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Household's Food Consumption Profile during Agricultural Mitigation Period: Burkina Faso Centre-West Region Case

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ABSTRACT

Background: Simplified and reliable tools for individual and household diet quality assessment have been found helpful to reduce cost of the dietary survey. The main objective of this study was to determine the household's diet profile in the Centre-West Region of Burkina Faso. **Methods:** A cross-sectional study was conducted on household food consumption using the last seven days recall. Food consumption score (FCS) was calculated by adding sores of the consumed food groups for each household. **Results:** Overall, 985 households were involved from 37 rural and three urban places from the Centre-West Region of Burkina Faso. With regard to the FCS, 28%, 28%, and 44% of the households had a poor (FCS ≤ 21), borderline (21< FCS ≤ 35), and acceptable (FCS > 35) scores, respectively. Increased FCS improved the food consumption frequency rich in nutrient (vitamin A, iron, protein) groups. The quality of household's diet was determined by socioeconomic variables such as household assets and number of income sources. Urban households get their food from the market places, while rural ones consumed their own productions. **Conclusion:** Diet quality based on food groups' consumption was associated with the socioeconomic status of households with regard to a certain food vulnerability. More efforts are required to strengthen the food security in vulnerable households regarding healthy diets for the population.

Keywords: D*ietary survey; Food groups; Households Food consumption; Burkina Faso*

Introduction

Although substantial efforts have been made to prevent or handle food crisis, many countries in west Africa are still facing with food and nutritional crises due to structural or cyclical causes. In order to ensure food and nutritional security in a population, evidence-based policies and strategic investments are required in this sector. This is only possible by raising the deciders' awareness based on reliable information.

Evidence-based data on household food access

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mechanism or individual dietary data may be costly in term of money and time. Moreover, a high level of technical skills and capacities are needed for both data collection and analysis (Estelle and Marie, 2014). Simplified and reliable tools for individual and household diet quality assessment have been found helpful in reducing the costs related to these types of dietary surveys during the past recent years (Estelle and Marie, 2014, Food and Nutrition Technical Assistance, 2006); such as calculation of food consumption scores (FCS), food variety, and food diversity.

Food diversity, as a qualitative measure of food consumption, gives an account of the variety of foods accessible to a households, which is close to the measure of diet nutritional adequacy at an individual level (World Food Programme, 2008). Household food diversity score provides a snapshot of the economic ability of a household to access a variety of foods, as demonstrated by several studies (Gina *et al.*, 2013, Kennedy *et al.*, 2010).

The literature showed that the FCS was associated with caloric intake (Coates *et al.*, 2007, Deitchler *et al.*, 2010, Wiesmann *et al.*, 2009). Food consumption can be used as proxy measures for the underlying nutritional status (Tiwari *et al.*, 2013).

Another tool is the recommended energy and nutrients intake, which represents the intakes necessary for a person or a group of people to maintain good health and sustain sufficient reserves. In order to meet these needs, a food consumption national or local model is necessary by taking into account food practices and nature quality of the consumed food. Such data are not available for the Centre-West Region of Burkina Faso, where a study on household's food and nutritional assessment was carried out. This research aimed to present the findings of this study with regard to the household dietary quality in Burkina Faso region.

Materials and Methods

Study design, location, and population: A cross-sectional study was conducted on household food consumption from February 22 to 28 in 2017. The study was conducted in the Region of the Centre-West of Burkina Faso, located at 100 kilometres from Ouagadougou, the capital, during February 2017, which is a period of agricultural mitigation (January to June) in Burkina Faso (Conseil National de Sécurité Alimentaire, 2016). This Region includes the provinces of Boulkiemdé, Sanguié, Sissili, and Ziro. The total population of the region was estimated as1554040 in 2016 (715996 men and 838044 women) distributed among 119541 households with 87% residents in rural areas (Institut National de la Statistique et de la Démographie, 2017).

This region was the seventh poorest region of Burkina Faso with a poverty index of 41.3% in 2011 (Institut National de la Statistique et de la Démographie, 2011). In 2016, the prevalence of wasting, stunting, and underweight children was 8.8%, 25.1%, and 19.0%, respectively (Ministère de la santé, 2016).

