



NEONATAL MORTALITY: AN EPIDEMIOLOGICAL STUDY IN A PUBLIC MATERNITY

MORTALIDADE NEONATAL: ESTUDO EPIDEMIOLÓGICO EM UMA MATERNIDADE PÚBLICA MORTALIDAD NEONATAL: ESTUDIO EPIDEMIOLÓGICO EN UNA MATERNIDAD PÚBLICA

Rosileide Barbosa Rodrigues¹, Danyella Augusto Rosendo da Silva Costa², Richardson Augusto Rosendo da Silva³, Rejane Marie Barbosa Davim⁴, Jamili Anbar Torquato⁵, Luciana Ferreira Monteiro e Oliveira⁶

ABSTRACT

Objective: to describe the profile of neonatal mortality in a regional public maternity. **Method:** documentary research, retrospective, transversal, quantitative, using charts and Information System Records of the mortality of newborns who were died between 2007 to 2009, in a maternity in the interior of Paraíba/PB, northeastern of Brazil. All electronic 115 records were selected that registered neonatal death up to 27 days born, comprised in the period already described. Data were analyzed through descriptive statistics, presented in tables. The research project has been approved by the Research Ethics Committee, Protocol 0594/2010. **Results:** it was identified that the causes of neonatal mortality were related to respiratory failure; septicemia; prematurity and pneumopathy. **Conclusion:** it is necessary to invest in permanent education of professionals who watch the woman during the pre-natal, childbirth and the puerperium, in order to promote a reduction in neonatal morbidity and mortality. **Descriptors:** Neonatal Mortality; Epidemiology; Causes of Death.

RESUMO

Objetivo: descrever o perfil da mortalidade neonatal em uma maternidade pública regional. **Método:** pesquisa documental, retrospectiva, transversal, quantitativa, utilizando prontuários e fichas do Sistema de Informações da Mortalidade dos recém-nascidos que foram a óbito entre 2007 a 2009, em uma maternidade no interior da Paraíba/PB, Nordeste do Brasil. Foram selecionados todos os 115 prontuários eletrônicos que apresentavam registro de óbito neonatal até 27 dias de nascido, compreendidos no período já descrito. Os dados foram analisados por meio da estatística descritiva, apresentados em tabelas. O projeto de pesquisa foi aprovado pelo Comitê de Ética em Pesquisa, Protocolo nº 0594/2010. **Resultados:** identificou-se que as causas da mortalidade neonatal estavam relacionadas a insuficiência respiratória; septicemia; prematuridade e pneumopatia. **Conclusão:** torna-se necessário investir na educação permanente de profissionais que assistem a mulher durante o pré-natal, parto e puerpério, de forma a promover a redução na morbimortalidade neonatal. **Descritores:** Mortalidade Neonatal; Epidemiologia; Causas de Morte.

RESUMEN

Objetivo: describir el perfil de la mortalidad neonatal en una maternidad pública regional. **Método:** investigación documental, retrospectiva, transversal, cuantitativa, utilizando prontuarios y fichas del Sistema de Informaciones de la Mortalidad de los recién nacidos que fueron a óbito entre 2007 a 2009, en una maternidad en el interior de Paraíba/PB, Nordeste de Brasil. Fueron seleccionados todos los 115 prontuarios electrónicos que presentaban registro de óbito neonatal hasta 27 días de nacido, comprendidos en el período ya descrito. Los datos fueron analizados por medio de la estadística descriptiva, presentados en tablas. El proyecto de investigación fue aprobado por el Comité de Ética en Investigación, Protocolo nº 0594/2010. **Resultados:** se identificó que las causas de mortalidad neonatal estaban relacionadas a insuficiencia respiratoria; septicemia; prematuridad y neumopatía. **Conclusión:** se torna necesario invertir en la educación permanente de profesionales que atienden a la mujer durante el pre-natal, parto y puerperio, de forma a promover la reducción de la morbilidad y mortalidad neonatal. **Descriptores:** Mortalidad Neonatal; Epidemiología; Causas de Muerte.

