Infant Mortality in the Belize District from 2016 to 2018

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Abstract
Infant mortality has been internationally defined as the number of deaths that occur in a pediatric population during the first year of life. It represents the death risk for children under one year of age. **Materials and Methods** A retrospective descriptive epidemiological study was conducted in order to analyze the behavior of infant mortality in the district of Belize during the period from January 1, 2016 to December 31, 2018. The study population included all the deceased children less than one year of age during the study period in the Belize District territory per 1000 live births. **Results** The infant mortality rate showed an irregular trend; the lowest rate was observed in 2018, with 19 deaths for a rate of 10.3 per 1000 live births. Male sex prevailed with 59.09%. The highest number of infant deaths occurred in the group of mothers aged 20–24 years, 28.4%. The highest death risk was found in the early neonatal group with 45 deaths for a rate of 8.4 per 1000 live births. **Conclusions** Infant mortality rates in the Belize District showed an irregular trend, with the lowest mortality rate observed in 2018, 19 deaths for a rate of 10.3 per 1000. Most deceased children had mothers in the 20–24 age group, 28.4%. Infants weighing less than 1000 grams showed the highest death risk. Perinatal conditions were the main cause of death, among which respiratory distress is the leading one.

Keywords
Infant mortality, infant mortality rate, causes of death

■ INTRODUCTION

Infant mortality has been internationally defined as the number of deaths that occur in a pediatric population during the first year of life. It represents the death risk of children less than one year of age.(1) The infant mortality rate is the number of infant deaths for every 1000 live births.(2,3) In addition to giving us key information about maternal and infant health, the infant mortality rate is an important marker of the overall health of a society. It has three components: early neonatal mortality, late neonatal mortality and post-neonatal mortality. Early neonatal mortality includes deaths in children aged 0 to 6 days with respect to the population (live births) and is expressed per 1000 live births. It is the infant mortality component, in which it is most difficult to reduce morbidity and mortality.

Late neonatal mortality includes deaths that occur in children aged 7 to 27 days, referred to the population of live births and expressed by 1000. This component is greatly influenced by mortality due to infections in the neonatology services. The main causes of death are due to congenital anomalies, anoxia, neonatal respiratory depression and obstetric traumas that exceed 6 days and by infections in cribs and neonatology services.

Post-neonatal mortality records the deaths that occur in children aged 28 days to 11 months and 29 days old, referred to the population of live births and by 1000 live births. It is closely linked with mortality for acute respiratory diseases and sepsis, mainly in those children that have a marked low nutritional substrate.(3,4)

The main causes of death are due to conditions originating in the perinatal period, congenital malformations are in the second place, followed by respiratory diseases. Each year, 2.6 million children die with less than one month of life. A million of them die on the same day of birth.(1) Adequate

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Prenatal Care is an important predictor of maternal and fetal health.(5,6) Approximately 3 million newborns in the world die during the first month of life. One million of those deaths occur within 24 hours of birth.(1) The World Health Organization (WHO) notes that the main sources of infant mortality in the world are neonatal conditions. In this period, which goes from birth to the first 27 days of life, congenital conditions and others, related to the mother's lack of care during pregnancy or childbirth, or the child's first days of life notably affect mortality.(7)

Our general objectives were to analyze the behavior of infant mortality in the Belize District during the period from January 1, 2016 to December 31, 2018. The specific aims were to determine infant mortality rates by year during the period studied; to determine mortality distribution with respect to the age of the mother, to the gestational age and birth weight; to determine the distribution of mortality by sex and age groups and to identify the main causes of mortality.

■ MATERIALS AND METHODS
A retrospective descriptive epidemiological study was conducted in order to analyze the behavior of infant mortality in the District of Belize during the period from January 1, 2016 to December 31, 2018. The source of information were the birth statistics and infant mortality data recorded by the Belize Health Statistical System, Belize Health Information System (BHIS). The population included all the deceased children less than one year of age, registered during the study period, whose mothers lived in the area of the Belize District territory. Considering the moment in which death occurs, the age groups were: neonatal (up to 27 days), which includes early neonatal mortality (up to 7 days) and late neonatal mortality (from 8 to 27 days) and post-neonatal (28 days to 11 months and 29 days). The infant mortality rate was calculated as the number of deaths of children less than one year old in a given time period for every 1000 live births in the same period. Subsequently, infant mortality was separated by birth weight into three major groups: extreme immaturity, less than 1000 grams, low birth weight (LBW), from 1000 to 2499 grams and normal weight 2500 grams and more. Finally, the causes of death were analyzed, for which, the definition of infant mortality and its components proposed by the Ministry of Health of Belize in accordance with the World Health Organization (WHO) criteria was adopted. The description of death causes was made taking into account the basic cause that triggered the event in the infant less than one year old. Tables were made that showed the comparative analysis of the 3-year study results; conclusions and recommendations were made. Descriptive statistics was the method used for analysis.

