FOOD INSECURITY AND DISASTERS – AN ANALYSIS OF THE FOOD CONSUMPTION OF THE CHILD POPULATION AFFECTED BY AN ENVIRONMENTAL DISASTER

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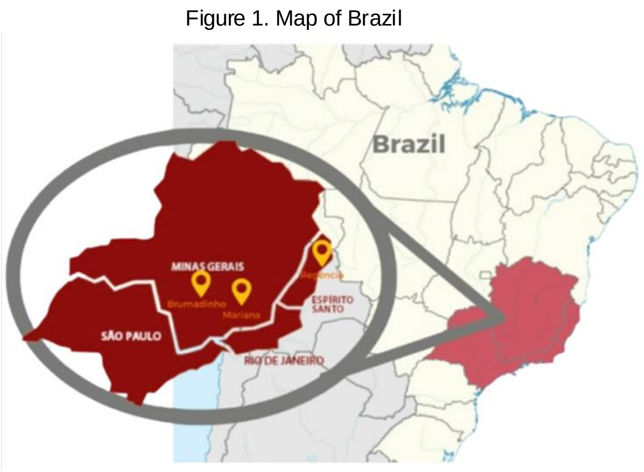
INTRODUCTION

The Brumadinho disaster, which occurred in 2019 in the state of Minas Gerais, was caused by the collapse of a mining tailings dam. The tailings slurry spread across a large area of the country, causing the deaths of hundreds of people, socio-environmental impacts, contamination of soil and water by heavy metals, damage to property and local infrastructure, and the loss of local production capacity (Peixoto & Asmus, 2020).

Figure 1. Map of Brazil



Source: Primo et al., 2021.

The occurrence of a disaster can causes changes in the social dynamics and lifestyle of the population, leading to a reduction in physical activity and changes in their eating patterns, either due to difficulty in accessing natural foods or fear of contamination. Studies indicate an increase in the consumption of ultra-processed foods in crisis situations. These, in turn, have a high energy density and low nutritional value and are associated with several chronic non-communicable diseases such as obesity and other chronic diseases in children. Macro and micronutrient deficiencies such as iron, vitamin B1, vitamin B3, vitamin A, protein, among others, are also common in populations affected by disasters, caused by an inadequate nutrition Children are especially vulnerable, as a healthy and adequate diet is essential for their growth and development (Adeoya *et al.*, 2022).

The objective of the study was to analyse the food consumption of children aged 0 to 6 years living in areas affected by an environmental disaster caused by a mining dam colapse in Brumadinho, Minas Gerais, Brazil.

MATERIALS AND METHODS

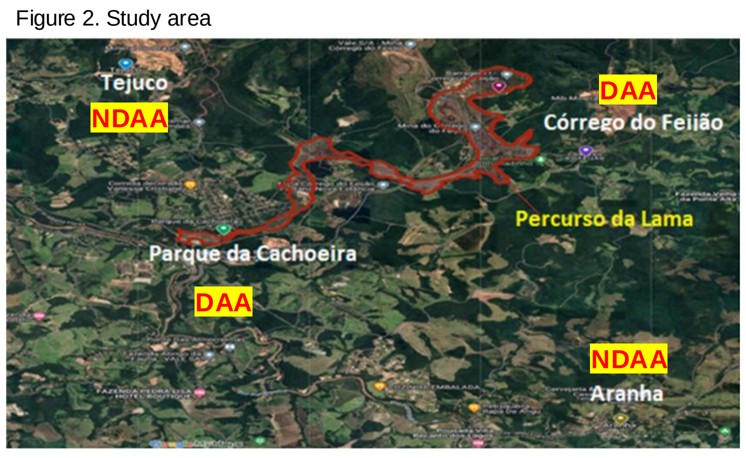
Type and study population

A descriptive study whose population is composed of children aged 0 to 6 years living in areas affected by an environmental disaster.