¹Nurse, Maternity Dr. Peregrino Filho. Patos (PB), Brazil. E-mail: rosileidebrodrigues@hotmail.com; ²Master's degree in Nursing, Nurse of Work, Federal Institute of Education Science and Technology of the State of Rio Grande do Norte/IFRN. Natal (RN). Brazil. E-mail: danyellaugusto@yahoo.com.br; ³Nurse, Professor, Undergraduate Degree and Postgraduate in Nursing, Federal University of Rio Grande do Norte/UFRN. Natal (RN), Brazil. E-mail: rirosendo@yahoo.com.br; ⁴Obstetrician Nurse, Professor Associated III, Federal University of Rio Grande do Norte/UFRN. Natal (RN), Brazil. E-mail: rejanemb@uol.com.br; ⁵Graduated in Physical Education and Physiotherapy Education and Culture Integrated College of Santa Fé do Sul (SP), Specialist in Respiratory physiotherapy by UNICID, Doctorate in Science Degree from USP-FMUSP. E-mail: jamilianbar@yahoo.com; ⁶Nurse, Specialist in Family Health, Master of Science in Nursing/MNsc. João Pessoa (PB), Brazil. E-mail: lucianafmonteiro2003@ig.com.br

INTRODUCTION

By the vulnerability of living and goods access to health services, the first years of life are one of the periods of increased risk of death. Thus, the infant mortality rate (IMR) has been considered as a sensitive indicator to social and health conditions of human populations.¹ The IMR is divided into two periods: the neonatal, which estimates the risk of death in the first 27 days of life and postnatal with death between 28 days until the end of the first year of life. While neonatal mortality is intrinsically related to the conditions of pregnancy and childbirth and the physical integrity of the child, post-natal mortality is more associated with socioeconomic conditions and the environment with a predominance of infectious causes.²

The unfavorable socioeconomic condition of the population is directly related to the risk of death for children under one year old, the rates are higher due to large poverty and also worst epidemiological indicators and assistance to maternal and child health, as fewer prenatal consultation and highest percentage of newborns with low birth weight (NBBW).³

Certain causes of death in the neonatal period are considered reducible from adequate follow up of pregnancy and childbirth and others still may be preventable by diagnosis and early intervention. In the post neonatal period, the main causes of death are also considered preventable and easy intervention for being more associated with the precarious conditions of sanitation and access to health care.⁴

Neonatal mortality which happens around 0-28 days are, in almost all of them, due to perinatal causes and to congenital anomalies related to problems of pregnancy, childbirth, maternal factors and congenital and genetic problems. These constitute what has been called endogenous causes as opposed to exogenous causes or related to environmental factors, such as: infectious diseases and malnutrition, factors presumably determinants and conditions of late infant mortality that occurs between 28 days of life.⁵

The interest in studying the subject came up in the hospital environment of a regional public maternity inside of Paraíba (PB), northeastern of Brazil, acting as professional nursing staff at medium risk nursery providing assistance to newborn (NB). Given this, it is necessary to evaluate the quality of perinatal care, reflecting both reproductive health conditions, linked to socioeconomic factors on

quality of delivery and neonatal care, follow-up and monitoring of the diseases of childhood, thus contributing to the reduction of avoidable causes of child mortality.

It is difficult to establish with precision the evolution of neonatal mortality, considering that the index of sub notifications committed to quality of estimates. Most of the data available on infant mortality derives from information that affects the analysis of more recent periods. On these considerations, the following research question emerged: what are the factors related to neonatal mortality in a regional public maternity inside of Paraíba (PB)?

Is notorious the relevance of this study since it may subsidize other scientific research and enhance the knowledge of health professionals, academics and the general public for a discussion about the neonatal mortality. From this perspective, it had as objective:

- To describe the profile of neonatal mortality in a regional public maternity.

