● **Original article**

PROFILE AND PREVENTABILITY OF NEONATAL DEATHS IN A CITY IN LEGAL AMAZON

Kátia Fernanda Alves Moreira[1], Bianca Oyola Bicalho[2], Luanna Cristina Sales Santos[2], Fabíola Mara Gonçalves de Siqueira Amaral[3], Nathalia Halax Orfão[4], Mônica Pereira Lima Cunha[5]

ABSTRACT: Describe the profile of neonatal deaths and preventable causes in Porto Velho, state of Rondônia, in the period from 2011 to 2015. It is a descriptive, cross-sectional study conducted with data from the *Sistema de Informação de Nascidos Vivos* (Live Births Information System) and *Sistema de Informação de Mortalidade* (Mortality Information System). Two-hundred and seventy-nine deaths were eligible, with 208 (74.55%) premature births, 156 (55.91%) male, 194 (69.54%) weighing up to 2,499 grams, with Apgar values ranging from 6 to 10 in the first minute (170; 60.93%) and fifth minute (226; 81%); and 261 without anomalies (93.55%). The neonatal mortality coefficient decreased in years 2014 (3.79) and 2015 (2.28). Regarding basic causes, 87 (31.18%) were reducible through adequate attention to newborns, followed by 47 (16.85%) reducible through adequate attention to women during pregnancy. The high prevalence of these deaths calls attention to the need to improve prenatal care and the structure of the *Rede Cegonha* (Stork Network) in order to ensure care that has quality and is integrated and continuous for mother and children.
DESCRIPTORS: Newborn; Child Mortality; Public Health; Cause of Death.

PERFIL E EVITABILIDADE DE ÓBITO NEONATAL EM UM MUNICÍPIO DA AMAZÔNIA LEGAL

RESUMO: Descrever o perfil dos óbitos neonatais e causas evitáveis em Porto Velho - Rondônia, no período de 2011 a 2015. Estudo descritivo, do tipo transversal, realizado com dados do Sistema de Informação de Nascidos Vivos e Sistema de Informação de Mortalidade. Foram elegíveis 279 óbitos, sendo 208 (74,55%) precoce, 156 (55,91%) sexo masculino, 194 (69,53%) peso até 2.499 gramas, Apgar variando de 6 a 10 no 1° 170 (60,93%) e 5° minuto 226 (81%), sem anomalia 261 (93,55%). O coeficiente de mortalidade neonatal diminuiu nos anos de 2014 (3,79) e 2015 (2,28). Quanto às causas básicas, 87 (31,18%) eram reduzíveis por adequada atenção ao recém-nascido, seguido de 47 (16,85%) por adequada atenção à mulher na gestação. A alta prevalência desses óbitos alerta para necessidade de melhoria na assistência pré-natal e estruturação da rede cegonha, para garantir atenção de qualidade, integrada e contínua ao binômio mãe/filho.
DESCRITORES: Recém-nascido; Mortalidade infantil; Saúde Pública; Causas de Morte.

PERFIL Y EVITABILIDAD DE DECESO NEONATAL EN UN MUNICIPIO DE LA AMAZONIA LEGAL

RESUMEN: Describir el perfil de los decesos neonatales y causas evitables en Porto Velho – Rondônia, en el período de 2011 a 2015. Estudio descriptivo, del tipo transversal, realizado con datos del Sistema de Información de Nacidos Vivos y Sistema de Información de Mortalidad. Fueron elegibles 279 decesos, siendo 208 (74,55%) precoces, 156 (55,91%) de sexo masculino, 194 (69,53%) con peso hasta 2.499 gramos, Apgar variando de 6 a 10 en 1° minuto 170 (60,93%) y en 5° 226 (81%), sin anomalías 261 (93,55%). El coeficiente de mortalidad neonatal disminuyó en 2014 (3,79) y 2015 (2,28). Respecto de las causas básicas, 87 (31,18%) eran reducibles mediante adecuada atención del recién nacido, seguida de 47 (16,85%) por adecuada atención de la mujer embarazada. La alta prevalencia de estos decesos alerta sobre necesidad de mejora de atención prenatal y estructuración de una red cigüeña, garantizando atención calificada, integrada y continua al binomio madre/hijo.
DESCRIPTORES: Recién Nacido; Mortalidad Infantil; Salud Pública; Causas de Muerte.

