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Analysis of Infant Mortality in Three Hospitals in the Eastern Democratic Republic of the Congo

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Abstract

Background: Infant mortality refers to deaths that affect children during their first year of life per 1,000 live births. It is composed of early neonatal mortality (0-7 days of birth), late neonatal mortality (8-27 days) and post-neonatal mortality (28-365 days). The objective of this study was to determine the prevalence and associated risk factors of infant mortality in Butembo, Democratic Republic of the Congo.

Methods: This was a retrospective study carried out from January 2015 to December 2016 in 3 Congolese hospitals (Cliniques Universitaires du Graben (CUG), Matanda Hospital and Kitatumba General Referral Hospital) on 8033 children.

Results: The prevalence of infant mortality was 14.31‰. A child under one year hospitalized at CUG has 6.66 times the risk of death than those hospitalized at other hospitals. Age <7 days, male sex, weight <2499 grams, history of hospitalization during pregnancy, less than 4 sessions of antenatal care, APGAR score <7, dystocic delivery, irregularities in immunization schedule, pathologies such as HIV/AIDS, acute respiratory infection, prematurity, and neonatal infections were the risk factors contributing to infant mortality.

Conclusion: Actions aiming to reduce the occurrence of risk factors should be done in order to get the possible lowest prevalence of infant mortality.

Introduction

Infant mortality is the number of deaths of infants under one-year old per 1,000 live births in a given period. It consists of a death of an infant before his or her first birthday [1-5]. This is one of the parameters which reflect the health of a given population [2,3]. Infant mortality is composed of early neonatal mortality (0-7 days from birth), late neonatal mortality (8-27 days) and post-neonatal mortality (28-365 days) [1,2].

The World Health Organization (WHO) estimates that 46% of all under 5 child deaths were among newborn infants, babies in the neonatal period(0-28 days old), and among them, 2.6 million died in their first month of life. [4,6].

In sub-Saharan Africa, the average infant mortality rate is 92.2 per 1,000 live births and 10% of children born in this region die before the first year of life. The major causes of infant mortality in sub-Saharan Africa are, in order of importance, neonatal causes (26%), child pneumonia (21%), malaria (18%), diarrhea (16%), HIV/AIDS (6%), measles (5%) and accidents (2%) [7].

The Democratic Republic of the Congo is not spared from this issue. According to the United Nation Children's Fund (UNICEF) report, 80% of child deaths occur in five countries, and the Democratic Republic of the Congo is the fifth one [8]. The majority of newborn deaths occur in countries with low income, and this is due to the fact that health care access is low [6]. The insecurity generated by armed groups in the eastern part of the country has forced people to instability. Housing conditions are difficult (no water, no medical care, insufficient nutrition) [9]. Children under one year pay a heavy price, exposing them to a high infant mortality rate [8,9].

Based on the magnitude of the consequences of infant mortality on the population and on the future of a country, the issue is a real public health problem and requires further studies at the local or regional level, especially in Butembo which is one of the Eastern DRC cities which is experiencing a growing insecurity. Therefore, this study aims to determine the prevalence and associated risk factors of infant mortality in Butembo.

Methodology

This was a retrospective study carried out from January 2015 to December 2016 in 3 hospitals (Cliniques Universitaires du Graben (CUG), Matanda Hospital and Kitatumba General Referral Hospital)

on 8033 children. The three hospitals are located in Butembo, Eastern DRC.

Our sample was exhaustive including all children who were aged of equal or less than one year, alive or deceased, having been hospitalized in the paediatric or neonatal unit of the hospitals mentioned above, and whose health files were found and well completed. Thus, 8033 children were screened.

The following parameters were analysed: individual characteristics of the child (including the age, sex and weight), past medical history (including the antenatal, perianal and postnatal cares and the diseases contracted by the child).

Data were processed and analysed using the Epi-Info software, version 3.5.4. The odds ratio (OR) test was used and P-value ≤0.05 was considered significant at a confident interval of 95%.

This study did not have an ethical problem. An ethical clearance was obtained from the local research ethics committee of the Faculty of Medicine at the Université Catholique du Graben. The study was conducted following the principles of the Declaration of Helsinki.

