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RESEARCH ARTICLE

FOOD PRACTICES AND NUTRITIONAL STATUS OF CHILDREN AGED 0 TO 2 YEARS IN BRAZZAVILLE

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ABSTRACT

To feed one self is for the human being a primordial necessity. A good diet is the first medicine to keep your nutritional status normal. Malnutrition is one of the main causes of infant and child mortality. Nutritional problems observed in infants and young children, are closely related to complementary feeding practices. A study was conducted on the nutritional practices and nutritional status of children aged 0-2 years in Brazzaville. Its objective was to assess the nutritional practices and nutritional status of children aged 0-2 in Brazzaville. **Methods:** By way of this, a lateral survey by interrogation has been carried out from a sample of 206 children of the nine districts. The data had concerned the nutritional condition, the dietary observance, the diet of infants and young children. **Results:** Breast-feeding is almost general to 95.1% with taking of colostrum by 75.7%, 92.3% children were taking breast dining the period of survey. After the birth, only 9.2% of children had been given immediately the breast after the birth. Exclusive breastfeeding made up 22.96% of children, with more than 4 times a day practiced in 80.1%. 57.3% took the porridge, 33.9% of which took it from the age of 6 months with 55.1% who took it twice a day. 61.2% take water of which only 2.4% took it from 6 months. 21.8% of children started eating special meals once a day (82.2%). 15.5% of children already eat family meals once a day, or (71.9%).The rate of emaciation weight of inadequacy and the late of growth are respectively to 7.2%, 8.2% and 13.6%. **Conclusion:** the investigation found that the dietary practices inflicted on these children are not good. The early introduction of additional food and the dietary diversification, also the weakness of frequency daily of consumption are factors which lead to different nutritional status of children survey.

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INTRODUCTION

Food is a primary necessity for humans. A good diet is the first medication to keep your nutritional status normal. Malnutrition is one of the main causes of infant and child mortality (Horton, 1988; Broeck *et al*, 1993; Pelletier, 1995 and Rice, 2000). Malnutrition mainly means poor nutrition, characterized by insufficient or excessive protein, energy and micronutrient intake (WHO, 2016). It has many harmful and irrevocable consequences for young children: increased risk of mortality, reduced immune defenses, retarded motor development, reduced cognitive and learning skills in school.

This malnutrition occurs mainly in the first 24 months after birth. During this period, the child gradually switches from liquid and milk feeding to a diversified and semi-liquid (semi-solid) then solid diet. In fact, from 6 months, breast milk is no longer sufficient to cover the baby's energy and nutrient needs on its own. However, it must be supplemented with a complementary food in order to cover its nutritional needs and ensure normal growth of the child. Indeed, nutritional problems in infants and young children in many countries are closely linked to complementary feeding practices (WHO, 1998). In addition, the early introduction of complementary foods causes a significant reduction in milk production in the

nursing mother, and predisposes to the onset of Protein-Energetic Disease (PEM) in infants (Hennart, 1981). It is estimated that one in four children under five, or 129 million children in the developing world, are underweight. 1/3 of children under 5 are stunted due to malnutrition (Unicef, 2012). In Congo, nearly 24% of children suffer from chronic malnutrition (stunting), of which almost a third (1/3) or 6% in severe form (wasting), around 12% of children are underweight (ESDC-II, 2011-2012).

MATERIAL

Anthropometric material

- A horizontal height measurement rod (child under 2 years old)
- A Salter beam balance with panties or a basket to put the child to measure the weight.

Teaching material: The teaching material consists of a survey sheet which was used to collect data from a questionnaire focusing on eating practices, in particular the initiation of breastfeeding, the age at which food was introduced. in addition, the age at which breastfeeding stopped (sheet in annex).

METHODOLOGY

Study framework: The Republic of the Congo is a country in central Africa with an area of 342,000 km2. Its population is estimated at 4,085,422 inhabitants, of which 51.7% are women and 48.3% are men. Children under the age of 5 represent 14% of the national population. The Congolese population is 56% divided between Brazzaville and Pointe-Noire. She is relatively young, because 62.8% is under the age of 30 (SOFRECO-CERAPE, 2012). Brazzaville, its political and administrative capital, is its first city. It is located in the south of the Congo on the right bank of the Congo river and on the north bank of the Pool Malabo opposite Kinshasa. Indeed, it has an area of 269.3 km2 with a population of 1,696,392 inhabitants (2015) and a density of 26,428 inhabitants. / km2. Brazzaville has nine (9) districts which are respectively: Makélékélé, Bacongo, Poto-poto, Moungali, Ouenzé, Talangaï, Mfilou, Madibou and Djiri.

Type of study: This is a survey of dietary practices carried out with children from 0 to 2 years old in Brazzaville with anthropometric measurements in order to collect data on their nutritional status.

Target population: It is made up of children aged 0-2 years living in Brazzaville.

Type of survey: This is a cross-sectional survey with 24-hour recall techniques, frequency of consumption and food history.
Location of the survey: The survey was carried out in the nine (9) integrated health centers (CSI) of Brazzaville. These centers formed the sampling frame for our sample. which was the subject of our investigation.

Survey frame: The various integrated health centers in Brazzaville were identified on the basis of a list provided to us by the Ministry of Health and Population. These centers are: Tenrynkio, Bissita, three Martyrs, Moukondo, Jane Viale, Marien Ngouabi, Indzouli, Fulbert Youlou and Jacques Opangault.

Sampling and sample size: In each arrondissement, an integrated health center was chosen in a reasoned manner, according to the visibility of this center and its frequency of consultation. To obtain our sample, a survey was carried out in each integrated health center. Likewise, the children who made up our unit of analysis were chosen by random sample from the reporting unit, which is the mother of each child. This allowed us to have 206 children making up the size of our sample.