Sampling: The number of households was estimated according to OpenEpi (version 3) proportion sample size calculation (Dean *et al.*, 2013). The hypothesis was that at least 50% of the households will have poor FCSs.

The inclusion criterion for the households was signing informed consent forms. The exclusion criteria included having no consent to participate in the study and having no ability to answer the questions. In each household, the person in charge of food preparation was selected for the study on behalf of the household.

Ethical considerations: The study was approved by the Ethics Committee for Health Research of Burkina Faso. The study objectives were clearly explained to the participants, selected household heads, and local authorities.

Data collection process and instruments: Investigators and previously trained supervisors collected data from households. The face-to-face interview with the concerned people was used in households using pre-tested questionnaires. In each selected household, an individual interview was conducted with the person in charge of food

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preparation in the household. Socio-demographic information, economic data, household food consumption, and food sources were collected. A qualitative 7-day food consumption recall was used to determine the number of days each food items or groups were eaten within the household during the previous 7 days. The number of meals per day was also collected. The 7-day recall seems to be the most appropriate recall period to capture information about the household's habitual diet. A recall period longer than 7 days has proved to be problematic due to remembering difficulties. A shorter recall period would risk missing foods served habitually but infrequently at the household level.

The weekly special days (market, feasts, or celebrations) and normal days were both included in the recall. Yet, long periods of special diet days like Ramadan, other fasting periods, or special long festivities were excluded from the recall. Food items consumed in very small quantities (15 grams or less of fish or milk powders, oilseeds, nuts, oils/fats/butter, and 3 tiles or less of sugar in beverages, etc.) were referred to as condiments, recorded separately, and not included in the FCS. The food sources retained for survey were purchase, own production, fishing/hunting, goods/services trade, barter, borrowing, gift, collection/picking, food aid, etc.

According to the African and Burkina Faso food composition tables, a list of 23 food items/groups were surveyed (Barbara *et al.*, 2012, Ministère de la santé, 2007). The food items were aggregated in eight food groups, including cereals, tubers and roots; legumes and nuts; meat, fish, poultry, and eggs; dark green leafy vegetables; fruit; oils and fats; milk and dairy products; and sugar/sugar products. Others information included questions related to household characteristics (household head gender, age, marital status, household income resources, drink water sources, etc.).

Study variables: Socio-economic index was a group of the electro-household goods, fuel used for kitchen, household equipment, animals possession, land possession, and household water sources. This index was transformed in 3 balanced effective classes in order to define some household with low, medium, and high socioeconomic levels. Meal frequency is a crude indicator of food consumption because households might adjust the quantity and quality of their foods. Sources of food consumed are collected to obtain a more comprehensive understanding of the household food availability and access.

Based on the information about the food consumption during the previous 7 days, the number of food groups consumed in the household were established and used for the household. The consumption days of each food group were summed and the maximum number was seven.

The FCS is a composite indicator of dietary diversity, food consumption frequency, as well as nutrient intake by a household. It is intended to capture both diet quantity and quality.

The household food consumption score was calculated by multiplying each food groups' weight (ranging from 0.5 to 4) by frequency (ranging from 0 to 7). The highest weight was attributed to foods with relatively high energy, good quality protein, and a wide range of micro-nutrients that can be easily absorbed.

The score values calculated for each household were reported on a scale ranging from 0 to 112. The standard thresholds were used to determine three classes of households' food consumption (poor, borderline, and acceptable).

The poor consumption class (severe food insecurity) was related to households whose FCS was less than or equal to 21. The borderline consumption class (moderate food insecurity) included households whose FCS was higher than 21 and less than or equal to 35.

The acceptable consumption class (food safety) composed of households with FCS higher than 35. The consumption frequency of food groups rich in specific nutrients (vitamin A, iron, and protein) was determined by adding food consumption frequency from subgroups rich in

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nutrients.

To collect more information on consumption rate of households in specific nutrient-rich food groups (iron, vitamin A, protein), an analysis of the nutritional quality of the food consumption was made according to the WFP methodology (World food programme, 2015) .