[1]Nurse. Doctor of Nursing. Nursing professor at the Rondônia Federal University Foundation. Porto Velho, Rondônia, Brazil.
[2]Nursing Student. Rondônia Federal University Foundation. Porto Velho, Rondônia, Brazil.
[3]Nurse. Master's Degree Student in Health Sciences Teaching. Nursing Professor at the Rondônia Federal University Foundation. Porto Velho, Rondônia, Brazil.
[4]Nurse. Doctor of Nursing. Nursing Professor at the Rondônia Federal University Foundation. Porto Velho, Rondônia, Brazil.
[5]Nurse. PhD Student in Health Sciences. Nursing Professor at the Rondônia Federal University Foundation. Porto Velho, Rondônia, Brazil.

Corresponding author:
Bianca Oyola Bicalho
Fundação Universidade Federal de Rondônia
BR 364, Km 9,5, sem número - 76801-059 - Porto Velho, RO, Brasil
E-mail: biancaylbicalho@gmail.com

● **INTRODUCTION**

Child mortality rate (CMR) is one of the health indicators employed to assess the health conditions, economic development and quality of life of a given population[1]. Globally, almost 40% of child mortality (CM) is related to preventable or treatable infectious causes, such as pneumonia, diarrhea diseases, birth complications and malnutrition[2].

In 2015, of the 5.9 million deaths among those younger than 5 years, 2.7 million occurred in the neonatal period. In Brazil, even with a CMR reduction of 73%, 16 child deaths occur for each 1,000 live births (LB), with possible variations related to regional disparities. In poorer regions, such as the Northeast and North, the Neonatal Mortality Rate (NMR) has high percentages due to precarious sanitary conditions, access to and use of health services, and number of prenatal consultations[3].

In Brazil, CMR has been decreasing in the last decades. This fact is due to the implementation of social and health programs by the Federal Government, with the goal to provide better health care for children and women. Two examples of programs that successfully decreased CM are the promotion of breastfeeding and the Rede Cegonha (Stork Network)[4].

With the end of the era of Millennium Development Goals in 2015, projections related to mortality rates in the country, especially in the neonatal period, show that they will remain high, with their growth rates varying according to causes, among which stand out prematurity, congenital malformation, intrapartum asphyxia, perinatal infections and maternal factors, with a considerable proportion being deaths preventable by health services actions[2,5-6].

In this sense, the description of the profile of neonatal deaths and preventable causes in the city of Porto Velho, state of Rondônia, in the period from 2011 to 2015, will enable identification of vulnerabilities and challenges in the offering of care to pregnant women and newborns in health services that are considered references in the state and bordering areas.

● **METHOD**

This is a descriptive epidemiological and cross-sectional study, based on secondary data obtained from the Sistema de Informação de Nascidos Vivos (Live Births Information System–SINASC) and Sistema de Informação de Mortalidade (Mortality Information System–SIM), in the period of January 2011 to December 2015, which are available through the Secretaria Municipal de Saúde de Porto Velho (City Health Department of Porto Velho). The data collection period was April 2016.

The study's population comprised all neonatal deaths for pregnant women residing in the aforementioned city that were informed and recorded in the data base of the health information systems. Inclusion criterion was all neonatal deaths with death certificates (DC) with at least 50% of fields filled in. Exclusion criterion was deaths with no recording of year or number of the Live Birth Certificate (LBC).

Variables chosen for the study were: maternal sociodemographics; neonatal epidemiology; obstetrics; characteristics related to the basic cause of death and newborn (NB) population for calculation of the neonatal mortality coefficient (NMC). In order to obtain preventable deaths, the variable basic cause of death was coded according to the International Statistical Classification of Diseases and Related Health Problems–10th Revision (ICD-10). Deaths were classified in subgroups of preventable deaths according to the update to the list of preventable causes of death by interventions of the Brazilian Unified Health System[7], which are: reducible by care for women and NBs; reducible by adequate care for women during pregnancy; reducible by adequate care for women during birth; reducible by adequate care for newborn; reducible by adequate actions of diagnosis and treatment; badly defined causes of death and other causes (not clearly preventable).

Data were analyzed by frequency distribution using the software Microsoft® Excel®. This study met all ethical aspects of Resolution 466/2012[8], according to approval under ruling No. 870.192 CEP/NUSAU/ UNIR.

● **RESULTS**

The number of LBs in the city in the period of 2011 to 2015 was 30,236 of which 643 resulted in death in the neonatal period. Of those, 279 were eligible for this study. It must be emphasized that 56.61% (364) of neonatal deaths did not have DCs with at least 50% of variable fields filled in.