The present study is justified considering that infant mortality is an important indicator for national health systems worldwide. Different studies clearly show that maternal and perinatal morbidity and mortality are concentrated in high risk population groups, which must be identified before complications occur. Therefore, we suggest that the results of this study could contribute with planned actions to eliminate preventable risk factors and consequently reduce infant mortality rates in Belize

■ RESULTS AND DISCUSSION
The results presented in Table 1 show infant mortality rates by years. In the Belize District, 88 deaths occurred. There were 32 deaths in 2016 for an 18.8 mortality rate. The highest mortality rate occurred in 2017 with 37 deaths for a 20.3 mortality rate. The lowest mortality rate was observed in 2018 with 19 deceased children and 10.3 mortality rate. Table 2 shows infant mortality distribution with respect to mother's age. When analyzing these figures, we observe

Table 1. Infant mortality rate by years, Belize District, 2016 - 2018

Year	Live births	Deaths	Rate
2016	1697	32	10.8
2017	1825	37	20.3
2018	1843	19	10.3

Source: BIHS

that there were 11 deaths in the group of mothers aged 15–19 years for 12.5 % of the total deaths. The highest infant mortality was found in the group of mothers aged 20–24 years, 25 for 28.4 % of the deceased.
A total of 36 cases were extremely premature with less than 30 weeks of gestational age, contributing to the highest
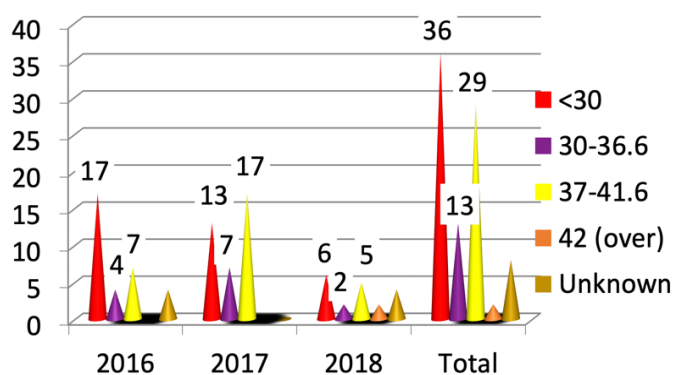
Table 2. Infant mortality distribution according to the age of the mothers, 2016 - 2018

| Age of the mother	2016		2017		2018		Total	
	No.	%	No.	%	No.	%	No.	%
15-19	2	6.2	6	16.2	3	15.8	11	12.5
20-24	12	37.5	7	18.9	6	31.6	25	28.4
25-29	7	21.9	9	24.3	3	15.8	19	21.6
30-34	6	18.8	10	27.1	2	10.5	18	20.5
≥35	3	9.4	5	13.5	4	21.1	12	13.6
Unknown	2	6.2	0	0	1	5.3	3	3.4
Total	32	100	37	100	19	100	88	100

Source: BIHS

mortality. It was followed by the group of 37 to 41.6 weeks of gestational age with 29 deaths. Except in 2017, in the other two years, most of the deceased were preterm neonates.

The sex of the deceased children was analyzed, and male sex predominated during the 3 years studied. Fernández Cantón points out that the distribution of child deaths by sex has remained stable. There is a notable male

Source: BHIS

Graphic 1. Distribution of infant mortality according
to gestational age by studied year, Belize District, 2016-2018
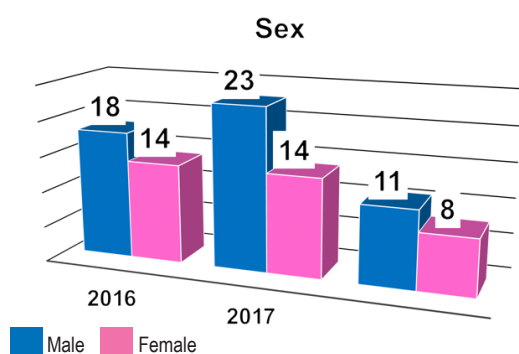
Source: BHIS

Graphic 2. Distribution of infant mortality by sex,
Belize District, 2016-2018

predominance, which constitutes a universal behavior, 56% of the deceased were boys vs. 44%, girls.(13)

The investigation reveals that 36.4% children had a birth weight of less than 1000 grams (Table 3). Low birth weight (LBW) is the most important predictive index of infant mortality because it is associated with increased risk of mortality, and prenatal care is a key factor in preventing preterm births and very low birth weight babies. Premature

Table 3. Distribution of infant mortality according
to birth weight by years, Belize District, 2016 - 2018

Birth weight (grams)	2016		2017		2018		Total	
	No.	%	No.	%	No.	%	No.	%
<1000	14	43.8	10	27	8	42.1	32	36.4
1000-2499	8	25	9	24.3	3	15.8	20	22.7
2500-3999	6	18.7	14	37.8	5	26.3	25	28.4
≥4000	1	3.1	1	2.7	1	5.3	3	3.4
Unknown	3	9.4	3	8.2	2	10.5	8	9.1
Total	32	100	37	100	19	100	88	100

Source: BIHS

birth is the biggest contributor to the Infant Mortality Rate (IMR).(14) Worldwide it is estimated that 1 in 6 children is born with low weight. One out of every 5 children born in developing countries has a weight of less than 2500g. Latin American and Caribbean countries present more favorable figures with 1 out of 10.(15) The reduction of low birth weight is an important contribution to the Millennium Development Goal of reducing child mortality.

