

## The Impact of Food Security on the Nutritional Status of Children under 5 in the Bandiagara Circle in Mali

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### Abstract

### Original Research Article

**Background:** Child malnutrition remains a real public health problem in developing countries, including Mali. Several studies have been conducted to assess the prevalence of malnutrition and food security (EDS, ENSAN, SMART etc.) but to our knowledge no study has focused on assessing the impact of food security on the nutritional status of children under 5 in the Bandiagara district. **Objective:** To assess the impact of food security on the nutritional status of children under 5 in the Bandiagara circle in Mali. **Methodology:** This study is cross-sectional, descriptive and quantitative, using a questionnaire to assess the impact of food security on the nutritional status of children aged 6-59 months in the Bandiagara circle. It took place from August 1, 2021 to July 31, 2022. **Results:** A total of 378 children under 5 years old were surveyed, including 26.5% MAM and 9.5% SAM with a low SCAM of 18.5% and an average of 10.1%. Child gender, mother's education, low income, and household size were identified as the most contributing factors to child malnutrition and food insecurity. **Conclusions:** Malnutrition constitutes a form of synthesis of the results obtained in the management of the four dimensions of food security (availability, accessibility, stability and use) and in the management of the interactions of the contributing factors.

**Keywords:** impact, malnutrition, child, food security, nutrition.

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## INTRODUCTION

Food security at the individual, family, national, regional and global levels exists when all human beings have, at all times, physical and economic access to sufficient, safe and nutritious food to meet their energy needs and food preferences for an active and healthy life [1].

In Mali, insecurity in the centre and north of the country continues to affect access to food for the most vulnerable, livelihoods and the agricultural and pastoral production capacities of the most vulnerable households. This is manifested by the lack of access to areas of agricultural production (family plots), livestock (pastures and water points) and trade (rural markets), or

the partial or total loss of means of production due to forced displacement. With 4.7 million people affected by food insecurity, including 2.3 million people with emergency assistance needs, 2020 was, according to the results of the Cadre Harmonisé (CH) exercises, the year most strongly marked by food insecurity since 2014 [2].

## OBJECTIVE

To assess the impact of food security on the nutritional status of children under 5 years of age in the Bandiagara circle.

## MATERIALS AND METHOD

This was a cross-sectional, descriptive and quantitative study, using a questionnaire to assess the

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impact of food security on the nutritional status of children aged 6-59 months in Bandiagara circle. It took place from August 1, 2021 to July 31, 2022. The study was conducted in the central Cscm of Bandiagara from 1 August 2021 to 31 July 2022 which covers a population of 20,166 inhabitants.

#### The variables in this study were:

- The dependent variable is the impact of food security on children's nutritional status
- Independent variables included
  - o Socio-demographic information of children and mothers/carers
  - o Types of children's diets
  - o The level of education of mothers/carers
  - o Mothers/carers' views on their child's nutritional status

#### Study Population

It concerned:

- All children under 5 years old who came to the central Cscm of Bandiagara.
- Mothers/carers of children under 5 who came to the central Cscm in Bandiagara.

#### Inclusion Criteria:

- **For Children:** All children under 5 years old who were received at the Cscm central of Bandiagara during the collection period for any reason.
- **For Mothers/Carers:** Mothers/carers of children under 5 years of age who have been at

the central CSCOM of Bandiagara during the period for whatever reason.

#### Non-inclusion Criteria:

- **For Children:** Cases of refusal and absence of parents or guardians.
- **For Mothers/Carers:** Cases of refusal or absence.

#### Sampling Methods

The sample size was calculated by **Raosoft®** software using the following parameters: 95% CI, 5% margin of error and normal distribution. The sample size with a population of 22,572 for 2020 gives 378 children.

#### Data Collection Techniques and Tools:

In this study we used a questionnaire to collect information about children and mothers/carers of children who have been to the central Cscm in Bandiagara.

Data were collected through a questionnaire addressed to mothers/carers and children to facilitate entry.

