Food Quality and Nutritional Status of Pregnant and Lactating Women in The Non-Lotted Area on the Outskirts of Ouagadougou, Burkina Faso

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ABSTRACT

Background: To contribute to the fight against malnutrition among women of reproductive age, this study aimed to evaluate the quality of food and the nutritional status of pregnant and lactating women. **Methods:** This cross-sectional study was conducted from June 2018 to September 2018 to explore the frequency and distribution of the dietary, socioeconomic, and health characteristics of pregnant and lactating women as well as their nutritional status. The target population consisted of 124 pregnant women and 118 nursing women age between 15 to 49 years. **Results:** The prevalence of acute malnutrition was 30.9% among women in general, 1.6% with severe malnutrition according to the mid-upper arm circumference (MUAC). In terms of the body mass index (BMI), the prevalence of malnutrition among lactating women was 13.5%; 10.5% with moderate malnutrition and 3.5% with severe malnutrition. The women aged between 15 to 49 years had poor dietary diversity. The mean dietary diversity score (DDS) was estimated at 4.14±0.86. This score was 4.19±0.87 in pregnant women and 4.09 ± 0.85 in lactating women. However, no statistically significant difference was observed between them ($P = 0.20$ and OR = 0.82) [0.4; 1.4]. A substantial proportion (19.8%) of women had a low DDS (< 5), with a rate of 16.9% among pregnant women and 22.9% among lactating women. **Conclusion:** This study revealed the presence of food and nutrition insecurity in semi-urban areas, particularly in "undeveloped" areas. Improving the living conditions of the populations in these localities, in parallel with nutritional education actions, could help to reduce the disease.

Keywords: *Malnutrition; Dietary diversity; Pregnancy; Lactating women*

Introduction

Burkina Faso, like other West African countries and Sahel region, is regularly confronted with climatic and socioeconomic difficulties, one of the consequences being the persistence of chronic undernourishment (Marivoet *et al.*, 2020, Ministry of Health, 2020). Most rural

households and communities face annual food insecurity (Marivoet *et al.*, 2020, Sebai, 2019). In most of these households, diet is poorly diversified. In 2019, food consumption was poor in 0.7% of households and limited in 21.0% of households with disparities between regions and provinces (Marivoet *et al.*, 2020, Ministry of Health, 2020). These situations affect the nutritional status of the country's most vulnerable populations (Marivoet *et al.*, 2020, Ministry of Health, 2020). Malnutrition is, therefore, present in all forms (Ministry of Health, 2020). According to the National Institute of Statistics and Demography (NISD), malnutrition can affect all age groups, including pregnant and lactating women, who are among the most vulnerable populations (National Institute of Statistics and Demography, 2014). However, according to the Swiss Society for Nutrition (SSN), pregnant women who are malnourished are not only at risk of giving birth to a low-birth-weight infant but are even less likely to be able to provide a sufficient quality and quantity of breast milk for their children (Swiss Society of Nutrition, 2015). The majority of these low-birth-weight children may later be at risk of physical growth retardation, psychomotor disorders, and pubertal development disorders in adolescence (Swiss Society of Nutrition, 2015).

These various findings should result in a particular interest in the nutrition and health of pregnant and lactating women, both for the harmonious development of children and for the improvement of the quality of life of the women themselves. In general, improving the nutrition and health of women could contribute to the resolution of children's health and nutrition problems and ensure their social well-being. Thus, it would be of great importance to initiate maternal nutrition actions in a way to improve access to healthy and quality food as well as feeding practices. These actions will make it possible to effectively combat malnutrition among pregnant and breastfeeding women. It is, therefore, necessary to have better knowledge of the diet and nutritional status of pregnant and lactating women to better strengthen interventions in favour of these vulnerable groups.

The general objective of this study was to evaluate the quality of the diet and the nutritional status of pregnant and lactating women seen in consultations in health and social promotion centres on the outskirts of Ouagadougou. Specifically, the main objectives were to assess the quality of women's diet and to evaluate the nutritional status of women.

