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RESEARCH ARTICLE

DETERMINANTS OF ACUTE MALNUTRITION AMONG CHILDREN UNDER FIVE IN THE DJIRI DISTRICT OF BRAZZAVILLE IN 2018

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ABSTRACT

Introduction: Acute malnutrition is defined by the weight / height (W/ H) index <- 2 Z-score at the median of the WHO standards. It is responsible for 45% of deaths of children under 5 in developing countries. ***Objectives:*** To determine the prevalence and determinants of malnutrition among children under five in the district of Djiri in Brazzaville in 2018. ***Methods:*** An analytical cross-sectional study was conducted on 482 mother-child pairs whose children were aged 6-59 months in the Djiri district of Brazzaville. We collected data from May 30 to July 15, 2018. We identified the factors associated with acute malnutrition. Anthro 2005 and Epi-info version 7.2. softwares were used for storage and analysis of data. The influence of the variables on the occurrence of acute malnutrition was calculated using Chi2, Odds Ratio with 95% CI. The level of significance was set up at $p < 0.05$. ***Results:*** The prevalence of acute malnutrition or wasting was (40/482) 8.3%. Factors associated with acute malnutrition were age less than 23 months [ORa: 2.10 (1.30- 3,37); p = 0.0016], birth weightless than2500g, [ORa: 3.23 (1.82-5.72); p = 0.001] and households with more than 7 persons [ORa: 2.28 (1.31-3.96), p = 0.01]. ***Conclusion:*** Preventive measures are needed to reduce their prevalence.

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INTRODUCTION

Acute malnutrition or wasting is determined by a weight / height (W / H) index <- 2 SD (standard deviation or Z-score) at the median of the WHO standards. According to FAO's State of Food Security and Nutrition in 2016 report, 51 million children under the age of 5 were malnourished. Malnutrition is the underlying cause of 45% of all deaths of children under five registered worldwide (SOFI, 2017; Black *et al.,* 2008; De Onis *et al.,* 2007; UNICEF, 2013; WHO, 2018). In the Republic of Congo, the prevalence of malnutrition is 6% in children under five. This condition is the second leading cause of death for children under five (29%) after malaria (31%) in Congo. Little data is available on the specific entity of acute malnutrition in the Republic of Congo. This study aimed at identifying the determinants of acute malnutrition among children under five in the Djiri district of Brazzaville in 2018.

METHODS

Type-Place-Time-Period: This was a cross-sectional analytical study (assigned / unaffected) conducted in the district of Djiri, Brazzaville, Republic of Congo), from April 9 to October 29, 2018.

Population: The target population were children aged 6-59 months, living in the Djiri district of Brazzaville. Children were included after assent of the parents; mothers of children from 6 to 59 months were included after their clear consent. We excluded children from who were presenting other sickness than malnutrition and mothers who were not able to answer to our questions. We received ethical clearance from the CIESPAC Ethics Committee. To determine the sample size in our study, we used Kelsey's formula. The sample size was calculated by Epi-Info version 7.2 software using the STATCALC application. We considered as determinants of malnutrition, the maternal low level of education (MSP, 2012). with the hypothesis: percentage of malnourished children (exposed P0) to 30% and the percentage of children not malnourished (P1 unexposed) to 10%, the power was 90% and 5% of errors. $N = 2P\ (1\text{-}P)\ (Z\alpha / 2 + Z1\text{-}\beta)^2 / (Po\text{-}P1)^2$. We found N = 471. We used the multistage cluster sampling technique (WHO methods). To determine the number of subjects in each cluster, we estimated the percentage of children under 5 in each neighborhood at 20%. The cumulative number of children under 5 in the Djiri district was calculated by adding the sample of the 7 neighborhoods of the Djiri district, which gives us a total of 34064. The number of individuals per cluster in each neighborhood were calculated by dividing the sample size by the total number of clusters

(471/30), which gives us 16 individuals per cluster. To determine the number of clusters in each neighborhood, we first multiplied the number of children under five in each neighborhood by the total number of clusters that was set at 30, then we divided the result by the total number of children under 5 in the district. To determine the population to be polled by neighborhood, we multiplied the number 16 representing the number of individuals per cluster by the number of clusters of each neighborhood.

Variables

Data was collected from mothers of children. A UNICEF-recommended wooden board measuring instrument, which was inserted with a calibrated tape was used to collect anthropometric data from all children aged 6 to 59 months who had been living in Djiri district, Brazzaville for more than six months. The weight and height were measured without shoes, socks, hair ornaments, the subject positioned at the Frankfurt plane using a wooden board inserted with a ribbon calibrated to read the nearest 0.1 cm. The size of the children aged 6-23 months was measured lying down using a board. In children older than two years, height was measured standing up to the nearest 0.1 cm, using a vertical wooden panel, placing the child on the measuring board, standing in the middle of the tray; the head, the external auditory meatus and the lower edge of the eye were on a horizontal plane (Frankfurt plane).