Vitamin A-rich foods are: dairy, offal, eggs, vitamin A-rich vegetables, green leafy vegetables, and vitamin A-rich fruits. Protein-rich foods are: legumes, dairy products, lean meat, offal, fish, and eggs. Bioavailable iron-rich foods are: lean meat, offal, and fish.

In this study, we assessed the association of FCS and consumption frequency of the specific nutrient rich food groups with socio-demographic and economic variables.

Ethics and informed consent: Study protocol was validated by a committee of doctoral school of sciences and technologies in the University of Ouaga 1 Pr Joseph Ki-Zerbo. Health authorities in the Region of Centre-West were given authorization prior to the data collection. Informed consent forms were obtained before any inclusion of a household or an individual in the study. The protocol of this study was approved by Burkina Faso ethics committee of health research.

Treatment and data analyses of data: Data were analysed with IBM-SPSS version 20.0 (IBM Corp., 2011). Socio-economic index was calculated by principal component analysis. The electro-household goods, fuel used for kitchen, household equipment, animals' possession, land possession, and household water sources were used in determination of the socioeconomic status index. Socioeconomic index was the first component obtained after extraction and correlation of the matrix method. This index was transformed in 3 balanced effective classes in order to define some households with low, medium, and high socioeconomic levels. Later, bivariate descriptive analyse was used. Variables were expressed as frequencies, percentages, and mean ± standard deviation (SD) with one decimal and confidence intervals (95%). Differences were considered significant at P-value < 0.05 for all tests.

Results

Socio-demographic characteristics of the surveyed households: The sample consisted of 985 households identified in 37 villages and 3 towns in the Centre-West Region.

As shown in **Table 1**, 85% of the households were headed by men, 66.5% of the household heads were uneducated, and only 12.7% of them finished the primary school. Most of the household heads (70.5%) were monogamous, while 23.4% of them were polygamous.

Half of the households (50%) had three income sources, while the others (42% and 8%) had two and one income sources, respectively. Drinking water source was fountain in 53% of the households, while 9% were still drinking water from unprotected duged wells (**Table 1**).

Hoseholds' food consumption characteristics

In urban areas, the number of meals consumed per day was three or more in 74% of the households, while this rate was about 50% in adults in rural area .

In the last seven days, all households (100%) consumed grain food groups and its derivatives including tubers and legumes, 94% of households consumed meats, fish, poultry, and eggs, 90% of households consumed vegetables, 83% of households consumed legumes, 73% of households consumed sugars and sugar products, 65% of households consumed oils and fats, 35% of households consumed fruits, and 30% of households consumed milk and dairy products (**Figure 1**).

Regarding the food frequency consumption, analysis indicates that, seven days before the survey, households consumed mainly cereals' group (51.3%), (**Figure 2**).

Food consumed sources: According to **Table 2**, corn and millet/sorghum came from the own-production and purchases' groups. Yet, rice, fonio (*Digitaria exilis*), roots/tubers, poultry, meat, eggs, and legumes came from the purchases and own-production group. Majority of the food

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groups containing bread, wheat, fish, milk, and dairy products were provided by purchase. Sugar, sugar products, and pasta came from purchase in households that had consumed them. Vegetables/leaves, fees/dried fruits came from purchase, and collection/piking came from own production and other sources.

Food consumption score: The FCS mean±SD and median were 38.1 ± 23.2 and 31.5 (**Table 3**), respectively.

As presented in **Table 3**, the FCS was poor (FCS ≤ 21) in 28% of the households, at borderline (21 < FCS ≤ 35) in 28% of the households, and at acceptable level (FCS > 35) in 44% of the households. Almost 56% of households had limited access to food during the agricultural mitigation period and food insecurity.

According to **Table 4**, vitamin A-rich and protein-rich food groups' consumption was more frequent in Sanguié than other provinces (P < 0.001). Consumption of iron-rich food groups was more frequent in Ziro households than other provinces (P < 0.001). However, urban households consumed vitamin A-rich and protein-rich food groups more frequently than the rural areas (P < 0.001; P = 0.032). No significant difference was observed between rural and urban areas concerning the consumption frequency of iron- rich food groups (P = 0.215). A significant difference was seen among provinces (P < 0.001). However, increased consumption frequency of nutrients-rich food groups (vitamin A, iron, and protein) increased FCS and vice versa.

