Epidemiological Profile of Precocious Neonatal Mortality in the Period 2008 to 2015 in Porto Velho, Rondonia, Brazil

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Abstract— *The objective of this study was to describe the epidemiological profile of precocious neonatal infant mortality in the city of Porto Velho, Rondonia. A quantitative, descriptive study with an ecological approach was carried out. The data source used was secondary, originating from the linkage between SINASC and SIM databases, from the Health Surveillance Agency of the Rondonia Health Department. For treatment, absolute frequency analyzes were performed. The neonatal infant mortality rate was 9.7 deaths per thousand live births, with a predominance of the preterm neonatal patient: 7.2 deaths per thousand live births. Of the deaths, 482 (72.8%) occurred in the precocious neonatal period (0 to 6 days) and 164 (24.7%) in the late neonatal 7 to 27*

days of life. The findings indicate the need to improve the quality of health care services available in the city, both prenatal and obstetric care in the neonatal period.

I. INTRODUCTION

The infant mortality rate (death of children under one year per thousand live births - NVs) is a sensitive indicator of social, economic development and above all health care in a given geographic space and time.

Infant mortality is still divided into neonatal mortality (death 0-27 days) and post-neonatal mortality (27 days for deaths until 364 days of age). Since neonatal mortality and also divided into two periods, precocious neonatal (0 to 6 days) and late neonatal (7 to 27 days).

Although the global rate of infant mortality (under five years) has reduced by 49% between 1990 and 2013 - from 90 to 46 deaths per thousand NVs - 74% of these deaths corresponded to children under one year and 44% occurred in the neonatal period (zero to 27 days of life).

Data from a survey conducted by Moreira, et al (2014) in the city of Porto Velho, showed a predominance of deaths in children under years born to mothers aged 20 to 34, whose percentage ranged from 26.0% in 2006 29.0% in 2010, with percentage swings in other years.

Over this period, the study showed an increasing trend from premature deaths. Between 2006 and 2007 this percentage was maintained in 50.0%, increasing to 53% in 2008 and in 2010, representing 54.0% of deaths in children under 1 year, featuring intense incidence of neonatal mortality in preterm (MOREIRA et al, 2014).

In 2013, the leading causes of neonatal death in the world were complications from premature birth (35%) and labor (24%) and attributed to sepsis (15%), considered one of the leading causes of death in this age group in Brazil.

This situation and due to the more pronounced reduction in deaths in the post-neonatal period, which reflects social inequalities, coverage and quality of health care. Already neonatal deaths have close relationship with the health care provided to pregnant women and newborns during the antepartum, delivery and immediate care to child at birth. Another relevant situation and the high proportion of neonatal deaths in the first day and the first week of life, which shows the relationship of neonatal mortality with the health care provided to pregnant women and newborn and the need to consider the targeted actions the improvement of such assistance (LORENZO, Brunken and LUPPI, 2013).

One of the biggest current challenges to reduce infant mortality in our country and the proper care of the newborn, in addition to monitoring the entire cycle pregnancy until the birth of the baby, with quality service at all levels of complexity.

The timely and effective access to obstetric and neonatal care quality, from the prenatal care, delivery care, postpartum and care received by the newborn also contribute to reducing the incidence of diseases and, consequently, a higher survival rate of newborn -born, especially newborns risk.

Thus, the aim of this study was to identify and characterize the epidemiology of neonatal infant mortality in Porto Velho, from 2008 to 2015.

II. METHODS

It is a quantitative study of descriptive character with ecological approach. Data collection was performed using a previously tested instrument adapted Oliveira (2009), which extracted the secondary data information infant deaths neonatal period defined stratified from the following sources of information: Information System born Alive - SINASC; Mortality Information System - SIM, coming from the State Agency of Health Surveillance of Rondônia-RO-AGEVISA.

