

## Research Article

*Journal of Clinical Pediatrics and Child Care Research***Mortality in the Pediatric Emergency Department of the Mother and Child Academic Hospital in N'djamena****Youssef Djidita Hagre<sup>1\*</sup>, Joséphine Toralta<sup>1</sup>, Douna Granga Daouya<sup>1</sup>, Acherif H Zagalo<sup>2</sup>, Ousmane K Ildjima<sup>1</sup>, Ahmed Moussa Tidjani<sup>1</sup> and Georges Moyen<sup>3</sup>**<sup>1</sup>The Mother and Child Academic Hospital, N' Djamena, Chad<sup>2</sup>Hospital of Peace Farcha, N'Djamena, Chad<sup>3</sup>Brazaville Academic Hospital, Brazaville, Congo**\*Corresponding Author**

Youssef Djidita Hagre, The Mother And Child Academic Hospital, N' Djamena, Chad.

**Submitted:** 2023, Sep 11; **Accepted:** 2023, Oct 25; **Published:** 2023, Nov 10**Citation:** Hagre, Y. D., Toralta, J., Daouya, D. G., Zagalo, A. H., Ildjima, O. K., et al. (2023). Mortality in the Pediatric Emergency Department of the Mother and Child Academic Hospital in N'djamena. *J Cli Ped Chi Res*, 4(1), 39-44.**Abstract****Background:** Child mortality is a significant concern for healthcare systems in developing countries.**Objective:** To contribute to reducing mortality in the Paediatric Emergency Department of the Mother and Child Academic Hospital in N'Djamena.**Methods:** A cross-sectional analytical study was conducted between June 2019 and May 2020. Children aged one month to fifteen years hospitalised were the study population. Those who died were included. The variables studied were age, sex, and parents' socio-economic and educational level, time to consultation and access to care, length of hospitalisation, symptoms on admission, history, diagnosis, treatment and outcome. The statistical test used was the KHI2**Results:** Of 13972 hospitalised children aged between 1 month and 15 years, 362 (3.44%) died. The children were 56.4% boys (n=204) and 43.6% girls (n=158), with a sex ratio 1.29 and an average age of 24 months. Five-year-olds accounted for 71% (n=257). They were from urban areas, 83.7% (n=303) and of low socio-economic status 57.6% (n=171). Deaths occurred during on-call hours (night shift) 63.8% (n= 231) and within 24 hours 66.5% (n= 241). Malaria 37.1% (n= 43), acute respiratory infections 25% (n= 29) and severe acute malnutrition 12.9% (n= 15) were the causes of death. Impaired general condition, respiratory distress, grade II coma, severe anaemia and lack of blood transfusion were associated with death.**Conclusion:** Mortality is still high, often due to preventable diseases, and we need to step up communication to change behaviour. Primary prevention involves improving people's living conditions.**Keywords:** Mortality, Children, Pediatric Emergencies, Associated Factors**1. Introduction**

The death of a child, the result of morbid process that is not, or is poorly controlled, is a social drama. Despite the efforts to reduce infant mortality, it remains a concern for health system in developing countries. There are 5.2 million deaths of children under-5 every year, and 15 000 children die every day worldwide. That is 10 children every minute, 46% of them in Sub-Saharan Africa, according to the United Nations' global estimates for 2020 [1]. Over half of these deaths are preventable and can be treated with simple, low-cost interventions. The leading causes of mortality in children

under-5, well-known in Africa, are prematurity, perinatal asphyxia, neonatal infections, pneumonia, diarrhoea and malaria [2].

In Chad, according to the 2019 MICS6-CHAD DHS, the infant mortality rate fell from 106‰ in 2010 to 78 ‰ in 2019 and the under-5 mortality rate from 191‰ in 2004 to 122 ‰ in 2019 [3]. These rates, among the highest in the sub-region, are risk compromising achieving the third Sustainable Development Goal (SDG) [4].