Mothers were mostly young, with complete high school, homemakers, with fewer prenatal consultations than recommended by the Ministry of Health (minimum of six consultations), a single pregnancy, preterm and via C-section (Table 1).

Table 1 – Distribution of maternal characteristics, according to sociodemographic and obstetrics variables in the period from 2011 until 2015. Porto Velho, Rondônia, Brazil, 2016

Selected characteristics	2011		2012		2013		2014		2015		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Age of mother												
10 to 19	32	29.09	27	24.77	8	26.67	5	23.81	1	11.11	73	26.16
20 to 29	47	42.73	59	54.13	19	63.33	13	61.90	5	55.56	143	51.25
30 to 39	27	24.55	21	19.27	3	10	3	14.29	2	22.22	56	20.07
40 to 49	3	2.73	2	1.83	-	-	-	-	1	11.11	6	2.15
Ignored	1	0.91	-		-	-	-	-	-	-	1	0.36
Education												
Did not study	1	0.91	3	2.752	-	-	-	-	1	11.11	5	1.79
Elementary school	18	16.36	10	9.174	-	-	2	9.524	1	11.11	31	11.11
High school	83	75.45	75	68.81	29	96.67	14	66.67	6	66.67	207	74.19
Higher education	8	7.27	17	15.6	-	-	2	9.52	1	11.11	28	10.04
Ignored	-	-	4	3.67	1	3.33	3	14.29	-	-	8	2.87
Occupation												
Housewife	70	63.64	74	67.89	18	60	13	61.90	7	77.78	182	65.23
Student	2	1.82	4	3.67	1	3.33	-	-	1	11.11	8	2.86
Other	25	22.73	22	20.18	9	30	8	38.10	1	11.11	65	23.3
Ignored	13	11.82	9	8.26	2	6.67	-	-	-	-	24	8.60
Number of prenatal consultations												
Fewer than 4 consultations	44	40	44	40.37	4	13.33	13	61.90	2	22.22	107	38.35
Between 4 and 6 consultations	27	24.55	42	38.53	15	50	5	23.81	4	44.44	93	33.33
7 consultations or more	39	35.45	19	17.43	9	30	3	14.29	1	11.11	71	25.45
Ignored	-	-	4	3.67	2	6.66	-	-	2	22.22	8	2.86
Types of pregnancies												
Single	101	91.82	99	90.83	29	96.67	21	100	9	100	259	92.83
Multiple	7	6.36	8	7.34	1	3.33	-	-	-	-	16	5.73
Ignored	2	1.82	2	1.83	-	-	-	-	-	-	4	1.43
Pregnancy age												
Preterm (22 to 36 weeks)	52	47.27	61	55.96	10	33.33	17	80.95	7	77.78	147	52.69
Term (37 to 41 weeks)	31	28.18	24	22.02	17	56.67	-	-	2	22.22	74	26.52
Post-term (42 weeks and over)	-	-	2	1.83	-	-	-	-	-	-	2	0.72
Ignored	27	24.55	22	20.18	3	10	4	19.05	-	-	56	20.07
Birth method												
C-section	60	54.55	66	60.55	18	60	6	28.57	3	33.33	153	54.84
Vaginal	50	45.45	35	32.11	12	40	15	71.43	6	66.67	118	42.29
Ignored	-	-	8	7.33	-	-	-	-	-	-	8	2.86

Source: SINASC/ SIM – Department of Epidemiology/SEMUSA, 2016

Neonatal deaths were mostly premature, male, with low weight at birth, Apgar ranging from 6 to 10 in the first and fifth minute and no anomalies (Table 2).

Table 2 – Distribution of characteristics of neonatal deaths in the period from 2011 until 2015. Porto Velho, Rondônia, Brazil, 2016