Inclusion criteria

- Be 0 to 2 years old;
- Accept to participate in the survey;
- Residing in the city of Brazzaville at the time of the investigation;
- Being listed in the selected CSIs in Brazzaville;
- Accept the taking of anthropometric measurements.

Exclusion criteria

- Not be aged 0 to 2 years;
- Did not reside in Brazzaville;
- Not to be listed in the selected CSI of Brazzaville
- Refusal to participate in the investigation.

Conduct of the investigation: The survey took place in each integrated health center, the duration of the survey was two days. During the survey, the women were interviewed individually, the answers given were ticked on the survey sheet (annex). Information regarding the child's age and birth weight was dictated by the mother. The mother's weight, which the mother ignored, was obtained from the baby's weigh card. The anthropometric measurements were made with the electronic weight scale, suspended on a floor, the child only wore the weighed base. The size was measured using a horizontal measuring rod. The cranial and brachial perimeter were measured using a non-extensible tape measure. Clinical signs of malnutrition such as edema, hair loss and flaking of the skin were looked for on the spot on each child. The response was immediately recorded on the survey form.

Determination of the indicators used to describe and evaluate infant feeding practices: The different indicator rates are calculated using WHO formulas. These formulas are as follows:

For the exclusive breastfeeding rate we have:

TAME = N. <6 months exclusively fed with breast milk during the last 24h / N. of <6 months × 100

The predominant breastfeeding rate

TAMP = N. <6 months mainly fed breast milk during the last 24 hours / N. <6 months × 100

Feed rate completed in a timely manner

TACTP = N. 6-9 months of age who received an AC + breast milk during the last 24 hours / children 6-9 months × 100

Rate of continuing breastfeeding at 1 year

TPAM 1 year = children aged 12-15 months breastfed / children aged 12-15 months × 100

Bottle feeding rate

TAB = N. <6 months bottle-fed during the last 24 hours / children <6 months × 100

Retained to characterize the nutritional state of the child: The anthropometric indices calculated are expressed as standard deviation (SD) or Z-score according to the international reference values NCHS / CDC (1977) and the WHO standard (2006).

It is:

- Weight for height, this index characterizes a state of thinness considered as acute malnutrition.
- When the Z-score <to - 3 E.T., acute malnutrition is severe.
- When the Z-score is> - 3 E.T and <to -2 E.T acute malnutrition is moderate.
- The prevalence of thinness (wasting) is defined as the percentage of children with a Z-score <<-2 AND.
- Height for age, characterizes stunting considered chronic malnutrition.
- When the Z-score <to - 3 E.T, chronic malnutrition is severe
- When the Z-score is> - 3 E.T and <to -2 E.T chronic malnutrition is moderate
- The prevalence of length delay is defined as the percentage of children whose Z-score is <-2
- Weight for age, reflects underweight. The prevalence of underweight is defined as the percentage of children whose Z-score is <-2 -2 SD.

Processing and statistical analysis of survey data

The processing of the data collected as well as the entry and production of the raw tables were carried out using Word, Excel, EPI-INFO.6.04d fr-2001 and ENA software. The quantitative variables were expressed in the form of figures and percentages. The significance of the differences perceived between two percentages was verified by standard tests of differential statistics. The comparison of more than two percentages is carried out using the Student test. For this, the comparison value $\chi 2$ is given by the tables of $\chi 2$ degree of freedom, with a significance threshold of 5%.

RESULTS

Characteristic of the sample

Distribution of children by sex: The results on the distribution of children by sex are shown in Figure 1. The analysis in Figure 1 shows that female children are the most numerous with a percentage of 51.5; The male sex represents 48.5%. The difference is significant with P<0.005.

Age of children (months): The results on the age of the children surveyed are shown in Table 1.

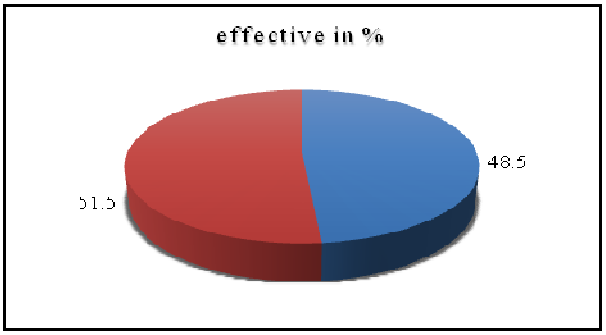

Figure 1: Distribution of children by sex male Female

Table 1: Distribution of children surveyed according to age intervals

Age (months)	Effective	Percentage (%)	95% Confidence Interval	Values of the Statistical test
0-2	22	10.7	6.8-15.7	
3-5	90	43.7	36.8-50.8	
6-8	43	20.9	15.5-27.1	
9-11	33	16.0	11.3-21.8	χ^2=30.229
12-14	10	4.9	2.4- 8.7	ddl=205
15-17	5	2.4	0.8- 5.6	p<0.001
18-20	1	0.5	0.0- 2.7	
21-23	2	1.0	0.1- 3.5	
Total	206	100.0		
Average ± Standard deviation : 6 ± 3,7mois				

It appears from Table 1 that the most represented age group is that of children aged 3 to 5 months with a percentage of 43.7, followed by that of 6 to 8 months with a percentage of 20.9. Children aged 9 to 11 months are represented at 16.0%. The least represented age group is that of 18 to 20 months with 1.0%. The average age of the children surveyed is 6 ± 3.7 months. The difference is very significant because the probability p<0.001.