FCS, socio-demographic, and economic characteristics: According to **Table 5**, people living in households headed by men had a higher food consumption rate (45%) than those headed by women (42%). The people most vulnerable to food insecurity were those living in households having one (96%) or two (79%) sources of income, respectively. More than 40% of households had at least 3 sources of income and were at the borderline to acceptable levels with regard to food consumption score. The possession of animals was decisive in food insecurity; households with animals were less affected by food insecurity than those who had none.

According to our results, 88% of the households who have no animals, were food insecure. Among households who practiced market gardening, 66% had an acceptable level of food consumption, while 37% of household have never practiced gardening (P < 0.001). The education level (P = 0.10) of the household head did not have a significant effect on the households' food situation (P = 0.06). In rural areas, the proportion of households in the situation of severe food insecurity was 28% against 26% in urban areas (P = 0.29).

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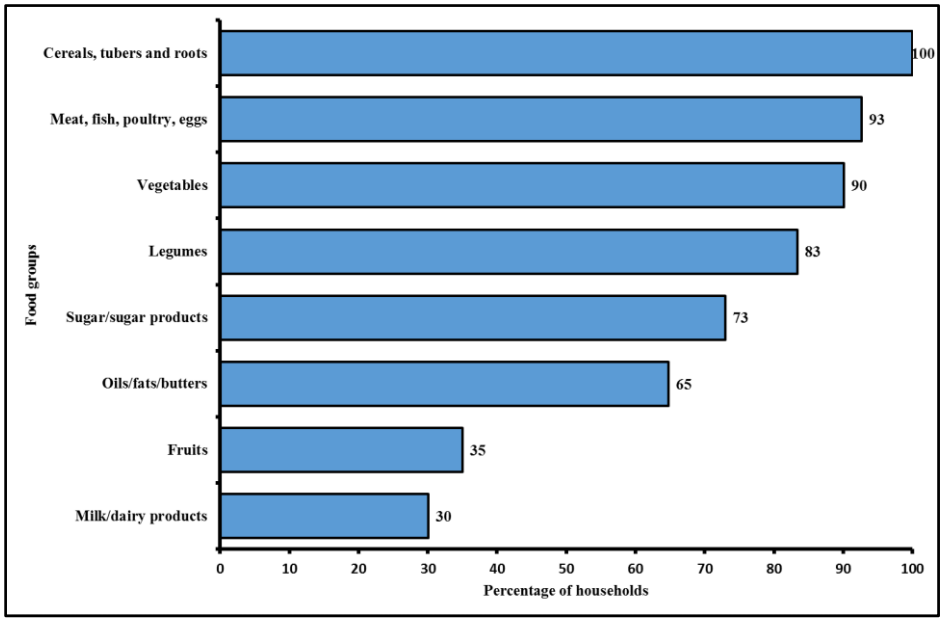