Materials and Methods

Study design and participants: This cross-sectional study was conducted from March 2018 to September 2018. The study described the frequency and distribution of dietary, socioeconomic, health, and nutritional characteristics of pregnant and breastfeeding women. This study took place in four health centres in neighbourhoods of Ouagadougou, commonly known as unplanned neighbourhoods. These randomly chosen health centres were Yamtemga, Gampèla, Zongo, and Polesgo. There are deprived of electricity and water connections, low living standards of the inhabitants in some of the non-lotted areas, and limited number of health centres and schools in these areas (National Institute of Statistics and Demography, 2013). As a result, these vulnerable populations could experience significantly higher maternal and child morbidity and mortality rates than individuals in other urban areas. Most households in unplanned areas are poor, with poverty levels close to those in rural areas (Bictogo, 2014, National Institute of Statistics and Demography, 2013).

A purposive sampling technique was used to enrol any woman encountered during the study period in one of the selected health centres. The sample size was not calculated on a statistical basis; it was a purposive sample. In total, 242 women (124 pregnant and 118 lactating women) were selected and their consent was obtained to participate in the study. According to the area of residence, the women were distributed as follows: Polesgo (60 women), Yamtemga (60 women), Gampèla (61 women), and Zongo (61 women).

The inclusion criteria consisted of:

- Pregnant women who attended counselling in

one of the four Health and Social Promotion Center (CSPS) involved during the study period,

- Lactating women who attended counselling in one of the four CSPS involved during the study period,
- Women who gave consent to participate in the study,
- Women aged between 15 to 49 years; reproductive age.

The exclusion criteria included:

- Women who did not attend counselling in any of the four CSPS involved during the study period,
- Women who were not pregnant and/or breastfeeding,
- Women who did not give their consent.

Measurements: Individual interviews were used for the collection of qualitative and quantitative data. Data collection techniques, such as the 24-hour recall were used. The interviews were carried out under supervised conditions to avoid the effect of answers on the questions. Thus, quiet and isolated places were chosen to collect quality information.

Dietary data were obtained through a 24-hour recall of the women's diet on the day prior to the interview. The foods consumed by the women in the 24 hours prior to the interview were grouped into 10 food groups. This made it possible to calculate the women Dietary Diversity Score (DDS) by summing the different groups consumed by the women. The groups used were cereals, white and plantain roots and tubers, legumes (beans, peas and lentils), nuts and seeds, dairy products, meat, poultry and fish, eggs, dark green leafy vegetables, other fruits and vegetables rich in vitamin A, other vegetables and other fruits (Levinson *et al.*, 2016).

For each participant, sex, age, weight and height were recorded. Age was determined using official documents, such as birth certificate or equivalent, health record, or birth record if available. Anthropometric measures, including the height and weight of each participant, were determined using standard techniques (Ministry of Health, 2014). With regard to anthropometric measurements,

electronic scales with a precision of 100 g were used to assess the weight of the individuals in the sample. A wooden height gauge, graduated in centimetres, was used for height measurement. Finally, the mid-upper arm circumference (MUAC) was measured using a Shakir cuff graduated in centimetres (Ministry of Health, 2014).

Socio-sanitary and morbidity variables, dietary variables and socio-demographic variables were assessed. Socio-sanitary and morbidity variables included hand washing practices, regularity of prenatal and child health visits, clinical signs, and infections. Dietary variables included meal intake frequency, knowledge of feeding practices, ability to cite examples from each food group, and main source of food. Socio-demographic variables included women's responsibility in the household, level of occupation, activities and/or sources of income, marital status and marital regime, household size, age of the woman, and level of education.

In addition, the MUAC of all women was measured and the body mass index (BMI) of lactating women was calculated using the following formula: BMI = weight(kg)/height^2(m). For pregnant women, MUAC was only considered to evaluate nutritional status.

Ethical considerations: In this study, populations were asked to participate in research based on their free and informed consent. That is, each woman decided without coercion or influence to participate in this study after being informed of the consequences of her decision. Since the women in the 15-18 age group are children and do not have the legal capacity to consent, they were not enrolled in the study without the permission of a parent or other legal representative. The research team will work to consider fundamental ethical principles while respecting individuals and their dignity. As such, the content of the informed consent was made available to participants prior to any intervention.