Deaths were described according to the main groups for deaths from causes listed on the death certificate obtained by *linkage* of the research bank with the SIM and the causes registered in the records. This list of causes groups the codes of 10 [the] revision of the International Classification of Diseases (ICD-10).

Data were analyzed using absolute and relative frequency of the selected variables.

For the last step, it was carried out GIS data of deaths in the neonatal period, distributed in the city, from 2008 to 2015. The data were spatially on a vector basis of the urban area of the Old Port district headquarters, purchased from the Secretary of Old Port of City planning - SEMPLAN (2017), so that each neighborhood presents a value corresponding to the processed data. It was used as a tool of expertise and building maps: Geographic Information System - GIS, through Software Quanto Giz – Qgiz, version 2.8.1.

III. RESULTS

In the period 2008-2015, n = 65 967 born children, children of mothers living in Porto Velho. These n = 1,002 died less than a year old.

CMI was 9.7 neonatal deaths per thousand live births, with precocious neonatal predominant component: 7.2 deaths per thousand live births. Of the deaths, 482 (72.8%) occurred in the precocious neonatal period (0 to 6 days) and 164 (24.7%) in the late neonatal (7 to 27 days).

Table 1 shows the results for the leading causes of deaths in the neonatal group in this study. The conditions in the perinatal period were responsible for n = 492 (74.43%) of deaths in this period, n = 152 of these (30.8%) were caused by Bacterial Septicemia of the newborn.

The causes of higher prevalence of neonatal deaths in this study with a percentage equal to 25% are related to bacterial septicemia RN, being considered deaths from preventable causes.

Bacterial sepsis is considered a disease originated in the perinatal period and should be understood as a preventable cause. Originates in precocious pregnancies, this cause is defined as a clinical syndrome characterized by nonspecific and systemic inflammatory response correlated to the presence of bacteria in sterile body fluids. Precocious sepsis is related to pregnancy and / or peripartum factors, and the etiological agents originating from the maternal genital tract or maternal bacteremia. *Streptococcus agalactiae* , *Escherichia coli* and *Listeria monocytogenes* are the main bacteria responsible for precocious onset of disease. Among the most common clinical signs in sepsis stand-disordered breathing (Aquino et al, 2009).

This feature explains the finding of n = 105 neonatal deaths that were diagnosed with respiratory distress, associated with septicemia.

On this, Malta et al (2010) reports that in developing countries, infant mortality is high and a significant portion of this number is due to perinatal and neonatal mortality. The main causes of perinatal mortality are associated with prematurity, to bacterial septicemia, asphyxia, the intrauterine infections, toxemia of pregnancy and multiple birth defects as those referred to the neonatal period are the intrauterine acute infections, respiratory problems, birth defects, the prematurity and postnatal infection, is taking an amount that varies depending on operating conditions of the Maternity and Nursery.

In recent decades, the mother's obituary declined to almost vanish; By that time, perinatal losses did not follow the same rhythm when considering the balance between the scientific and technological progress and the possibility that these resources are available to the pregnant woman, the fetus and the newborn, in countries not in the first world (BRAZIL, 2015).

In maternity wards of the least favored regions, such as the northern region, the nurseries have little equipment resources, limited physical area, large numbers of newborns at risk and especially small number of personnel (nurses, aides, etc. .), often not well trained.

A preventable death is one whose occurrence is related to medical intervention and quality health services. The preventability now considered according to various criteria to organize and cover the different factors that contribute to the occurrence of these deaths, in addition to analyzing the effectiveness of the health system (Pereira et al., 2016)

It is considered that the birth weight is alone, the major risk factor related to neonatal mortality (Faria et al, 2014).

Table.1: Distribution of neonatal infant mortality indicators in Porto Velho per biennium second major cause of death.