Study area

The study were carried out in two areas: directly affected area (DAA) and area not directly affected (NDAA) by the environmental disaster (figure 2).

Figure 2. Study area



Source: Bruminha Project - UFRJ.

Data sources

Data collection was carried out in August 2022, through interviews with questionnaires administered to the mothers/responsible of the child.

Sociodemographic variables were collected by the application of Socio-environmental questionnaire.

The Food Consumption Markers Form of the Brazilian Food and Nutrition Surveillance System Data were used to collect data about food consumption pattern on the day before the interview. There are three different forms: one to children under six months, one to children from 6 to 23 months and one to children from 24 months or over. These forms was based on a document on indicators for assessing infant and young child feeding practices published by the World Health Organization.

In the present study, it was used data collected by two forms: from 6 to 23 months and 24 months or over.

From 6 to 23 months - The objective of the questions for this phase is to characterize the diet from 6 months of age and the adoption of risk behavior, both for the assessment of food consumption and for the occurrence of micronutrient deficiency and excess weight.

24 months or over - It was developed with the aim of identifying healthy or unhealthy eating and behavior patterns (Brazil, 2015).

The healthy eating markers analyzed in the present study were fruits, vegetables, legumes, rice and meat; the unhealthy ones were sweets, stuffed biscuits, instant noodles, packaged snacks, savory biscuits, hamburgers/sausages, soft drinks and sweetened drinks.

Statistical analysis

Descriptive analyzes were carried out using frequency distributions and data were presented as percentages. Pearson's chi-square test were used to evaluate differences in variable frequencies and ANOVA test were used to compare means. The software used was the Statistical Package for the Social Sciences (SPSS).

RESULTS

A total of 189 children were evaluated, 23.3% (n=44) aged between 6-23 months and 76.7(n=145) aged 24 months or over; 51.8% (n=98) of them living in directly affected area (DAA) and 48.2% (n=91) living in not directly affected área (NDAA).

The average length of time is 35±20,5 months (p=0.915), 50.5% of participants are female and 49.5% are male (p=0.564), and 67.7% are non-white children (p=0.511).

Table 1 shows the socioeconomic characteristics of responsible for children.

Table 1. Socioeconomic characteristics – responsible for children

Characteristics/area	NDAA	DAA	Total	p-value
Race – N(%)*				
Non-white person	51(73.9)	29(82.8)	80(77)	0.221
White person	18(26.1)	6(14.2)	24(23)	
Total	69(100)	35(100)	104(100)	
Average per capita income (U$) – (mean±PD)	158.4±101.7	159.6±71.8	153,1±91,7	0.666
Government assistance – N(%)				
Yes	34(31.5)	19(35.2)	53(32.7)	0.381
No	74(68.5)	35(64.8)	109(67.3)	
Total	108(100)	54(100)	162(100)	
Income changes after disaster – N(%)				
Yes	29(44)	19(57.6)	48(48.5)	0.163
No	37(56)	14(42.4)	51(51.5)	
Total	66(100)	33(100)	99(100)	

missing=58;missing=63*
Legend: NDAA= not directly affected area; DAA= directly affected area

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RESULTS

Table 2 shows the consumption of healthy eating markers by group. In both groups studied, the highest percentage of children who did not consume the four healthy eating markers live in DAA. However, no statistically significant difference was found between the two groups. In group 2, were observed that 92.8% of children who did not consumed meat live in DAA (p=0.026).