Results

Out of the 8033 children screened, the overall prevalence of infant mortality in Butembo is 14.31‰ (Table 1). The CUG shows a high rate (50.49‰) of infant mortality (Table 2). The early neonatal mortality is 20.66‰ and the late neonatal mortality is 6.95‰ and the males are more concerned (22.17‰) than females (9.10‰) (Table 3). Children with low birth weight increase have a high rate mortality, respectively 96.15‰, 38.83‰ and 22.29‰ for children of a weight <1000 grammes, in between 1000 and 1499, and in between 1500-2499 grammes (Table 3). Regarding relation between the past history and the infant mortality, the mothers of 34.23‰ of children dead had hospitalization during their pregnancy, mothers of 32.63‰ children had less than 4 cessions of prenatal consultation, 28.69‰ children had a low (<7) score of APGAR, 20.80‰ children were bone by dystocic delivery and 57.72‰ followed irregularly the immunization program (Table 4). The most frequent pathologies responsible for infant mortality are respiratory infections (25.11‰), prematurity (24‰) and neonatal sepsis (23.31‰) (Table 4).

Study sites	n	Cases of Infant mortality	Rate (‰)	O.R	95%CI Lim<	95%CI Lim>	P-value
CUG	1209	61	50.49	6.66	4.52	9.82	0
Matanda	3880	18	4.63	0.19	0.11	0.33	
Kitatumba	2944	36	12.22	0.79	0.52	1.19	
Total	8033	115	14.31				

Table 2: Study sites and infant mortality.

Variables	n (N=8033)	Cases of Infant mortality (n=155)	Rate (‰)	O.R	95%IC Lim<	95%IC Lim>	P-value
Age (days)							
0-7	2807	58	20.66	1.91	1.3	2.81	0
8-27	2013	14	6.95	0.41	O.22	0.74	
28-365	3213	43	13.38	O.89	O.60	1.33	
Sex							
Male	3202	71	22.17	2.47	1.66	3.67	0
Female	4831	44	9.1	0.41	0.27	O.60	
Weight (in grams)							
<1000	52	5	96.15	7.61	2.61	20.45	0
1000-1499	412	16	38.83	3.07	1.73	5.39	0
15OO-2499	1256	28	22.29	1.75	1.11	2.75	0.01
2500-4000	396O	35	8.83	0.45	0.29	0.67	
>4000	2353	31	13.17	0.88	0.57	1.35	

Table 3: Individual characteristics of the infants dead.

Year	Total population	Cases of Infant mortality	Rate (‰)
2015	4163	54	12.97
2O16	3870	61	15.76
Total	8033	115	14.31

Table 1: Prevalence of infant mortality.

Variables	n (N=8033)	Cases of Infant mortality (n=155)	Rate ()	O.R	95%IC Lim<	95%IC Lim>	P-value
Hospitalization during pregnancy							
Yes	1986	68	34.23	4.53	3.06	6.7	0.00
No	6O47	47	7.77	0.22	0.15	0.33	
Number of Antenatal care sessions							

<4	2513	82	32.63	5.61	3.67	8.6	0.00
≥4	5520	33	5.97	0.18	0.12	0.27	
Apgar score							
<7	2300	66	28.69	3.43	2.32	5.06	0.00
≥7	5733	49	8.54	0.29	0.2	0.43	
Mode of delivery							
Dystocic	2500	52	20.8	1.84	1.25	2.71	0.00
Eutocic	5533	63	11.38	0.54	0.37	0.8	
Immunization schedule of the child							
Irregular	1O22	59	57.72	7.61	5.16	11.22	0.00
Regular	7011	56	7.98	0.13	0.09	0.19	
Pathologies of the child							
HIV/AIDS	20	5	250	23.47	7.47	71.9	0.00
Respiratory infection	2270	57	25.11	2.53	1.72	3.72	0.00
Prematurity	1000	24	24	1.84	1.14	2.95	0.01
Neonatal infection	815	19	23.31	1.77	1.04	2.98	0.03
Other	3928	10	2.54	0.1	0.05	0.19	

Table 4: Past history and infant mortality.

