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Food Typology of Traditional Foods Based on Millet, Sorghum, and Cowpea from the Rural Communes of the North Central Region of Burkina Faso

RASMATA DABO[1,2], FATOUMATA HAMA-BA[1*] AND ALY SAVADOGO[2]

[1]Food Technology Department (DTA), Institute of Applied Sciences and Technologies (IRSAT), National Centre for Scientific and Technological Research (CNRST), Ouagadougou, Burkina Faso
[2] Laboratory of Biochemistry and Applied Immunology (LaBIA), Training and Research Unit of Life and Earth Sciences (UFR//SVT), Joseph KI-ZERBO University (UJKZ), Ouagadougou, Burkina Faso

* Corresponding author: hamafatou@gmail.com

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Food vulnerability is a growing plague in developing countries, neglecting local foods. Better knowledge of local foods is necessary to improve their consumption. The objective of this study is to identify the types of local millet, sorghum, and cowpea foods in the North Central Region from a socio-cultural perspective. The methodology consisted of organizing 12 focus groups to respond to an individual questionnaire on the socio-cultural characteristics of participants and their knowledge of their millet, sorghum, and cowpea-based diet. The focus groups targeted women and men in the young, adult, and senior age groups in the communes of Lebda and Boussouma. Among the traditional dishes inventoried, 25 commonly consumed dishes were selected and reproduced by rural women. A total of 44 traditional foods, 3 improved traditional foods, and 4 imported foods based on millet, sorghum, and cowpea were inventoried. Socio-cultural knowledge of these foods differed by age group but was identical for the two rural communes. Among these foods, some are consumed routinely or occasionally, while others are specific to vulnerable groups. Knowledge of the types of foods will help guide nutrition policy to promote the consumption of some types of foods.

1. Introduction

Food is one of the most important elements of every nation's traditional culture. food traditions play a central role in society and also human behaviour (UNESCO, 2021). Culturally appropriate and diverse, healthy diets contribute to food and nutrition security. Some research has highlighted the value of considering the diet as a whole by identifying food typologies, the aim of which is to assess food consumption patterns (De Bourdeaudhuij and Van, 1999), (Gillman and al., 2002). In Burkina Faso, cereals and legumes are an important source of nutrients for its population (MAAH-DGESS, 2020). Among the main cereals consumed in Burkina Faso, sorghum, millet, and maize represent the majority of food consumption (about 70%).

Several studies have evaluated the nutritional potential of cereal grains (Songre-Ouattara and al, 2015) (Kowieska and al., 2011), (Malomo and al., 2013)). Sorghum carbohydrates make up 80% of the grain's dry matter. It contains 7-16% protein, 3-4% lipids,

and 1.5-3% mineral contents of dry matter (Fliedel and al., 1996). Millet is highly palatable and rich in protein, minerals, and energy (Andrews and al., 1993) (Michaud and al., 2002). Millet contains an average of 67.5% carbohydrate, 11.6% protein, 5% lipids, and 2.3% mineral content of dry matter (Nambiar and al., 2011). Groundnuts, cowpeas, and voandzou are consuming more than 2 to 4 times a month by all households as a food item in Ouagadougou, Kaya, Lebda, and Nobéré (Hama-Ba and al., 2017). Cowpea is a vital legume for the food security and health of populations around the world with major nutritional and nutraceutical qualities (Hall, 2012). In developing regions, it is mainly grown for its seeds and leaves, and occasionally for the green pods (Gerrano and al., 2017). Whole cowpea grain contains 23-32% protein, 50-60% carbohydrates, and less than 1% fat (Jos´e and al., 2014) (Kirse and Karklina, 2015).