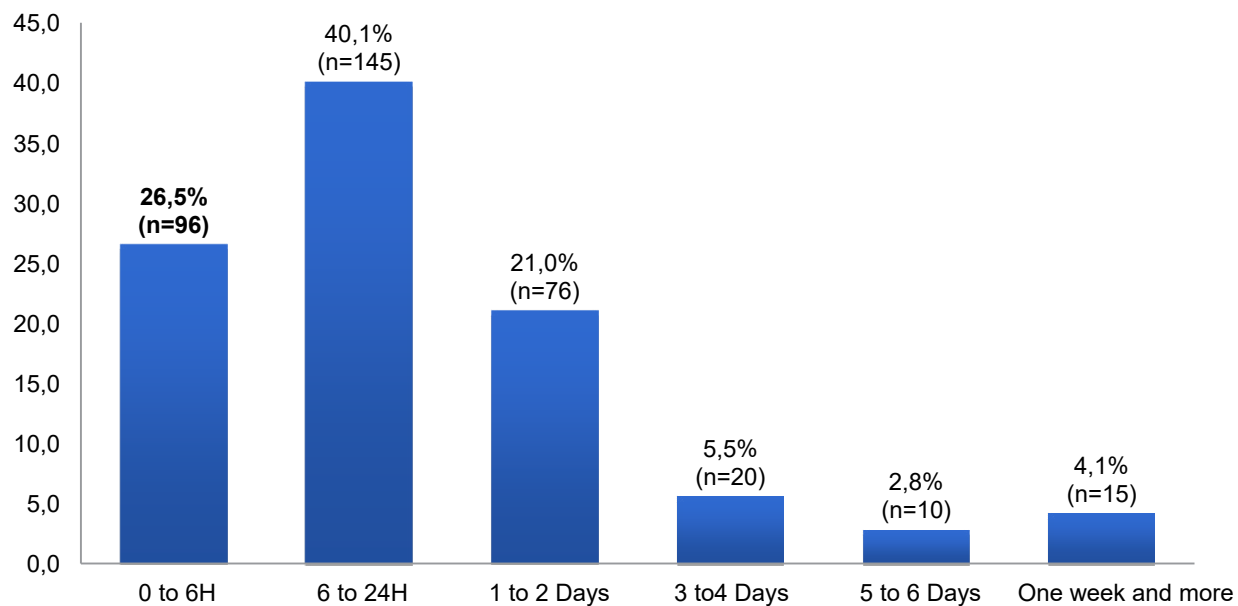
In developed countries, paediatric emergency departments created in the image of adult emergency departments now meet efficiency criteria [5]. In Chad, the lack of upstream flow management and insufficient hospitalisation capacity downstream of the Emergency Department of the Mother and Child Academic Hospital (MCAH) explain the death rate observed in 2018: 23.5%. The general aim of this work was to contribute to the reduction of infant mortality in the Emergency Department of the MCAH in N'Djamena and precisely to determine the mortality rate, assess the evolutionary profile and identify the factors associated with the deaths of children admitted to the Department.

## 2. Methodology

It was a cross-sectional and analytical study carried out between June 2019 and May 2020 (12 months) in the Paediatric Emergency Department of the MCAH in N'Djamena, the only structure responsible for receiving children in distress. The study population consisted of children between 1 month and 15 years admitted to Paediatric Emergency Departments during the study period. Deceased children, whose records were usable, and consenting mothers were included. The variables studied were age, sex, socio-economic and educational level, time between onset of symptoms and access to care, length of hospitalisation, symptoms on admission, history, diagnosis, treatment and outcome.

The data were entered and analysed using Epi Data software and Statistical Package for Social Sciences (SPSS) version 20.0. The statistical test used was the KHI2.

### 3.2.1. Time of Death



**Figure 1:** Breakdown by Time of Death

## 3. Results

### 3.1. Epidemiological Aspects

During the study period, 13972 children aged between 1 month and 15 years were admitted to the emergency department of the MCAH, including 480 deaths, of which 362 met the inclusion criteria, i.e. a mortality rate of 3.44%. Boys accounted for 56.4% (n=204) and girls 43.6% (n=158), with a sex ratio 1.29. The age range was 1 month to 5 years, 71% (n=257) and 5 to 15 years, 29% (n=105). The average age was 24 months. 83.7% (n=303) were from urban areas and 16.3% (n=59) from rural areas.

### 3.2. Clinical Aspects

The main reasons for admission were fever 71.8% (n=260), vomiting 46.7% (n=169), diarrhoea 31.5% (n=114) and breathing difficulties 30.1% (n=109).

The father was a farmer 25.3% (n=75), a worker in the informal sector 32.3% (n=96), a shopkeeper 22.2% (n=66) and a civil servant 20.2% (n=60). In comparison, the mother was a housewife 84.5% (n=251), a shopkeeper 4.7% (n=14), a civil servant 0.7% (n=2) and a worker in the informal sector 10.1% (n=30).

Before admission, 85.4% (n=309) of patients had been treated. This involved a medical prescription 64.18% (n=200), self-medication 17.2% (n=53) and traditional treatment 4.9% (n=15).