Data analysis: The data were entered using SPSS IBM version 17.0, and data clean-up was performed to avoid duplicate, missing or mis-entered data in the database. For analysis, a

description of the characteristics of the sample was performed through calculations of the numbers, means, and frequencies with their 95% confidence intervals.

Results

Socio-demographic characteristics: The mean age of the women in the population was 27.04 ± 6.8 years, with a minimum of 16 and a maximum of 46. **Table 1** shows the distribution by age group. The results showed that the majority of women aged between 21 to 30 years (53.5%). The mean household size was 5 individuals with a minimum of 2 individuals and a maximum of 15 individuals. **Table 2** presents the socio-economic characteristics of the studied women. Nearly 6.6% of the women were the head of household in terms of expenditures; this rate increased to 7.3% among pregnant women and was 5.9% among lactating women. More than 63% of the women were at home and had no occupation other than housework. This rate reached 66.1% among breastfeeding women and was 61.3% among pregnant women. Among the occupations studied, petty trade (18.6%) was the main activity. Nearly 5% of women were students, 4.1% were civil servants, 1.2% were employed in services, 5.8% were artisans, and farmers represented 1.7% of the total population. Only 27.6% of women obtained an elementary school education, 23% had secondary school education, and 2.9% obtained a higher education.

Knowledge of food practices and of food groups: In this section, the women's knowledge was discussed regarding the existence of the three types of food (builders, energizers and protectors). The results revealed that more than 93.4% of women, including 91.1% of pregnant women and 96.1% of lactating women, felt that they could not distinguish between the three types of food. Only 15 women (6.6%) of the total population (8.9% pregnant women and 3.9% lactating women) felt that they could distinguish between the three types of food.

Daily food consumption: In this section, food consumption practices were assessed in terms of the number of meals consumed per day. According to the values, it can be seen that nearly 94% of women ate at least 3 meals a day, i.e., 96% of pregnant women and 92% of lactating women (**Figure 1**). On the other hand, a non-negligible number of women (6% in the total population, 4% among pregnant women and 8% among lactating women) ate less than 3 meals a day (**Figure 1**).

The main sources of food: It appears that the purchase of food represented the main source of nourishment in 100% of cases. However, there was a non-negligible percentage (8.26%) of women who believed that, in addition to buying food, they benefit from food produced on their own. These findings indicated that the peripheral areas or "non-parcelled areas" constitute semi-rural environments where populations are willing to farm because of the availability of agricultural villages surrounding them. In addition, some women believe that their households adopt other strategies by lending food (0.83% of cases) or exchanging a good for food (1.65% of cases). These findings reflect some of the coping strategies that people adopt when they find themselves in a state of food deficit.

Food group consumption frequencies: It appears that the cereals, white roots and tubers and plantains group and the group of other vegetables are the most common (100%) in the daily diet of women (**Figure 2**). The next groups frequently found in their diet include, in order of importance, the meat, fish, and seafood group (69%), pulses (40%), and the dark green leafy vegetables group (38%). The proportion of women who consumed milk and dairy products was 25%, fruits and vegetables rich in vitamin A was 17%, nuts and seeds were 13%, and eggs was 3% (**Figure 2**).

Dietary diversity score (DDS): **Table 3** shows the different scores grouped into three classes: DDS < 5 indicates low dietary diversity (LDD); DDS = 5 indicates minimum dietary diversity for women (MDD), and DDS > 5 reveals high dietary diversity (HDD) (Levinson *et al.*, 2016). The results show poor dietary diversification, with an average score of 4.14±0.86 in the general population. This reflects the generally low dietary diversity of most women in by comparing the two