However, we note that eating habits are increasingly detached from food traditions, creating an alarming situation in the nutritional status of the low-income population. The Burkina Faso traditional food has an important place in the social and cultural customs. Specific traditional dishes are prepared for many traditional festivals. For example, there are celebrations to mark the start of the harvest and the beginning of the consumption of new crops. Traditional foods help avoid dependence on imported foods. They also help to promote and develop local crops, which are often neglected as a source of energy, even though they are better adapted to the environment. This is the case in Nigeria, Ghana, and other countries where it has been demonstrated that the development of local agricultural products stimulates technological innovation and traditional know-how (Mervin, 1998). The flooding of the markets with external products of undetermined quality has a strong influence on the nutritional status of the population. In addition to stunting, which will affect 24.9% of children under the age of five in 2020 (MS, 2019). Burkina Faso, like most developing countries, is affected by a nutritional transition leading to excess weight ((Finucane et al, 2011) (Ng et al, 2014) (Stevens et al, 2012)) which is accompanied by an increase in the incidence of high blood pressure (HTA) and diabetes (Popkin, 2015). The latter two are major factors in increasing the incidence of cardiovascular disease (CVD) and cancer (Diendere, 2017). The prevalence of hypertension, diabetes, total hypercholesterolemia, and obesity was 17.6%, 4.9%, 3.5%, and 2.1%, respectively, and the majority of the population (97.3%) was exposed to at least one common risk factor for no communicable diseases (STEPS, 2014).

The Centre-Nord region of Burkina Faso has the highest prevalence of stunting with 32.2%, including 10.1% of severe forms, and the lowest proportion of Centre-Nord dietary diversity scores in 2021. However, in the region, millet, sorghum, and cowpea are grown and consumed. These crops are used to produce local dishes, and a minority of these dishes constitute staple foods. Traditional know-how is a source of solutions to the current food problems facing our populations. The food process and food mixes that are highly nutritious are no longer known to today's populations but were very useful in the past. It is therefore important to know the dishes, the types of food commonly consumed, the dishes abandoned and to estimate their nutritional value. Knowledge of nutritional values will enable nutritionists to guide the population in their food intake and promote the consumption of certain abandoned dishes. This will help balance the population's diet. Numerous studies in Burkina Faso have revealed the existence of traditional dishes such as *tô*, porridge, couscous or *wesla*, cowpea fritters, *zoomkoom*, pancakes, etc. (Icard-Vernière and al., 2010) ; (Songre-Ouattara and al., 2016); (Kagambèga and al., 2019); (Soma and al., 2019)). Many traditional foods are disappearing. Some food is little known by the new generation. The youngest is increasingly integrating imported products. The promotion of food diversity, and the changing behaviours to ensure sustainable consumption are key elements of the global strategy to achieve the Millennium Development Goals. (UNESCO, 2021).

The objective of this study is to identify the types of millet, sorghum, and cowpea-based foods in the rural North Central region of Burkina Faso. This study will provide a better understanding of the place of traditional food in the current context of malnutrition and the control of certain chronic diseases.

The results of the study will benefit vulnerable people in households (children, pregnant women, lactating mothers, the elderly, and the sick). This will be done through policymakers who will pass laws for the promotion of local products, health professionals and community organizations who will be doing awareness campaigns, and processors and restaurateurs

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who will be responsible for preparing these dishes to make them available and accessible. These actions will help fight malnutrition and maintain the nutritional balance of patients suffering from non-communicable diseases due to poor nutrition.

2. Materials and methods

The methodology consisted of focus group discussions to answer an individual questionnaire and inventory of local millet, sorghum and cowpea foods, food preparation and nutritional analysis of foods.

2.1 Zone of study

The focus groups were conducted in the North Central region of Burkina Faso in the communes of Lebda and Boussouma. The commune of Lebda is located 25 km from Pissila on the Kaya-Boulsa axis. It is about 15 km from Kaya, the capital of the Centre North region in the province of Sanmatenga, and 120 km from the city of Ouagadougou. The commune of Boussouma is also located in Sanmatenga, 20 km from the city of Kaya. These two communes have a traditional organization. The foods were reproduced in Lebda.

2.2 Organization of focus groups

A total of twelve groups were formed in each commune according to the age and gender of the participants. Three age groups were considered: group G1, which represents the oldest people over 50 years old, group G2, which represents adults between 35 and 50 years old, and group G3, which represents young people between 15 and 35 years old. For each age group, 2 subgroups of men and women were created separately. The number of participants per focus was eight. Two agents were in charge of the animation. The discussion was facilitated in the local language "Mooré" which is a language commonly spoken in the North Central region. Each session lasted between 90 and 120 minutes and was recorded by dictaphones. The main selection criteria were membership in the commune and the function of the producer.