Analysis

Data analysis was conducted using Epi-info 7.2 and Anthro 2005 software. The absolute and relative frequencies as well as the central tendency parameters (mean, median) and dispersions (standard deviation and quartile) were calculated. With respect to the influences between different variables, the logistic regression analysis was done and the odds ratios were calculated with their 95% confidence intervals. Adjustments on confounders were made. Statistical tests of Wald, Fisher and Pearson were used. The threshold of significance was set up at $p<0.05$.

RESULTS

In total, 482 mother-child pairs were interviewed. The prevalence of acute malnutrition was (40/482) 8.3%.The children mean age was at 32.3 ± 17.5 months and the mothers mean age at 30 ± 5.9 years. Among the children, 55% (265/482) of were female (Table 1, 2 and 3). We found that, children born with a birth weight of less than 2500 grams were more likely to develop acute malnutrition, compared to those born with a birth weight of at least 2500 grams. This risk remains high after adjustment to confounding factors [7.83% vs. 10.84%; ORa: 3.23 (1.82-5.72); p = 0.001] (table4). Households with more than 7 persons were associated with high risk of chronic malnutrition, compared to those living in households with less than 3 persons, this risk remained high after adjustment to confounding factors [4.7% vs. 15%; ORa: 2.28 (1.31-3.96), p = 0.01] (tab4). We also found that children aged 6 to 23 months were more likely to present acute malnutrition, compared to children aged 24 to 59 months, this risk remains high despite adjustment for confounding factors [5.9% vs. 12.67%; ORa: 2.10 (1.30-3.37); p = 0.0016] (Table 4).

DISCUSSION

We conducted a cross-sectional analytic study intending to identify factors associated with acute malnutrition in Congo. The questions were addressed to the mother and we presume that some of them had some recall difficulties that could mistake some answers. Some parents refused to participate in the study for personal reasons and their children could not be included in the study. In spite of some shortcomings, this study revealed the prevalence of acute malnutrition at 8.3%. This result is higher than that of the 2011-2012 DHS II, which was 6% at the national level (WHO, 2018). Othersinvestigated the same field (Kouakou *et al.,* 2016; Yisak *et al.,* 2015; Mukalay *et al.,* 2010; Demissie *et al.,* 2013; Keino *et al.*; Sellam and Bour, 2015; Juma *et al.,* 2018; Lira *et al.,* 2011; Debnath and Bhattacharjee, 2014; El Kishawi *et al.,* 2018; Yessoufou *et al.,* 2014).

Table1. Socio-economic characteristics of mothers according to acute malnutrition in Djiri in 2018

Characteristics	Acute malnutrition				Total		p-value
	Yes		No				
	N=40	%	N=442	%	N=482	%	
Mother's age (Years)							0,033
Mother's age (Class)							
16-35	38	95.0	360	81.8	398	82.9	
36-47	2	5.0	82	18.2	84	17.1	
Mother's profession							**0.018**
House wife	16	40.0	189	44.0	205	42.0	
Student	8	20.0	87	19.6	95	19.6	
Employee	4	10.0	51	10.4	55	11.0	
Libral	12	30.0	115	26.0	127	27.4	
No. of children of the mother							**0.063**
-5	40	100.0	405	92.0	445	92.7	
+5	0	0.0	37	8.0	37	7.3	
Level of education							**0.50**
Primary	5	12.5	31	7.1	36	7.5	
Secondary	29	72.5	318	72.2	347	72.2	
Superior	6	15.0	88	19.6	94	19.2	
None	0	0.0	5	1.1	5	1.1	
Marital status							**0.88**
Single	7	17.5	98	22.1	105	21.9	
In a relationship	31	77.5	325	73.8	356	74.1	
Divorced/Widow	2	5.0	19	4.1	21	4.0	

Table2. Socio-demographic characteristics of children according to acute malnutrition in Djiri in 2018

Characteristics	Acute malnutrition				Total		p-value
	Yes		No				
	N=40	%	N=442	%	N=482	%	
Sex of the child							**0,099**
M	23	57.5	191	43.9	217	46.0	
F	17	42.5	248	56.1	265	54.0	
Age of the child (months)					**0.0044**		**0.0044**
Age of the child (class)							
6-23	22	55.0	162	34.6	184	36.0	
24-59	18	45.0	280	65.4	298	64.0	
Birth weight							**0 .033**
1800-2500	38	95.0	360	81.8	398	82.9	
2600-5300	2	5.0	82	18.2	84	17.1	
Feeding – 6 months							**0.25**
EBF	10	25.0	94	21.1	104	21.5	
Mixed feeding	30	75.0	319	72.8	349	72.9	
Artificial milk	0	0.0	29	6.1	29	5.6	
Vaccination							**0.29**
Completely	24	60.0	315	71.5	339	70.3	
Incompletely	16	40.0	127	28.5	143	29.7	
Water consumed							**0.042**
Mineral	24	60.0	169	38.5	193	40.3	
Tap	16	40.0	247	55.5	263	54.5	
Drilling	0	0.0	26	6.0	26	5.2	
Colostrum							**0.93**
Yes	28	70.5	311	70.6	339	70.7	
No	12	29.5	131	29.4	143	29.3	