groups of women, it was found that the mean score for pregnant women (4.19±0.87) is higher than that of in lactating women (4.09±0.85). However, no statistically significant difference was observed between them (P = 0.2 and OR = 0.82) [0.4; 1.4]. **Table 4** indicates the different scores grouped into three classes (Levinson *et al.*, 2016). Analysis of scores by classification shows that nearly 19.8% of women had LDD; 16.9% among pregnant women and 22.9% among lactating women (This is the result of a poor and limited diet composed mainly of starchy foods, dark leafy greens, and other vegetables. Nearly 49.6% had MDD; 50.8% among pregnant women and 48.3% among lactating women (**Figure 3**). This means that these women struggle to incorporate more than five food groups in their daily intake. Finally, nearly 30.6% of women had acceptable or HDD, i.e., 32.3% in pregnant women and 28.8% in lactating women. The pregnant and lactating women had a poorly diversified diet. Nearly 6% of the women consumed less than 3 meals a day. The results also showed a predominance of cereals (100%) and other vegetables (92%) in their diet. The recipes consumed by women are mostly composed of "TÔ" (which is a food composed of cereal and consumed in Africa) with sauce and rice with sauce or fat. These recipes are generally accompanied by sauces whose main ingredients are other vegetables, such as tomatoes, onions, and cabbage.

Nutritional status: The description of anthropometric variables among pregnant and lactating women is presented in the **Table 4**. The mean height of the women in the study was 163.6±6.9 cm. The mean weight and BMI of lactating women were 60.16±11.27 kg and 22.4±4.2 kg/m^2, respectively. The mean MUAC for the general population was 254.2±45 mm.

Nutritional status assessed by MUAC in 112 pregnant women and 79 lactating women revealed the following results shown in **Table 5**. The results showed the presence of malnutrition (30.9%) in the total population distributed as follows: 29.3% moderate malnutrition (180 ≤ MUAC < 230 mm) and 1.6% severe malnutrition (MUAC < 180 mm). Moreover, the presence of malnutrition was more pronounced in the pregnant women (33.9%) than in the lactating women (22.8%). There was also severe malnutrition rate of 1.8% among pregnant women compared to 1.3% among lactating women.

Assessment of the nutritional status of lactating women through BMI revealed the results shown in **Table 6**. Although 67.5% of lactating women have satisfactory nutritional status (18.5 ≤ BMI < 25 kg/m^2), there were women with underweight malnutrition (nearly 13.5%): 10.5% moderate (16 ≤ BMI < 18.5 kg/m^2), and 3.5% severe i.e. BMI < 16 kg/m^2. Overweight rates were also observed in nearly 18.4% of cases, with 14.9% overweight (25 ≤ BMI ≤ 29.9 kg/m^2) and 3.5% obese i.e. BMI ≥ 30 kg/m^2.
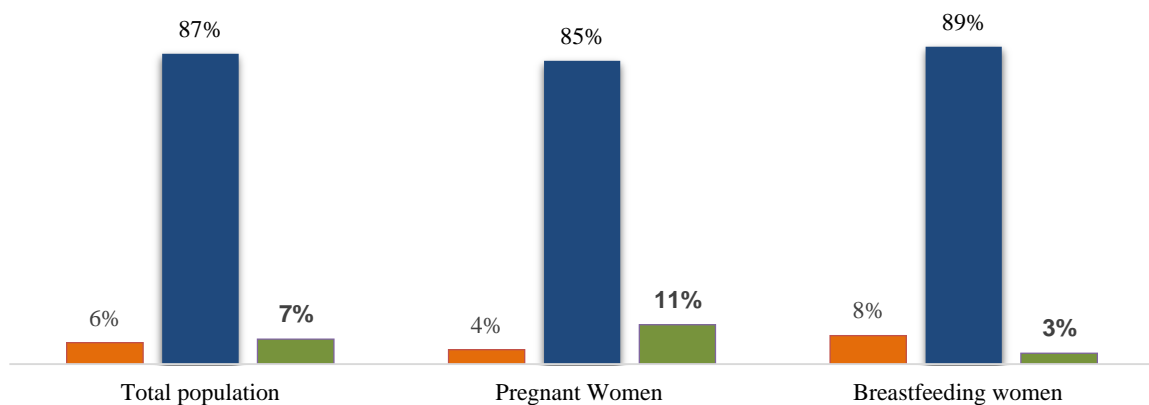

