Dietary diversity and nutritional status of children from 24 months to 59 months old in the rural communities of central north region in Burkina Faso.

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ABSTRACT

In Burkina Faso, malnutrition is the most important risk factor for child mortality, especially in rural areas. Combating malnutrition is thus a key priority for state and non-governmental organizations. This study aims to determine the prevalence of various forms of malnutrition, in relation to childhood feeding practices in three villages of Pissila province. The study involved 200 children aged between 24 months to 59 months. Anthropometrics parameters were used to assess the forms of malnutrition. A semi quantitative questionnaire was administered to mothers to determine the frequency and nature of food consumption by children. The prevalence of all forms of malnutrition were high for all age groups. Wasting (40.6%) and underweight (45.5%) were the most prevalent. Almost 12.3% have both emaciation and stunting. The dietary diversity score was low with a mean of 2.5 while the food varieties score was 5.7. Only 11.7% of children consumed an animal product at least once a week. The non-timber forest products are the main source of minerals. This situation indicates a real public health problem in our rural communities. An integrated program to combat undernutrition in children is necessary to screen and detect children who have accumulated these forms of malnutrition.

Key words: malnutrition, prevalence, rural, children, dietary diversity.

Diversité alimentaire et état nutritionnel des enfants de 24 mois à 59 mois dans les communes rurales de la région du Centre-Nord au Burkina Faso.

RESUME

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Au Burkina Faso, la malnutrition est le facteur de risque le plus important dans les zones rurales. La lutte contre la malnutrition est une priorité essentielle pour les organisations étatiques et non gouvernementales. L'objectif de cette étude a été de déterminer la prévalence de diverses formes de malnutrition, en relation avec les pratiques alimentaires des enfants dans trois villages de la province de Pissila. L'étude a porté sur 200 enfants âgés de 24 à 59 mois. Une étude de consommation alimentaire a été réalisée auprès des mères d'enfants. La prévalence de malnutrition est élevée pour tous les groupes d'âge. L'émaciation (40,6%) et l'insuffisance pondérale (45,5%) étaient les plus répandues. La diversité alimentaire était faible avec un score moyen de 2,5 tandis que le score de variétés alimentaires était de 5,7. Seulement 11,7% des enfants ont consommé au moins une fois un produit d'origine animale au cours de la semaine. Les produits forestiers non ligneux constituent les principales sources de minéraux pour les enfants. Cette situation indique un réel problème de santé publique dans nos communautés rurales. Un programme intégré de lutte contre la dénutrition des enfants est nécessaire pour dépister et détecter les enfants qui ont accumulé ces formes de malnutrition.
Mots clés : malnutrition prévalence, rural, enfants, diversité alimentaire,

INTRODUCTION

Reducing malnutrition prevalence of children under five years of age is a global priority. Recent global analysis indicates that substantial progress in reducing the number of stunted children is being achieved but not in Africa (IFPRI, 2016). Many researches indicate the heightened risk of mortality for children with multiple anthropometric deficits (McDONALD *et al*., 2013). Achieving the objectives of sustainable development and that of the nutrition strategy in Africa remains a challenge. Childhood malnutrition remains a serious nutritional concern in rural areas of Sub-Saharan Africa. Early childhood development is the basis of national productivity and social capital (DAELMANS *et al*., 2017; WALKER *et al*., 2015).

In Burkina Faso, the national level of the prevalence of stunting in children from 6 months to 59 months is 24.9 %, excluding the central region (main urban area) which has only 12.5%, while all other regions have a threshold above 21% (SMART, 2020).

The most sustainable way to address malnutrition is through promoting the consumption of a diet that is both high in quality and diversity (ARIMOND & RUEL, 2004; ARIMOND *et al*., 2010). Dietary diversity is defined as the variety of foods across and within food groups consumed over a given reference period to ensure the required intake of essential nutrients for being in good health (PARAPPURATHU *et al*., 2015; RUEL, 2003). Nutritional status is strongly correlated with the dietary diversity of the individual (ARIMOND & RUEL. 2004).

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The rural sector needs increasing attention and organization. State and non-governmental structures work through awareness-raising activities to improve the nutritional status of populations in many rural communes. It is obvious that the actions to fight against malnutrition should be specific to the targeted population.

This study was carried out to determine the current prevalence of malnutrition and the relationships between food practices and nutritional deficiencies in a rural community of Burkina Faso.

I. MATERIAL AND METHODS

1.1.The study area

The study was carried out in three villages of the Pissila department: Lebda, Goema and Komsilga. These villages are located at 20 km from Kaya, the main city of the central north region. Moreover, Kaya is only 100 km from the capital city of the country. Each village has a health centre and a primary school. The village of Lebda has a dam that serves as a water tank for the surrounding villages.

1.2. Subjects

The study involved 200 children aged between 24 months and 59 months. The children were reached in the households which selected randomly. Children's parents are farmers. Only healthy children were registered. All surveyed households provided informed consent prior to participation.

1.3. Ethics approval

It was approved by National Centre of Scientific and Technology Research under the number N/Réf. A10-2020 CEIRES.

