdf

Gaíva, M. A., Lopes, F. S. P., Ferreira, S. M. B., & Mufato, L. F. (2018). Óbitos neonatais de recém-nascidos de baixo peso ao nascer. *Revista Eletrônica de Enfermagem, 20*, v20a18. doi: 10.5216/ree.v20.47222.

Lansky, S., Friche, A. A. L., Silva, A. A. M., Campos, D., Bittencourt, S. D. A., Carvalho, M. L., ... Cunha, A. J. L. A. (2014). Pesquisa nascer no Brasil: perfil da mortalidade neonatal e avaliação

da assistência à gestante e ao recém-nascido. *Caderno de Saúde Pública*, *30*(supl.1), pp. S192-S207. doi: 10.1590/0102-311X00133213

Maia, L. T. S., Souza, W. V., & Mendes, A. C. G. (2020). Determinantes individuais e contextuais associados à mortalidade infantil nas capitais brasileiras: uma abordagem multinível. *Caderno de Saúde Pública*, *36*(2), e00057519. doi: 10.1590/0102-311X00057519

Malaquias, T. S. M., Gaiva, M. A. M., & Higarashi, I. H. (2015). Percepções dos familiares de crianças sobre a consulta de puericultura na estratégia saúde da família. *Revista Gaúcha de Enfermagem, 36*(1), pp. 62-68. doi: 10.1590/1983-1447.2015.01.46907

Malta, D. C., Prado, R. R., Saltarelli, R. M. F., Monteiro, R. A., Souza, M. F. M., & Almeida, M. F. (2019). Mortes evitáveis na infância, segundo ações do Sistema Único de Saúde, Brasil. *Revista Brasileira de Epidemiologia*, *22*, e190014. doi: 10.1590/1980-549720190014

Mangiavacchi, B. M., Oliveira, J. B., Rangel, A. L. F. R., Rodrigues, M. F., & Jacomini, L. S. (2021). Imunização no primeiro ano de vida: a vulnerabilidade brasileira em tempos de pandemia. *Múltiplos Acessos, 5*(1), pp. 216-229. doi: 10.51721/2526-4036/v5n1a15

Marques, C. P. C. (2015) *Redes de atenção à saúde*: a Rede Cegonha. São Luís: Universidade Federal do Maranhão. Recuperado de https://ares.unasus.gov.br/acervo/html/ARES/2445/1/UNIDADE_2.pdf

Martins, K. M., Santos, W. L., & Álvares, A. C. M. (2019). A importância da imunização: revisão integrativa. *Revista de Iniciação Científica e Extensão*, *2*(2), pp. 96-101. Recuperado de https://revistasfacesa.senaaires.com.br/index.php/iniciacao-cientifica/article/view/153

Matos, K. F., & Martins, C. B. G. (2013) Mortalidade por causas externas em crianças, adolescentes e jovens: uma revisão bibliográfica. *Revista Espaço Saúde, 14*(1-2), pp. 82-93. Recuperado de https://pesquisa.bvsalud.org/portal/resource/pt/lil-705459

Mombelli, M. A., Sass, A., Molena, C. A. F., Téston, E. F., & Marcon, S. S. (2012). Fatores de risco para mortalidade infantil em municípios do Estado do Paraná, de 1997 a 2008. *Revista Paulista de Pediatria, 30*(2), pp. 187-194. doi: 10.1590/S0103-05822012000200006

Nascimento, R. M., Leite A. J. M., Almeida, N. M. G. S., Almeida, P. C., & Silva, C. F. (2012). Determinantes da mortalidade neonatal: estudo caso controle em Fortaleza, Ceará, Brasil. *Caderno de Saúde Pública, 28*(3), pp. 559-572. doi: 10.1590/S0102-311X2012000300016

Organização Mundial de Saúde. (2018). *CID-10 Classificação Estatística Internacional de Doenças e Problemas Relacionados à Saúde*. (2, 10.ª Ed, p.212). São Paulo, SP: Universidade de São Paulo.

Portaria n.º 569/GM, de 1.º de junho de 2000. (2000). Institui o Programa de Humanização no Pré-Natal e Nascimento, no âmbito do Sistema Único de Saúde. Diário Oficial da União, seção 1, p. 4. Brasília, DF. Recuperado de https://bvsms.saude.gov.br/bvs/saudelegis/gm/2000/prt0569_01_06_2000_rep.html

Sanders, L. S. C., Pinto, F. J. M., Medeiros, C. R. B., Sampaio, R. M. M., Viana, R. A. A., & Lima, K. J. (2017). Mortalidade infantil: análise de fatores associados em uma capital do Nordeste brasileiro. *Caderno de Saúde coletiva, 25*(1), pp. 83-89. doi: 10.1590/1414-462X201700010284

Silva, A. L. A., Mendes, A. C. G., Miranda, G. M. D., & Santos Neto, P. M. (2016). Childbirth care in Brazil: a critical situation has not yet been overcome. 1999-2013. *Revista Brasileira de Saúde Materno Infantil*, *16*(2), pp. 129-137. doi: 10.1590/1806-93042016000200004

Sociedade Brasileira de Pediatria. (2016) *Programa de Reanimação Neonatal. Reanimação do recém-nascido ≥34 semanas em sala de parto.* Recuperado de https://portaldeboaspraticas.iff.fiocruz.br/wp-content/uploads/2019/06/DiretrizesSBPReanimacaoRNMaior34semanas26jan2016.pdf

Viellas, E. F., Domingues, R. M. S. M., Dias, M. A. B., Gama, S. G. N., Theme Filha, M. M., Costa, J. V., ... Leal, M. C. (2014). Assistência pré-natal no Brasil. *Cadernos de Saúde Pública*, *30*(Suppl. l1), pp. S85-S100. doi: 10.1590/0102-311X00126013

World Health Organization. (2017) Fundo das Nações Unidas para a Infância (UNICEF). *Levels & Trends in Child Mortality*: Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation. Recuperado de https://www.unicef.org/media/60561/file/UN-IGME-child-mortality-report-2019.pdf