Figure 1. Daily food consumption

Food consumption of 1 to 2 meals a day is represented by orange. Food consumption of 3 to 4 meals a day is represented by blue. Food consumption of more than 5 meals a day is represented by olive green.
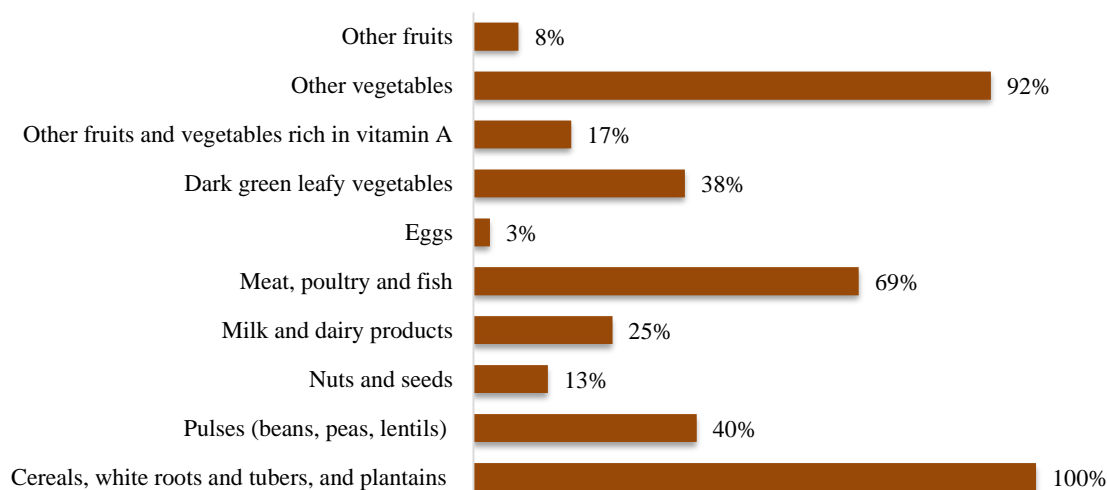
Figure 2. Consumption frequency of food groups by the study population.
The frequencies of the food groups consumed by women are presented in orange.

Table 1. Distribution of age groups

Age groups (years)	Pregnant women	Lactating women	Total population
< 20	116 (20.33)[a]	123 (18.97)	239 (19.70)
20 - 30	116 (52.84)	123 (54.31)	239 (53.50)
> 30	116 (26.83)	123 (26.72)	239 (26.80)

[a]: N(%)

Table 2. Socioeconomic characteristics of the women

Characteristics	Pregnant women N (%)	lactating women N (%)	Total population N (%)
Women's occupation			
Housewife	76 (61.3)	78 (66.1)	154 (63.6)
Shopkeeper	27 (21.8)	18 (15.3)	45 (18.6)
Cultivator	3 (2.5)	1 (0.8)	4 (1.7)
Artisan	6 (4.8)	8 (6.8)	14 (5.8)
Official	6 (4.8)	4 (3.4)	10 (4.1)
Pupil/student	5 (4.0)	7 (5.9)	12 (5.0)
Service employee	1 (0.8)	2 (1.4)	3 (1.2)
Level of education			
Out of school	47 (38.5)	55 (47.0)	102 (42.7)
Primary	38 (31.1)	28 (23.9)	66 (27.6)
Secondary	31 (25.4)	24 (20.5)	55 (23.0)
Superior	0 (0.0)	7 (6.0)	7 (2.9)
Franco-Arab	6 (4.9)	3 (2.6)	9 (3.8)
Female head of household in terms of expenditure			
Yes	9 (7.3)	7 (5.9)	16 (6.6)
No	115 (92.7)	111 (94.1)	226 (93.4)
Total	124	118	242

Table 3. Mean scores of dietary diversity within the populations

Groups	Mean ± SD	P-value
General population	4.14 ± 0.86	
Pregnant women	4.19 ± 0.87	0.2
Lactating women	4.09 ± 0.85	

Table 4. Frequency distribution of dietary diversity categories within the populations

Groups	Low dietary diversity	Moderate dietary diversity	High dietary diversity	Total
General population	48 (19.8)[a]	120 (49.6)	74 (30.6)	242
Pregnant women	21 (16.9)	63 (50.8)	40 (32.3)	124
Lactating women	27 (22.9)	57 (48.3)	34 (28.8)	118