Death occurred within 24 hours of admission (66.6%, n=241), within 48 hours (87.6%, n=317) and after 48 hours (12.4%, n=45). (Figure 1)

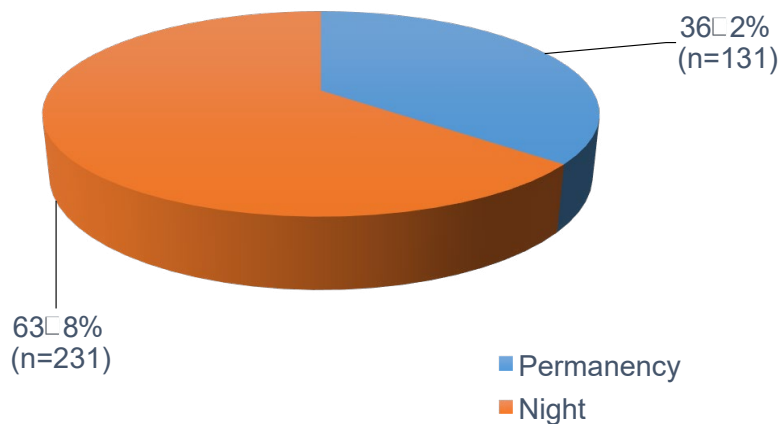
### 3.2.2. Pathologies Responsible for Death

Pathologies	n	%
Severe Malaria	43	37,1
Acute Respiratory Infections	29	25,0
Severe Acute Malnutrition	15	12,9
Acute Gastroenteritis	11	9,5
Sepsis	8	6,9
Cardiopathy	4	3,4
Meningitis	3	2,6
Hépathopathy	1	0,9
Others*	2	1,7
<b>Total</b>	<b>116</b>	<b>100,0</b>

\* Meningocele (n=1) Thermal Burn (n=1)

**Table 1: Pathologies Responsible for Death**

### 3.2.3. Period of Death



**Diagram 1: Period of Death**

### 3.3. Factors Associated with Death

Items	Early Death	Belayed Death	Total	khi <sup>2</sup>	p
	(within 24h)	(beyond 24h)			
Impairment of the General Condition*	207	91	298	6,19	0,0119
Coma II*	60	8	68	17,653	0,000
Severe Dehydration	30	13	43	0,223	0,636
Severe Pallor*	78	27	105	3,952	0,046
Respiratory Distress*	134	90	224	27,567	0,001

\*There is a significant relationship between deterioration in general condition, depth of coma, severe pallor, respiratory distress and early death.

**Table 2: Relationship between Death and Clinical Signs on Admission**

## b. Relationship between Time of Death and Pathology

Time of Death					
Diagnostic at the moment of Death	Early Death	Delayed death	Total	khi <sup>2</sup>	P
	(within 24h)	(beyond 24h)			
Severe Malaria*	128	43	171	9,983	0,0015
Severe acute malnutrition	28	8	36	2,254	0,133
Acute Respiratory Infection*	27	23	50	4,122	0,0423
Sepsis	14	8	22	0,091	0,763
Meningitis	6	4	10	0,012	0,443
Acute gastroenteritis	9	10	19	3,110	0,077
Cardiopathy*	4	7	11	3,358	0,0368
Acute kidney failure	2	4	6	3,029	0,081
Hemopathy	5	4	9	0,503	0,477
Hepathopathy	3	3	6	0,186	0,32
Acute generalized peritonitis	4	0	4	2,031	0,154
Polytrauma	4	0	4	2,031	0,154
Kala-azar disease	0	1	1	0,123	0,334
Craneo-cephalique trauma	3	0	3	0,382	0,553
Acute intestinal intussusception	1	0	1	0,000	1,000
Metabolic disorders	0	1	1	0,123	0,334
Neoplasia	0	1	1	0,123	0,334
Meningo-encephalocele	0	1	1	0,123	0,334
Severe thermal injury	0	2	2	1,562	0,111
Acute intestinal obstruction	2	1	3	0,000	1,000
Haemorrhagic syndrome	1	0	1	0,000	1,000
Total	241	121	362		

\*Severe Malaria (p=0,0015) Respiratory Infections (p=0,0423) and the Cardiopathies (p=0,0368) are associated with early death.

**Table 3: The Relationship between Time of Death and Disease**

## c. Relationship between Death and Haemoglobin Levels

Time of Death					
	Haemoglobin Level	Premature Death	Delayed Death Total	khi <sup>2</sup>	P
	(within 24h)	(beyond 24h)			
Hb : >12 g/dl	48	14	62	8,554	0,003
Hb : 10 et 12 g/dl	48	31	79	1,535	0,215
Hb : 7 et 9g/dl	74	40	114	0,206	0,649
Hb < 7g/dl *	34	32	66	11,869	0,0005
Not performed	39	2	41	16,933	0,000
Total	241	121	362		

Haemoglobin levels below 7 g /dl are associated with early death.