Infant mortality rate analyzed by age group (Table 4) shows that cases from the early neonatal group (45) have the highest risk of death, with a rate of 8.4 per 1000 live births. In agreement with other authors, the early neonatal group is where the highest number of deaths occurred and, as known, where reduction is most difficult. These deaths are also related to perinatal and childbirth care.(16,17,18)

Table 4. Infant mortality rate by age group, Belize District, 2016 - 2018

Age group	2016		2017		2018		Total	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
I. Early neonatal (0-6 days)	21	12.4	17	9.3	7	3.8	45	8.4
II. Late neonatal (7-27 days)	5	2.9	5	2.7	3	1.6	13	2.4
III. Post neonatal (28-364 days)	6	3.5	15	8.2	9	4.9	30	5.6

Source: BIHS

Distribution of infant mortality regarding its main causes shows that respiratory distress, congenital malformations, prematurity and neonatal asphyxia represent the leading causes of death. The results presented in this paper suggest that a substantial part of these deaths could be prevented. Other investigations reveal that the main causes of death reported in children less than one year of age during the last years were perinatal diseases and congenital malformations with the disappearance of infectious and acute diarrheal diseases among these causes.(1) UNICEF, WHO and the World Bank reported that the leading causes of death among children less than five years-old in 2017 were preterm birth complications, acute respiratory infections, intrapartum-related complications, congenital anomalies and diarrhea.(20)

■ CONCLUSIONS

Infant mortality rates in the Belize District showed an irregular trend, with the lowest mortality rate observed in 2018. The highest mortality was found for children of mothers in the 20–24 years group. The highest number of deaths corresponded to boys. Regarding weight, children weighing less than 1000 grams are at highest death risk. The highest risk by child age was found in the early neonatal group. Most deaths are due to preterm births. Perinatal conditions are the main cause of death, among which respiratory distress is the leading condition.

Table 5. Distribution of infant mortality according to the main causes of death, Belize District, 2016 - 2018

Causes of death	2016		2017		2018		Total	
	No.	%	No.	%	No.	%	No.	%
Respiratory distress	15	46.9	7	18.9	2	10.5	24	27.3
Congenital malformations	6	18.7	7	18.9	5	26.3	18	20.4
Prematurity	0	0	6	16.2	4	21	10	11.4
Neonatal asphyxia	4	12.5	4	10.8	2	10.5	10	11.4
Pneumonia and bronchoneumonia	2	6.3	3	8.1	3	15.8	8	9.1
Sepsis	0	0	6	16.2	1	5.3	7	7.9
Sudden death syndrome	0	0	3	8.1	1	5.3	4	4.5
Accident	1	3.1	1	2.8	1	5.3	3	3.5
Other	4	12.5	0	0	0	0	4	4.5
Total	32	100	37	100	19	100	88	100

Source: BIHS

■ RECOMMENDATIONS
• Support the integration of delivery services to address the preventable causes of infant death.
• Raise the health education level of the population to improve maternal and perinatal health.
• Improve primary care strategies and interventions to prevent congenital diseases and improve diagnosis of congenital malformations quantitatively and qualitatively.
• Improve the quality of skilled care during labor and delivery.

Mortalidad infantil en el Distrito de Belice de 2016 a 2018

Resumen

La mortalidad infantil se ha definido internacionalmente como el número de muertes que ocurren en una población pediátrica durante su primer año de vida. Representa el riesgo de morir de niños menores de un año. El objetivo es analizar el comportamiento de la mortalidad infantil en el Distrito de Belice durante el período del 1 de enero de 2016 al 31 de diciembre de 2018. **Métodos** Se realizó un estudio epidemiológico descriptivo retrospectivo para analizar el comportamiento de la mortalidad infantil en el distrito de Belice durante el período comprendido entre el 1 de enero de 2016 y el 31 de diciembre de 2018. La población del estudio incluyó todos niños menores de un año de edad fallecidos, registrados durante el período de estudio, dentro del territorio del distrito de Belice. **Resultados** La tasa de mortalidad infantil mostró una tendencia irregular; la menor tasa se observó en 2018, con 19 muertes para una tasa de 10,3 por 1000 nacidos vivos. Predominó el sexo masculino con 59.09%. El mayor número de muertes infantiles ocurrió en el grupo de madres entre 20 y 24 años,28.4% del total. El mayor riesgo de muerte se encontró en el grupo neonatal temprano con 45 muertes para una tasa de 8,4 por 1000 nacidos vivos. **Conclusiones** Las tasas de mortalidad infantil en el Distrito de Belice tienen una tendencia irregular, con la tasa de mortalidad más baja observada en 2018, 19 fallecidos para una tasa de 10,23 por 1000. Los niños que pesaron menos de 1000 gramos tenían el mayor riesgo de muerte. Las condiciones perinatales fueron la principal causa de muerte, de las cuales la dificultad respiratoria se destaca como la principal.

Palabras clave

Mortalidad infantil, tasa de mortalidad infantil, causas de muerte

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