2.3 Questionnaire or guide

The interview guide focused on the social identification of the participants, the inventory, and the history of the dishes. The main discussion was oriented on the knowledge of millet, sorghum, and cowpea-based dishes and products, those commonly consumed, the abandoned dishes, new dishes, foods eaten during special occasions (festivals, funerals, christenings, traditional celebrations, etc.), foods eaten during the seasons (rainy season, harvest, welding periods), foods eaten by vulnerable groups (children, pregnant women, nursing mothers, the elderly and the sick). The categorization of foods into traditional, new, and specific occasional groups was described. Traditional foods have been defined as foods that are authentic to the region. New foods were defined as improved traditional foods and imported foods. Occasional foods were defined as foods eaten during festivals, baptisms, and funerals, such as temporal foods that are consumed during rainy seasons, harvest seasons, and welding periods. Specific foods were defined as foods for the nutritional recovery of children, pregnant women, postpartum women, the elderly, and patients.

2.4 Material

The millet (*Pennisetum glaucum*), sorghum (*Sorghum bicolor (L)*), groundnut (*Arachis hypogea (L)*), and cowpea (*Vigna unguiculata (L)*) used in this study were brought in by the women. The fruits and leaves of tamarind (*Tamarindus indica*), and the leaves of bagana (*Piliostigma reticulum*) were collected in the bush, shea butter, salt, oil, peanut powder, sesame seeds, cotton seed powder, and potash were obtained with the rural women and used as ingredients.

2.5 Preparation of food

2.5.1 Choice of women who prepare foods

The criteria for selecting the women were their experience in preparing food in their households and their regular consumption of local meals. Each woman was asked to choose the food she had mastered and to describe the steps involved in its preparation. The other participants were asked to amend and correct the steps if they had forgotten.

2.5.2 Food preparation diagram

The diagram for each food was created by the group supervisors following the descriptions of the different steps made by the women who were selected. The other participants are invited to amend and correct the

steps in case of omission. At the end of the description of the preparation steps, the common unit steps of the different dishes were identified. The dish diagrams were summarized in a few diagrams based on the unit steps and the raw materials used. From the inventoried dishes a total of 25 commonly consumed dishes were selected for reproduction.

2.6 Statistical Analyses of the Data

Transcription of the focus group audio was done by verbatim in French. The data were entered into Excel 2016 according to the defined types of dishes. A thematic analysis was applied to the transcribed data. Statistical processing was carried out using SPSS software version 2020. Descriptive statistical analyses were carried out with the calculation of response frequencies.

3. Results

3.1 Socio-economic characteristics of focus group members

The socioeconomic characteristics of participants are represented in Table 1.

All of the focus group participants belonged to the Mossi ethnic group. They are mostly illiterate as 91% of the participants in Boussouma and 84% of the participants in Lebda have never attended formal school. The highest level of education was secondary school, with only 4% of participants in Boussouma and 6% of participants in Lebda.

The majority of participants in both communes were Muslim (75% of participants in Boussouma and 59% of participants in Lebda) and married (89% of participants in Boussouma and 96% of participants in Lebda). Most participants were indigenous (52% of participants in Boussouma and 69% of participants in Lebda). In addition to their production activities, some participants held secondary positions. These functions include animators, traders, gold miners, blacksmiths, herders, processors, students, and authorities (customary, religious, administrative. As for the origin of the participants, natives or indigenous

Table 1. Socio-economic characteristics of participants

Socio-economic parameters	Participants	Boussouma		Lebda	
		Number	Percentage (%)	Number	Percentage (%)
Religion	Total	44	100	49	100
	Christian	11	25	17	35
	Islamic	33	75	29	59
	Traditional		0	3	6
Ethnic group	Mossi	44	100	49	100
Educational level	Alphabetized	0	0	14	29
	Koran	3	5	2	4
	Not instructed	38	86	26	53
	Primary school	3	5	4	8
	Secondary school	2	4	3	6
Matrimonial status	Single	5	11	1	2
	Divorced	0	0	0	0
	Married	39	89	47	96
	Widowed	0	0	1	2
Profession	Other activities	30	68	8	16
Origin	Native	23	52	34	69
	Migrant	21	48	15	31

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people represented the majority in the focus groups and in both communes. However, in Boussouma, the percentage of migrants, defined as those who are not originally from the commune, tends to balance that of natives.