METHOD

Documentary retrospective and transversal study, with a quantitative approach, using the observation of patient records and charts of Mortality Information System (MIS) of the NBs who were died between the years 2007 to 2009, in a public and regional maternity hospital in the city of Patos in the interior of Paraíba (PB), northeastern of Brazil, which received the title of Child Friend Hospital by the United Nations Children's Fund (UNICEF). The maternity offers accommodation with 58 obstetric beds and a medium risk nursery with eight beds. Currently, from April 28, 2012, the maternity, reference in the northeast interior, was expanded with ten beds in Neonatal Intensive Care Unit (ICU-NEO) and seven MATERNAL ICU starting to work with 109 beds. This expansion comes to benefit more than 905 thousand inhabitants in the municipality, counting also with new mammography services, high risk prenatal and maternal and neonatal Mobile Intensive Care Unit, with risk classification in accordance with the gravity of the comorbidity.

The population of this study consisted of 9,000 records of NBs served in the maternity and the sample consisting of 115 records of those who have died in the period from January 2007 to December 2009. All electronic records were selected which registered neonatal death from zero to 27 days, comprised in the period described above. All neonatal deaths over 27 days were deleted.

The instrument used for collecting data was a structured itinerary, tabbed and subsequently transcribed for a worksheet elaborated according to the objective proposed by the study with data from MIS cards and electronic charts of NBs who were died, in the maternity. The data were collected in the period from July to September 2010. It had as maternal variables: age, educational level, number of queries in the pre-natal, delivery type, gestational age, number of births and morbidities during pregnancy. In the NB were related to: Apgar score, birth weight, cause of death and sex. The results were analyzed on the basis of the quantitative approach, from information contained in medical records and with the relevant literature, taking into account the factors related to maternal and neonatal mortality related to the NB.

The realization of this study took into account the ethical aspects of research involving human subjects recommended by Resolution 196/96 of the National Health Council.⁶ The research was forwarded to the

Ethics and Research Committee of the Integrated College Patos/PB, and approved under the Protocol. 0594/2010.

All data collected were entered into a spreadsheet of the program Microsoft Excel 2007, analyzed through descriptive statistics and presented in this study in the form of percentages.

RESULTS AND DISCUSSION

At first, it was made a mother's characterization of these NBS. It was observed that 59% of these women are aged between 16 and 25 years old; 28% between 26 and 35 years old; 9% aged over 36 years old and 4% with 15 years old or less (table 1).

Table 1. Distribution of NBs mothers by age group, 2007-2009. Patos/PB, 2012.

Age group	n	%
Until 15 years old	5	4
16 to 25 years old	68	59
26 to 35 years old	32	28
36 years old or more	10	9
Total	115	100

With these results, there is a prevalence of maternal age between 16 and 25 years old, this being deemed appropriate to experience a pregnancy under conditions favorable to a healthy pregnancy for both mother and fetus. The chances of complications in this age group are much lower than in those with higher age; even in healthy situations, pregnant women also are more likely to present risks in pregnancy from 30 years old, whereas these prenatal users can be considered of high risk.⁷

However, according to the World Health Organization (WHO), those women between 10 and 19 years old, has been considered, in some countries, public health problem, causing obstetric complications with repercussions for both the mother and the NB, as well as psychosocial and economic problems in need of differentiated service in health services, ensuring the assessment of risks of pregnancy with lower rate of complications for mother and son.⁸

With regard to education, it was observed that 57% of mothers have elementary school; 24 % complete high school; 13% incomplete high school; 4% incomplete university and 2% complete university. The data demonstrate a high prevalence among mothers who present

elementary school, this factor can influence the understanding of possible complications that occur during the gestational period and may hinder the understanding or absorption of information about this accident, contributing to the healthy development of their situation and of the fetus, with losses for both.

Corroborating this claim, the literature states that education x population education is the basis for efficiency of actions established by improving knowledge and understanding of certain factors of life by the population, in particular of mothers; thus, generates better targeting of assistance/guidance in that it uses language compatible with the understanding to the health user, favoring the health picture for mother-child welfare.⁹

In a study of descriptive, transversal and restrospective type developed in the Integrated Health Centre Amaury de Medeiros (CISAM), reference maternity in the city of Recife/PE, with 105 sample charts of NBs infected who died in the period from January 2006 to December 2007, comes also to corroborate this research, demonstrating that the education level of mothers not literate