[a]: N(%)

Table 4. Mean(±SD) of anthropometric variables

Variables	N	Lactating women	N	Pregnant women	N	Total population
Height (cm)	114	163.6 ± 6.9	119	163.6 ± 6.5	233	163.6 ± 6.7
MUAC (mm)	78	261.1 ± 45.1	110	249.3 ± 44.4	188	254.2 ± 45.0
Weight (kg)	117	60.16 ± 11.27		--		--
BMI (kg/m^2)	117	22.4 ± 4.2		--		--

MUAC: Mid-upper arm circumference; BMI: Body mass index

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Table 5. Nutritional status of pregnant and lactating women.

Variables	Total population		Pregnant women		Lactating women	
	N	%	N	%	N	%
Severe malnutrition	3	1.6 (0.6-3.8)[a]	2	1.8 (0.9-4.1)	1	1.3 (0.4-3.2)
Moderate malnutrition	56	29.3 (19.7-41.3)	38	33.9 (20.4-45.2)	18	22.8 (14.7-32.9)
Total malnutrition	59	30.9 (20.1-48.4)	40	35.7 (22.3-51.9)	19	24.1 (18.6-36.1)
Normal status	132	69.1 (42.3-89.7)	72	64.3 (39.9-74.1)	60	75.9 (50.5-92.3)

Confidence interval 95%

Table 6. Nutritional status of lactating women according to BMI

	N	% (Confidence interval 95%)
Obesity	4	3.50 (1.6-6.8)
Overweight	17	15.50 (11.1-24.4)
Normal	77	67.50 (51.3-72.7)
Moderate malnutrition	12	10.50 (6.9-14.2)
Severe malnutrition	4	3.50 [1.4-7.1]

Discussion

The mean score of dietary diversification for women was 4.14±0.86. This score was lower than that of observed in the pregnant women (4.19±0.87) but higher than that of observed in the lactating women (4.09±0.85). However, a

statistically significant difference was not observed between these two groups (P-value = 0.2 and OR = 0.82 [0.4-1.4]). These values are higher than the average (3.35±0.02) of the food groups consumed by women at the national level and in the central region (3.86±0.13) in 2019 (Ministry of Health, 2020). This reflects a generally low level of dietary diversification in Burkina Faso among most women. These findings reflect the fact that these women struggle to consume more than three food groups daily. These results are lower than what was reported by Yoboué et al. in 2018. They studied women's DDS < 4 in 23.46% of people in seven cities in Cote d'Ivoire (Yoboué *et al.*, 2018). This is the result of a poor and limited diet consisting mostly of starchy groups, dark leafy green, and other vegetables group (Sebai, 2019, Yoboué *et al.*, 2018). These diets could be explained by the low economic resources and low level of education resulting in poor feeding practices (Yoboué *et al.*, 2018). At the national level, the Ministry of Health in a nutrition survey in 2018 showed a rate of 20.3% of women consuming at least 5 food groups; while 79.7% consumed fewer than 5 food groups the day before the survey (Ministry of Health, 2020). In general, the poor dietary diversity of women could contribute to the presence of malnutrition in the population. The results showed the presence of malnutrition (30.9%) in the total population, distributed as follows; 29.3% moderate malnutrition ($180 \leq$ MUAC < 230) and 1.6% severe malnutrition (MUAC < 180). These values were significantly higher than the results of the nutrition survey at the national level (4% global malnutrition, 0.7% of which were severe malnutrition). The same is true for the central region (7% total malnutrition, including 0.4% severe malnutrition) of Burkina Faso (Ministry of Health, 2020). These differences could be justified by the fact that the women in the present study all came from a sample of women attending health centres because of illness. However, it is known from the literature that diseases contribute to the presence of malnutrition. Contrary to the results of the national survey, the results of the current study