Selected characteristics	Neonatal Mortality											
	2011		2012		2013		2014		2015		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Classification of death												
Premature	71	64.55	89	81.65	24	80	16	76.19	8	88.89	208	74.55
Late	39	35.45	20	18.35	6	20	5	23.81	1	11.11	71	25.45
Gender												
Male	68	61.82	54	49.54	16	53.33	14	66.67	4	44.44	156	55.91
Female	42	38.18	53	48.62	14	46.67	7	33.33	4	44.44	120	43.01
Ignored	-	-	2	1.83	-	-	-	-	1	11.11	3	1.07
Weight at birth												
Up to 2,499 grams	60	54.55	87	79.82	21	70	20	95.24	6	66.67	194	69.53
2,500 grams and over	27	24.55	18	16.51	7	23.33	1	4.76	3	33.33	56	20.07
Ignored	23	20.91	4	3.67	2	6.67	-	-	-	-	29	10.39
Apgar at 1st minute												
0 to 5	36	32.73	39	35.78	1	3.33	12	57.14	3	33.33	91	32.62
6 to 10	67	60.91	62	56.88	29	96.67	8	38.10	4	44.44	170	60.93
Ignored	7	6.36	8	7.34	-	-	1	4.76	2	22.22	18	6.45
Apgar at 5th minute												
0 to 5	17	15.45	15	13.76	-	-	5	23.81	1	11.11	38	13.62
6 to 10	88	80	86	78.9	30	100	15	71.43	7	77.78	226	81
Ignored	5	4.55	8	7.33	-	-	1	4.76	1	11.11	15	5.38
Anomalies												
No	105	95.45	101	92.66	29	96.67	19	90.48	7	77.78	261	93.55
Yes	5	4.55	8	7.34	1	3.33	2	9.52	2	22.22	18	6.45

Source: SINASC/ SIM – Department of Epidemiology/SEMUSA, 2016

During the period of 2011 to 2013, the city of Porto Velho presented an increasing NMC, but with abrupt decreases in 2014 and 2015 (Table 3).

Table 3 – Distribution of Neonatal Deaths, Live Births, and Neonatal Mortality Coefficient in the Period of 2011 to 2015. Porto Velho, Rondônia, Brazil, 2016

Year	Neonatal deaths		Live births		NMC*	NMC* Premature
	N	%	N	%		
2011	110	39,43	9773	32,32	11,25	7,26
2012	109	39,07	9252	30,6	11,78	9,62
2013	30	10,75	1742	5,76	17,22	13,78
2014	21	7,53	5538	18,32	3,79	2,89
2015	9	3,23	3931	13	2,28	2,04
Total	279	100	30236	100	9,23	6,88

* Neonatal Mortality Coefficient
Source: SINASC/ SIM – Department of Epidemiology/SEMUSA, 2016

It is noteworthy that neonatal deaths had an abrupt decrease in Porto Velho between 2013 and 2015, which is surprising even when considering the marginal improvements in social and health conditions in the state of Rondônia. These data suggest under-notification, which signals a critical situation, because it compromises accurate epidemiological analysis. Considering that most neonatal deaths happen in hospital environments, there is an expectation for higher reliability in DC information.

The main basic cause of death was related to inadequate care for NBs. The main cause was unspecified sepsis of NB, followed by causes preventable by adequate care for pregnant women, especially neonatal respiratory distress syndrome (Table 4).

Table 4 – Distribution of Causes of Neonatal Death in the Period of 2012 to 2015, According to the International Diseases Classification (IDC) and the Preventability Classification. Porto Velho, Rondônia, Brazil, 2016

PREVENTABILITY CLASSIFICATION AND PRIMARY CAUSES OF DEATH	2011		2012		2013		2014		2015		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Preventable through care for women and NBs											29	10.39
Fetus and newborn with very low weight	5	31.25	1	12.50	2	50	-	-	-	-	8	27.59
Fetus and newborn affected by hypertensive maternal disorders	2	12.50	-	-	1	25	-	-	-	-	3	10.34
Fetus and newborns affected by other maternal circulatory and respiratory diseases	1	6.25	2	25	-	-	-	-	-	-	3	10.34
Congenital syphilis	1	6.25	1	12.50	-	-	1	100	-	-	3	10.34
Others	7	43.75	4	50	1	25	-	-	-	-	12	41.38
Reducible through adequate care for women during pregnancy											47	16.85
Newborn respiratory distress syndrome	16	100	18	100	4	100	5	100	4	100	47	100
Reducible through adequate care for women during delivery											43	15.41
Asphyxia at birth, unspecified	8	47.06	15	83.30	2	66.67	4	80	-	-	29	67.44
Neonatal aspiration syndrome, unspecified	8	47.06	1	5.56	-	-	1	20	-	-	10	23.26
Neonatal meconium aspiration	1	5.88	2	11.10	1	33.33	-	-	-	-	4	9.30
Reducible through adequate care for NBs											87	31.18
Neonatal bacterial sepsis, unspecified	15	53.57	18	75	6	50	4	57.14	3	100	46	52.87
Newborn primary atelectasis	2	7.14	6	25	2	16.67	1	14.29	-	-	11	12.64
Others	11	39.29	13	31	4	33.33	2	28.57	-	-	30	34.48
Reducible through adequate diagnosis and treatment actions											2	0.72
Meningitis	1	100	-	-	-	-	1	100	-	-	2	100
Badly defined causes of death											2	0.72
Unspecified disorders during perinatal period	1	-	-	-	-	-	1	-	-	-	2	100
Other causes (not clearly preventable)											69	24.73
Anencephaly	4	12.90	5	17.90	1	16.67	1	50	1	50	12	17.39
Atelectasis	3	9.68	4	14.30	2	33.33	-	-	-	-	9	13.04
Multiple congenital malformations, not classified in other parts	3	9.68	3	10.70	-	-	1	50	1	50	8	11.59
Other	21	67.74	16	57.10	3	50	-	-	-	-	40	57.97