(55.24%), was one of the factors for this percentage of neonatal deaths.¹⁰

As for participation in the pre-natal, 50% of mothers attended between four to six consultations; 22% attended more than seven; 16% between three and 12% did not attend the consultations. Having in mind the frequency of prenatal consultations of those users, this result can be considered unsatisfactory since the ideal attendance for prenatal care varies according to the gestational weeks presented by pregnant women, being the ideal monthly consultation until the 32nd week, a biweekly from the 32nd to 36th and a weekly from the 36th week until childbirth.¹¹

As for prenatal care, certain health professionals' interventions during pregnancy can certainly change and promote maternal prognosis. The most important strategies constitute a tripod with specific interventions related to maternal health promotion, prevention of risks and guarantee of nutritional support during pregnancy. Promoting maternal health and fetal contemplates the recommendation of optimal number and quality of prenatal consultations, establishment of maternal immunization program, prevention, diagnosis and treatment of intercurrent diseases of pregnancy.¹²

The sample under study showed that 65% of mothers were subjected to natural childbirth and 35% to caesarian. The figures show that the normal childbirth had its majority, but despite several myths that surround it, the preference is compensatory, whether because rapid recovery, reduced risk of infection, security offered by this method among other factors. This is a fact which has also been observed in a study with changes of placenta and variations of the Apgar score, which comes under the proportions observed in this study.¹³

It was possible to observe that the majority of NBs (72%) presented Apgar below seven on the 5th minute and 28% Apgar scale considered normal, i.e. above seven, therefore, there is the risk of undesirable factors for the health of these babies, whereas these percentages indicate undesirable changes, such as fetal hypoxia, among others, may be affecting them and contributing to impairment of health framework, consequently, causing a possible death.

These results come against a study developed in northeastern of Brazil, to be observed that the Apgar of these babies in the 1st minute was less than seven with a death rate of 64.76%, associating that the time of onset of early infection was lower (92.38%)

with the late (7.62%).¹⁰

The Apgar score - AS, has the purpose to check quickly the clinical state of NB and identify those who require assistance to assess risks and prevent sequel of a potential asphyxia. It consists of five parameters closely related to perinatal Hypoxia: heart rate (missing: 0; <100/min: 1; > 100/min: 2); breath (missing: 0; low/irregular: 1; strong/cry: 2); reflex irritability (missing: 0; some movement: 1; sneezing/cry: 2); muscle tone (flaccid: 0; bending legs and arms: 1; active movement/good flexion: 2) and color (cyanotic/pale: 0; cyanosis of extremities: 1; pink: 2). On a scale of zero to ten if its value is less than seven, it will be diagnosed fetal hypoxia.¹³

In a microscopic study of placentas impregnated by meconium, it was demonstrated that this impregnation accompanies several other placental changes as heart attack and vilosite, reflecting the fetal suffer diagnosed by AS less than seven in the 5th minute, suggesting the importance of studying the relationship between the fetal suffering, assessed through the AS and placental changes.¹³

It was found in the same way that most NBs (97%) were assisted with the methods of ventilation (ventilation by Pressure, Intubation or Mask), 3% was not. It was showed apparent prevalence of NBs who underwent ventilation, demonstrating the increased number of children at birth, needed oxygen as a result of undesirable complications inherent to the delivery. In this way, this oxygen necessity can damage the integrity of NBs, often fatal. These percentages can be justified for those NBs who presented unsatisfactory result in relation to Apgar, i.e. less than seven in the 1st minute at birth.

The purpose of ventilation assistance is to provide a complement to spontaneous respiratory effort of the NB until the basic disease stabilizes and the little patient can resume fully independent ventilation. This ventilation may be indicated with results found in Apgar; the less than seven in the 5th minute is more than enough for the forwarding of NB for prevention of involving respiratory problems, in this case the ventilation.¹⁴

As for the weight of the NBs, 43% weighed more than 2,500 kg; 39% between 1,000 and 2,500 Kg and 18% less than 1,000. From the data expressed, it is concluded that, although a good portion of NBs submit weight above 2,500 kg, most showed a total of 57% among those who weighed less than 2,500 kg,

showing that prevail in low weight, showing higher chances of complications that interfere directly on the welfare of these babies often causing them irreversible sequel, including death.

