

Research Article

Effect of Agricultural Periods on Household's Food Consumption Habits: Burkina Faso Centre-West Region Case

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Abstract: Introduction: To measure food access and diet quality, simplified and reliable tools for individual and household have been found helpful to reduce the cost of dietary survey. **Objective:** The main objective was to determine the effect of agricultural periods on household's food consumption habits in the Centre-West Region of Burkina Faso. **Methods:** A cross sectional study on household food consumption was carried using the last seven day (7) recall. Food consumption score (FCS) was built by adding the values for all food groups consumed during the seven days for each household. **Results:** Overall, 985 households from 37 rural places and 3 urban cities from the Centre-West Region of Burkina Faso were involved in the study. Each household was visited three times in the year 2017. With regard to the food consumption score, 32%, 27.8% and 11.6% of the households had a poor (FCS \leq score respectively in the agricultural welding, mitigation, and increase periods. The household food consumption scores were borderline (21 < FCS \leq 35) 44.3%, 28.0% and 48.8% respectively in the agricultural welding, mitigation and increase periods. In the agricultural welding, mitigation and increase periods, the household food consumption score were acceptable (FCS >35) respectively 23.7%, 44.2%, and 39.5%. There were more households who consumed vegetables in welding period than another period of year. The proportion of households who consumed sometimes vitamin A-rich and iron-rich food groups increased respectively during mitigation, welding and increase periods. **Conclusion:** Household diet quality based on food group's consumption was affected by agricultural periods. More efforts in term of strengthening food security more particularly in vulnerable household are needed for healthy diets for people during the year.

Keywords: dietary survey, food groups, household's food consumption, periods, Burkina Faso.

INTRODUCTION

Substantial efforts were made in order to prevent or handle food crisis, nevertheless many countries in West Africa are still facing food and nutritional crises due to structural or cyclical causes. In order to assure food and nutritional security to the population at a country or regional level, evidences based policies and strategical investments are need in this sector, which is only possible by raising the awareness of deciders, based on reliable information's.

Evidence based data on household food access mechanism or individual dietary data may appears costly in term of money and time involved and also because they required a high level of technical skills

capacities for both data collection and analysis (Estelle & Marie, 2014; G. L. Kennedy, Pedro, Seghieri, Nantel, & Brouwer, 2007). Simplified and reliable tools for individual and household diet quality assessment have been found helpful to reduce these cost related to these kind of dietary survey in the past recent years (Estelle & Marie, 2014; Food and Nutrition Technical Assistance, 2006), such as calculation of food consumption scores (FCS), food variety and food diversity.

Food diversity is a qualitative measure of food consumption, which gives an account of the variety of foods accessible to a households, which is close to the measure of nutritional adequacy of the diet at an individual level (World Food Programme, 2008).

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Household food diversity score provides a snapshot of the economic ability of a household to have access to a variety of foods, as demonstrated by several studies (Food and Agriculture Organization, 2012; G. Kennedy, Razes, Ballard, & Dop, 2010).

Several studies have demonstrated that the FCS is associated with caloric intake (Coates, Rogers, & *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 represent the intakes necessary for a person or a group of person to maintain good health and sustain sufficient reserves. In order to meet these needs, food consumption model specific to nations or local level taking into account food practices, nature quality of the food consumed is necessary. 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 present paper aim to present the findings of this study related to household dietary quality, in this Region of Burkina Faso.

MATERIAL AND METHODS

Study Design, Site and Population

A cross sectional study on household food consumption was carried out in the Region of the Centre-West of Burkina Faso, located at one hundred kilometres from Ouagadougou, the capital, during year 2017. This Region includes the provinces of Boulkiemdé, Sanguié, Sissili, and Ziro. The total population of the Region was estimated in 2016 at 1 554 040 inhabitants (715 996 men and 838 044 women) distributed in 119 541 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).

The study was conducted in 2017 during the period of agricultural mitigation (January to June), agricultural wedding (July to September) and agricultural increase (October to December) in Burkina Faso (Conseil National de Sécurité Alimentaire, 2016).