Source: SINASC/ SIM – Department of Epidemiology/SEMUSA, 2016

● DISCUSSION

Neonatal deaths occurred predominantly among children of young women aged between 20 and 29 (51.25%), following the trend of neonatal mortality occurring for women below the age of 34[9-10] as a result of the higher fertility rate and higher social vulnerability in this age group.

The results in this research disagree with other studies in which neonatal mortality has also been associated with socioeconomic factors, among which is included mothers' low educational level, a child mortality factor very much emphasized in the literature, in which children born to mothers with a low educational level have higher chances for death before the end of their first year[11-12].

The number of prenatal consultations in this study was below four (38.35%) and it is known that ensuring at least six prenatal consultations before 12 weeks of pregnancy benefits the pregnant women, independently of age, social class, or instructional level, because it enables early diagnosis of possible pathologies during pregnancy that might harm the health of women and children, in addition to enabling a better monitoring of babies' development[13].

Studies claim that socioeconomic indicators, among which is working outside the house (most women in this research were homemakers) represent a risk factor for neonatal mortality[14-15], in that the mothers' time availability to attend prenatal consultations and administer self-care becomes limited, directly affecting the newborns' quality of life[15].

Although the study presented higher deaths for single fetus pregnancies (92.83%), even considering it is a protective factor for NBs[16], it is emphasized that there is a strong association between neonatal mortality and multiple pregnancies, because it is a risk factor for prematurity and intrauterine growth[17].

The predominant birth route in Porto Velho was C-section (54.84%). This finding agrees with other studies, in which 56.7% and 52%[18] of neonatal deaths happened to mothers who underwent C-sections.

It was observed that there was a lower percentage of deaths for vaginal delivery (42.29%), which contributes to the strengthening of the immune system, the development of cardiac rhythm, and pulmonary maturation among NBs. Vaginal delivery is physiological and women's bodies are prepared for such an event[18]. Moreover, a study conducted in the state of Rio Grande do Sul lists prematurity as a reason for C-section deliveries because of the margin of error when calculating gestational age[19].

Findings related to the male gender of neonatal deaths agree with a study conducted in the city of Fortaleza[14]. This difference between genders happens during the intrauterine period. The female gender presents better metabolic adaptation to pregnancy stressors, enabling better adaptation for birth, which leads to lower mortality[20].

This study shows an increasing discrepancy between premature births, especially after a low percentage in 2013 (33.33%), when compared to the years of 2014 and 2015 (80.95% and 77.78%, respectively), which can be a result of induced C-sections[21]. It is known that neonatal deaths are predominant among NBs with low weight and prematurity[6].

One of the limitations of this study refers to the analysis of deaths at SIM in the years of 2013, 2014, and 2015, which evidenced a low number of recorded neonatal deaths. This affected more reliable analyses of neonatal mortality in Porto Velho, because this indicator can demonstrate the quality of healthcare services, basic sanitation, and education. The SINASC also presented a low number of recorded LBs in 2013. This fact did not compromise the information available to characterize neonatal mortality, which is generally associated with biological, care, and socioeconomic factors.

A predominance of Apgar scores between 6 and 10 was observed, both for first minute (60.93%) and for the fifth minute (81%). However, studies conducted in the states of Ceará and Rio Grande do Sul demonstrated that Apgar indexes below or equal to 8 are predictors for risk of death, placing NBs under higher vulnerability[14,22].

In this study, there were no anomalies for 93.55% of deaths, although such conditions could increase neonatal deaths[23].

The researched NMC was 9.23/1000 LB, which fell below data found for the city of Recife, state of

Pernambuco (10.99/1000 LB)[24]. However, when compared to other studies, this coefficient is higher, because for Cuiabá, state of Mato Grosso, the NMC found was 8.2[25], and for the state of Rio Grande do Sul it was 8.3[22].