Weight of children at birth: The different information obtained on the birth weights of children is presented in Figure 2. Figure 2 shows that, 70.9% of children were born with a weight between 2.5 and 3.5 kg. 18.93% have a birth weight greater than 3.5 kg and 10.20% have a birth weight less than 2.5 kg. The average weight of children at birth is 3.1 ± 0.5 kg. The difference is very significant since P<0.001.

Weight of children: The results concerning the weight of children at the time of the survey are presented in Table 2. Analysis of the results in Table 2 shows that 26.2% of children weigh between 5.1 and 6 kg; 24.3% weigh between 6.1 and 7kg and 20.9% are in the range of 7.1-8kg. The other classes are poorly represented. The average weight of the children is 7 ± 1.9 Kg. The difference is very significant, since p <0.001.

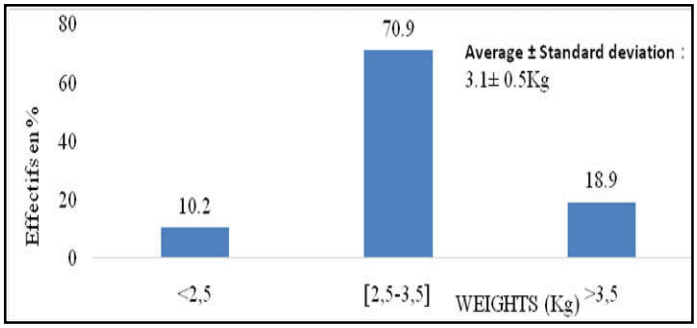

Figure 2. Distribution of children by birth weight

Table 2. Distribution of children by weight

Poids (kg)	Effective	Percentage (%)	95% confidence Interval	Values of the Statistical test
3.1-4	4	1.9	0.5- 4.9	χ^2=42.004
4.1-5	12	5.8	3.0-10.0	p<0.001
5.1-6	54	26.2	20.3-32.8	ddl=205
6.1-7	50	24.3	18.6-30.7	
7.1-8	43	20.9	15.5-27.1	
8.1-9	12	5.8	3.0-10.0	
9.1-10	15	7.3	4.1-11.7	
10.1-11	7	3.4	1.4- 6.9	
11.1-12	5	2.4	0.8- 5.6	
12.1-13	2	1.0	0.1- 3.5	
13.1-14	2	1.0	0.1- 3.5	
Total	206	100,0		
Average ± Standard deviation: 7 ± 1,9Kg				

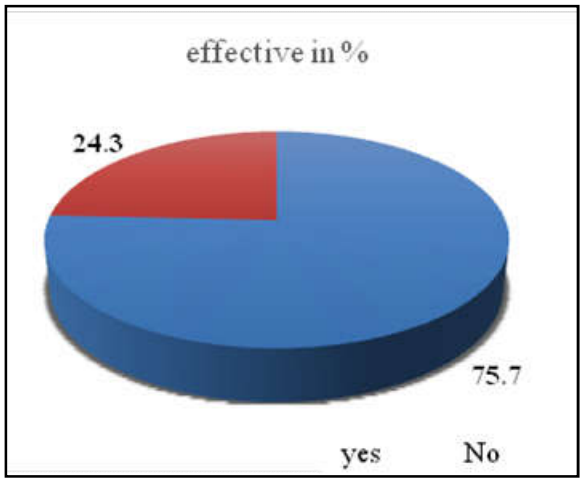

Figure 3. Distribution of children according to colostrum intake

Colostrum: Figure 3 presents the results on whether or not to take colostrum. Figure 3 shows that 75.7% of children took colostrum compared to 24.3% who did not. The very significant difference with p <0.001.

Breast milk: Table 3 presents the results on the breastfeeding practices carried out towards the children under 2 years surveyed. Table 3 shows that the majority of the children surveyed took breast milk. Indeed, 95.1% were breastfed, compared to 4.9% who did not take breast milk. The difference is very significant because p <0.001. Regarding initiation to breasts after birth, the results show that 46.4% of children were breastfed before 24 hours after birth; as against 44.4% of children were breastfed after 24 hours after birth. While, 9.2% of children took breast milk right after giving birth. The difference is very significant because p <0.001. The results for the daily frequency of milk intake show that 80.1% breastfeed more than four times a day, followed by 15.3% who breastfeed three times a day. The other frequencies are poorly represented. The difference is very significant with p <0.001.
Regarding the schedule for breastmilk intake, the results show that, 70.4% of children take breastmilk at their request (when they cry), 8.2% of children take breastmilk according to the schedule dictated by the mother and 21.4% of the children are breastfed on demand and also, according to the schedule dictated by mom. The difference is very significant, since p <0.001. Speaking of the age at which breastfeeding stopped, it appears that 92.3% are still breastfeeding during the investigation period. But the survey found that 3.1% of children stopped breastfeeding at ages 0-6 months and 7-12 months, respectively.

Those who stop breastfeeding in the 13-18 month age group are poorly represented with a percentage of 1.5. The difference is very significant, since p <0.001.

Hydrant

Food diversification and the frequency of their consumption

Complementary food: Table 4 presents information on the age at which water intake began, the daily frequency and the type of water consumed by children. The analysis of the results in Table 4 shows the following facts. Regarding water intake, 61.2% of children take water against 38.8% who do not consume it. The difference is very significant because p <0.001. Regarding the age at which water was first taken, the results show that the majority of children started to take water before the age set by the WHO (6 months). Indeed, children who took water in the age group between 3-5 months are the most represented with a percentage of 37.3. Also, there are children who started taking water from the age of 0 to 2 months, or 26.2%. Children who started drinking from 6 months of age represent 34.1%. Those who started to drink after 6 months represent 2.4%. The difference is very significant because p <0.001.