Sampling

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

The survey was performed exclusively on household head who provided a written informed consent. Have been excluded, the households who the respondents were sick or unable 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.

Permission for data collection was obtained from the regional health authorities.

An informed written consent was obtained from all household heads before interviews were conducted. The study's purpose and objectives were explained to each participant prior to interview. Study participants were free to refuse or withdraw from the study at any time.

Data Collection Process and Instruments.

Investigators (31) and previously trained supervisors (7) have collected data from household's tree times in the year 2017.

The interview face-to-face with the people concerned was used in households using pre-tested questionnaires. In each household selected, the person preparing and cooking the food was asked to recall household food consumption over a seven day period. The respondent is asked about the household's frequency of food consumption in number of days over the past week for each food group/ item. This includes the food sources. The food sources retained for survey are: purchase; own production; fishing/hunting, goods/services trade, barter; borrowing; gift; collection/picking, food aid, and other with precision. A household was considered absent if during three times investigator didn't see someone inside to respond questions.

A qualitative seven days recall of food consumption was used to capture the number of day each food items or groups was eaten within the household during the previous 7 days.

The food items or groups listed in the questionnaire was detailed on a list of twenty-three (23) items according to the West African and Burkina Faso food composition tables (Barbara *et al.*, 2012; Ministère de la santé, 2007) to facilitate the respondent memory.

The seven day recall seems to be the most appropriate recall period to capture information about household's habitual diet. 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 in the recall.

Food items that are 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.

Study Variables

Sources of food consumed are gathered in order to obtain a more comprehensive understanding of the household food availability and access.

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 milk products; and sugar/sugar products.

Based on the information on the food consumption during the previous seven days, the number of food groups consumed in the household were established and used for household. The number of consumption days of each food group, was the sum of consumption days of each food item in the food group. If the sum exceeds seven, we kept seven.

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

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

The values of the scores thus calculated for each household were reported on a scale ranging from 0

to 112. The WFP standard thresholds were used to determine the three classes of households' food consumption in poor, borderline and acceptable (World Food Programme, 2008). WFP has established cut-off points of $FCS \leq 21.0$ to indicate poor food consumption (severe food insecurity), $FCS=21.5-35.0$ to indicate borderline food consumption (moderate food insecurity) and $FCS > 35.0$ to indicate acceptable food consumption (food security).

The consumption frequency of food groups rich in specific nutrients (vitamin A, iron, and protein), was determined by adding the food consumption frequency from subgroups with each food group rich in nutrients.

For more information on the consumption 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.

Treatment and statistical analyses of data

Data were analysed with IBM-SPSS version 20.0 (IBM Corp., 2011). Bivariate descriptive analysis was used. Variables were expressed as frequencies, percentages, mean \pm standard deviation (SD) with one decimal. WFP has established cut-off points of $FCS \leq 21.0$ to indicate poor food consumption, $FCS=21.5-35.0$ to indicate borderline food consumption and $FCS > 35.0$ to indicate acceptable food consumption.

RESULTS

Number of households surveyed in the year

The sample consisted of 985 households identified at the mitigation period in 37 villages and 3 towns in the Centre-West Region. At the wedding and increase agricultural periods, 930 and 936 households were involved respectively in the study (table 1).

Table 1: Household concerned of the study

Province	Number of household by period		
	Mitigation n (%)	Wedding n (%)	Increase n (%)
Boulkiemdé	445 (45.2)	427 (46.0)	427 (45.6)
Sanguié	236 (24.0)	202 (21.7)	205 (21.9)
Sissili	152 (15.4)	150 (16.1)	152 (16.2)
Ziro	152 (15.4)	151 (16.2)	152 (16.2)
Region	985 (100.0)	930 (100.0)	936 (100.0)

Household Food Consumption Score

The FCS mean±SD was respectively 38.1 ± 23.2, 34.9±12.9 and 28.6±13.2 respectively in period of mitigation, welding and increase (table 2).