The PMNP for Porto Velho was 6.88, similar to the figure found in another study conducted in Cuiabá, state of Mato Grosso (6.0/1000 LB)[25]. This aspect is associated with shortcomings in care during the prenatal phase, assistance to NBs, and lack of access to information. This finding does not suggest a real decrease in neonatal mortality, because of the elevated numbers of sub-registries, especially in the Northern and Northeastern states. This demands caution when analyzing data[26]. It is mandatory to set up reliable information systems to analyze mortality, because estimations of neonatal death coefficients are complex both for the dividend (neonatal deaths) and for the divisor (LB).

Among the main causes of death in Porto Velho, 31.18% are reducible through adequate care for NBs, as well as for pregnant women (16.85%) and during delivery (15.41%). A study conducted in the central region of the state of Minas Gerais found that the evolution of preventable child deaths presented similar results to those of Porto Velho, with 36.5% referring to care for NBs and 28.1% to care for women during pregnancy[27].

In the study conducted in Cuiabá, similar results were found, with the highest proportion of reducible deaths being those related to adequate care for NBs[25]. As for causes reducible by adequate attention to women during pregnancy, asphyxia during delivery was the main cause (31.5%) in a study conducted in Salvador[28], which is similar to the results in this study (67.44%).

It is important to emphasize that quality prenatal monitoring is directly related to mother-child well-being,because inadequate monitoring during the prenatal period results in serious consequences for mothers and children, such as recurring urinary infections, premature births, and low birth weight, which are the main risk factors for neonatal sepsis[29].

Moreover, it is necessary to improve the quality of health care, as well as the diagnosis and early treatment of infections that happen during the prenatal period, delivery, and birth, because the results found were worrisome and could be prevented through effective health services with prevention and treatment measures for the occurrence or its determining condition[30].

The reduction in neonatal mortality is associated with the importance given by city administrators, services, health systems, and society to these high rates of mortality, especially in the first six days of life[6].

The results suggest that information reported on SINASC and SIM still present ignored or incomplete variables, which diminishes their quality. Probably these data incorrectly filled in in DCs and LBCs are due to the absence of fetal and child death committees in Porto Velho, which would contribute to the qualification of information, in addition to bringing awareness to professionals regarding adequate recording of vital statistics.

Another factor that might be related to this reality is the location of the researched city, which presents large riverside and rural areas, with enormous care and services gaps. These harm information flow and communication, favoring under-notification and under-recording in health information systems. This fact hampers the construction of indicators for the organization and management of healthcare networks.

● **CONCLUSION**

In this study, there was a prevalence of premature deaths for male newborns weighing below 2,499 grams, with Apgar values ranging from 6 to 10 at the first minute and fifth minute, without anomalies. The neonatal mortality coefficient was ascending, with an abrupt decrease in the years of 2014 and 2015. The predominant basic cause was reducible through adequate care for newborns. Such results call attention to the need to improve prenatal care and the structure of the Rede Cegonha (Stork Network) in the city, with the aim of guaranteeing quality care that is integrated and continuous.

Lack of information in the fields of DCs and LBCs made it difficult to conduct a reliable analysis

of some of the research findings. In order to achieve this, it is necessary to raise awareness among professionals and educate them about the importance of correctly filling in information in order to generate adequate information that can help change this reality. It is fundamental for professionals to know their roles in the construction of quality indicators, because those indicators enable the planning of effective health actions and policies, and their part in changing these results.

● REFERENCES

1. dos Santos HG, de Andrade SM, Silva AMR, Mathias TAF, Ferrari LL, Mesas AE. Mortes infantis evitáveis por intervenções do Sistema Único de Saúde: comparação de duas coortes de nascimentos. Ciênc. saúde coletiva. [Internet] 2014;19(3) [acesso em 03 fev 2016]. Disponível: http://dx.doi.org/10.1590/1413-81232014193.01182013.

2. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. The Lancet. [Internet] 2015;385(9966) [acesso em 25 jan 2017]. Disponível: http://dx.doi.org/10.1016/S0140-6736(14)61698-6.