**Table 4: Relationship between Death and Haemoglobin Level**

#### d. Relationship between Blood Transfusion and Death

Time of Death			
Blood Transfusion	Early Death (within 24h)	Delayed Death (beyond 24h)	Total
Transfused	28	40	68
Not Transfused *	213	81	294
Total	241	121	362

$$\text{Khi}^2 = 24,271; p = 0,000$$

The absence of transfusion was associated with early death.

**Table 5: Relationship between Blood Transfusion and Death**

#### e. Relationship between Haemoglobin Level and Deaths in Malaria

Diagnostic at the Moment of Death					
	Hemoglobin level		Total	khi <sup>2</sup>	P
	Others	Severe malaria			
Hb : >12 g/dl	29	13	42	5,225	0,022
Hb : 10 et 12 g/dl	48	31	79	2,773	0,095
Hb : 7 et 9g/dl	53	61	114	2,398	0,121
Hb < 7g/dl*	33	53	86	9,01	0,0026
Not runned	27	14	41	3,313	0,0687
Total	190	172	362		

Severe anaemia with a haemoglobin level < 7 g/dl was associated with death in severe malaria

**Table 6: Distribution of Death by Haemoglobin Level and Causative Pathology**

## 4. Discussion

### 4.1. Epidemiology

Intending to contribute to reducing mortality in the Paediatric Emergency Department of the MCAH in N'Djamena, this study aimed to determine the mortality rate and identify the factors associated with the deaths of children admitted to the Department.

Child mortality, estimated at 3.4% in this study, is still high, although lower than that reported by BALANGA et al. 2020, 13.4% and ASSE et al. 2011, 7.1 to 13.8% [6,7]. The low mortality rate in this study, compared with that of the African authors consulted, is methodological. Indeed, the definition of emergency is far from being consensual. Our triage department is where all the children admitted to the hospital converge. It is not the case for the framework of the study carried out by the authors consulted, or the services in question are structured differently from the triage service.

Mortality is higher in boys: 56.4%, as in the study by Balenga and al [6]. The excess male mortality would be linked to the predominance of male patients, according to Nzame Y and al [8]. Children under-5: 71% willingly pay the heaviest price, confirming the African literature, which reports the predominance of infant-juvenile mortality [6-9]. The under-five mortality noted in this work is higher compared to the average under-5 mortality rate worldwide,

estimated at 43% [10]. In 2018, the World Bank noted that five African countries including Chad, Somalia, Nigeria, the Central African Republic, Sierra Leone and Guinea had an under-5 mortality rate that exceeds 100 deaths per 1000 LB, a rate twenty times higher than that observed in high-income countries [11]. The children who died came from disadvantaged socio-economic backgrounds, particularly parents who worked in the informal sector, fathers, or homemakers. These are more early deaths that occur in 66% of cases during the first 24 hours as reported by Soumana and al in Niger [12]. The factors associated with death in the first 24 h in this study were deterioration in general condition on admission,  $p=0.0119$ , the existence of respiratory distress ( $p=0.001$ ), coma ( $p=0.000$ ) and severe anaemia ( $p=0.046$ ). The occurrence of early deaths, which reflects the severity of the clinical condition of the children on admission, is a consequence of the delay in consultation but also of the inadequacy of the technical resources of the Mother and Child Academic Hospital's emergency department in providing adequate care distressing conditions in small childrens. For STASSE et al. 2015, and MUAMBA 2018, the delay in consultation is due to the inaccessibility of health centres for several reasons, including the collapse of the public health system and the emergence of an unregulated private system that is unsuited to the population's socio-economic level [13,14]. We found that 85% of patients had been given medication before hospitalisation, 64%

had been prescribed medication deemed incorrect, 17% self-medication and 5% traditional treatment. The predominance of deaths during on-call hours, particularly for night consultations, reported by Mabiala-Babela Jr. et al. 2009 in Congo, is confirmed by this study [12,15]. Indeed, the on-call period is that of the great influx in the emergency department coupled with the quantitative and qualitative deficit of the nursing staff. The most frequent causes of death are malaria, acute respiratory infections and severe malnutrition (37.1%, 25% and 12.9%, respectively). The same diseases are found in Africa, although in different proportions in children under five. The diseases associated with early death in Yaoundé are severe malaria, ARI and heart disease [16]. In Niger, the risk of death is four times higher due to malnutrition, malaria, severe anaemia, hypoglycaemia and severe thrombocytopenia, which increases the risk of death sevenfold [12,16]. It is also the case for Balenga et al. 2020 where the four pathologies that cause death are severe malaria, acute bronchiolitis, diarrhoea and meningitis [6]. The predominance of these diseases and associated factors, in addition to the low socio-economic level which constitutes the common denominator, is proof of the failure of health policies in Sub-Saharan Africa. In Chad, vaccination coverage is estimated at 23% in 2019, just one example [3].