It is clear such results as presented in table 2, the FCS was acceptable (FCS > 35) in 44.0%, 39.5%

and 23.7% of households, respectively in agricultural period of mitigation, increase and welding.

Almost 28.0%, 32.0% and 11.6% of households had limited access to food during respectively the period of agricultural mitigation, welding and increase.

Table 2: Household food consumption score

Variables	Mitigation		Welding		Increase	
	n (%)	Mean±SD	n (%)	Mean±SD	n (%)	Mean ± SD
FCS (all)	985 (100)	38.1 ± 23.2	930 (100)	34.9±12.9	936 (100)	28.6±13.2
Poor	274 (28)	15.0 ± 4.4	298 (32)	15.9±3.9	109 (11.6)	16.9±3.0
Borderline	276 (28)	27.5 ± 4.1	412 (44.3)	28.1±4.1	457 (48.8)	28.9±3.8
Acceptable	435 (44)	59.5 ± 18.4	220 (23.7)	46.8±11.4	370 (39.5)	47.7±10.2

Hosehold’s food groups consumption during the periods of the year

In the last seven days in the previous survey, according to period of mitigation, welding and increase, respectively 30%, 30.8% and 31.2% of household was consumed the milk and dairy products. Approximately 100% of household was consumed starchy during the year.

There were more household who consumed vegetables (95.3%) in welding period than another period. Legumes where most consumed by household during increase (91.8%) period than others periods.

The number of household consumed energetic food was increased according respectively to mitigation, welding and increase periods (table 3).

Table 3: Household food groups consumption during mitigation, welding and increase period

Food groups	Mitigation n (%)	Welding n (%)	Increase n (%)
Milk and dairy products	296 (30.0)	287 (30.8)	292 (31.2)
Fruits	346 (35.1)	287 (30.8)	411 (43.9)
Oils and fats	638 (64.8)	626 (67.3)	656 (70.1)
Sugar and sugar products	719 (73.0)	731 (78.6)	788 (84.2)
Legumes	821 (83.3)	810 (87.1)	859 (91.8)
Vegetables	887 (90.0)	886 (95.3)	883 (94.3)
Meat, Fish, Eggs	927 (94.1)	847 (91.1)	898 (95.9)
Grains, tubers, roots	985 (100.0)	923 (99.2)	931 (99.5)

Hosehold’s food groups consumption frequency during the periods of the year

Regarding the food frequency consumption, on the seven days preceding the survey, at least 28% to 31% of households had consumed sometimes milk and dairy products (table 4).

There were more households (60.4%) who consumed fruits sometimes during mitigation period

than another’s. The proportion of household who consumed sometimes oils/fats and sugar/sugars products increase respectively on periods of mitigation, welding and increase.

During the periods of welding and increase, there were more households (92.5%) who consumed sometimes vegetables than mitigation period.

Table 4: Household food consumption variation as a function of periods of the year

Food groups	Sometimes consumption			Daily consumption		
	Mitigation n (%)	Welding n (%)	Increase n (%)	Mitigation n (%)	Welding n (%)	Increase n (%)
Milk and dairy products	277 (28.1)	280 (30.1)	290 (31.0)	19 (1.9)	7 (0.7)	2 (0.2)
Fruits	595 (60.4)	351 (37.7)	410 (43.8)	43 (4.4)	0 (0.0)	1 (0.1)
Oils and fats	595 (60.4)	618 (66.5)	650 (69.4)	43 (4.4)	8 (0.9)	6 (0.6)
Sugar and sugar products	605 (61.4)	696 (74.8)	758 (81.0)	167 (16.9)	35 (3.8)	30 (3.2)
Legumes	648 (65.8)	761 (81.8)	796 (85.0)	173 (17.6)	49 (5.3)	63 (6.7)
Vegetables	723 (73.4)	860 (92.5)	866 (92.5)	184 (18.7)	26 (2.8)	17 (1.8)
Meat, Fish, Eggs	708 (71.9)	836 (89.9)	824 (88.0)	219 (22.2)	11 (1.2)	74 (7.9)
Grains, tubers, roots	465 (47.2)	652 (70.1)	733 (78.3)	520 (52.8)	271 (29.1)	203(21.7)