3.2 Inventory of traditional millet, sorghum, and cowpea foods

3.2.1. Inventory of foods by raw material

The dishes were grouped into simple dishes based on millet, sorghum, or cowpea and also into mixed dishes based on millet/sorghum and cowpea or/and leaves (see pictures in annex). The simple dishes were in turn grouped according to their mode of cooking into several forms, namely fried foods (pancakes, *samsa*), drinks (*zomkom, zomparga, dolo, pasta (tô, bengfallés)*, couscous (wesla) rolled dishes (benkida porridge, lumps), porridges (porridge, *kalbenga, pog-rogdo-benré*), foods cooked simply in water or steam (*banigula, foura, gonré, malguemnoré, guelbom, pigga)*. These various inventoried foods are presented in the following Table 2.

Figure 1 illustrated types of food classified according to their respective raw materials and cited respectively, according to the commune, age, and gender of the participants.

According to the food type, the foods mentioned are the same in both communes. The largest proportion of cereal-based foods was cited by the G2 groups aged between 35 and 50 years, representing 57% of the total. Cowpea dishes were cited equally by G2, G1, and G3 and represented a small proportion of all foods (22-25 %). Cereal-cowpea, cereal-leaves, and cowpea-leaves dishes were cited infrequently by all groups. Cereal-based foods were equally cited by men and women, accounting for 57% and 56% of foods respectively. Cowpea-based foods were cited more by women than by men and accounted for 24% and 22% of foods respectively. Cereal-cowpea foods were the most cited by men. Cereal-leaves and cowpea-leaves foods were slightly more frequently mentioned by women than men, accounting for 2% and 1% of the foods mentioned, respectively.

3.2.2. Inventory by food history

The foods inventoried were grouped into two types of foods, traditional foods, and new foods. These new foods are composed of improved and imported traditional foods (see Table 2). Among these types of food, there is a classification of commonly consumed foods, occasionally consumed foods, and foods consumed by vulnerable groups.

Figure 2 shows the types of traditional foods categorized by history.

Improved and imported traditional foods inventoried by the focus groups are few These foods are composed of cereal-based foods, cowpea-based foods, and mixed foods (see Table 2). The new foods are enriched mugdugu, and millet/sorghum bread, enriched tô, gonsala, green_beans-wesla, and dèguè. Among these foods the bread, the dèguè and the green beans have been identified as imported foods. The enriched mugdugu, the enriched tô and the gonsala are improved traditional foods. These new foods also include commonly consumed foods, food specific to vulnerable groups and occasional food. The traditional foods were mostly simple foods (see Table 2). Among these foods, a large proportion disappeared, as shown in Figure 3. The disappearing foods that have been cited are, among others banigula, guelbom, kemogho, gouroum, malguemnoore, zabi/birba, kaloré, and muyamuya.

3.2.3. Specificity of the food

Some foods are commonly consumed, but others are consumed occasionally. These occasions are among others:
- the rainy season, which runs from June to October
- the harvest season which is from September to November - the lean season which overlaps with the rainy season (April to October)
- and the festive season (traditional festivals, religious festivals, weddings, and baptisms).

Others are eaten by vulnerable groups (children, pregnant women, the elderly, and patients). On the other hand, some foods are commonly consumed.