Variables	Neonatal Mortality (%)			
Classification of causes of death	2008-2009	2010-2011	2012-2013	2014-2015
Infectious and parasitic diseases (A00-B99)	4 (2,2)	3 (1,6)	4 (2,8)	6 (3,8)
Afecções originadas no período perinatal (P00-P96)	138 (77,5)	129 (68,9)	105 (74,4)	120 (76,9)
Originating in the perinatal period (P00-P96)	27 (15,1)	48 (25,6)	26 (18,4)	21 (13,4)
Others	9 (5)	7 (3,7)	6 (4,2)	9 (5,7)
Total	**178**	**187**	**141**	**156**

Source: Santos et al, 2018.

With regard to the second deaths birthweight, which was evidenced during the study period, there were n = 169 (25.5%) neonatal deaths in infants who weighed less than 1 kg, followed n = 108 (16.3%) with less than 1.4 kg (Figure 1).

Gizaw *et al*, (2014) reported that low birth weight is an important indirect cause of death, but maternal complications at work are at high risk of neonatal death, and poverty is also strongly associated with an increased risk.

The highest proportion of low birth weight neonates, ie, birth weight less than 2.5kg, found in the studied population, shows that low birth weight is a risk factor for neonatal mortality, and that as the weight birth increases the risk of death decreases significantly.

Corroborating these findings cite the study by Potrich et al. (2011) with data from the city of Santa Maria - Rio Grande do Sul, in the database of the Department of the Unified Health System (DATASUS) with RNs to identify mortality, where it was found that from 2000 to 2008 there was a higher frequency of deaths weighing less than 1.5 kg.

Another study conducted in the state of Pernambuco through information contained in the SIM database showed that a total of 8,055 deaths from 2009 to 2011, 63.1% (n = 5,083), ie, most were neonates weighing less than 2.5 kg (Pereira et al, 2016).

In relation to birth weight, 60% of infant deaths are infants with low birth weight. On the other hand, that the longer the lifetime, the greater the proportion of weight not informed on the death certificate.

This proportion reaches 28.5% of infant deaths occurred in the post-neonatal period, which may compromise the analysis of that feature.

Regarding the mode of delivery, 41.2% of deaths occurred during the study period, there mothers whose type was cesarean delivery.

It is considered high prevalence of cesárias recorded in the city of Porto Velho, during the period studied.

Moreira et al, (2014), evaluated the cesarean rate in the 2006 to 2010 period, pointed out in his study that the cesarean rate ranged between 35.0% and 47.0% of births.

In Brazil, cesarean section is one of the highest percentages in the world, around 36.4% of hospital births (Victoria et al, 2011).
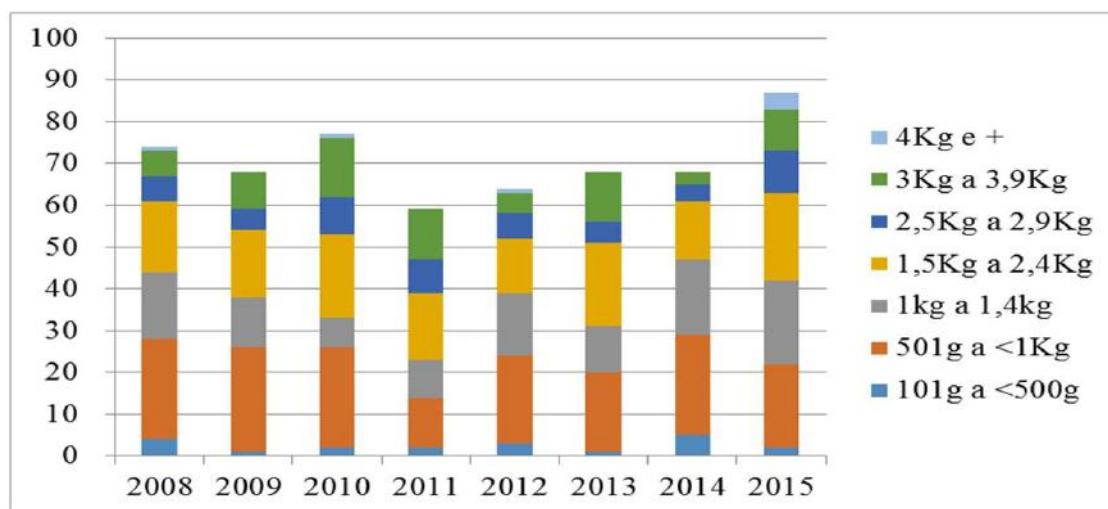

Fig.1: Distribution of neonatal deaths per year in Porto Velho, according to birth weight. Porto Velho, Rondônia, 2016.
Source: Santos et al, 2018.