1.4. Dietary assessment

Two health workers from the health centre and two nutritionist students trained under continuous supervision of a nutritionist researcher collected the dietary data. The data were collected between January and March 2020.

An interview was conducted with the caregiver of each child by experienced interviewers who visited the houses of the participants. The questionnaire is based on a recall of food consumed on the week prior to the day of survey. The frequency of consumption was: never, 1 to 3 times a month, 1 to 6 times a week, 1 to 6 times a day.

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The survey agent made two visits in each household. The first visit was done to obtain the mother's consent and agree on the day and time for the administration of the questionnaire. The second visit was for interview. The local language “mooré” which is the common language in the commune, was used for the administration of the questionnaire.

1.5. Anthropometry

To assess the child's nutritional status, the parameters weight, height, age and sex were recorded at children household. The weight was obtained by weighing the child using an adult scale. Height was obtained by measuring with a child's height gauge. The child's age was obtained from the child's health record. Children were subdivided into three groups according to their age: [24-36] months,]36-48] months and]48-60] months. The prevalence of stunting, underweight, and wasting was expressed in percentage of children as height by age Z score (HAZ), weight by age Z score (WAZ) and weight by height Z score (WHZ) (WHO, 2006).

1.6. Diet diversity and food variety scores

A Diet Diversity Score (DDS) was defined as the number of food groups consumed by each child modified from KANT and *al* (1991, 1995). The score included seven groups: cereal/tubers, vegetables, legumes, milk and milk products, meat and fish, eggs, fruits. The maximum score was seven, one point given for each group consumed during the registration period.

Food Variety Score (FVS) was defined as the number of different food items eaten during the registration period. The method was modified from KREBS-SMITH *et al.* (1987) and DREWNOWSKI *et al*. (1997).

1.7. Statistics analysis

WHO Anthro software was used to determine the Z-scores. Records were deleted when the z-score was greater than 6 or less than -6 for height to age ratio and when it was greater than 5 or less than -5 for weight to age ratio (CROWE *et al*., 2014). When a value for weight, height, age and sex was missing, the record was also deleted. R software was used for Anova, means and standard deviation.

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II. RESULTS

2.1. General characteristics

In total 187 children aged between 6 to 59 months, were eligible. The proportion of female (61.5%) was greater than the proportion of male (38.5%). Only 40.6% of children were not affected with any malnutrition form.

Wasting and underweight had the highest prevalence, more than 40%. Nearly 12.3% have stunted and wasting, 47.6% have a severe form of malnutrition (Table I).

Table I: Study sample characteristics (Mean ± standard deviation)

Variables	Mean	±	Standard deviation
Age (months)	41.8	±	9.75
Weight (kg)	12.0	±	2.24
Height (cm)	93.0	±	7.28
HAZ (Stunting)	-1.46	±	1.02
WHZ (Emaciation)	-1.54	±	1.69
WAZ (Underweight)	-1.86	±	1.32
FVS	5.7	±	4.14
DDS	2.53	±	1.19

2.2. Prevalence of malnutrition by age and gender

The table II shows that the prevalence of malnutrition by age groups. The prevalence of stunting was found to be highest (46.0%) among children aged [24-36] months. Children aged more than 36 months were the most affected by wasting and underweight. For all age groups, the prevalence of children concurrently wasted and stunted was more than 10%.

The DDS was low for children aged 48 to 59 months; a significant difference was observed between DDS age group. This trend is similar for FVS.

Table II: Prevalence of malnutrition and food index by age

Prevalence (%)	[24-36] months (n=63)	]36-48] months (n=65)	]48-60] months (n=59)	Total (n=187)
Not stunted, not wasted, not underweight	39.7	33.8	49.2	40.6
Stunting	46.0	24.6	18.6	29.9
Wasting	25.4	53.8	42.4	40.6
Underweight	42.9	49.2	44.1	45.5
Stunting and wasting	12.7	13.8	10.2	12.3

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FVS	6.1	6.2	4.6	5.7
DDS	2.7	2.7	2.1	2.53

2.3. Prevalence of malnutrition by village

According to the villages, more than 50% of children have at least one form of malnutrition (Table III). Goema had the highest prevalence of wasting. The prevalence of concurrence wasting and underweight was high in the three villages.

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Table III: Prevalence of malnutrition and food index by village

Prevalence (%)	Goema (n=63)	Komsilga (n=59)	Lebda (n=65)	Total n=187
Not stunted, not wasted, not underweight	38.1	45.8	38.5	40.6
Stunting	28.6	30.5	30.8	29.9
Wasting	47.6	30.5	43.1	40.6
Underweight	47.6	42.4	46.2	45.5
Stunting and wasting	15.9	8.5	12.3	12.3
FVS	6.27	5.29	5.54	5,71
DDS	2.70	2.34	2.55	2,53

2.4. Dietary assessment

For all villages, vegetable products are the most consumed. Only 11.7% consumed an animal product at least once a week. In Goema village, nearly 19% of children have eaten an animal product in the past week. The table IV presented the food group consumption by week for each village.