Table 2. Traditional millet, sorghum and cowpea food

Type foods	Simples foods	Raw material	Cooking mode	Composite foods	Raw materials	Cooking mode
Traditional foods	*banigula*	sorghum	with water	*babenda*	millet/sorghum +leaf	with water
	benga_cooked	cowpea	with water	*benga_mil*	cowpea + millet	with water
	bengfalle	cowpea	with water	*bengneton*	cowpea +leaf cowpea	with water+ steam
	porridge	sorghum/ millet	with water	*cowpea_wesla*	cowpea+sorghum/millet	water+ steam
	bessé	millet	juice	*coumwesla*	*millet+obergine*	with steam
	pog-rogdo-benré	millet	with water	*wesla_feuille*	millet+leaf	with steam
	dolo	sorghum	juice	*wesla_voandzou*	millet+voandzou	water+steam
	pancake	sorghum/millet	frying	*gnon/guilipon*	millet+leaf	with steam
	gonre	millet	with steam	*bengyissa*	millet+leaf cowpea	with steam
	gonsaala	cowpea	steam+water	*Bassi*	millet+groundnut	steam+ torrefied
	gouroum	millet	with water			
	guelbom	millet	with water			
	foura	millet	with water			
	kalbenga	cowpea	with water			
	kaloré	millet	with water			
	kemogho	millet	with water			
	malguemnoore	cowpea	with water			
	mouyamouya	sorghum	with water			
	pigga	millet	with steam			
	cowpea sauce	cowpea	soup			
	samsa	cowpea	frying			
	tô	sorghum/ millet	dough			
	Toubani	cowpea	with water			
	wesla	sorghum/ millet	with steam			
	zabi/birba	cowpea	with water			
	zomkom	millet	juice			
	zomparga	sorghum/ millet	juice			
Improved traditional foods				enriched *mugdugu*	millet+groundnut	torrefied
				enriched porridge	millet+cowpea/groundnut	with water
				enriched *tô*	millet/sorghum+legum	with water
Imported foods	bread	sorghum / millet + wheat	in oven	green bean _wesla	millet+ bean	with steam
	biscuits	millet/sorghum+wheat	in oven	*dèguè*	millet+milk	with steam

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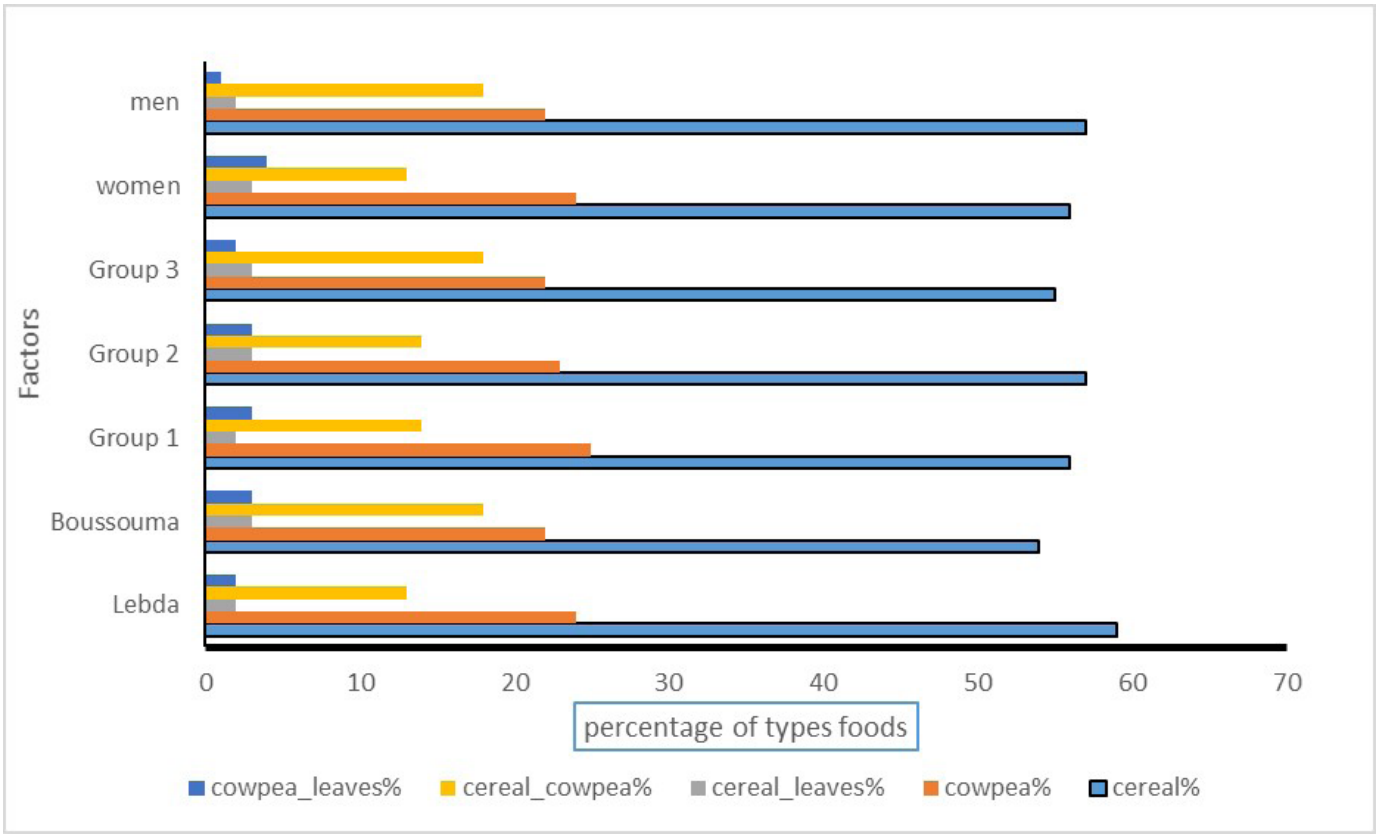