On the findings regarding sex of the child who died in the neonatal period, Figure 2 below shows that in all the years of the study period, there was a predominance of males. The epidemiological behavior presents an average of 82.7 deaths per year, with a higher prevalence in newborn males (57%).

The sex of the RN showed association with neonatal mortality in this study also was observed by Pereira et

al. (2016) and Gaiva, Fujimori & Sato (2015) found that high risk for male RNs.

According Knupp (2010) compared to female, male newborns have an increased risk of neonatal death among in all weight ranges and gestational age. The author also explains the difference in neonatal mortality between the sexes because boys exhibit a slower global ripening.
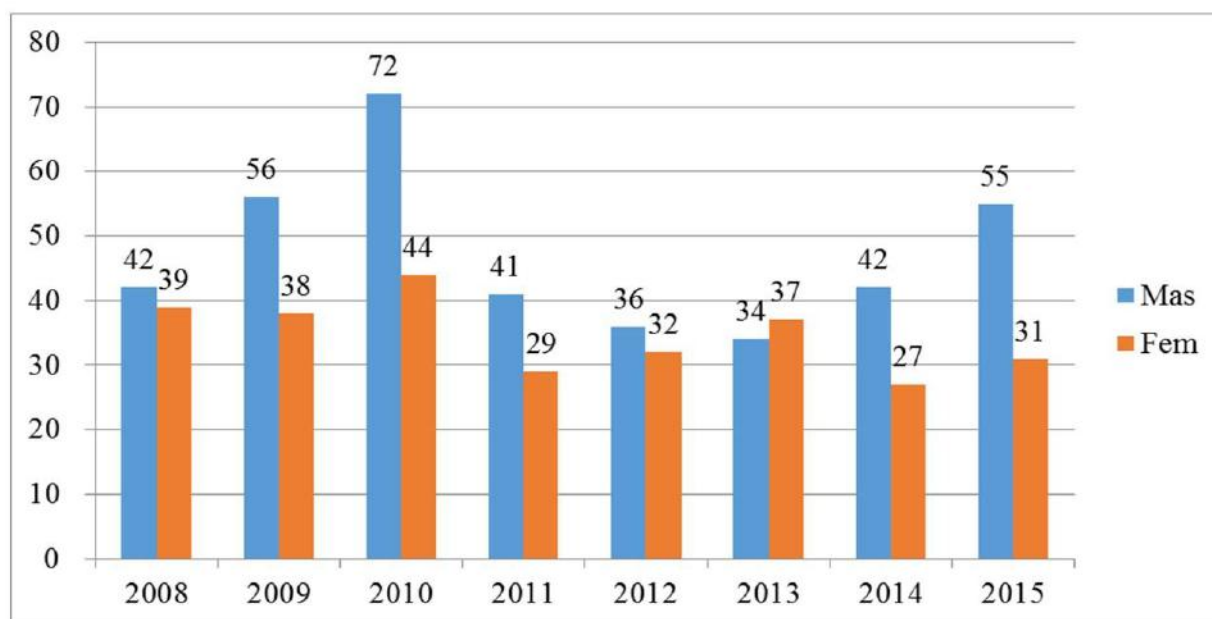

Fig.2: Distribution of children neonatal deaths per year, according to sex of the newborn. Porto Velho, Rondônia, 2016.
Source: Santos et al, 2018.