Hosehold’s nutrients-rich food consumption frequency during the periods of the year

According to table 5, the proportion of households who consumed sometimes vitamin A-rich food groups increased respectively during mitigation

(72.2%), welding (81.2%) and increase (89.4%) periods. In the same direction, the proportion of households who consumed sometimes iron-rich food groups increased respectively during mitigation (78.9%), welding (82.9%) and increase (94.4%) periods.

In mitigation period there were more households who consumed daily vitamin A-rich (23.1%), iron-rich (13.4%) and protein-rich (33.8%) foods than another's periods.

Protein-rich foods were more consumed sometimes by households during welding (75.6%) than mitigation (63.5%) and increase (70.5%) periods.

Table 5: Nutrients rich-food groups consumption according to agricultural periods

Food groups	Sometimes consumption			Daily consumption		
	Mitigation n (%)	Welding n (%)	Increase n (%)	Mitigation n (%)	Welding n (%)	Increase n (%)
Vitamin A-rich	711 (72.2)	755 (81.2)	837 (89.4)	228 (23.1)	156 (16.8)	55 (5.9)
Iron-rich	777 (78.9)	771 (82.9)	884 (94.4)	132 (13.4)	48 (5.2)	13 (1.4)
Protein-rich	625 (63.5)	703 (75.6)	665 (70.5)	333 (33.8)	209 (22.5)	272 (29.1)

Food consumed sources variation in the year

Table 6 present the sources of foods consumed by households during the year.

The grains, tubers, roots, legumes and vegetable were most consumed by farmers (own production) than another's foods groups during the

three agricultural periods of year. Milk, milk products, fruits, meat, fish, eggs, oils and fats were more purchased than own consumption during the year.

There were more people who collected fruits during mitigation period (18.4%) than increase (15.3%) and mitigation (13.3) periods.

Table 6: Household food consumption variation according to food sources and period

Food groups	Own production			Purchase			Another		
	M (%)	W (%)	I (%)	M (%)	W (%)	I (%)	M (%)	W (%)	I (%)
Meat, fishes and eggs	15.3	21.2	20.1	83.4	74.1	75.4	1.3	4.7	4.5
Milk and dairy products	3.4	5.6	6.8	95.2	89.9	91.4	1.4	4.5	1.7
Grains, tubers, roots	38.6	34.2	43.3	60.7	63.2	54.7	0.7	2.6	2.0
Legumes	53.6	49.6	75.6	46.1	44.3	23.7	0.3	6.1	0.7
Vegetables	29.2	71.0	50.7	65.0	28.0	16.6	5.8	1.0	32.7
Fruits	9.2	20.7	10.0	77.5	60.8	74.7	13.3	18.4	15.3
Oils and fats	6.9	2.6	4.4	92.5	94.7	92.4	0.6	2.7	3.2

M=mitigation, I=Increase, W=Welding

DISCUSSIONS

Households were first selected during mitigation period who corresponding with dry season. In this period household activities were less than another's periods. The agricultural welding period corresponding with the rainy season who most of people work in the farms. The period of agricultural increase is the moment of harvest. There were less people in households during welding and increase agricultural periods than mitigation.

Household Food Consumption Score

The FCS was acceptable (FCS > 35) in 44.0%, 39.5% and 23.7% of households, respectively in agricultural period of mitigation, increase and welding. These households had a rich and diverse food consumption, so they were in food security. The remaining households had a poor or borderline FCS. For these two categories of households, food was monotonous, undiversified and less rich. These

households were in food insecure, moderate and severe. According to the present study and literature, periods influence household food security (Hillbruner & Egan, 2008).