Figure 1. Percentages of households' consumed food groups in the last 7 days

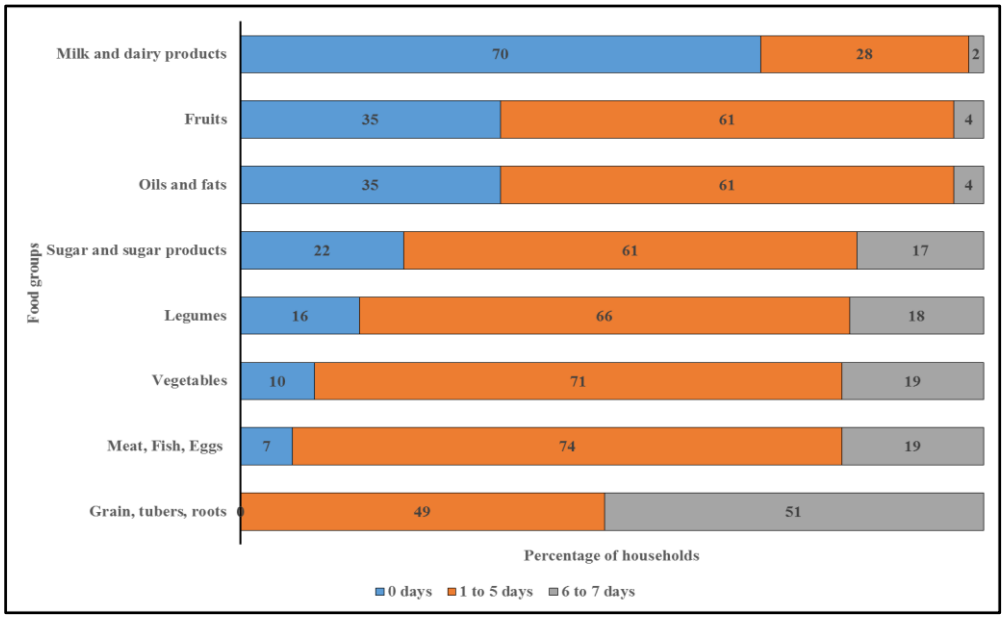

Figure 2. Food group's consumption frequency (% households)

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Table 1. Household socio-demographic characteristics

Socio-demographic and economic characteristics		N (%)
Marital status of household head	Married monogamy	694 (70.5)
	Married polygamy	227 (23.0)
	Single	21 (2.1)
	Widower or widow	41 (4.2)
	Divorced	1 (0.1)
	Another	1 (0.1)
Sex of household head	Male	838 (85.0)
	Female	147 (15.0)
Education level of household head	Illiterate	655 (66.5)
	Primary	125 (12.7)
	Secondary	54 (5.4)
	Superior	2 (0.2)
	Koranic	35 (3.6)
	Alphabetised	114 (11.6)
Household head age	15-37	330 (33.5)
	38-50	331 (33.6)
	≥ 51	324 (32.9)
Household income resources	Farmer	474 (48.0)
	Stockbreeder	395 (40.0)
	Trader	50 (5.0)
	Salaried	8 (1.0)
	Market garden	12 (1.0)
	Other	46 (5.0)
Number of household income resource's	1	77 (8.0)
	2	415 (42.0)
	≥ 3	491 (50)
Origin of household drink water	Protected wells	374 (38.0)
	Not protected wells	90 (9.0)
	Fountain	521 (53.0)
Time remaining before food stock breaking (month)	≤ 1.0	401 (41.0)
	1.1 – 4.0	279 (28.0)
	≥ 4.1	305 (31.0)
Province	Boulkiemdé	445 (45.0)
	Sanguié	238 (24.0)
	Sissili	152 (15.0)
	Ziro	150 (15.0)
Socioeconomic status	Low	383 (38.9)
	Medium	275 (27.9)
	High	327 (33.2)
Areas	Rural	861 (87.0)
	Urban	124 (13.0)

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Table 2. Sources of food consumed in the households during the last 7 days

Food items	N	Purchase N (%)	Own production N (%)	Collection/piking N (%)	Other sources N (%)
Corn	748	224 (30.0)	524 (70.0)	0 (0)	0 (0)
Rice	650	491 (75.5)	158 (24.3)	0 (0)	1 (0.2)
Millet/sorghum	803	138 (17.2)	664 (82.7)	0 (0)	1 (0.1)
Fonio	77	54 (70.1)	21 (27.3)	0 (0)	2 (2.6)
Roots/tubers	286	162 (56.6)	117 (40.9)	0 (0)	7 (2.5)
Bread	492	485 (98.6)	0 (0)	0 (0)	7 (1.4)
Fish	841	818 (97.3)	0 (0)	0 (0)	23 (2.7)
Poultry	301	172 (57.3)	121 (40.2)	0 (0)	8 (2.5)
Meat	398	342 (85.9)	43 (10.8)	0 (0)	13 (3.3)
Eggs	224	121 (54.0)	103 (46.0)	0 (0)	0 (0)
Milk/dairy	296	272 (91.9)	10 (3.4)	0 (0)	14 (4.7)
Legumes	821	438 (53.3)	307 (37.4)	0 (0)	76 (9.3)
Sugar/honey	721	(100.0)	0 (0)	0 (0)	0 (0)
Pasta	413	(100.0)	0 (0)	0 (0)	0 (0)
Oils/fats/butters	638	590 (92.5)	48 (7.5)	0 (0)	0 (0)
Vegetables	887	576 (65.0)	259 (29.2)	18 (2.0)	34 (3.8)
Fruits (fee, dry)	346	268 (77.5)	32 (9.2)	43 (12.4)	3 (0.9)