Table 2. Consumption of healthy eating markers by group

CHILDREN AGED 6 TO 23 MONTHS – G1 (N=44)

Area/frequence	None	1-3 times/ week	4-6 times/ week	Daily	Total	p-value
Fruits – N(%)						
NDAA	0	5(55.5)	1(33.3)	10(32.2)	16(36.4)	0.490
DAA	**1(100)**	4(44.5)	2(66.7)	21(67.8)	28(63.6)	
Total	**1(100)**	**9(100)**	**3(100)**	**31(100)**	**44(100)**	
Vegetables and legumes– N(%) *						
NDAA	0	5(35.7)	2(66.7)	9(42.8)	16(42.1)	0.229
DAA	0	9(64.3)	1(33.3)	12(57.2)	22(57.9)	
Total	**0**	**14(100)**	**3(100)**	**21(100)**	**38(100)**	
Meat – N(%)						
NDAA	0	2(40)	4(57.2)	10(40)	16(36.4)	0.167
DAA	**7(100)**	3(60)	3(42.8)	15(60)	28(63.6)	
Total	**7(100)**	**5(100)**	**7(100)**	**25(100)**	**44(100)**	
Rice – N(%)*						
NDAA	1(25)	1(33.3)	0	13(43.3)	15(39.5)	0.812
DAA	**3(75)**	2(66.7)	1(100)	17(56.7)	23(60.5)	
Total	**4(100)**	**3(100)**	**1(100)**	**30(100)**	**38(100)**	

CHILDREN FROM 2 TO 6 YEARS OLD – G2 (N=145)

Area/frequence	None	1-3 times/ week	4-6 times/ week	Daily	Total	p-value
Fruits, vegetables and legumes– N(%)**						
NDAA	4(30.7)	11(42.3)	8(50)	42(48.3)	65(45.7)	0.653
DAA	**9 (69.3)**	15(57.7)	8(50)	45(51.7)	77(54.3)	
Total	**13(100)**	**26(100)**	**16(100)**	**87(100)**	**142(100)**	
Potato, yam, cassava, manioc, flour or pasta – N(%)***						
NDAA	5(45.5)	43(48.3)	9(69.3)	9(29)	66(45.8)	0.110
DAA	**6(54.5)**	46(51.7)	4(30.7)	22(71)	78(54.2)	
Total	**11(100)**	**89(100)**	**13(100)**	**31(100)**	**144(100)**	
Meat – N(%)***						
NDAA	1(7.2)	16(43.3)	10(58.8)	40(52.6)	67(46.5)	0.026
DAA	**13(92.8)**	21(56.7)	7(41.2)	36(47.4)	77(53.5)	
Total	**14(100)**	**37(100)**	**17(100)**	**76(100)**	**144(100)**	
Rice – N(%)						
NDAA	1(25)	2(50)	1(16.7)	63(48.1)	67(46.2)	0.380
DAA	**3(75)**	2(50)	5(83.3)	68(51.9)	78(53.8)	
Total	**4(100)**	**4(100)**	**6(100)**	**131(100)**	**145(100)**	

**missing=6; **missing=3; ***missing=1.Legend: NDAA= not directly affected area; DAA= directly affected area*

The unhealthy eating markers by group are presented in the table 3. In both groups and areas studied, were observed the consumption of ultra-processed foods (UPFs). The most frequent consumption of UPFs were reported in DAA. However, no statistically significant difference was found between the two groups.

Table 3. Unhealthy eating markers by group

CHILDREN AGED 6 TO 23 MONTHS – G1 (N=44)

Area/frequence	No	1-3 times/ week	4-6 times/ week	Daily	Total	p-value
Hamburger/sausage – N(%)						
NDAA	13(37.2)	3(33.3)	0	0	16(36.4)	0.507
DAA	22(62.8)	**6(66.7)**	0	0	28(63.6)	
Total	**35(100)**	**9(100)**	**0**	**0**	**44(100)**	
Soft drinks/sweetened beverages – N(%) *						
NDAA	9(39.1)	4(33.3)	0	3(37.5)	16(36.4)	0.740
DAA	14(60.9)	8(66.7)	1(100)	**5(62.5)**	28(63.6)	
Total	**23(100)**	**12(100)**	**1(100)**	**8(100)**	**44(100)**	
Instant noodles, packaged snacks and salty biscuits – N(%)						
NDAA	12(38.7)	3(30)	**1(100)**	0	16(36.4)	0.371
DAA	19(61.3)	**7(70)**	0	**2(100)**	28(63.6)	
Total	**31(100)**	**10(100)**	**1(100)**	**2(100)**	**44(100)**	
Stuffed biscuits, sweets or treats – N(%)						
NDAA	13(43.3)	2(22.2)	0	1(33.3)	16(36.4)	0.444
DAA	17(56.7)	7(77.8)	**2(100)**	**2(66.7)**	28(63.6)	
Total	**30(100)**	**9(100)**	**2(100)**	**3(100)**	**44(100)**	