The birth weight is more important in determining isolated factor of child survival in children with low birth weight (less than 2,500 Kg) presenting more risk to die or get sick in the first year of life. The importance of the BPN to public health is determined not only by subsequent mortality and morbidity risks, but also by the frequency with which this occurs. The highest prevalence of BPM are observed in

developing countries, as a consequence of the worst living conditions that exist in these locations due to the shorter duration of pregnancy, intrauterine growth retardation, or the combination of both.¹⁵

The diagnoses that most affect the NBs involve the respiratory tract, being respiratóra the failure of higher prevalence inherent to this research with percentage equivalent to 61%; 17% of these were affected by respiratory Anoxia; 9% septicemia; 7 % preterm birth and 6% for pneumopatia (table 2).

Table 2. Distribution of NBs by death causes, 2007-2009. Patos/PB, 2012.

Death Causes	n	%
respiratory Insufficiency	70	61
Anoxia	20	17
Septicemia	10	9
Preterm birth	08	7
Pneumopatia	07	6
Total	115	100

These data show that, in this unit, the majority of deaths of NBs is related to the respiratory system, being justified by NBs who have Apgar less than seven in 5th minute and were directed to ventilation.

In study developed on neonatal mortality in Brazil showed that prematurity is the leading cause of neonatal death in all regions of the country, followed by infections, malformations and asphyxia/hypoxia. These causes have major contribution in the excess risk of neonatal death in Brazil and indicate problems in assistance related to prenatal care during labor and to the newborn. On the other hand, the congenital malformations were the second most common cause of death in the State of Paraná in the neonatal period being more frequent after the seventh day of life. The improvement in health care can be exemplified by this increase in congenital malformations, which are related to the development of the country.¹⁶

Respiratory infections represent between 20% and 40% of neonatal hospitalizations and 30% to 60% of consultations with health services in most countries. In those under developing the respiratory infections are responsible for a third of deaths and half of the hospitalizations in children under five years old, constituting public health problem.¹⁷

The classification of NB by gestational age is as important as the birth weight. By gestational age, this is sorted on pre-term (less than 37 full weeks or 259 days), term (37 to 41 weeks and six days or 260-294 days) and post-term (42 weeks or 295 days or more). Accurate assessment of gestational age (GA) is

an essential component of a quality practice both as neonatal and obstetric.⁵

The evaluation of the vitality of the NB, immediately after delivery, has been made by numerical scores systemized by Apgar which practicality, received universal acceptance logo. These scores are not able to assess all the complexity of the events that occurred with the NB on the childbirth and even less to inform about the neurological system (NS), once that evaluate only the brainstem structures responsible for the cardio-respiratory system.⁵

In Brazil, the average infant mortality rate is 25 per 1000 live births, i.e. more than 76,000 children die every year before completing the first year of life. Of those deaths, the number of deaths in the neonatal period is greater than 60%.⁷

Neonatal mortality should be seen, in principle, as preventable phenomenon, handle the quality of services. Monitoring of the fetal and neonatal hospital deaths, in that sense, it is relevant regarding the main problems element present in the offer and in the quality of health care for women and children.⁹

Maternal factors associated with neonatal mortality more common are: maternal age; number of births; prenatal visits; morbidities during pregnancy; use of tobacco in pregnancy; use of antenatal corticosteroids; chorioamnionitis and twin pregnancy. The factors related to the NB and associated with neonatal mortality, as birth weight and gestational age, have been considered the main indicators of death in the neonatal period and, as a result, have become

important to study infant mortality coefficients. Other factors are also involved, such as: type of childbirth; Apgar score; intrauterine growth; sex; use of pulmonary surfactant of mechanical ventilation and parenteral nutrition.¹⁰

The literature highlights risk factors related to neonatal deaths, as not performing prenatal care, teenage mothers and BPN. Therefore, in areas where the population receives appropriate care from the prenatal care and childbirth and extends to the RN, neonatal mortality is low. However, it can be checked that, even in developed countries, considering that neonatal mortality is very low, there are a number of neonatal deaths inevitable that, in general, are due to very serious and complex congenital anomalies to the very low weight at birth.¹⁸