## RESULTS

### 4.1 Socio-Demographic Characteristics of Participants

A total of 378 companions of children aged 6 to 59 months were included in this study. All accompanying persons had voluntarily agreed to answer the questions in this study,

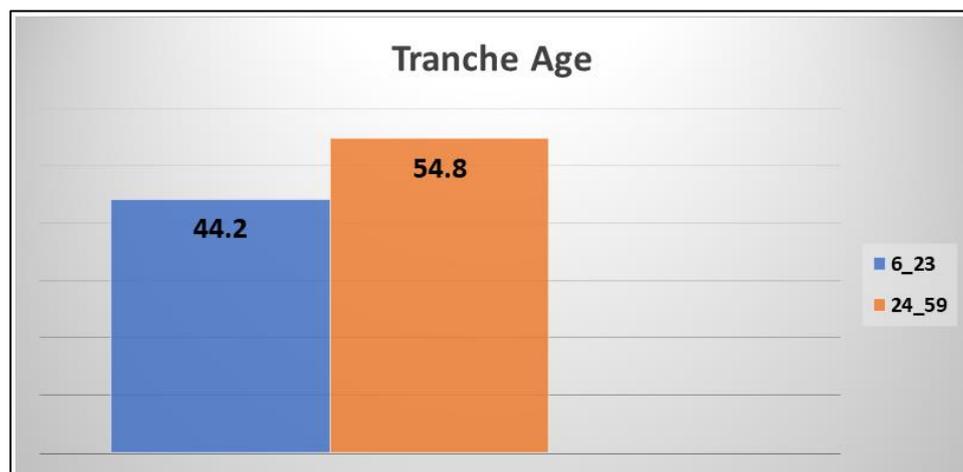
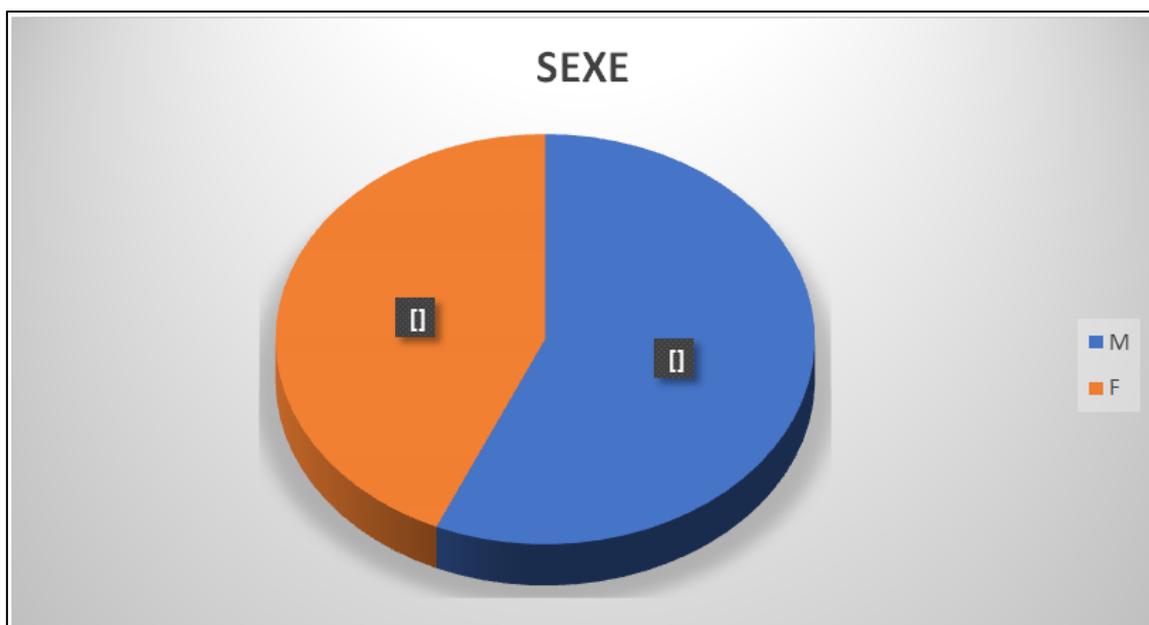