In this study, the n = 482 neonatal deaths occurred in the period, n = 191 (47.6%) were mothers residing in area neighborhoods east of the city of Porto Velho (Figure 3).

This area of the city comprises 39.5% coverage of the Health Strategy Porto Velho family, with the performance of n = 30 eSF in 06 Basic Health Units of the Family.

This brings us to the thought that these women had some kind of contact with health services or performed some sort of prenatal care.

The neighborhood by death records represent the correlation been reported in other studies, the association between neonatal infant death to local development. The neighborhoods presented the findings point to the discussion about the infrastructure of these geographic areas and existing health services.

This association reflects the nature of multiple determination causes of infant mortality as a strategic indicator for achieving the much desired (but still distant) social development in Brazil. Not surprisingly, the reduction of IMR is one of the goals advocated by Brazil in the context of the Millennium Development Goals, MDGs (WHO, 2005).
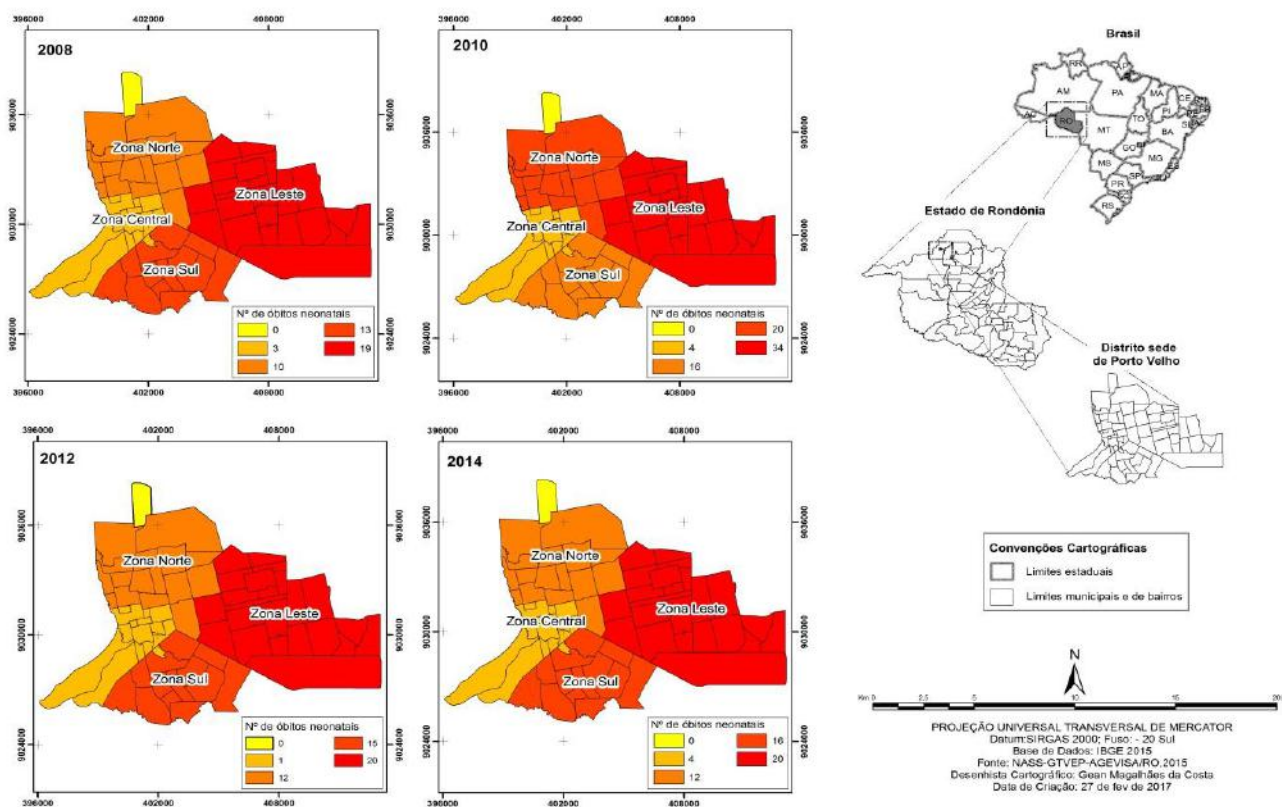

Fig.3: Distribuição espacial dos óbitos neonatal, por ano, segundo bairro de residência da mãe.