Table 3. Food consumption score (FCS)

Variables	N (%)	Mean ± SD	CI	Min	Max	Median
FCS (all)	985 (100)	38.1 ± 23.2	36.7-39.6	2.0	109.0	31.5
Poor	274 (28)	15.0 ± 4.4	14.5-15.6	2.0	21.0	16.0
Borderline	276 (28)	27.5 ± 4.1	27.0-27.9	21.5	35.0	27.0
Acceptable	435 (44)	59.5 ± 18.4	57.7-61.3	35.5	109.5	55.5
Animal protein CS	927 (94)	12.7 ± 9.0	12.1-13.2	0.0	28.0	12.0
Milk/dairy CS	296 (30)	2.3 ± 5.0	1.9-2.6	0.0	28.0	0.0
Cereal/tuber CS	985 (100)	10.3 ± 3.9	10.1-10.6	2.0	14.0	12.0
Legumes CS	821 (83)	7.5 ± 6.9	7.0-7.9	0.0	21.0	6.0
Vegetables/leaf CS	887 (90)	2.3 ± 5.3	1.9-2.6	0.0	7.0	1.0
Fruits CS	346 (35)	1.2 ± 1.6	1.1-1.3	0.0	7.0	1.0
Sugar CS	721 (73)	1,0 ±1.1	0.9-1.1.	0.0	3.5	0.5
Oil/fat CS	638 (65)	0.6 ± 0.8	0.5-0.6	0.0	3.5	0.5

SD: Standard deviation, CI: Confidence interval, Min= Minimum, Max= maximum, CS: Consumption score

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Table 4. Geographic situation, areas, and FCS as functions of rich food group's consumption

Variables	N	Food group's (FG)								
		Vitamin A-rich			Protein-rich			Iron-rich		
Consumption		NC	SC	DC	NC	SC	DC	NC	SC	DC
Province										
Boulkiemdé	445	3.8	69.2	27.0	2.9	56.3	40.9	6.3	73.3	20.4
Sanguié	238	3.8	56.3	39.9	2.1	52.1	45.8	10.5	76.9	12.6
Sissili	152	11.8	82.2	5.9	2.6	85.5	11.8	9.9	83.6	6.6
Ziro	150	1.3	96.0	2.7	3.3	80.7	16.0	5.3	94.0	0.7
P-value*			< 0.001			< 0.001			< 0.001	
Areas										
Urban	124	0.8	91.1	8.1	3.2	73.4	23.4	6.5	84.7	8.9
Rural	861	5.2	69.5	25.3	2.7	62.0	35.3	7.9	78.0	14.1
P-value*			<0.001			0.032			0.215	
FCS										
Low	274	13.5	85.8	0.7	8.8	91.2	0.0	19.7	80.3	0.0
Borderline	276	1.1	97.5	1.4	1.1	98.2	0.7	4.0	96.0	0.0
Acceptable	435	1.4	47.6	51.0	0.0	23.9	76.1	2.5	67.1	30.3
P-value*			< 0.001			< 0.001			< 0.001	

NC= No consumed, SC= sometimes consumed, DC= Consumed at least once a day *P-value statistically significant at 5%

Table 5. Food cancumption score (FCS) as a function of socio-demographic and economic characteristics

Indicators		N	Poor FCS (%)	Borderline FCS (%)	Acceptable FCS (%)	P-value[a]
Household head gender	Male	838	25	30	45	< 0.001
	Female	147	43	15	42	
Areas	Rural	861	28	27	45	0.29
	Urban	124	26	34	40	
Province	Boulkiemdé	445	27	24	49	< 0.001
	Sanguié	238	24	25	51	
	Sissili	152	34	32	34	
	Ziro	150	29	41	30	
Number of adults' meals	≤ 2 times	459	31	29	41	0.19
	= 3 times	466	26	28	47	
	≥ 4 times	60	23	23	53	
Market gardening practice	Yes	229	15	18	66	< 0.001
	No	756	32	31	37	
Animal possession	Yes	944	27	28	45	0.06
	No	41	39	34	27	
Woman education level	Illiterate	722	31	28	42	0.10
	Primary	105	20	26	54	
	Secondary	44	16	32	52	
	Literate	8	25	38	38	
	Koranic	92	24	28	48	
Religion	Islam	339	27	30	42	0.01
	Catholic	332	29	29	42	
	Protestant	126	37	25	38	
	Tradition	158	18	25	57	
	None	30	33	23	43	
Time before livestock breaking (month)	<= 1.0	401	30	32	38	0.003
	1.1 – 4.0	279	22	25	52	
	≥ 4,1	305	30	25	45	