Neonatal mortality coefficient is a component of infant mortality and expressed directly to the assistance given to the prenatal, childbirth and neonatal period, reflecting the coverage and quality of health services. In areas where infant mortality coefficient can be considered low, 60% to 80% of deaths occur in children under the age of 28 days of life, i.e. during the neonatal period.¹⁹

The infant mortality rate and its components are important predictors of levels of health of a population. In Brazil, despite the significant reduction observed in the last two decades, the coefficient of infant mortality (CIM) is still considered high. There is too much disparity between the rates of infant mortality within the national geographic space, arising from distortions in the social structure, as the concentration of income in the country. The phenomenon of decline in infant mortality observed throughout Latin America, including in Brazil, was never uniform but faster, where are focused social investments, measures of sanitation and health services.²⁰

CONCLUSION

It was found that 59% of mothers were between 16 and 25 years old; 57% with elementary school; 89% performed prenatal care; 65% have opted for natural childbirth; 70% did not show urinary tract infections. As for newborns, 72% had less than seven in Apgar in the 5th minute. It was identified that the cause of neonatal mortality is related to respiratory failure; respiratory Anoxia; septicemia; prematurity and pneumopatia.

It was noticed that there are barriers that can reduce the risk of neonatal mortality,

given that there are several factors that interfere with pregnancy providing precarious conditions, hindering the development of NBs from the gestational period as in the postpartum. It was observed as a limitation to the study, charts filled inappropriately, with blank spaces, as well as the MIS chart, making it impossible to be explored other variables, other than those used in this study.

It is crucial to the realization of investments in the training of professionals working in primary health care, to reverse this situation common in many municipalities in the Northeast region of the country. Are also very important the knowledge of risk factors, use and organization of health services, as well as the follow-up of these children for early detection, prevention of risks and damage to the quality of life of these women and their NBs.

The family health Strategy can valuable contribute to the decrease in neonatal mortality, having the nurse important role in monitoring of pregnant women and of NBs, as well as in the development of health education activities that collaborate with the company aiming to reduce measures of preventable deaths. Finally, control measures are necessary to improve the assistance provided to pregnant women in prenatal care, childbirth and the puerperium, in order to promote the reduction of neonatal morbidity and mortality.

REFERENCES

1. Rede Inter-Agencial de Informações para a Saúde (RIPSA). Indicadores Básicos para a Saúde no Brasil: Conceitos e Aplicações. Brasília: Organização Pan-americana da Saúde; 2008.

2. Lima EFA, Sousa AI, Primo CC. Mortalidade Neonatal em Serra, Espírito Santo 2001-2005. Rev enferm UERJ [Internet]. 2008 [cited 2012 Mar 16];16(2):[about 5 p.]. Available from: <http://revistas.um.es/eglobal/article/viewFile/237/228>

3. Duarte EC, Schneider MC, P Paes-Sousa R, Silva JB, Castillo-Salgado C. Expectativa de vida ao nascer e mortalidade no Brasil em 1999: análise exploratória dos diferenciais regionais. Rev panam salud pública [Internet]. 2002 [cited Jan 15];12(6):[about 5 p]. Available from: www.scielo.org/scielo.php?script=sci_arttext&pid=S1020-49892002001200009&lng=pt&nrm=iso&tlng=pt

4. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Saúde Brasil 2006: uma

análise da situação da saúde. Brasília: Ministério da Saúde; 2006.