are lower than those of Bechir et al. They showed malnutrition prevalence of nearly 48% among nomadic women during the dry season compared to 44.6% during the rainy season (Bechir *et al.*, 2011). The present results also showed that the presence of malnutrition is more pronounced in the group of pregnant women (33.9%) than in the group of lactating women (22.8%). Severe malnutrition was also found to be 1.8% in pregnant women compared to 1.3% in lactating women. This difference could be due to the physiological state of the pregnant women. During pregnancy, digestive disorders are present and often lead to vomiting and diarrhoea (Bechir *et al.*, 2011). Two problems arise here, including not only does the pregnant woman loses weight and becomes more vulnerable to malnutrition, but she also lacks the appetite to consume good quantities of food. Thus, although the DDS of pregnant women was higher than that of breastfeeding women, when the quantities ingested are not sufficient, the pregnant woman is still more vulnerable to malnutrition than breastfeeding women. These situations result not only from inadequate nutrition of the population but also from the presence of diseases in the population. As a reminder, the mean DDS was 4.14 food groups, and nearly 19.8% had a DDS below 5 food groups. In addition, a significant number of women, 6% of the total population, 4% of pregnant women, and 8% of lactating women, consume less than 3 meals per day, which could lead to undernourishment. In addition, it should be noted that in pregnant women, the first trimester is marked by low weight gain due to digestive disorders (lack of appetite, vomiting, nausea). This could contribute to weight loss at this stage of pregnancy. According to BMI, the malnutrition rate as underweight was nearly 13.5%; 10.5% moderate ($16 \leq$ BMI < 18.5) and 3.5% severe (BMI < 16 kg/m^2). These situations of malnourishment result not only from inadequate nutrition among women but also from the presence of diseases that contribute to making lactating women more vulnerable. The study showed that the diet of lactating women was not of good quality. Nearly 22.9% did not reach the minimum

DDS, which is consuming at least 5 food groups. Moreover, only 3% of them managed to consume at least 5 meals a day. Lactating women should consume enough food in sufficient quantity and quality to cover their needs. When needs are not met, the woman runs the risk of experiencing malnutrition. Overweight was also observed in nearly 18.4% of women, i.e. 14.9% overweight ($25 \leq$ BMI ≤ 29.9) and 3.5% obese (BMI ≥ 30 kg/m^2). In the literature, several authors have already revealed cases of malnutrition due to under- or overweight in women of reproductive age (Diadie *et al.*, 2019, Djossinou, 2019). This study was not able to explore all possible aspects of women's nutritional status and diet, and other variables not considered in this study, such as trimester of pregnancy or age of the breastfed child, would have helped to explain the results differently or to reinforce our findings. However, similar studies could better explain the process.

Conclusion

Most of these women (70%) did not have a secondary level education, and almost 63% of them were housewives who had no income-generating activities other than household chores. These deficiencies could be responsible for the poor quality of food, characterized by a mean score of dietary diversity that does not meet the minimum score of 5 food groups in most cases (69.4%). Additionally, the frequency of meals was insufficient in 6% of cases. These inadequacies reflect the presence of undernourishment in the population, with almost 29.3% of the population suffering from moderate malnutrition and 1.6% from severe malnutrition. On the other hand, as the "non-lotted" neighbourhoods are peri-urban, a few characteristics of the nutritional profile of city dwellers are also present. Indeed, overweight rate of 14.5% and 1.5% of obesity were observed among breastfeeding women. Therefore, a coexistence of the two forms of malnutrition is observed in the population. However, by exploring other variables not considered in this study, such as the trimester of pregnancy or the age of the breastfed child, the results could be explained or

reinforced in a different way. This study revealed the presence of this challenge in semi-urban areas, particularly in "undeveloped" areas. Improving the living conditions of the populations of these localities, in parallel with nutritional education actions, could help reduce the level of food insecurity and malnutrition rates.

Conflicts of interest

The authors do not declare any conflict of interest.

Authors' contributions

A. Savadogo contributed to the framing and supervision of the study. A. Zoubga contributed to the methodology, data collection, data analysis, and manuscript writing. J. Some contributed to the methodology, data analysis, and translation of the manuscript into English. U. Zongo contributed to the writing of the manuscript and the methodological supervision. M. Bengaly and A. Nikiema participated in the supervision during the realization of the study.

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