In Burkina Faso, the central regions have a prevalence of food insecurity overall above average national (LOADA & OUREDRAOGO/NIKIEMA, 2008; Programme Alimentaire Mondial, 2014).

In February 2017, similar studies was conducted in Nigeria (Jean-Martin, 2017), Zambia (Allan, Arif, & Andrew, 2017) and Yemen (Adham, Arif, Jean-Martin, & Endalkachew, 2017) through phones interviews. There were more households 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%) (UE & COFED, 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.

The household's food situation with poor FCS is explained also by the current economic situation and the weakness of the food stock in these households. Also, climate changes decreases their resilience to food insecurity. These households must have food assistance to improve their food situation. During 2017, at Niger (Kountche *et al.*, 2017) and Chad (Mary-Ellen, *et al.*, 2017) WFP food assistance contribute to improve beneficiary household's food consumption.

Household's Food Groups Consumption During The Periods of The Year

According to period of mitigation, welding and increase, respectively 30%, 30.8% and 31.2% of household was consumed the milk and dairy products.

Approximatively 100% of household was consumed starchy during the year. The high consumption of cereals in this study was strongly due to their physical availability. Early February 2017, the food situation was satisfactory and was characterized by an availability of cereals on the market with a general trend of the evolution of prices on the rise (Afrique Verte, AcSSA, AMASSA, & APROSSA, 2017). Households in the Centre-West Region had similarities to those of Niger (USAID ICF International Inc, 2014), Bissau Guinea (Koffi, Damietta, & Bessa), Mali (Welthungerhilfe, 2013) and Ghana (Amugsi, Mittelmark, & Oduro, 2015) according to cereal food consumption. Households (97.3%) at Abidjan in Côte d'Ivoire during December 2012, had a diet based on cereals, roots and white tubers, and 42.1% were consuming 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 this study, there were more household who consumed vegetables in welding period than another period. Legumes were most consumed by household during increase period than others periods. The number of household consumed energetic food was increased according respectively to mitigation, welding and increase periods.

There were many factors linked to the period of the year who explain these differences.

One explanation for the higher consumption of vegetables during welding period is the disponibility of green leafy vegetables. There were some foods which

are typical of the period and were accessible to the households during this period.

In particular, some foods depending of household purchasing power, meaning households can have little or higher choice of them (sugar, oils and fats, meats...) during the year.

Regarding the household food frequency consumption, on the seven days preceding the survey, at least 28% to 31% of households had consumed sometimes milk and dairy products in the year 2017. There were more households who consumed fruits sometimes during mitigation period than another's. One of the reasons is the great availability of mangoes and others fruits during mitigation period. The proportion of household who consumed sometimes oils/fats and sugar/sugars products increase respectively on periods of mitigation, welding and increase.

During the periods of welding and increase, there were more households who consumed sometimes vegetables than mitigation period.

Household's nutrients-rich food consumption frequency during the periods of the year

In the present study, the proportion of households who consumed sometimes vitamin A-rich and iron-rich food groups increased respectively during mitigation, welding and increase periods. Recent study from Ghana also found that fruit and/or green leafy vegetable consumption was higher in the rainy season compared to the dry season (Abizari, *et al.*, 2017).

The difference in consumption of fruits and vegetables between periods may partly be explained in the present study, by the seasonal availability of fruits and vegetables in Burkina Faso. According to nutrients-rich food consumption in the Centre-West region in 2017, in agricultural welding period, women, young children and infants consumed more iron rich-foods than vitamin A-rich foods (OUEDRAOGO, COMPAORE, AMOUZOU, & DICKO, 2019).

Protein-rich foods were more consumed sometimes by households during welding than mitigation and increase periods. Households who had a low consumption frequency of specific nutrient-rich food group's would run a high risk of micronutrient deficiency. Low consumption of proteins exposed to acute malnutrition and growth retardation. In Burkina Faso, children of pre-school age, did not consume or consumed provitamin A-rich food at a low frequency (Zongo, *et al.*, 2017). The reasons were financial accessibility, seasonal availability and also ignorance.