Regarding the daily frequency of water intake, more children who consumed water more than 4 times a day, with a percentage of 35.7. Those of 2 and 3 taken per day represent 25.4% and 24.6% respectively. Children with a frequency of one water intake per day represent 14.3%. The difference is very significant with p <0.001. Regarding the type of water consumed by children, the study showed that mineral water (Crystal and Mayo) was mainly consumed, ie 96.0%. While, other types of water namely, tap water (1.6%), spring water (1.6%) and well water (0.8%) have been poorly consumed. Well water and boiled / cooled water were not consumed by the children interviewed. The difference is very significant, since p <0.001.

Porridge consumption: The results on the consumption of porridge are given in Table 5. Regarding taking porridge, the results show that 57.3% of children consume porridge, 42.7% who do not. The difference is very significant, since p <0.001.
Regarding the age at which porridge started, the children who started porridge between 3-5 months were the most numerous (60.2%), followed by those who started porridge at the age of 6 months (33.9%) and those who took the porridge at the age of more than 6 months (3.4%). Children who started consuming porridge between 0-2 months of age are the least numerous (2.5%). The difference is very significant, with p <0.001. For the daily frequency of consumption of porridge, the results show that 55.1% of children consumed porridge twice a day, 36.4% consumed it once a day. Children who consumed porridge three times a day and more than four times a day represent 5.9% and 2.5% respectively. The difference is very significant, since p <0.001. Regarding stopping porridge, children aged 7-9 months represent 7.6%, those who are less than 6 months represent 2.5%. Those who quit after 6 months represent 1.7%. Those who stopped taking porridge at an age greater than 12 months are not represented (00.0%). On the other hand 87.3% have not yet stopped taking porridge. The difference is very significant with p<0.001. Regarding the different types of porridge, there is a consumption of two types of porridge.

Table 3. Distribution of children according to breastfeeding practices

Parameters	Variables/ characteristics	Effective	Percentage (%)	95% Confidence Interval	Values of the statistical Test
Breast milk	yes no	196 10	95.1 4.9	91.3-97.6 2.4- 8.7	χ^2=41.502 p<0.001 ddl=205
Initiation to breasts after birth	Less than 1h Less than 24h Greater than 24h	18 91 87	9.2 46.4 44.4	5.5-14.1 39.3-53.7 37.3-51.6	χ^2=51.183 p<0.001 ddl=195
Daily frequency	1time/j 2time/j 3time/j 4 ou plus de 4time/j	1 8 30 157	0.5 4.1 15.3 80.1	0.0- 2.8 1.8- 7.9 10.6-21.1 73.8-85.5	χ^2= 95.647 p<0.001 ddl=195
Breast milk intake schedule	Child request According to schedule Both	138 16 42	70.4 8.2 21.4	63.5-76.7 4.7-12.9 15.9-27.8	χ^2= 25.603 p<0.001 ddl=195
Age when breastfeeding stopped (month)	During breastfeeding 0-6 7-12 13-18	 181 6 6 3	 92.3 3.1 3.1 1.5	 87.7-95.7 1.1- 6.5 1.1- 6.5 0.3- 4.4	χ^2= 30.473 p<0.001 ddl=195

Table 4: Distribution of children by water intake

Parameters	Variables/ charactéristics	Effectives	Percentage (%)	95%confidence interval	Values of the statistical test
Hydrant	yes no	126 80	61.2 38.8	54.1-67.9 32.1-45.9	χ^2=40.786 p<0.001 ddl=205
Age of start of water intake (months)	0-2 3-5 From 6 After 6	33 47 43 3	26.2 37.3 34.1 2.4	18.8-34.8 28.9-46.4 25.9-43.1 0.5- 6.8	χ^2=28.790 p<0.001 ddl=125
Daily frequency	1time/j 2time/j 3time/j 4 ou plus de 4time/j	18 32 31 45	14.3 25.4 24.6 35,7	8.7-21.6 18.1-33.9 17.4-33.1 27.4-44.7	χ^2=29.384 p<0.001 ddl=125
Nature of water	Tap water Spring water Well water Mineral water	2 2 1 121	1,6 1,6 0,8 96,0	0.2- 5.6 0.2- 5.6 0.0- 4.3 91.0-98.7	χ^2=87.317 p<0.001 ddl=125

Table 5: Distribution of children according to porridge consumption

Parameters	Variables/ characteristics	Effective	Percentage (%)	95% Confidence Interval	Values of the statistical test
Porridge	yes no	118 88	57.3 42.7	50.2-64.1 35.9-49.8	χ^2=41.309 p<0.001 ddl = 205
Age of start of porridge (months)	0-2 3-5 From 6 after 6	3 71 40 4	2.5 60.2 33.9 3.4	0.5- 7.3 50.7-69.1 25.4-43.2 0.9- 8.5	χ^2=43.258 p<0.001 ddl=117
Daily frequency porridge	1time/j 2time/j 3time/j More than 4time/j	43 65 7 3	36.4 55.1 5.9 2.5	27.8-45.8 47.7-64.3 2.4-11.8 0.5-7.3	χ^2=27.818 p<0.001 ddl=117
Age of stopping porridge (months)	Less of 6 from 6 7-9 10-12 Greater than 12 Not yet	3 2 9 1 0 103	2.5 1.7 7.6 0.8 00.0 87.3	0.5-7.3 0.2-6.0 3.5-14.0 0.0-4.6 00-00 79,2-92.7	χ^2=50.235 p<0.001 ddl=117
Type of porridge	Traditional Imported Both	62 18 38	52.5 15.3 32.2	43.1-61.8 9.3-23.0 23.9-41.4	χ^2= 21.645 p<0.001 ddl=117
Nature of porridge	But Phosphatin Cerelac Bledine Other Mixed	62 4 3 6 1 42	52.5 3.4 2.5 5.1 0.8 35.6	43.1-61.8 0.9- 8.5 0.5- 7.3 1.9-10.7 0.0- 4.6 27.0-44.9	χ^2=14.431 p<0.001 ddl=117
Adding food to the porridge	yes no	71 47	60.2 39.8	50.7-69.1 30.9-49.3	χ^2=30.896 p<0.001 ddl=117
Type foods	Powdered milk Concentrated milk Cheese Other Mixed	24 2 8 4 33	33.8 2.8 11.3 5.6 46.5	23.0-46.0 0.3- 9.8 5.0-21.0 1.6-13.8 34.5-58.7	χ^2=14.028 p<0.001 ddl=70