3. United Nations Children's Fund (Unicef). Levels & Trends in Child Mortality. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation. [Internet] 2015 [acesso em 14 mar 2017]. Disponível: https://www.unicef.org/publications/files/Child_Mortality_Report_2015_Web_8_Sept_15.pdf

4. Ministério da Saúde (BR). Mortalidade Infantil no Brasil: tendências, componentes e causas de morte no período de 2000 a 2010. In: Saúde Brasil 2011: uma análise da situação de saúde e a vigilância da saúde da mulher. [Internet] Brasília: Ministério da Saúde; 2012 [acesso em 11 mar 2017]. Disponível: http://repositorio.unb.br/bitstream/10482/12478/1/CAPITULO_MortalidadeInfantilBrasil.pdf.

5. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, et al. Global, regional, and national causes of under-5 mortality in 2000-15: an updated systematic analysis with implications for the Sustainable Development Goals. The Lancet. [Internet] 2017;388(10063) [acesso em 25 jan 2017]. Disponível: http://dx.doi.org/10.1016/S0140-6736(16)31593-8.

6. Lansky S, Friche AAL, da Silva AAM, Campos D, Bittencourt SDA, de Carvalho ML, et al. Pesquisa Nascer no Brasil: perfil da mortalidade neonatal e avaliação da assistência à gestante e ao recém-nascido. Cad. Saúde Pública. [Internet] 2014;30(Supl 1) [acesso em 12 jun 2016]. Disponível: http://dx.doi.org/10.1590/0102-311X00133213.

7. Malta DC, Sardinha LMV, de Moura L, Lansky S, Leal MC, Szwarcwald CL, et al. Atualização da lista de causas de mortes evitáveis por intervenções do Sistema Único de Saúde do Brasil. Epidemiol. Serv. Saúde [Internet] 2010;19(2) [acesso em 3 fev 2016]. Disponível: http://scielo.iec.pa.gov.br/pdf/ess/v19n2/v19n2a10.pdf.

8. Ministério da Saúde (BR). Conselho Nacional de Saúde. Diretrizes e normas regulamentadoras de pesquisa envolvendo seres humanos. Resolução n. 466, de 12 de dezembro de 2012. Brasília; 2012.

9. Ortiz LP, Oushiro DA. Perfil da mortalidade neonatal no estado de São Paulo. São Paulo em Perspectiva. [Internet] 2008;22(1) [acesso em 12 mar 2016]. Disponível: http://produtos.seade.gov.br/produtos/spp/v22n01/v22n01_02.pdf.

10. Soares ES, Menezes GMS. Fatores associados à mortalidade neonatal precoce: análise de situação no nível local. Epidemiol. Serv. Saúde. [Internet] 2010;19(1) [acesso em 11 mar 2017]. Disponível: http://dx.doi.org/10.5123/S1679-49742010000100007.

11. Jobim R, Aerts D. Mortalidade infantil evitável e fatores associados em Porto Alegre, Rio Grande do Sul, Brasil, 2000-2003. Cad. Saúde Pública. [Internet] 2008;24(1) [acesso em 11 mar 2017]. Disponível: http://dx.doi.org/10.1590/S0102-311X2008000100018.

12. Garcia LP, Santana LR. Evolução das desigualdades socioeconômicas na mortalidade infantil no Brasil, 1993-2008. Ciênc. Saúde Coletiva. [Internet] 2011;16(9) [acesso em 11 mar 2017]. Disponível: http://dx.doi.org/10.1590/S1413-81232011001000009.

13. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Atenção ao Pré-Natal de Baixo Risco. Série A: Normas e Manuais Técnicos. Caderno de atenção básica nº 32. Brasília: Ministério da Saúde; 2012.

14. Helena ETS, de Sousa CA, da Silva CA. Fatores de risco para mortalidade neonatal em Blumenau, Santa

Catarina: linkage entre bancos de dados. Rev. Bras. Saúde Mater. Infant. [Internet] 2005;5(2) [acesso em 12 mar 2016]. Disponível: http://dx.doi.org/10.1590/S1519-38292005000200010.

15. do Nascimento RM. Determinantes da mortalidade neonatal em Fortaleza-CE: um estudo caso controle [dissertação]. Fortaleza (CE): Universidade Federal do Ceará; 2011.

16. de Aguiar JB. Fatores de risco para a mortalidade neonatal, em hospital de referência [dissertação]. Fortaleza (CE): Universidade Estadual do Ceará; 2011.

17. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Gestação de alto risco: manual técnico. 5ª ed. [Internet] Brasília: Ministério da Saúde; 2012 [acesso em 11 mar 2017]. Disponível: http://bvsms.saude.gov.br/bvs/publicacoes/manual_tecnico_gestacao_alto_risco.pdf.