Figure 1. types of food classified by the commune, age group, and gender of participants

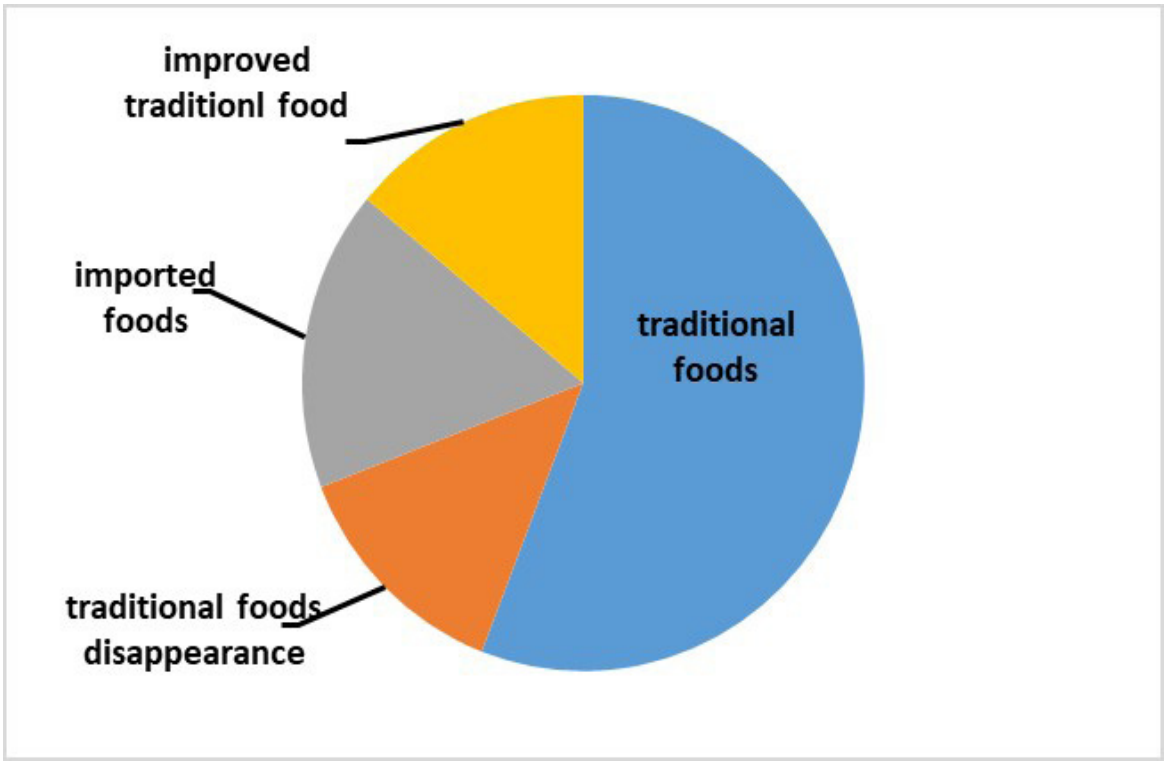

Figure 2. representation of traditional foods, improved traditional foods, and imported foods