In this context, prenatal actions should be offered and carried out under the Basic-AB Attention in Family Health Strategy - ESF. This strategy is structured from the family health unit with multi-professional team, who is responsible for a population bound by it and develops promotion and preventive health care, treatment and rehabilitation of injuries.

The city of Porto Velho currently has 19 primary care services, distributed in four zones (North, East, Central and South), 02 Basic Units without the Family Health Strategy and 17 Basic Units with the Family Health Strategy. Over this period, the city had 61 SF teams with a population coverage of 51% (SEMUSA, 2016).

Among n = 432 recorded deaths, the neighborhoods of the east side got the greatest records of births deaths alive with less than 7 days from preventable causes. The neighborhoods with higher incidence were aponia quarter (22), Socialist quarter (18), Mariana Neighborhood (16); Teixeirão quarter (16) and Barrio San Francisco (15

Source: Santos et al, 2018.).

This aspect points to the need to enter the local territories and identify the details that lead to vulnerabilities that can result in death in children less than year or even variations in the same territory.

From this, Figure 4 shows the geographical distribution in the city of Porto Velho of preventable neonatal deaths. 50.9% (220) of the total cases of deaths in the precocious neonatal period, were by preventable diseases that comprises the group.

In developing countries, more than nine million children die every year before birth and the first week of life as a result of complications during pregnancy. Many of these deaths are preventable. Overall, seven million women are affected by health problems related to pregnancy (YEGO et al., 2013).

In the northern region the impact is even greater by the lack primary health care service coverage and poor quality of the existing ones. According to the Quality Improvement Program of Primary Care (BRAZIL, 2017), the infrastructure of existing services and work processes are responsible for the low quality of care in this area, the discrediting of the front population to primary care model and the great looking to the medium and high complexity services.

Although not an objective of this study, the association made between the deaths in the precocious neonatal period and primary health care coverage area, showed that of the 59 neighborhoods with death records, only 18 (30.5%) are neighborhoods with coverage family health.

Souza and Melo (2013) state that one of the health care indicators that are linked to infant death is the coverage of the Family Health Strategy. This indicator is using as a variable in analyzes on the effects of AB on health conditions in the municipalities. In this respect it is possible to identify whether there was improvement in health indicators in relation to the degree of coverage.

The population coverage of family health teams was also used in other evaluations of the effectiveness of primary care in Brazil (Serra, 2004; PEIXOTO and ROCHA, 2008).

The findings lead us to reflect on the importance of family health coverage strategy and the impact that this cause in infant mortality. Taking into account that the practices developed by the SF teams are mostly focused on maternal and child health, it is clear that these indicators could be lower if there were more family health teams in the territories of the city's neighborhoods.