## 5. Conclusion

Mortality is still high in the MCAH Paediatric Emergency Department. Deaths occur more frequently in children under-5 years of age, from disadvantaged backgrounds, and mainly in the first 24 to 48 hours. The diseases associated with early death, all of which are preventable, are malaria, respiratory illnesses and anaemia. Impaired general condition, respiratory distress, state of consciousness, severe anaemia and lack of blood transfusion were associated with death.

The high rate of deaths in paediatric emergencies means that information and communication must be stepped up to change behaviour, and target programmes, including malaria, EPI (expanded program for immunization) and IMCI (integrated management of childhood illness), must be revitalised.

## References

1. <https://blogs.worldbank.org/fr/opendata/estimations-15-000-children-sont-morts-chaque-jour-en-2016/>. Accessed 02/08/2020.
2. WHO Children's sections. Reduce mortality. Fact Sheet No. 178, October 2017. [www.who.int/mediacentre/factsheets](http://www.who.int/mediacentre/factsheets). Accessed on 02/08/2020 at 4:30 p.m.
3. EDS MICS TCHAD 2019
4. Ministry of Economy and Development Planning of Chad. Voluntary national review on the implementation of the Sustainable Development Goals. June 2019; 101p
5. O'Meara, M., & Trethewie, S. (2016). Managing paediatric death in the emergency department. *Journal of Paediatrics and Child Health*, 52(2), 164-167.
6. BALENGA L\*, N'SINABAU E, MAGOGA K et al. Infant Mortality in the Pediatric Emergency Department of the N'djili/ISTM General Reference Hospital, Kinshasa. *CONGO SCIENCES: Vol 8 (3) November 2020*.
7. ASSE K.V., PLO K.J., YENAN J.P. et al. Pediatric mortality in 2007 and 2008 at the Abobo General Hospital (Abidjan/Ivory Coast). *Society of Anesthesia and Resuscitation of French-speaking Africa*. 16, 2. [2011]
8. Nzame Y, Ntsame S, Ndoutoume R, et al. Epidemiology of Nighttime Pediatric Emergencies at the Libreville University Hospital Center. *Health Sci. Say: Vol 21 (4) April 2020*.
9. AZOUMAH K.D., BALAKA B., MATEY K. et al. Hospital mortality at the Yendoubé children's hospital in Dapaong, Togo. *Med Afr Noire*, 54, 1, 5. [2007].
10. WHO. Child mortality levels and trends: 2018-SUN report. NEW YORK/GENEVA/WASHINGTON.
11. World Bank: World Development Indicators, [online]. [blogs.worldbank.org](https://blogs.worldbank.org), 2018 (accessed 11/22/20 at 2:31 p.m.).
12. SOUMANA A\*, KAMAYE M, YAYE B et al. Risk factors for mortality in children aged 0-59 months during the first seven days of hospitalization in the pediatric department of the Lamorde national hospital in Niamey J. *Rech. Sci. Univ. Lomé (Togo)*, 2017, 19(3): 595-606.
13. Stasse, S., Vita, D., Kimfuta, J., Da Silveira, V. C., Bossyns, P., & Criel, B. (2015). Improving financial access to health care in the Kisantu district in the Democratic Republic of Congo: acting upon complexity. *Global health action*, 8(1), 25480.
14. MUAMBA M.P. [2018]. Health in DR Congo: a multi-speed equation. <https://www.harambee-africa.org/fr/2018/03/05/la-sante-en-rd-congo-une-equation-a-multiieurs-vitesses.html>.
15. Mabiala-Babela JR, Senga P Night consultations in the pediatric emergency room of the Brazzaville University Hospital, *Congo Med Trop* 2009; 69:281-285.
16. Congratulated Nguetack et al. Profile of deaths occurring in children aged 3 to 59 months in the intensive care unit of a pediatric center in Yaoundé-Cameroon. *Pan African Medical Journal*. 2020;36(246). 10.11604/pamj.2020.36.246.11292. Available online at: <https://www.panafrican-med-journal.com/content/article/36/246/full>.

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