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Socio-economic status	Low	383	29	31	39	< 0.001
	Medium	275	30	30	38	
	High	327	23	21	54	
Income sources number	≤ 1	79	30	49	20	< 0.001
	2	415	32	33	35	
	≥ 3	491	24	21	56	

[a]: Chi esquire-test

Discussion

As in most studies, in urban areas the frequency of meals was regular and higher than the rural areas (Food Agriculture Organizatio *et al.*, 2015, Lykke *et al.*, 2002).

In this study, the high consumption rate of cereals was strongly due to their physical availability. During early February 2017, the food situation was satisfactory and characterized by availability of cereals in the market with a general rise in prices (Green Africa *et al.*, 2017). Households with a low consumption frequency of specific nutrient-rich foods would be at a high risk of micronutrient deficiency. Low consumption of proteins exposes the individuals to acute malnutrition and growth retardation. In Burkina Faso, children of pre-school age had low or no consumption of provitamin A-rich foods (Zongo *et al.*, 2017). The reasons were financial accessibility, seasonal availability, and also ignorance.

Households in the Centre-West Region had similarities to those of Niger (Nielsen AC *et al.*, 2014), Bissau Guinea, , Mali (Welthungerhilfe, 2013), and Ghana (Koffi *et al.*) according to cereal food consumption. Households (97.3%) in Abidjan, Côte d'Ivoire had a diet based on cereals, roots, and white tubers during December 2012 and 42.1% of them consumed milk or dairy products (Kouassi *et al.*, 2013). These households consumed more milk or dairy products than those in the Region of Centre-West during 2017 (30%).

In Centre-West of Burkina Faso, the households with animals were less affected by food insecurity than those who had none. At Niger, a study showed that food consumption was improving with the possession of animals. In addition consumption of products derived from livestock (meat and milk) increased the FCS and also the possession of livestock improved index of wealth, and consequently the household's food security (INS-Niger *et al.*, 2011)

The mode of acquisition of food was based on the food type, food availability during the study period, and household wealth. Population's food profile varies considerably from one region to another depending on the productions and local availabilities on the one hand and the purchase power of households on the other hand (Regional strategic analysis and knowledge support system *et al.*, 2011). Indeed, sorghum, millet, corn, rice, fonio (*Digitaria exilis*), vegetables and leaves, as well as oil came from majority of the households' own-production. However, the tubers/roots, wheat/bread, fish, meat, poultry, eggs, alcohol, oils and fats, fruits, milk, and legumes were mainly from market purchases. The dry bean is an important source of vegetable protein and reduces the deficit in animal products' consumption for the poorest families. Pasta, sugar, and salt cannot be produced by households; so, they totally came from purchases.

The diversity of food consumption and food consumption frequency in households were important indicators in measuring food security.

The analysis indicates that 28% of the households had a poor FCS, while 28% were at the borderline with regard to FCS. For these two categories of households, food was monotonous, undiversified, and less rich. These households (56%) were food insecure, moderate, and severe. The 44% of the remaining households had rich and diverse food consumption in food security.

In Burkina Faso, a prevalence of food insecurity,

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higher than the average national level, was observed in the central regions (Loada and Ouredraogo/Nikiema, 2008, World Food Programme, 2014).

In February 2017, similar studies were conducted in Nigeria (Jean-Martin, 2017), Zambia (Allan *et al.*, 2017), and Yemen (Adham *et al.*, 2017) through interviews by telephone calls. The number of households was higher in the Region of the Centre-West of Burkina Faso with acceptable FCS (44%) than those found in Zambia at Western (39.25%) and Yemen at Raymah (28.88%) during February 2017.