Observation of the results in Table 5 reveals the following facts.

Table 6. Distribution of children according to the intake of the special dish

Parameters	Variables/ charactéristics	Effective	Percentage (%)	95% Confidence interval	Values of the statistical test
Special dish grip	yes no	45 161	21.8 78.2	16.4-28.1 71.4-85.9	χ^2=58.853 P<0.001 ddl = 205
Taking the special dish / day	1time/j 2time/j	37 08	82.2 17.8	67.9-92.0 8.0-32.1	χ^2=20.434 P<0.001 ddl=44
Age of start of special dish	Before 6mois 6-8 mois 9-12mois Greater than 12	4 30 10 1	8.9 66.7 22.2 2.2	2.5-21.2 51.0-80.0 11.2-37.1 0.1-11.8	χ^2=23.800 P<0.001 ddl=44
Age when special meals were stopped (months)	Not yet 9-12 Greater than 12	40 3 2	88.9 6.7 4.4	75.9-96.3 1.4-18.3 0.1-11.8	χ^2=9.155 P<0.001 ddl=44

Table 7. Distribution of children according to the consumption of the family dish

Parameters	Variables/ caractéristics	Effective	Percentage (%)	95% confidence Interval	Values of the statistical Test
Family dish	yes no	32 174	15.5 84.5	10.9-21.2 78.8-89.1	χ^2=72.914 P<0.001 ddl=205
Start of family dish (month)	3-5 6-8 9-11 12-14 Greater than 15	02 13 14 02 01	6.3 40.6 43.8 6.3 3.1	0.8-20.8 23.7-59.4 26.4-62.3 0.8-20.8 0.1-16.2	χ^2=24.288 P<0.001 ddl=31
Family dish / day	1time/j 2time/j	23 9	71.9 28.1	53.3-86.3 13.7-46.7	χ^2=15.866 P<0.001 ddl=31

Table 8. Distribution of children by type of family dish consumed

Parameters	Variables/ caractéristics	Effective	Percentage (%)	95% confidence Interval	Values of the statistical test
Family dish type	Fish Alternate mixing	3 29	9.4 90.6	2.0-25.0 75.0-98.0	χ^2=21.131 P<0.001 ddl=31
Container dish	Refined oil Alternate mixing	4 28	12.5 87.5	3.5-29.0 71.0-96.5	χ^2=23.149 P<0.001 ddl=31

Table 9. Indicators describing infant feeding practices

Parameters	Percentage (%)
Exclusive breastfeeding rate (0-6 months)	22.96
Predominant breastfeeding rate (0-6 months)	94.81
Feeding rate completed in a timely manner (6-9 months)	86.15
1 year breastfeeding continuation rate	58.33
Bottle feeding rate (<6 months)	40.74

Table 10: Prevalence of acute malnutrition by weight-for-height index in z-scores, by age group

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 et <-2 z-score)		Normal (> = -2 z score)	
Âge (months)	Total no.	No.	%	No.	%	No.	%
0-5	114	2	1,8	3	2,6	109	95,6
6-11	75	1	1,3	8	10,7	66	88,0
12-23	17	1	5,9	0	0,0	16	94,1
Total	206	4	1,9	11	5,3	191	92,7

Table 11. Prevalence of underweight according to the weight-for-age index in z-scores, by age group

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 et <-2 z-score)		Normal (> = -2 z-score)	
Âge (months)	Total no.	No.	%	No.	%	No.	%
0-5	114	3	2,6	4	3,5	107	93,9
6-11	75	1	1,3	7	9,3	67	89,3
12-23	17	0	0,0	2	11,8	15	88,2
Total	206	4	1,9	13	6,3	189	91,7

Traditional porridge, consumed by 52.5% of children surveyed; imported porridge consumed by 15.3% of children surveyed. 32.2% consume both types of porridge. The difference is very significant, with p <0.001. As for the nature of the porridge, corn porridge is the most consumed with 52.5%. 3.4% of the phosphatine, cerelac and bledin slurries are consumed; 2.5% and 5.1% of children surveyed. Children who consume an alternating mixture of porridge represent 35.6%.
Other porridge including soy porridge, rice is consumed by 0.8% of children surveyed. The difference is very significant, with p <0.001. Among children who consume porridge, 60.2% consume porridge with the addition of other foods to the porridge, compared to 39.8% of children who do not add other foods. The difference is very significant, with p <0.001. Speaking of adding the food to the porridge, the results show that, 46.5% of children consume the porridge with the addition of a mixture of other foods. Milk powder alone represents 33.8%. 11.3% add the cheese and 2.8% the condensed milk. The other foods cited by mothers represent 5.6%. These are honey, egg, tomato, peanut paste, spinach, and oil. The difference is very significant, since p <0.001.