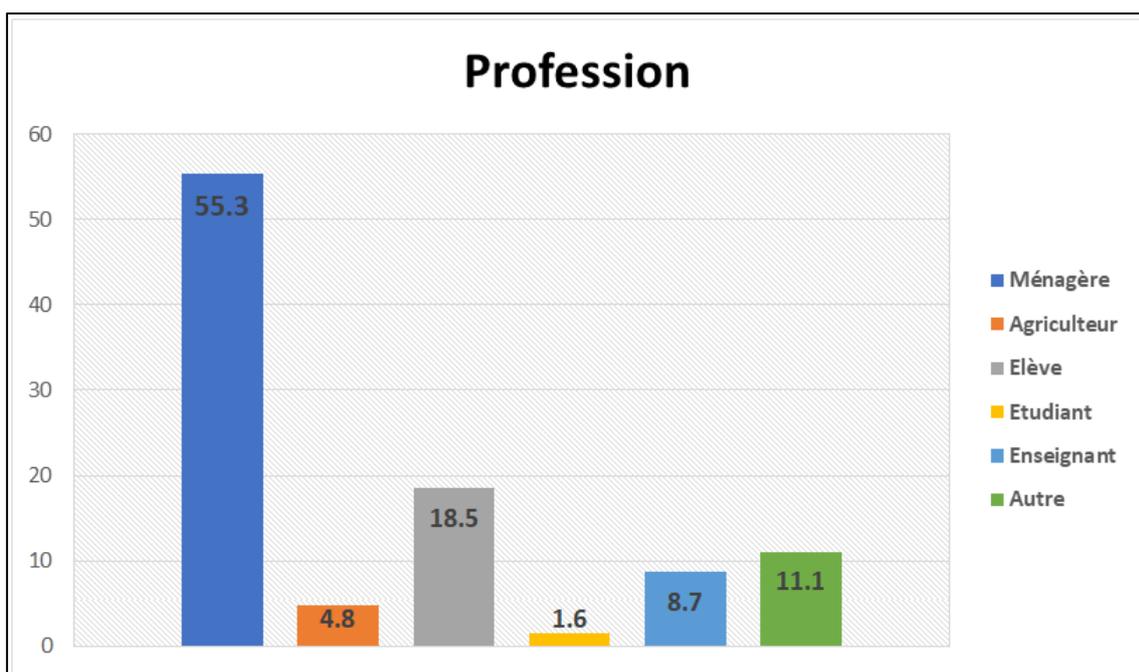
Figure 1: Distribution of children by age group; n=378

The most represented age group was 24-59 months or 54.8%.



**Figure 2: Distribution of children by sex, n = 378**

Male accounts for **57%** of the study population



**Figure 1: Distribution of accompanying persons by occupation, n = 378**

Housewives dominated the profession with **55.3%**

**Table 1: Distribution of accompanying persons by marital status, n = 378**

Marital status	Actual	Percentage
Married	321	84,9
Bachelor	55	14,6
Divorced	1	0,3
Widower	1	0,3

The marital status of accompanying persons was dominated by married couples with **84.9%**

**Table 2: Distribution of accompanying persons by level of education, n = 378**

Level of education	Actual	Percentage
Out of school	193	51,1
Primary	108	28,6
Secondary	31	8,2
Upper	46	12,2

The out-of-school dominated our study with **51.1%**.