5. Egewarth C, Pires FDA, Guardiola A. Avaliação da idade gestacional de recém nascidos pré-termo através do exame neurológico e das escalas neonatais e obstétrica. Arq Neuro-Psiquiatr [Internet]. 2002 [cited 2012 Mar 16];60(3b):[about 5 p.]. Available from: www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X2002000500014
6. Ministério da Saúde (BR). Resolução n.º 196/96, de 10 de outubro de 1996. Conselho Nacional de Saúde. Regulamenta pesquisa envolvendo seres humanos. Brasília: Ministério da Saúde; 1996.
7. Cloherty JP, Eidhenwald EC, Stark AR. Manual de Neonatologia. 5a ed. Rio de Janeiro, RJ: Guanabara Koogan; 2005.
8. Gama SGN, Szwarcwald CL, Leal MC. Experiência de gravidez na adolescência, fatores associados e resultados perinatais entre puérperas de baixa renda. Cad saúde pública [Internet]. 2002 [cited 2012 July 07];18(1):[about 5 p.]. Available from: www.scielo.br/scielo.php?script=sci_arttext&id=S0102-311X200200001000016&lng=pt&nrm=iso&tlng=pt
9. Branden PS. Enfermagem materna - infantil. 2a ed. Rio de Janeiro, RJ: Reichmann e Affonso Editores; 2007.
10. Bezerra MA, Corrêa MSM, Andrade PCAS, Andrade YFV. Profile of the mortality of infants affected by infections in neonatal intensive care unit. J Nurs UFPE on line [Internet]. 2010 [cited 2012 Apr 30];4(4):[about 5 p.]. Available from: www.ufpe.br/revistaenfermagem/index.php/revista/article/view/1125/pdf_234
11. Ministério da Saúde (BR). Manual técnico de Assistência Pré-Natal. Brasília: Ministério da Saúde; 2006.
12. Silva RCAF. Mortalidade Perinatal em Hospital Terciário da Região Norte do Brasil 2011 [dissertação]. Brasília (DF). Faculdade de Ciências da Saúde - UNB; 2011.
13. Corrêa RRM, Salge AKM, Ribeiro GA, Ferraz MLF, Reis MA, Castro ECC, et al. Alterações anatomopatológicas da placenta e variações do índice de Apgar. Rev bras saúde matern infant [Internet]. 2006 [cited 2012 Apr 15];6(2):[about 5 p.]. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1519-38292006000200012&lng=pt&nrm=iso&tlng=pt
14. Avena MJ, Carvalho WB, Beppu OS. Avaliação da mecânica respiratória e da oxigenação pré e pós-aspiração de secreção

em crianças submetidas à ventilação pulmonar mecânica. Rev Assoc Med Bras [Internet]. 2003 [cited Apr 10];49 (2):[about 5 p.]. Available from:

http://www.scielo.br/scielo.php?pid=S0104-42202003000200033&script=sci_arttext&lng=en

15. Lansky S. Perinatologia: situação atual e perspectivas. In: Alnes Filho N, Correa MD. Perinatologia Básica. 3rd ed. Rio de Janeiro, RJ: Guanabara Koogan; 2006. p. 1-6.
16. Lansky S, França E. Mortalidade Infantil Neonatal no Brasil: Situação, Tendências e Perspectivas. Texto elaborado por solicitação da RIPSa para informe de situação e tendências: demografia e saúde. Texto de apoio, texto 3. Belo Horizonte; 2008.
17. Mathias, TAF, Assunção AN, Silva GF. Óbitos Infantis Investigados pelo comitê de prevenção da mortalidade em região do estado do Paraná. Rev Esc Enferm USP [Internet]. 2008 [cited Jan 10];42 (3):[about 5 p.]. Available from: www.scielo.br/scielo.php?script=sci_issues&pid=0080-6234&lng=en&nrm=iso
18. Gomella TL. Neonatologia: manejo, procedimentos, problemas no plantão, doenças e farmacologia neonatal. 5a ed. Porto Alegre, RS: 2006.
19. Ferrari, LSL, Brito ASJ, Carvalho ABR, Gonzáles MRC. Mortalidade neonatal no município de Londrina, Paraná, Brasil, nos anos 1994, 1999 e 2002. Cad saúde pública [Internet]. 2006 [cited Jan 10];22(5):[about 5 p.]. Available from: www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2006000500019&lng=pt&nrm=iso&tlng=pt
20. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Dados e indicadores selecionados - Ano 4, n. 2. Brasília: Ministério da Saúde; 2006.

Monteiro e Oliveira LF, Davim RMB, Silva RAR da et al.

Neonatal mortality: an epidemiological study...

Submission: 2012/05/05
Accepted: 2013/08/17
Publishing: 2013/10/01

Corresponding Address

Rejane Marie Barbosa Davim
Av. Rui Barbosa, 1100 / Bloco C / Ap. 804
Bairro Lagoa Nova
CEP: 59056-300 — Natal (RN), Brazil