The large number of children who consumed animal products were in group [24-36] months, 15.9%. Eggs and milk are poorly consumed by all age groups (Table V).

Table IV: Food groups consumption by week for each village (% of children)

Food Groups	Goema	Komsilga	Lebda	All
Cereals and tubers	98.4	98.3	98.5	97.9
Milk	9.5	5.1	0.0	4.8
Meat-Fish	19.0	5.1	7.7	10,6
Eggs	0.0	1.7	0.0	0.5
Fruits	50.8	28.8	43.1	41.0
Vegetable	60.3	67.8	67.7	64.9
Legumes	31.7	27.1	38.5	32.4

Table V: Food groups consumption by week for each age group.

Food Groups	[24-36] months	]36-48] months	]48-60] months
Cereals and tubers	98,4	96,9	100,0
Milk	3,2	7,7	3,4
Meat-Fish	15,9	12,3	3,4
Eggs	1,6	0,0	0,0
Fruits	50,8	44,6	27,1
Vegetable	57,1	72,3	66,1
Legumes	44,4	35,4	16,9

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III.DISCUSSION

In our study, the malnutrition prevalence was high, 59.4% of children had at least one malnutrition form. These results corroborated those of many studies, the rural area is the most affected by malnutrition (JONES *et al*. 2014; KENNEDY *et al*. 2003). In Burkina Faso, at national level the prevalence of stunting in children from 6 to 59 months was 24.9 % (SMART, 2020). Stunting had the lowest prevalence (29.9%) compared to the others two, whose exceed 40%. Wasting and underweight had high compared to the national prevalence with respectively 8.1% and 17.3%.

The chronic malnutrition was the main form of malnutrition for children aged 24 to 36 months. At this age, the child was weaned, and then the quality and quantity of food were not sufficient to cover the food need. Stunting in the first two years of life is critical, the duration between pregnancies to 24 months is vital for nutritional intervention to reduce the adverse effect on child survival, health and development (VICTORIA *et al.*, 2008).

In all villages the malnutrition prevalence was high. There is no significant difference between the prevalence of malnutrition in the three villages. The village of Lebda has benefited from an incubation centre since 2014, with the support of the Mcknight Foundation and IRSAT. Enriched products were produced by women association and sold around the villages. The improvement of the nutritional situation requires the intervention of several actors, heads of households, the elderly, religious authorities, etc. According to many studies, the villages located in the same geographical populations share of the same underlying and basic causal factors wasting and stunting are often present (VICTORA, 1992, MARTORELL & YOUNG, 2012). A direct causal relationship between wasting and stunting is inconclusive, and a number of gaps in the evidence base have been highlighted (ANGOOD *et al*., 2016). However, a high risk of mortality has been mentioned for these children (MCDONALD *et al*., 2013).

Our study estimated higher stunting and wasting rate among male compared to female. The prevalence of children concurrently wasted and stunted was observed to be significantly higher (p-value=0,03) among males, 19.4%, compared to girls 7.8%.

The dietary diversity score was low in the three villages, 2.5 (±1.2), and for all age groups. The rural population is essentially agricultural. The main food group was cereals, vegetables and legumes with 98.4%, 65.2% and 32.6% respectively. All animal products (milk, fish, eggs) are low consumed, only 10.7% of children are consumed meat or fish. A positive correlation was found between DDS and micronutrient intake in Mali, Niger, Kenya (HATLOY *et al*., 1998; ONYANGO *et al*., 1998). The low diversity in diets is associated with increased risk of chronic undernutrition and micro-nutrient deficiencies in young children (ARIMOND

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& RUEL, 2004; KENNEDY *et al*., 2007; MOURSI *et al*., 2008). A positive correlation was found between farm diversity and the dietary diversity of households (BHAGOWALIA *et al*. 2012; JONES *et al*. 2014). The FVS was high, this means that in the same food group, a great diversity exists. In the cereal group, the varieties food are porridge, biscuit, wheat cake, couscous, local flour, enriched flour, "*foura*", "*massa*", bread, spaghetti, and local paste "*tô*". The vegetable group was composed with leaves which used to cook a sauce. Legume groups had a great variety item with bambara groundnut, "*samsa*", sesame, peanut, "*zamnè*".

The fruit was composed with non-timber forest product like, "monkey bread (*Adansonia digitata* fruit), *Balanites aegyptiaca* fruit, *Detarium senegalensis* fruit, *Ziziphus mauritiana* fruits. Others fruits were also intake by children like banana, watermelon, orange. The non-timber forest products are a main source for children to cover their micronutrient needs.

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CONCLUSION

All three forms of malnutrition are prevalent in the three villages. Dietary diversity is low, but variability is high within the most consumed food groups. The non-timber forest products are the main source of minerals.

This situation indicates a real public health problem in our rural communities. Because of the coexistence of these forms of malnutrition, an integrated program to combat undernutrition in children is necessary to screen and detect children who have accumulated these forms of malnutrition. Reinforcements are to be pursued through awareness raising on good nutritional practices.

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CONFLICT INTEREST

The authors declared no conflict of interest.

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