**Table 3: Distribution of accompanying persons by monthly income, n = 378**

Monthly income	Actual	Percentage
0-40000	199	52,6
40001-300000	179	47,4

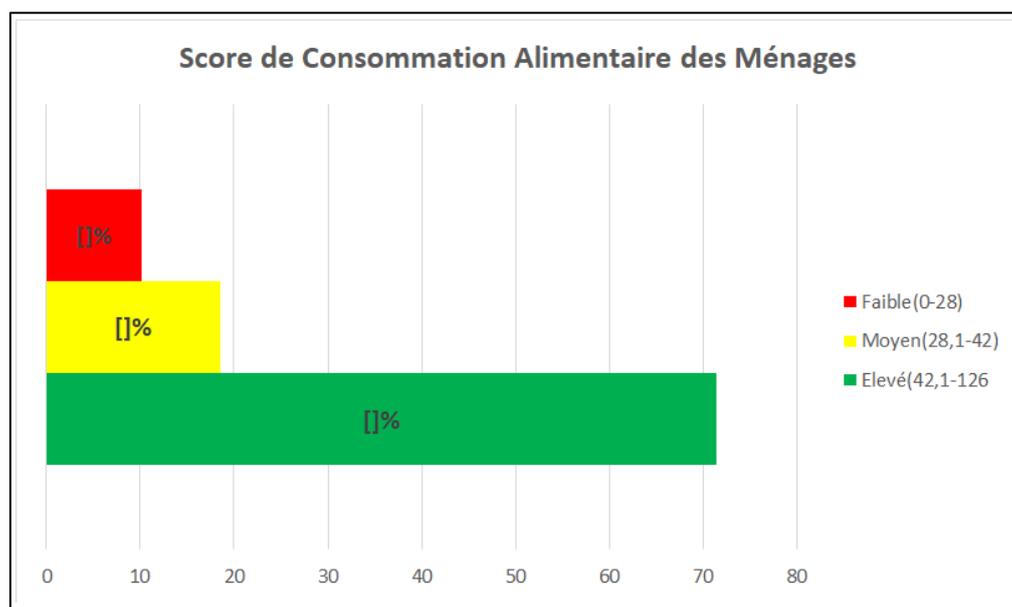
52.6% of our study population had a monthly income  $\leq$  40000fr.

4-2 The food consumption score (FCS) of Households:

**Table 4: Distribution of households by main food supply, n = 378**

Main source of food supply	Actual	Percentage
Own production	116	30,7
Purchase	237	62,7
Food aid	25	6,6
Borrowing, bartering, exchange for work, donations from friends or relatives	0	,0
Other	0	,0

The main source of food supply was dominated by purchasing at 62.7%.

**Figure 3: Distribution of households by household SCA, n = 378**

71.4% of the population had a high ACS

**Table 5: Distribution of families by skipping meals due to lack of means, n = 378**

Skipping meals	Actual	Percentage
No	360	95,2
Yes	18	4,8

95.2% of families in our study did not skip meals for lack of means.

## 4-3- The household dietary diversity score (SDA):

**Table 6: Distribution of families by breakfast, n = 378**

Breakfast	Actual	Percentage
Millet cake	106	28,0
Bassi	9	2,4
Rice with fat	47	12,4
Rice in sauce	9	2,4
Millet cake	16	4,2
Rice porridge	32	8,5
Millet porridge	148	39,2
Other	11	2,9

39.2% of our study population had millet porridge for breakfast.

**Table 7: Distribution of families by snack between breakfast and breakfast, n = 378**

Snack	Actual	Percentage
Millet cake	21	5,6
Bassi	3	,8
Rice with fat	29	7,7
Rice in sauce	8	2,1
Millet cake	22	5,8
Rice porridge	23	6,1
Millet porridge	156	41,3
Cake	22	5,8
Other	94	24,9

Snack was dominated by millet porridge with 41.3%

**Table 8: Distribution of families by breakfast, n = 378**

Lunch	Actual	Percentage
Millet cake	2	,5
Bassi	5	1,3
Rice with fat	50	13,2
Rice in sauce	71	18,8
Millet cake	245	64,8
Rice porridge	1	,3
Millet porridge	2	,5
Cake	1	,3
Other	1	,3

Tô was the most consumed meal at lunch with 64.8%.

**Table 9: Distribution of families by Dinner, n = 378**

Lunch	Actual	Percentage
Millet cake	1	,3
Bassi	20	5,3
Rice with fat	45	11,9
Rice in sauce	42	11,1
Millet cake	239	63,2
Rice porridge	11	2,9
Millet porridge	13	3,4
Cake	1	,3
Other	6	1,6