Special dish consumption: Table 6 presents the results on the consumption of special dishes by the child. Table 6 shows that 21.8% of the children surveyed take a special dish and 78.2% do not. The difference is very significant, with P <0.001. As for the daily frequency of taking the special dish, it appears that 82.2% of children take the dish only once / day, while 17.8% take it twice / day. The difference is very significant, with P <0.001. Regarding the age of introduction of special dishes, the results show that, 8.9% and 66.7% of children had an early introduction of the special dish respectively before the age of 6 months and the age included 6- 8 months. 22.2% started with this dish in the age group between 9-12 months. Those who started taking the special dish at an age above 12 months are poorly represented (2.2%). The difference is very significant, since P <0.001. Regarding the discontinuation of the special dish, 88.9% of children still continue to take their special dish. While, 6.7% stopped at the age of 9 to 12 months. But there were also those who stopped with the special dish when they were over 12 months old. The difference is very significant, since P <0.001.

Taking the family dish: Table 7 presents the results on children who consume family meals, the age at which they started consuming them and the daily frequency of eating these meals. The results in Table 7 show that, 15.5% of children already eat family meals; in contrast, 84.5% have not yet taken it, with P <0.001. Regarding the beginning of the consumption of family dishes, the observation is that they were introduced very early in children. The highest percentage is 43.8%, observed in children aged 9-11 months, then 40.6% in children aged 6-8 months. Children of 3-5 months are represented at 6.3%. Children with an age between 12-14 months represent 6.3% and there is also a late introduction of 0.5% of children who are over the age of 15 months. The statistical test reveals a very significant difference, since P <0.001. For daily consumption, the results show that the frequency of taking a day is higher with 71.9%, against 28.1% of taking a day (P <0.001).

Types of family dish consumed by children under 2 years of age: Table 8 presents the results on the types of family meals consumed by the children surveyed. The results in Table 8 show that, 96.6% of children make an alternating mixture of the dishes they eat among which there are: meat, vegetables, legumes, gnetum. 9.4% of children eat nothing but fish. Respondents who took an alternating mixture of palm oil, peanut oil, peanut paste and squash paste had a very high percentage of 87.5 versus those who took oil only refined (12.5%). Overall the difference is very significant, P <0.001.

Indicators used to describe and assess infant feeding practices: To determine these indicators, a breakdown of children by age was established. Table 9 presents the results on the indicators describing infant feeding practices. Table 9 shows that in Brazzaville the rate of exclusive breastfeeding is low, with a percentage of 22.96. The prevailing breastfeeding rate is high, with a percentage of 94.81. The rate of feeding completed in a timely manner is 86.15%. The one-year (1 year) continuing breastfeeding rate is 58.33%. The bottle feeding rate is 40.74%.

Nutritional status of children: The accuracy of the nutritional status of children takes into account the P/T, P/A and T/A benchmarks.

Weight versus size index: The results of the weight-for-height index are presented in Table 10. The results in Table 10 show that, severe wasting affects the different age groups with a small percentage (1.9%), moderate wasting affected only two age groups (0-5 months and 6-11 months), which corresponds to 5.3% of the population. 92.7% of children have normal nutritional status.

Weight index relative to age: Table 11 presents the results of the weight-for-age index. The results in Table 11 show that 1.9% of children are severe, compared to 6.3% who are moderate and 91.7% of children are in good nutritional status.

Size versus age index: The results of the size versus age index are presented in Table 12. For stunting, Table 12 shows that 4.4% of children suffer from severe chronic malnutrition, compared to 9.2% who suffer from moderate chronic malnutrition. While 86.4% present a normal state.

DISCUSSION

With regard to the sex of the children surveyed, the whole sample shows that girls predominate compared to boys with respective percentages of 51.5 and 48.5 and a sex ratio of 0.9. These results are similar to those obtained by N'golo (2010), who found 55.1% of girls against 44.9% of boys and a sex ratio of 0.81. This predominance was also observed by Claudie (2011), who found a female predominance in Sikasso with a sex ratio of 0.9. This difference could be explained by the fact that the sperm carrying the Y chromosome (boy) would be less resistant and with an ephemeral lifespan compared to the sperm carrying the X chromosome (girl), which has a longer lifespan (Anne, 2016). One of the major causes of death and morbidity in early childhood is low birth weight. The study showed that 10.2% of children have a birth weight less than 2.5 kg. This result is of the same order as that reported in a final report carried out in Congo EDSC-II (2011) which shows that, among the children whose birth weight is known at birth, 10% were of low birth weight (less than 2.5kg). This result is also similar to that obtained by Nitou *et al* (2012) who find that in Djambala, 11.8% of children were born with a low birth weight. This low birth weight could be explained by the fact that, during pregnancy, pregnant women were malnourished or

that their food intake did not satisfy their physiological state. This may have influenced the baby's birth weight.