Table 3. Socio-economic characteristics of households according to acute malnutrition in Djiri in 2018

Characteristics	Acute malnutrition				Total		p-value
	Yes		No				
	N=40	%	N=442	%	N=482	%	
Sex of household head							
M	37	92.5	415	94.3	452	93.6	0.64
F	3	7.5	27	5.7	30	5.4	
Prof of household head		**0.0031**					
Liberal	12	31.5	152	34.6	164	34.2	0.0031
Student	5	12.5	20	4.6	25	5.2	
Unemployed	1	2.5	12	2.7	13	2.7	
Salaried	21	53.5	255	58.1	276	57.9	
Household size					**0.058**		
Household size							**0.058**
1-3	9	22.5	51	11.6	60	12.5	
4-6	27	67.5	296	67.4	323	67.4	
7-12	4	10.0	92	21.0	96	20.1	

Table 4. Influence of the socio-demographic characteristics of the mother-child couple on the occurrence of acute malnutrition in Djiri- Brazzaville in 2018

Characteristics		Emaciation				$OR_{CI\ 95}$	p-value	ORadjusted	p-value
		Yes		No					
	N=482	N=40	%	N=442	%				
Mother'sage									
16-35	397	38	9.5	360	90.5	3.9(1.1-17.9)	0.033	1.6(0.9-2.8)	0.07
36-47	82	2	2.4	82	97.6	1			
Household size									
1-3	60	4	6.6	92	93.4	1			
4-6	323	27	8.3	297	91.7	2.1(0.7-6.1)	0.16		
7-12	96	9	9.4	53	90.6	3.4(1,2-13,6)	0.018	2.3(1.3-3.9)	
Age of the child									
6-23	174	22	12.6	161	87.4	2.6(1.3-5.2)	0.004	2.1(1.3-3.4)	0.0016
24-59	287	18	5.9	281	94.1	1			
Birth weight									
1800-2500	397	38	9.6	359	90.4	4.2(1.1-17.9)	0.033	3.2(1.8-5.7)	0.001
2600-5300	82	2	2.4	83	97.6	1			

The study conducted in Gaza-Palestine had similar results to ours with the prevalence of acute malnutrition at 8.2%, (El Kishawi *et al.,* 2018). Other findings were revealed the prevalence higher than ours ranging from 14% to 42.3% (Raphael *et al.,* 2011; Yisak *et al.,* 2015; Mukalay *et al.,* 2010; Demissie *et al.,* 2013; Yessoufou *et al.,* 2014). Nevertheless some finding with lowerprevalence were reported as varied from 1.4% to 6% (Mukalay *et al.,* 2010; Sellam and Bour, 2015). We found that children from households of large families were more predisposed to acute malnutrition [6.6% vs. 9.4%; ORa: 2.28 (1.31-3.96); P = 0.01]. This result is identical to that reported at Pernambuco in Brazil who found that large households or larger families were related to acute malnutrition OR: 1.35 (1.10-1.65) (Lira *et al.,* 2011). Other authors in Ethiopia in the district of Haramaya in 2013 found that households with more than 2 people were also a factor associated with acute malnutrition with an OR: 1.87 (1.19-2.7) (Yisak *et al.,* 2015). This result can be explained by the fact that large families often do not have enough income needed to meet the nutritional needs of each of their members. As a result, children in these households do not have adequate and sufficient nutrition. This

We found that the age of children under 23 months was a factor associated with acute malnutrition [5.9% vs 12.6%; OR: 2.1 (1.3-3.4); p = 0.0016]. These results are similar to those in Ethiopia in 2016 who found that the age of [12-24] months was associated with wasting and reported the OR at 3.24 (2.24-4.69) (Yisak *et al.,* 2015). In the Democratic Republic of Congo in Lubumbashi, a study found that children under one year of age were less likely to be emaciated OR: 0.4 (0.3-0.6) (Mukalay *et al.,* 2010). These results may be explained by the fact that these children are more exposed to infectious diseases. High proportion acute malnutrition in children under the age of 2 justifies the need for awareness-raising actions aimed targeting parents and particularly mothers on the need for preschool consultations as this could help for detecting this condition in our setting.

Conclusion

Acute malnutrition is a public health issue in the district of Djiri. Related determinants were children born with a weight <2500 g, children aged 6 to 23 months and those who were in households with more than 7 people. Preventive measures through improving living conditions, food security and intensifying communication for behavioral change are needed to reduce their prevalence.

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Availability of data and materials: The data sets supporting the conclusion of this study are available to the editor– in –chief upon reasonable request

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