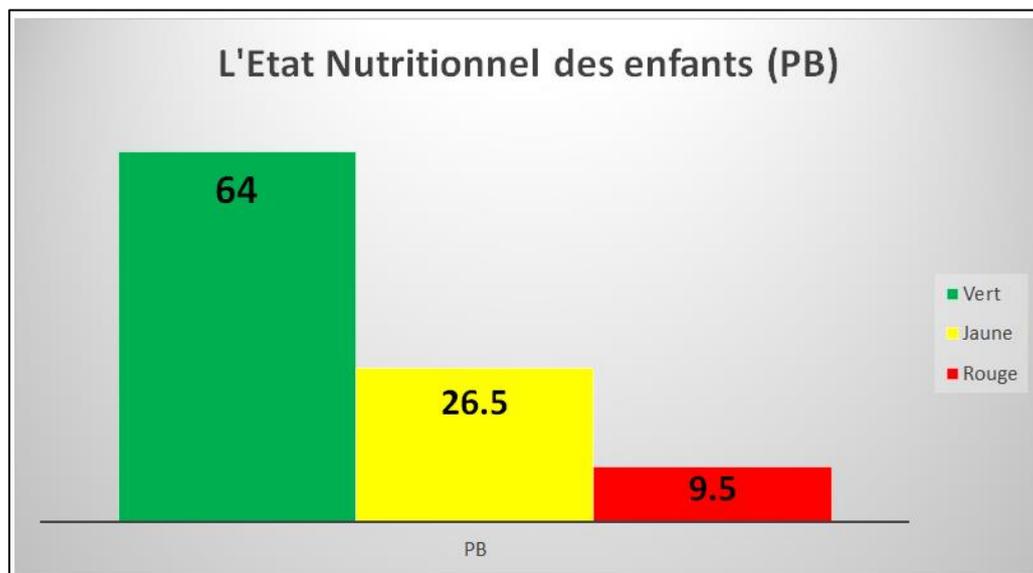
The Tô took the largest percentage also at dinner with 63.2%

**Table 10: Distribution of households by SDA, n = 378**

SDAM slice	Actual	Percentage
0-3(low)	0	,0
4-5(medium)	36	9,5
6-12(high)	342	90,5

90.5% of households had a high diversity score.

4-4-The nutritional status of children



**Figure 4: Distribution of children by nutritional status (CP)**

64% of children had a nutritional status in the green.

**Table 11: Age distribution and nutritional status of children**

		The nutritional status of children			Total
		Green	Yellow	Red	
Age range	6-23	89	54	24	167
	24-59	153	46	12	211
Total		242	100	36	378

More children aged 6-23 months are malnourished by children aged 24-59 months

**Table 12: Distribution of children by sex and nutritional status of children**

		The nutritional status of children			Total
		Green	Yellow	Red	
The sex of children	F	99	49	16	164
	M	143	51	20	214
Total		242	100	36	378

The male sex is more malnourished both severe and moderate than the female sex.

**Sex**

In our study, among the 378 children surveyed, we had 215 boys or 57% and 163 girls or 43% with a sex ratio of 1.31 in favor of boys.

**DISCUSSION**

**5.1 Socio-Demographic Characteristics of Children and Carers:**

Our study involved a population of 378 children aged 6 to 59 months who were surveyed anthropometrically (BP).

This male predominance was also found by two studies, one in the Kayes region circle of Nioro (commune of Nioro-Tougouné-Ragabé, Korera-Koré, Simbi, Sandaré, and Yerere) in 2012 which found a sex ratio of 1, 10 (Koné CT 2012) and the other in the

region of Koulikoro circle of Nara (communes of Guiré, Niamana and Fallou) in 2012 [3].

#### ✚ Profession

In our study, 55.3% of accompanying persons were exclusively involved in housework. This could be explained by the fact that the main activity of women who have not received any education is household work.

#### ✚ Level of Education

The out-of-school dominated our study with 51.1% which is comparable with that of [4] in Bandiagara or 54.94%.

Maternal socio-demographic and health profiles are important determinants of child malnutrition. An earlier study investigating the role of parental literacy in under-five malnutrition in a semi-urban community in Pakistan reported that better father's education and maternal education were found to be significantly associated with the child's normal nutritional status [5]. Low maternal education has been associated with poor feeding practices, leading to malnutrition [6]. Parental education is very important in the nutritional support of children and an earlier study conducted in Pakistan suggests that most of the factors analyzed that explain malnutrition in children (such as the age of the mother at marriage, the level of education and the nutritional status of the mother) are preventable [7].