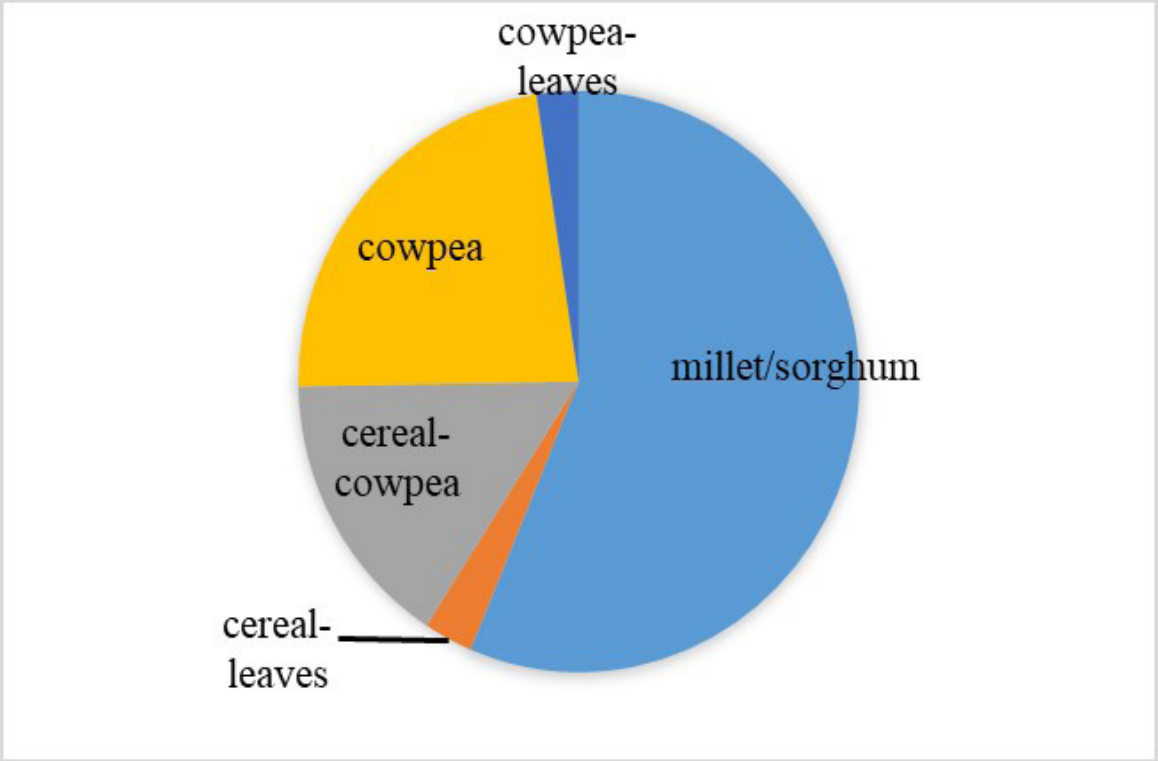

Figure 3. representation of common foods

3.2.3.1 Common foods

Commonly consumed foods were poorly represented among the foods inventoried. These foods are among others *banigula*, cowpea_cookie, porridge, *dolo, foura, pancake, gnon, gonre, guelbom, samsa, tô, wesla, zomparga, bassi, cowpea_millet, cowpea_sorghum, cowpea-wesla, mugdugu*. Among common dishes (Figure 3), cereal-based foods also represent 56%, cowpea-based foods 23%, and mixed foods 21% (cereal-cowpea, cowpea-leaves and cereal leave food). The result is a low representation of mixed foods and high consumption of simple cereal-based foods.

3.2.3.2 Occasional foods

Figure 4 shows foods consumed during the rainy season, the harvest season, the hunger season, and during the festive cited by participants.

Cereal-based dishes are the most cited among these dishes. The festive foods are classified into drinks (*zomkom, dolo bécé*), main food (*banigula, zabi, cowpea sauce), and snacks (pancakes). The foods tô, wesla, zoomparga, pigga, cowpea_millet, cowpea_rice, cowpea_wesla, wesla_leaves, bengnéton, bengyissa, babenda, berrense sagbo*, were cited as foods consumed during field work or the rainy season. The foods cowpea_cookie, gonré, tô, bengnéwesla, cowpea_millet, cowpea_leaves, bengyissa, coumwesla, zomparga, dolo, and kavadi were cited as foods consumed during the harvest. Cowpea_cookie, babenda, zomparga, and wesla were cited as foods eaten during the welding period