Discussion

From Table 1 it can be seen that out of the 8033 children aged of 0 to 1 year hospitalized at the Cliniques Universitaires du Graben, Kitatumba and Matanda hospitals, 115 children died. Thus, the infant mortality prevalence is 14.31‰. This prevalence is low than the one found in Algeria by Bchir, et al. (25.2‰) [10], it is also low than the mean infant mortality rate in the sub-Sahara African region (92.2 deaths per 1,000 live births) [7]. However, it is high than the infant mortality rate of the USA (5.9 deaths per 1,000 live births) [11]. There are large inequities in child across and within countries. The highest rate is seen in Asia and sub-Saharan countries [4,6]. According to the UNICEF, a child who was born in Sierra Leone run 30 times more risks to die before his fifth birthday than the one who was born in the United Kingdom [8]. The WHO justifies these inequities by the fact that in developing countries, the health care access is low [6].

It appears that a child under one year hospitalized at CUG runs 6.66 times the risk of infant mortality. This risk is statistically significant (P<0.05) comparing to the two other hospitals.

CUG is a tertiary referral medical structure for all hospitals in the city. In addition, the lateness of transferring patients may explain the high infant mortality in this hospital

Infants under seven days have 1.91 times the risk of dying. This risk is statistically significant (P<0.05). Male children are 2.47 times more likely to die and weighing less than 2499 grams increases by 1.75 times the risk of infant mortality.

According to Ravaoavarisoa, et al., in their study on the determinants of early neonatal mortality in the Befelatanana maternity ward in Antananarivo, an age <7 days, Apgar score less than 7 and weight <1500 g increased the risk of infant mortality. Thus, the deaths of male children accounted for 29.3% (173 deaths out of 150 male newborns) compared to 27.1% (138 deaths out of 210 female newborns) for females. Meanwhile, according to their findings, the gender has no significant influence on the neonatal mortality [12]. Katamea, et al. found that male sex was strongly associated with neonatal mortality in Lubumbashi, in the Democratic Republic of the Congo [13]. McCormick found in 1985 that low-birth-weight infants run more risk of mortality than the infant with normal weight at birth [14]. the effects of birth weight and gender on neonatal mortality in north central Nigeria found that the birth weight specific mortality rate was 126 per 1000 for the preterm low birth weight and 5 per 1000 for the term babies [15], and García-Basteiro, et al. in Southern Mozambique found that neonatal and infant mortality rates are remarkably high among preterm babies in the aforesaid region. [16]. All these studies are close to our findings according to which age under seven days, male sex and low birth weights are risk factors for infant mortality.

Children whose mothers had had episodes of hospitalization during pregnancy were 4.53 times the risk of infant mortality. Similarly, those whose mothers had completed less than 4 sessions of the antenatal care were at 5.61 times the risk of infant mortality. Ravaoavarisoa, et al. found that a non or insufficient participation of pregnant women to antenatal care consultation is associated with a high rate of neonatal mortality [12]. According to the WHO; skilled health care during pregnancy, childbirth and in the postnatal period lead to a prevention of complications of pregnancy for the mother and her new-born [6].

The APGAR score <7 and the dystocic delivery mode by caesarean section or not successively multiplied the risk of infant mortality by 3.43 and 1.84. The relationship between low APGAR score and neonatal and infant death has been also demonstrated by Stamatina, et al. in 2014 [17], and Ravaoavarisoa, et al. noticed that an APGAR score under 7 increases to 2 times the risk of early neonatal mortality [12].

Children who had irregularities in the immunization schedule were 7.16 times exposed to the risk of infant mortality. In fact, vaccines have a primordial role in the prevention of diseases.

Infants suffering from HIV/AIDS, respiratory infections, prematurity and neonatal infections successively run 23.47; 2.53; 1.84 and 1.77 times the risk of infant mortality. These findings are different from what is seen in sub-Sahara African region, where causes of infant mortality are neonatal causes (26%), child pneumonia (21%), malaria (18%), diarrhoea (16%), HIV/AIDS (6%), measles (5%) and accidents (2%). But, there are differences between countries [7]. Studies conducted at the Hanoi gynaecology and obstetrics hospital in Vietnam by Haoan, et al. report that, early neonatal mortality is due to preterm complications first. Their findings are different from ours as they considered only the early neonatal period [18].