18. Gaíva MAM, Bittencourt RM, Fujimori E. Óbito neonatal precoce e tardio: perfil das mães e dos recém-nascidos. Rev. Gaúcha Enferm. [Internet] 2013;34(4) [acesso em 24 fev 2016]. Disponível: http://dx.doi.org/10.1590/S1983-14472013000400012.

19. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Manual de Vigilância do Óbito Infantil e Fetal e do Comitê de Prevenção do Óbito Infantil e Fetal. [Internet] Brasília: Ministério da Saúde; 2009 [acesso em 23 jul 2016]. Disponível: http://svs.aids.gov.br/download/manuais/manual_infantil_fetal03_fim2_1.pdf.

20. da Silva TH, Fensterseifer LM. Prematuridade dos recém-nascidos em Porto Alegre e seus fatores associados. Revista Brasileira de História & Ciências Sociais – RBHCS. [Internet] 2015;7(13) [acesso em 20 fev 2017]. Disponível: http://dx.doi.org/10.14295/rbhcs.v7i13.305.

21. Misra DP, Salafia CM, Miller RK, Charles AK. Non-linear and gender-specific relationships among placental growth measures and the fetoplacental weight ratio. Placenta. [Internet] 2009;30(12) [acesso em 24 mar 2017]. Disponível: http://dx.doi.org/10.1016/j.placenta.2009.09.008.

22. Victora CG, Aquino EML, Leal MC, Monteiro CA, Barros FC, Szwarcwald CL. Saúde de mães e crianças no Brasil: progressos e desafios. The Lancet. [Internet] 2011; (377(9780) [acesso em 10 jun 2016]. Disponível: http://dx.doi.org/10.1016/S0140-6736(11)60138-4.

23. Zanini RR, de Moraes AB, Giugliani ERJ, Riboldi J. Determinantes contextuais da mortalidade neonatal no Rio Grande do Sul por dois modelos de análise. Rev. Saúde Pública. [Internet] 2011;45(1) [acesso em 13 abr 2016]. Disponível: http://dx.doi.org/10.1590/S0034-89102011000100009.

24. Borba GG, Nevez ET, Arrué AM, da Silveira A, Zamberlan KC. Fatores associados à morbimortalidade neonatal: um estudo de revisão. Rev. Saúde (Santa Maria). [Internet] 2014;40(1) [acesso em 15 mai 2016]. Disponível: http://dx.doi.org/10.5902/223658347774.

25. Rocha R, Oliveira C, da Silva DKF, Bonfim C. Mortalidade neonatal e evitabilidade: uma análise do perfil epidemiológico. Rev. enferm. UERJ. [Internet] 2011;19(1) [acesso em 10 jun 2016]. Disponível: http://www.facenf.uerj.br/v19n1/v19n1a19.pdf.

26. Lourenço EC, Brunken GS, Luppi CG. Mortalidade infantil neonatal: estudo das causas evitáveis em Cuiabá, Mato Grosso, 2007. Epidemiol. Serv. Saúde. [Internet] 2013;22(4) [acesso em 10 jun 2016]. Disponível: http://scielo.iec.pa.gov.br/pdf/ess/v22n4/v22n4a16.pdf.

27. Lisboa L, de Abreu DMX, Lana AMQ, França EB. Mortalidade infantil: principais causas evitáveis na região Centro de Minas Gerais, Brasil, 1999-2011. Epidemiol. Serv. Saúde. [Internet] 2015;24(4) [acesso em 17 jun 2016]. Disponível: http://dx.doi.org/10.5123/S1679-49742015000400013.

28. Nascimento RCS. Mortalidade perinatal em Salvador: análise espacial das condições de evitabilidade e desigualdades sociais [tese]. Salvador (BA): Instituto de Saúde Coletiva. Universidade Federal da Bahia; 2014.

29. Pires SA, de Almeida NMS. Mortalidade por septicemia bacteriana: um estudo descritivo no período perinatal. Revista Enfermagem Contemporânea. [Internet] 2016;5(1) [acesso em 12 mar 2017]. Disponível: http://dx.doi.org/10.17267/2317-3378rec.v5i1.946.

30. do Nascimento SG, de Oliveira CM, Sposito V, Ferreira DKS, do Bonfim CV. Mortalidade infantil por causas evitáveis em uma cidade do Nordeste do Brasil. Rev. bras. enferm. [Internet] 2014;67(2) [acesso em 10 mar 2017]. Disponível: http://dx.doi.org/10.5935/0034-7167.20140027.