There were less households in the Region of the Centre-West of Burkina Faso with acceptable FCS (44%) than those in Nigeria at Borno North (61.22) and Adamawa North (66.42%); in Mali (89%) (Agronomist and veterinary *et al.*, 2014). This difference is the fact that in Mali it was a food security project for women and children in the Region of Mopti, which is not the case in the Centre-West Region.

Naturally, food consumption diversity may depend on certain socio-demographic and economic characteristics at the household level. In Abidjan, being the household head, young, and educated, having income sources and food stocks reduced the risk of food insecurity for the household (Kouassi *et al.*, 2013).

In Centre-West of Burkina Faso, the most vulnerable people to food insecurity included those living in households with one or two income sources. More than 75% of the households with at least three income sources had borderline to acceptable food consumption scores. This is confirmed by a study carried out in Chad, which noted that diversification of income sources was a key strategy for households to improve their food security (Ollo *et al.*, 2013).

In Centre-West of Burkina Faso, the households with animals were less affected by food insecurity than those who had no animals. At Niger, a study showed that food consumption improved with possession of animals. In addition, consumption of products derived from livestock (meat and milk) increased the FCS and possession of livestock improved the wealth index and the household's food security consequently (INS-Niger *et al.*, 2011).

The practice of market gardening was crucial for the household's food consumption. Among households who practiced gardening, 45% had an acceptable FCS; whereas, 27% of those who never practiced gardening had acceptable FCS ($P < 0.05$). Households headed by women were most affected by poor FCS than those headed by men in the Centre-West Region, which is also confirmed by several other studies (INS-Niger *et al.*, 2011, Koffi *et al.*, 2011, Ollo *et al.*, 2012).

Religion and availability of stock during harvest were also among the other critical factors in the household's food situation in the Centre-West Region. The households' food situation with poor FCS can be explained by their current economic situation and food stock weakness. Furthermore, climate changes decrease the households' resilience to food insecurity. These households must have food assistance to improve their food situation. During 2017, in Niger (Kountche *et al.*, 2017) and Chad (Mary-Ellen *et al.*, 2017), WFP food assistance improved beneficiary household's food consumption.

Considering the advantages of this study, the 7-day recall can be mentioned as the most appropriate recall period to capture information about households' habitual diet. The determination of FCS was also quick and easy.

It should be noted that this study has some limitations. A 7-day recall requires some effort on the part of the interviewees to remember what was prepared, purchased, and consumed in the household.

Conclusion

This study presented the characteristics of food consumption at the household level in the Region of the Centre-West of Burkina Faso. To inevstigate the status of households' food consumption 7-day recall method was applied.

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This method allows to highlight the association of food consumption with sociodemographic and economic characteristics. Gender of the household head, availability of food stock, number and diversification of income sources, religion, market gardening practice, and socioeconomic status were among the crucial factors in improving the households' food consumption. Urban households mainly used the market channel for their food supply while in rural area it was mainly the own production. The household's with poor to borderline FCS must have food assistance to improve their food situation. Therefore, it is necessary to formulate and implement food security policies targeting vulnerable households to ensure a healthy diet. Similar surveys should be planned to provide answers for the questions with regard to the evolution of households' food consumption during specific periods of the year in Burkina Faso. However, the household food distribution among the members must be treated in future studies.

Conflicts of interest

The authors have no conflict of interest.

Author's contributions

Ouedraogo O, Compaore EWR, and Amouzou SKE designed and carried out the study. Ouedraogo O, Compaore EWR, and Amouzou SKE participated in data collection, analysis, and interpretation. Ouedraogo O, Compaore EWR, and Amouzou SKE wrote the manuscript. . Zeba AN made critical revisions in the article. The final manuscript was approved by Dicko M H. All authors read and approved the final manuscript.

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Abbreviations

FCS: food consumption score, WFP: world food programme, FAO: food and agriculture organisation, CI: confidence interval, SD: standard deviation, NC: not consumed, CS: consumption score, SC: sometimes consumed, CD: consumed at least one a day.

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