Breastfeeding practice: Speaking of taking colostrum, the study found that 75.7% of children took colostrum. This observed rate is of the same order as that obtained by Sawadogo *et al* (2003) in Burkina Faso, which shows a percentage of 77%. On the other hand, it is low compared to that obtained by Tchimbakala (2016) which finds 92.0%. This low intake rate of colostrum in our study, could be explained by the lack of knowledge of some mothers on the importance of this first milk. The breastfeeding rate for the study is 95.1%. These results are similar to those obtained by Tchimbakala (2016) in the Congo, which finds a breastfeeding rate of 96.6%. It is also close to that obtained by Arnaud (2004) in Côte-d´Ivoire which found 93.9%. But this rate is high compared to those obtained by Loyeke *et al* (2006) in the Equator province and by Nlend *et al* (1997) in Cameroonian urban areas with respective percentages of 73.5 and 86. By cons this rate is lower than that obtained by Gamgne (2009) in Cameroon and by Tchibindat *et al* (1994) in Congo in rural areas, which found 99% and 100% respectively. This breastfeeding rate could be explained by the fact that in Brazzaville, women adopt the mode of breastfeeding from the birth of the newborn. Regarding breast initiation after birth, the study showed breastfeeding immediately after birth (less than 1 hour) with a rate of only 9.2%. This result is low compared to that obtained by N'golo (2010) and Sawadogo *et al* (2003) who found rates of 58.3% and 20% respectively of the immediate breastfeeding of the newborn after birth.

Also, the study showed that 46.4% of children would breastfeed for the first 24 hours. This rate is lower than that obtained by Sawadogo *et al* (2003) which is 67%. On the other hand, it is high than that obtained by N'golo (2010), who found 18.9% of children breastfed on the same day of birth of the newborn. The study conducted showed that 44.4% of children would receive breast milk 24 hours after birth. This result is higher than that obtained by Sawadogo *et al* (2003), who found 13% of children who waited longer (more than 24 hours). The study showed an exclusive breastfeeding rate of 22.96%. This value could be explained by a low, see the lack of nutritional education in Integrated Health Centers. This rate is higher than that obtained by Savadogo (2007) in Mali and by Sonogo (2003), who found respectively 13.5% and 2.5% of children aged 0-6 months exclusively breastfed. This difference could be explained by the fact that mothers do not comply with WHO recommendations. On the other hand, this rate is close to that obtained in EDSC-II (2012) and that obtained by Chiabi *et al*. (2011), who found 21% and 20% respectively. These close values can be explained by the fact that our study and those carried out by the EDSCII, Chiabi *et al*, the women respect the recommendations of the WHO. The predominant breastfeeding rate is 94.81%, higher than that of Sawadogo *et al*. (2003), who found 71% of children under 6 months of age were predominantly breastfeeding. This rate shows that most of the children in Brazzaville are fed mainly breast milk.

Our study shows a timely feeding rate of 86.15%, this rate was also observed in a final report of the ESDC-II (2012) which states that a high proportion of Congolese children receive complementary foods while continuing to be 86% breastfed (6-8 months). This rate is higher than that obtained by Tchimbakala (2016), which found 27.77%. This rate obtained in our study can be explained by the fact that the majority of children surveyed receive complementary foods in a timely manner and that the minority receive them early or late. The result on the rate of continuation of breastfeeding at 1 year of our study (58.33%) is lower than that reported by Rambeloson *et al*. (2005) and by Arnaud (2004) who find 89.9% and 97.6% respectively.

This low rate could be explained by the occupation of mothers, who can no longer find enough time to breastfeed the baby or by the baby's refusal to breastfeed. study shows that, 36.9% of children took a bottle, this rate is lower than that obtained by Lassana (2008) who found almost half of the children (53.4%) before the disease were fed breast and bottle. 89.5% of children (0-2 months) start taking the bottle. This rate is higher than that of Health (2010), which shows 56% of children who took a bottle from birth. The bottle feeding from birth could be explained by the fact that mothers are forced to practice this mode of breastfeeding because of the lack of production of breast milk in these women.

Complementary feeding: The results of the study indicate that a water intake from 6 months with a rate of 34.1% of children. This rate is very low from the point of view of WHO recommendations. This indicates that, the majority of children took water before the age of 6 months. The study carried out shows that 33.9% of children have taken porridge from 6 months. This result is low compared to that obtained in Burkina Faso in a national nutritional survey (2012), which found 57.4%. This rate is very low because the WHO recommends a food diversification from 6 months. This low rate can be explained by an early introduction of complementary food before this age. 60.2% of children eat improved traditional porridge, that is to say a traditional porridge to which other foods are added. This result is higher than that obtained by Tchimbakala (2016) who finds that, the improved traditional porridge was consumed at 50%. Regarding simple traditional porridge, that is to say, no addition of any other food (except sugar), the study shows a consumption of 39.8%. This rate is higher than that obtained by Tchimbakala (2016), namely, (27.1%). It is closer to that obtained by Pinaud (2004) (37%). In the study undertaken, the highest daily frequency of porridge intake is 2 times. This result differs from that obtained by Nitou *et al* (2012), who finds that three meals represent the highest number of porridge meals ingested by infants in 24 hours. This difference in frequency could be explained by the fact that, the survey carried out by Nitou *et al*, takes into account a locality which has a traditional way of life. However, it is recognized that in developing countries, porridge lacks protein, lipids, a source of micronutrients and is of low energy density (Dewey, (2003); Elenga *et al*. (2009)). Trèche S. (1995) pointed out that it would be necessary for a 6 month old boy to consume porridge 4 times a day in order to supplement the energy intake of breast milk. According to the feeding schedule for infants and young children, special dishes and family dishes should be introduced from 9 months and 12 months respectively. The results obtained in the study undertaken, show the rates of 22.2% for the age ranging from 9-12 months and 6.3% for those from 12 months. These low rates are explained by an early introduction of these different types of dishes.

Nutritional status of children

Prevalence of wasting (Weight / Height): Our study shows that acute malnutrition is 1.9% in the severe form and 5.3% in

the moderate form. Our results are higher than those obtained in Algeria by MICS2 (2000), with the prevalence of wasting in its severe form of 0.6% and of wasting 2.8% for the moderate form. For the severe form, our results are close to those obtained in Togo by Sawadogo *et al* (2003), which shows 2.9% and 2% respectively of severe wasting. This rate is lower than that obtained UNICEF (2009) in Togo, where the national rate of acute malnutrition was 14%; as well as in Sudan and Bangladesh by 16% for each. These rates are also different from that of Ousmane (2003) who found 18.4% of severe malnutrition and 16.5% of moderate malnutrition whose weight / height ratio was evaluated.