#### ✚ Monthly Income

Our study reported that the majority of carers were low-income families (52.6%). This may explain the high prevalence of malnutrition among children. Our findings are consistent with those of an earlier study that reported that children from poor households suffered from at least one form of malnutrition. The coexistence of poverty and malnutrition is intergenerational, and this must be urgently recognised by implementing effective measures to break this vicious circle [8].

### 5.2 The Household Food Consumption Score

#### ✚ Main Source of Food Supply

The main source of food supply was dominated by the purchase (62.7%), this percentage could be explained by the urban location of the study and also the insecurity that prevents people from going to cultivate and finally without forgetting the poor rainfall of the 2020-2021 season. Our result is similar to other studies such as ENSAN 2021 with 84.9%, the survey conducted in Haiti in 2012 following Hurricane Isaac [9], the study of (Sebai\_Ines\_2018\_memoire Food Security and Household Food Diversity) which took place during a period of economic and climatic stress. In addition, agriculture, which was the primary source of income for Haitians, is beginning to be abandoned and replaced by the purchase of food [10]. In Haiti, the

population buys nearly 75% of its food [11]. Thus, rising food prices could be a very significant risk to food security [11].

Our study found a low SCAM of 10.1%, average of 18.5%, this result is significantly higher than that of the National Survey of Food and Nutrition Security of February 2020 of Mali [12] which is at 5.6% as low level and 12.6% average level overall.

According to the same ENSAN Mali 2020 of the regional level, the low SCAM is 9.2% and the average score is 15.9% which are still lower than our result of the Cercle Bandiagara.

This result explains the very high level of food insecurity in the circle of Bandiagara at the regional and national levels, which must attract the particular attention of the highest authorities of the country and partners to more action to remedy this problem.

### 5.3 Household Dietary Diversity Score

The porridge made from small millet was more consumed at breakfast and snack or 39.2% and 41.3%, the Tô made from small millet was also the most consumed at lunch and dinner or 64.8% and 63.2% whose ingredients were composed of cereals, sugar, oil, vegetables, legumes and sometimes dry poison which justifies our result of the SDAM acceptable to 90.5% which slightly lower than 97.4% of the ENSAN February 2020 of Mali.

Our result of 0% low SDAM was better than that of Koné CT [13] in its study in Niore with 14.2% and market gardening in the Bandiagara area can confirm this result.

### 5.4 The Nutritional Status of Children According to the BP

Our study finds that 26.5% of children are moderately malnourished and 9.5% severely malnourished in the Bandiagara circle which are significantly higher than those of Mali's SMART 2021 with 2.3% moderate and 0.6% severe overall.

According to the SMART 2021, it is the Mopti region that has emerged as the main provider of this form of acute malnutrition often responsible for the death of children under 5 years old with 4.5% of children under 5 years of age malnourished moderate and 1.2% severely malnourished which is always better than our result.

More children aged 6-23 months are severely malnourished (67%), this result is comparable to that of [14] who found 51.8%. This could be because this age group is most affected by early withdrawal and the problem of supplemental feeding.

Our result could be explained by the deterioration of the nutritional situation of the area during the year 2022.

Our study finds 10.7% of male children and 10.2% severely malnourished females which significantly higher than 2.6% male and 1.1% of SMART 2021[15].

This result explains the severity of the nutritional status and especially in the male sex who does not have the same degree of attachment to the mother as the girls which could be a source of disadvantage for the male sex.

## CONCLUSION

Malnutrition is a form of synthesis of the results obtained in addressing the four dimensions of food security (availability, accessibility, stability and utilization) and in managing the interactions of contributing factors. Several factors are at the root of malnutrition. Child health, nutrition, mother's level of education, household standard of living, environment, policies and programmes play fundamental roles in the nutritional status of small children.

Our study allowed us to highlight the impact of food security on the nutritional status of children under 5 years of age in the Bandiagara circle.

**Conflict of Interest:** none.

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