CHILDREN FROM 2 TO 6 YEARS OLD – G2 (N=145)

Area/frequence	No	1-3 times/ week	4-6 times/ week	Daily	Total	p-value
Hamburger/sausage – N(%)*						
NDAA	32(49.2)	33(44.6)	1(33.3)	1(50)	67(46.5)	0.772
DAA	33(50.8)	**41(55.4)**	**2(66.7)**	1(50)	77(53.5)	
Total	**65(100)**	**74(100)**	**3(100)**	**2(100)**	**144(100)**	
Soft drinks/sweetened beverages – N(%)**						
NDAA	9(37.5)	37(50)	12(63.1)	9(34.6)	67(46.8)	0.213
DAA	15(62.5)	37(50)	7(36.9)	**17(65.4)**	76(53.2)	
Total	**24(100)**	**74(100)**	**19(100)**	**26(100)**	**143(100)**	
Instant noodles, packaged snacks and salty biscuits – N(%)*						
NDAA	24(51.1)	37(50)	5(38.5)	1(10)	67(46.5)	0.093
DAA	23(48.9)	37(50)	**8(61.5)**	**9(90)**	77(53.5)	
Total	**47(100)**	**74(100)**	**13(100)**	**10(100)**	**144(100)**	
Stuffed biscuits, sweets or treats – N(%)*						
NDAA	21(60)	26(37.7)	10(50)	10(50)	67(46.5)	0.171
DAA	14(40)	**43(62.3)**	10(50)	10(50)	77(53.5)	
Total	**35(100)**	**69(100)**	**20(100)**	**20(100)**	**144(100)**	

**missing=1; **missing=2. Legend: NDAA= not directly affected area; DAA= directly affected area*

UPFs consumption is considered one of the leading causes of the current pandemic of obesity and non-communicable diseases, as these products are more caloric, have larger amounts of sugar, sodium and fat and lower protein and fiber content, when compared to fresh or minimally processed foods (Lopes *et al.,* 2020).

A higher consumption of UPFs is positively associated with body mass index, waist circumference, fat mass index, and fasting plasma glucose (Khoury *et al*., 2024).

According to Brazilian Guidelines, UPFs foods should not be offered to children, always giving preference to natural and minimally processed foods (Brazil, 2015).

Food choices can be determined by several factors: biological, social, cultural and economic. It is important to note that 57.6% of residents in DAA reported income changes after disaster and 64.8% of them reported do not receive government assistance. Studies show that the consumption of UPFs is positively related with low family income (Louzada *et al.,* 2023).

CONCLUSION

The occurrence of disasters can cause impacts on the entire food system, compromising access to quality food in sufficient quantity and, therefore, threatening the guarantee of Food Security of the population and causing the violation of the human right to adequate food. However, there are few studies in the literature about this, especially considering children.

An eating pattern marked by the consumption of unhealthy foods was observed in the population studied during early childhood, which can cause short, meddium and long-term effects to health, harming their growth and development.

Although we do not have information on the eating patterns of the population studied before the event, analysing the food consumption patterns of population affected by disasters is essential to guide comprehensive health care actions. This information is important to support the planning of public policies aimed at promoting healthy eating and to guarantee the food right in the face of adverse events.

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