At the Centre-West Region of Burkina Faso, the grains, tubers, roots, legumes and vegetable were most consumed by farmers (own production) than

another's foods groups during the three agricultural periods of year. The legumes are an important source of vegetable protein and helps reduce the deficit in the consumption of animal products for the poorest.

Milk, dairy products, fruits, meat, fish, eggs, oils and fats were more purchased than own consumption during the year. This implying great variation of these foods during the periods of year. Therefore, there was a great variation of micronutrients-rich food consumption because the animal source foods are known to be very good sources of micronutrients (Allen, 2008; Iqbal, *et al.*, 2006).

There were more people who collected fruits during mitigation period than increase and mitigation periods. The mode of acquisition of food was based on the type of food, their availability during the study period and the household wealth. Food profile of populations varies considerably from one Region to another depending on the productions and the local availabilities on the one hand and the purchasing power of households, on the other hand (ReSAKSSWA, Michigan State University, Syngenta, & fondation pour une agriculture durable, 2011).

Other studies have also shown food consumption can vary from one season to the next (Arsenault *et al.*, 2014; Becquey *et al.*, 2012; Ferguson *et al.*, 1993).

In Bangladesh, in particular, the effect of the season on food security in an urban area was attributed to differences in dietary diversity across seasons (Hillbruner & Egan, 2008).

Cultural characteristics are known to have an impact on food utilisation such as cooking patterns, cooking skills and food preferences (Renzaho & Mellor, 2010).

The diversity of households food consumption and food consumption frequency have proved being proxies important indicators to measure food security.

As advantages, the seven day recall seems to be the most appropriate recall period to capture information about household's habitual diet. The determination of FCS score is quick and easy.

It should be noted that this study has limitations. A seven days recall requires some effort to the interviewees in remembering what was prepared or purchased and eating in the household.

The FCS does not consider foods consumed outside of the household. It does not provide any information on intra-household food distribution.

CONCLUSION

This study makes significant contributions to the literature by documenting the effect of agricultural periods on food consumption habits at the household level in the Region of the Centre-West of Burkina Faso. The household food consumption and security are affected by the periods influencing by food access and people dietary habits.

Seven (7) days reminder method to describe satisfactorily household food consumption habits. This method allows to highlight a link between food consumption habits and agricultural periods of year.

The household's with poor to borderline FCS must have food assistance to improve their food situation during the year. Therefore, it is necessary to formulate and implement multisector food security policies targeting vulnerable households to ensure a healthy diet.

Interventions that aim to improve the household food and nutrition security in rural and urban communities need to recognize the role of agricultural period on diet habits. Policy makers and programme planners also need to incorporate initiatives that prevent undesirable period variation in diet habits.

In the future, the household food distribution among the members must be treated in future studies.

List of Abbreviations

FCS: food consumption score, WFP: World Food Programme, SD: standard deviation, M: mitigation, I: Increase, W: Welding.

Ethics and Informed Consent

Study protocol has been validated by a committee of doctoral school of sciences and technologies of the University Ouaga 1 Pr Joseph KI-ZERBO.

The study was approved by the Ethics Committee for Health Research of Burkina Faso. Permission for data collection was obtained from the regional health authorities.

An informed written consent was obtained from all household heads before interviews were conducted. The study's purpose and objectives were explained to each participant prior to interview. Study participants were free to refuse or withdraw from the study at any time.

Consent for Publication

Non applicable

Availability and Validity Of Data

The data used in this study can be provided by the author on request motivated.

Conflicts of Interest

The authors have no conflicts of interest.

Author's Contributions

OO, EWRC and SKEA designed and carried out the study. OO, EWRC and SKEA participated in the collection, analysis and interpretation of the data. OO, EWRC and SKEA wrote the manuscript draft and made the critical revisions of the article. The final manuscript is approved by MHD. All authors have read and approved the final manuscript.

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