Neonatal mortality was high in this study, with an average of 83 deaths per 1,000 live births. In this group, the findings even more impressive when one realizes that in the precocious neonatal component (death less than 07 days), showed an increase of the coefficient of 6.4 in 2008 to 9.2 in 2015.
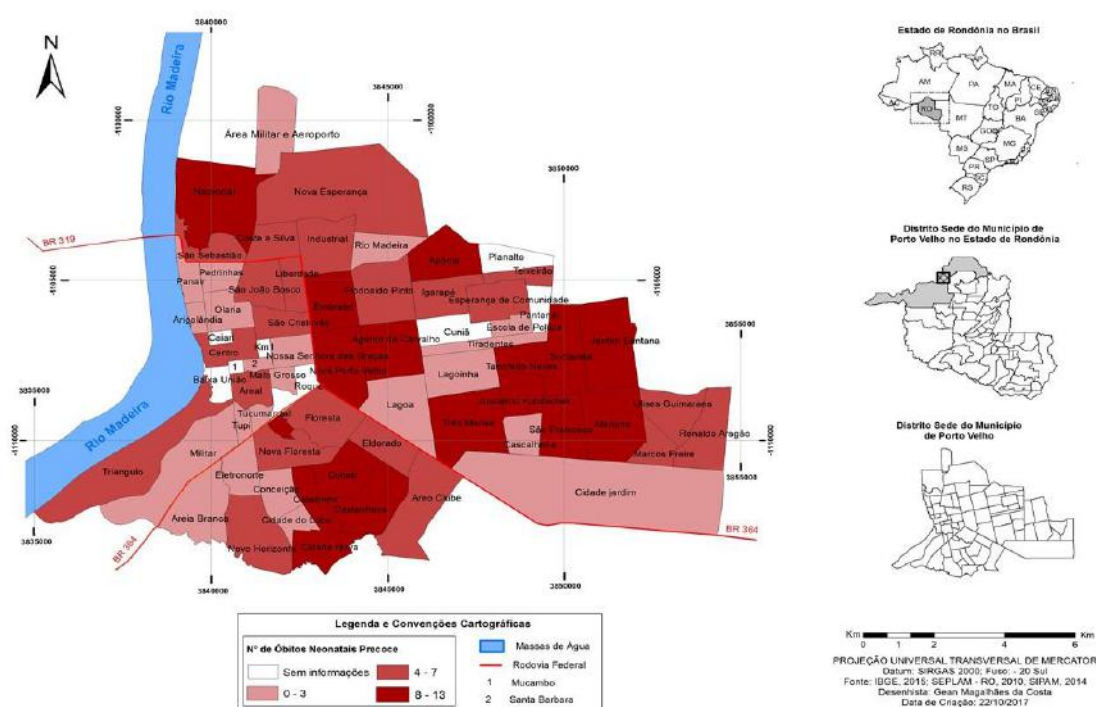

Fig.4: Spatial distribution of precocious neonatal deaths from preventable causes, according to the mother's residence.
Source: Santos et al, 2018.

IV.   CONCLUSION

The spatial distribution of infant deaths in the neonatal component enabled the identification of epidemiological patterns where most of the deaths occurred in this group live births to mothers living in neighborhoods in the eastern part of the city of Porto Velho.

The results presented in this thesis indicate the need for improvement in the quality of information available on the

SIM for both neonatal deaths as precocious neonatal, and no major discrepancies between the dead and live births in the context of death in the perinatal period.

No entanto, a proporção de ausência de informação em campos referentes à escolaridade materna e antecedentes obstétricos, por exemplo, bem como a discordância e variabilidade para o campo duração da gestação, evidenciam a necessidade de sensibilização e capacitação continuada de toda equipe envolvida no fluxo da DO, desde seu preenchimento nas unidades assistências de saúde até a entrada dos dados no sistema de informação da secretaria de saúde, bem como dos gestores.

Another point to be discussed is the need for constant strengthening of infant mortality prevention committee and fetal development, especially regarding the death investigation, given the opportunity to enter or change information in the revised system. Despite the completeness of almost 96% found in the "underlying cause of death" between the perinatal deaths, the reliability evaluation or validation of the information contained in this field is not included in this thesis, therefore, additional studies to examine this information can help SIM qualification as a reliable tool for assessing perinatal deaths.

Since the precocious neonatal deaths occur in the 1st week of life, it is suggested the need to restructure the Stork municipal network, with investment in care for pregnant women and newborns. In addition, the network coverage expansion of maternal and child care, redefinition of geographical and population criteria to facilitate the access of pregnant women, mothers and newborns to this loca network will contribute to the improvement of indicators.

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