Prevalence of underweight (Weight / age): We found a prevalence of 1.9% of severe underweight and 6.3% of moderate form. Our results are close to those obtained in a study carried out in Algeria by MICS2 (2000), which found a prevalence of underweight of 6% including 1.3% of the severe form. Our results are very weak compared to those indicated in Black African Medicine (1999) which found 5.1% and 19% respectively of severe and moderate malnutrition.

Prevalence of chronic malnutrition (height / age): Study shows 4.4% stunting in children in the severe form against 9.2% in the moderate form. Our results are weak than that of Tchimbakala (2016) who found 26.1% stunting in the severe form and 18.2% in the moderate form. It is as low as that reported in a final ESDC-II report (2012) which is 8.0% severe stunting and 24.4% moderate stunting. A study by Lassana (2008) shows a prevalence of 23.3% in the severe form and 34.5% in the form, these rates are higher than our results. Our results are also weaker than those of Agbère (2008) in Togo, who found that 44.6% of children had severe stunting and 22.4% moderate.

Conclusion

Food practices carried out in Brazzaville towards children under two years of age are not good practices. The early introduction of complementary foods, the low frequency of daily consumption, the low percentage of breastfeeding immediately after birth, are all the factors that have led to wasting, stunting and underweight of the children surveyed.

Conflict of interest: The authors declare that they have no conflict of interest.

Authors 'Contributions: All the authors participated in the survey, in the data analysis, in the funding and approved the final version of the manuscript.

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APPENDIX: Survey sheet

UNIVERSITY MARIEN NGOUABI
SCIENCES AND TECHNOLOGIES FACULTY
COURSE: BIOLOGICAL SCIENCES
OPTION: HUMAN NUTRITION

SURVEY SHEET

Survey on food practices and nutritional status of children aged 0 to 2 years in Brazzaville

Child's first and last name:.....

Date of Birth : .....

Child's weight: .....(Kg)

Child size: .....(Cm)

Household address:.....

Sex : Male ☐ female ☐

Name of mother or caregiver: .....

Name of CSI :.....

Borough:.....

District :.....

General information about the child

1. Age of children. 1=0 to 2 months ☐ 2=3 to5months ☐ 3=6 to 8months ☐
   4=9to11months ☐ 5=12to14months ☐ 6=15to17months ☐
   7=18to20months ☐ 8=21to24months ☐
2. birth weight. 1=[1to2.5kg] ☐ 2=[2.5to3.5kg] ☐ 3= [3.5to4kg] ☐

Clinical signs

3. Child has edema? 1=yes ☐ 2 =no ☐
4. If yes? are they: 1: localized ☐ 2 : generalized ☐
5. Does this hair fade and fall out? 1= yes ☐ 2= no ☐
6. The child's skin condition. 1= dry skin ☐ 2=scal ☐ 3=normal ☐
7. Disorders observed in children. 1=Anorexia ☐ 2= behavior change ☐

3= sunken eyes ☐ 4=distended skin ☐ 5=normal ☐

Child feeding

12. Did the child take the first milk (colostrum)? 1=yes ☐ 2=no ☐

13. Does the child take breast milk? 1=yes ☐ 2=no ☐

14. If yes, how long after birth did you put her on the breast? 1=less than 1 hour ☐

2= less than 24 hours ☐ 3=more than 24 hours ☐

15. How many times a day does the baby take breast milk? 1=once ☐ 2=twice ☐ 3=three times ☐ 4=more than 4 times ☐

16. How is the timing of breastfeeding decided? 1=When the child cries ☐ 2=According to / schedule ☐ 3=Other to be specified ☐

17. How many months (year) did you breastfeed? 1=Breastfeeding stock ☐ 2=From 0 to 2 months ☐ 3=From 2 to 4 month ☐ 4=From 4 to 6 months ☐ =Over 6 months ☐ Up to 2 years ☐

18. At what age did you start giving him water? 1=Not yet ☐ 2=From 0 to 2 months ☐ 3=From 4 to 6 months ☐ 4=From 6 months ☐

19. How many times a day does the child take water? 1=once ☐ 2=twice ☐ 3=three times ☐ 4=more than 4 times ☐

20. What type of water do you give the child? 1=Tap water ☐ 2=Well water ☐ 3=Boiled / cooled water ☐ 4=Water / drilling ☐ 5=Other to be specified .....

21. Does the child take the bottle? 1=yes ☐ 2=no ☐

22. If yes, from what age did he start taking the bottle?.....

23. Has the child ever stopped taking the bottle? 1=yes ☐ 2=no ☐

24. If yes, from what age did he stop taking the bottle?.....

25. From what age did you start giving her porridge? 1=Not yet ☐ 2=From 0 to 2 months ☐ 3=From 2 to 4 months ☐ 4=From 4 to 6 months ☐ =From 6 months ☐

26. How many times a day does he take porridge? 1=once ☐ 2=twice ☐ 3=three times ☐ 4=more than 4 times ☐

27. At what age did he stop taking porridge? 1=less than 6 months ☐ 2=from 6 months ☐ 3=between 6 and 9 months ☐ 4=between 9 and 12 months ☐ =more than 12 months ☐

28. What type of porridge does he take or has he taken? 1=Traditional ☐ 2=Imported ☐

3= Both ☐

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