Conclusion

The infant mortality prevalence in Butembo is 14.31‰. Factors incriminated in the occurrence of the infant mortality are the age ≤7 days, the male sex and the weight <2499 grams at birth, the history of hospitalization during pregnancy, the number of antenatal care session <4, the Apgar score <7, the dystocic delivery mode, the irregularity of children in the immunization schedule increased the risk of infant mortality. HIV/AIDS, respiratory infections, prematurity and neonatal infections are responsible for infant mortality in Butembo. Thus, actions aiming to reduce the occurrence of these risk factors should be done in order to get the possible lowest prevalence of infant mortality.

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References

1. Barbieri M, Catteau C. (2003) L'évolution de la mortalité infantile à la Réunion depuis cinquante ans. Population-F 58 : 229-252.

2. Institut de la statistique du Québec. Taux de mortinatalité, mortalité périnatale, néonatale et infantile, Québec et régions administratives, 2009-2013.

3. http://campus.cerimes.fr/media/campus/deploiement/pediatrie/enseignement/suivi_medical/site/html/4.html

4. United Nations Inter-agency Group for Child Mortality Estimation (UNIGME) (2017) Levels and Trends in Child Mortality: Report 2017. United Nations Children's Fund, New York.

5. INED (2014) La mortalité infantile dans le monde.

6. http://www.who.int/mediacentre/factsheets/fs178/en/

7. Viguera EP, Torres A, Freire JM, Hernandez V, Gil A (2011) Factors associated to infant mortality in Sub-Saharan Africa. Journal of Public Health in Africa 2: e27.

8. UNICEF (2016) la situation des enfants dans le monde 2016. L'égalité des chances pour chaque enfant. Juin.

9. Lindskog EE (2016) The effect of war on infant mortality in the Democratic Republic of Congo. BMC Public Health 16: 1059.

10. Bchir A, Soltani MS, Mtiraoui A (1997) Etude des causes de la mortalité infantile en bas-âge dans le gouvernorat de Monastir. Institut de recherches et d'études sur le monde arabe et musilman. Pp : 43-48.

11. http://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm

12. Ravaoarisoa L, Tang Toy MA, Rokotonirina El-CJ, Raobijaona HS, Rakotomanga JDM (2014) Déterminants de la mortalité néonatale précoce dans la maternité de Befelatanana, Antananarivo. Revue Anestheste-Réanimation ET DE Médecine Urgences 6: 1-4.

13. Katamea T, Mukuku O, Kamona L, Mukelenge K, Mbula O, et al. (2014) Facteurs de risque de la mortalité chez les nouveaux-nés transférés au service de néonatologie de l'Hôpital Jason Sendwe de Lubumbashi, République Démocratique du Congo. Pan Afr Med J 19: 169.

14. McCormick MC (1985) The contribution of low birth weight to infant mortality and childhood morbidity. N Engl J Med 312: 82-90.

15. Onwuanaku CA, Okolo SN, Ige KO, Okpe SE, Toma BO (2011) The effects of birth weight and gender on neonatal mortality in north central Nigeria. BMC Res Notes 4: 562.

16. García-Basteiro AL, Quintó L, Macete E, Bardají A, González R et al. (2017) Infant mortality and morbidity associated with preterm and small-for-gestational-age births in Southern Mozambique: A retrospective cohort study. PLoS ONE.

17. Stamatina IP, Mackay DF, Gordon Smith CS, Pell JP, Scott MN (2014) Apgar score and the risk of cause-specific infant mortality: a population-based cohort study. The Lancet 384: 1749-1755.

18. Thi Han P, Bao TV, Phong DN, Huong NT, Lazare M, et al. (2000) Mortalité néonatale précoce à l'Hôpital de gynécologie-obstétrique de Hanoï, Vietnam. Bull Soc Pathol Exot 93: 62-65.