3.2.3.3 Food consumed by vulnerable groups

The food consumed by the vulnerable groups is mostly simple cereal-based food. Figure 5 shows the proportions of food types according to the raw material used by children, pregnant women, breastfeeding women, patients, and elderly people.
The proportion of legume (cowpea) foods was lower than cereals foods. A few cereal and legume foods were cited as specific to children. The foods most eaten by children are: porridge, *mugdugou, samsa, benga*, and mild *tô*. The food most eaten by the elderly are: t*ô, dolo, gonré, wesla, wesla leaf, benga, kalbenga banigula* and *zomkom*. The food most consumed by the patient are porridge, *tô_ sauce_potash*, potash

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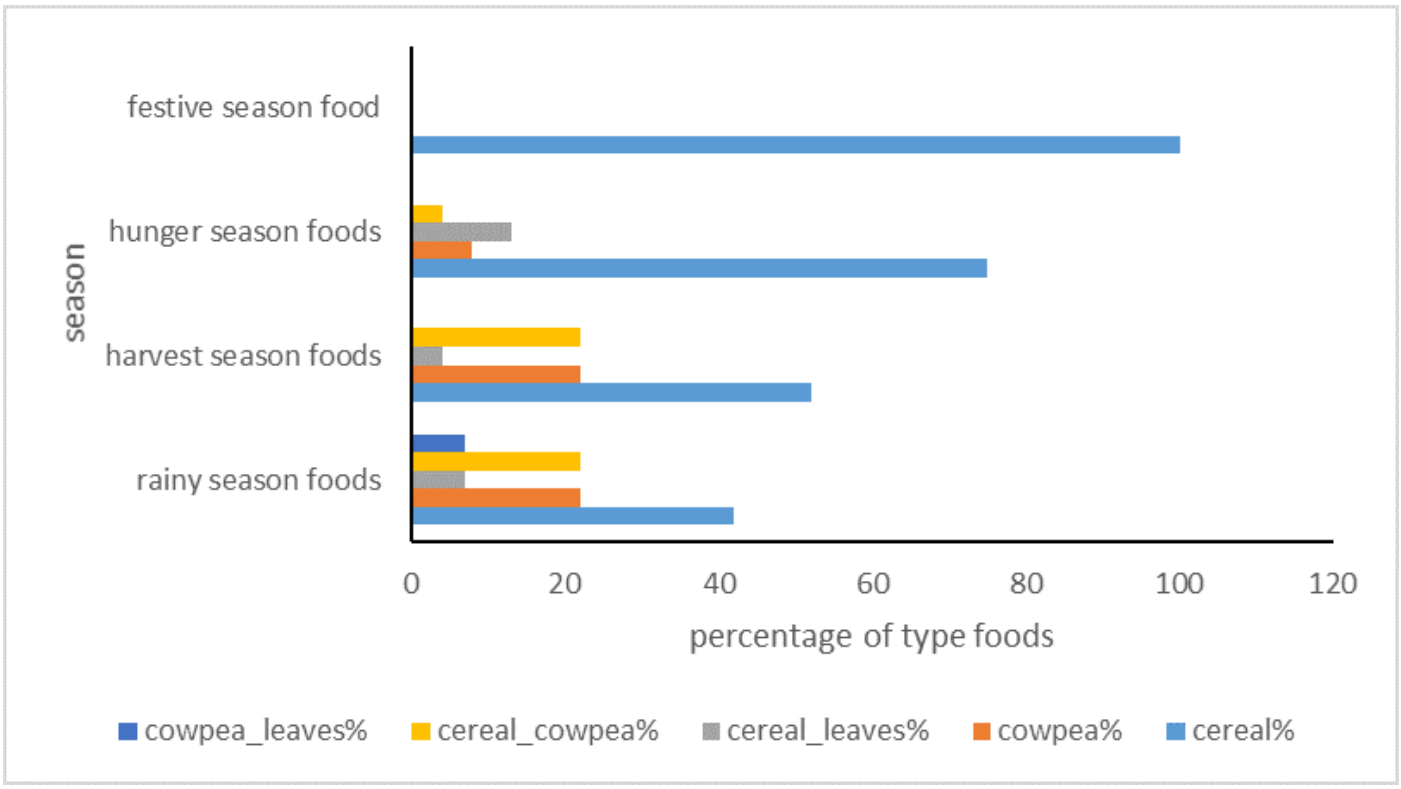

Figure 4. representation of the occasional foods

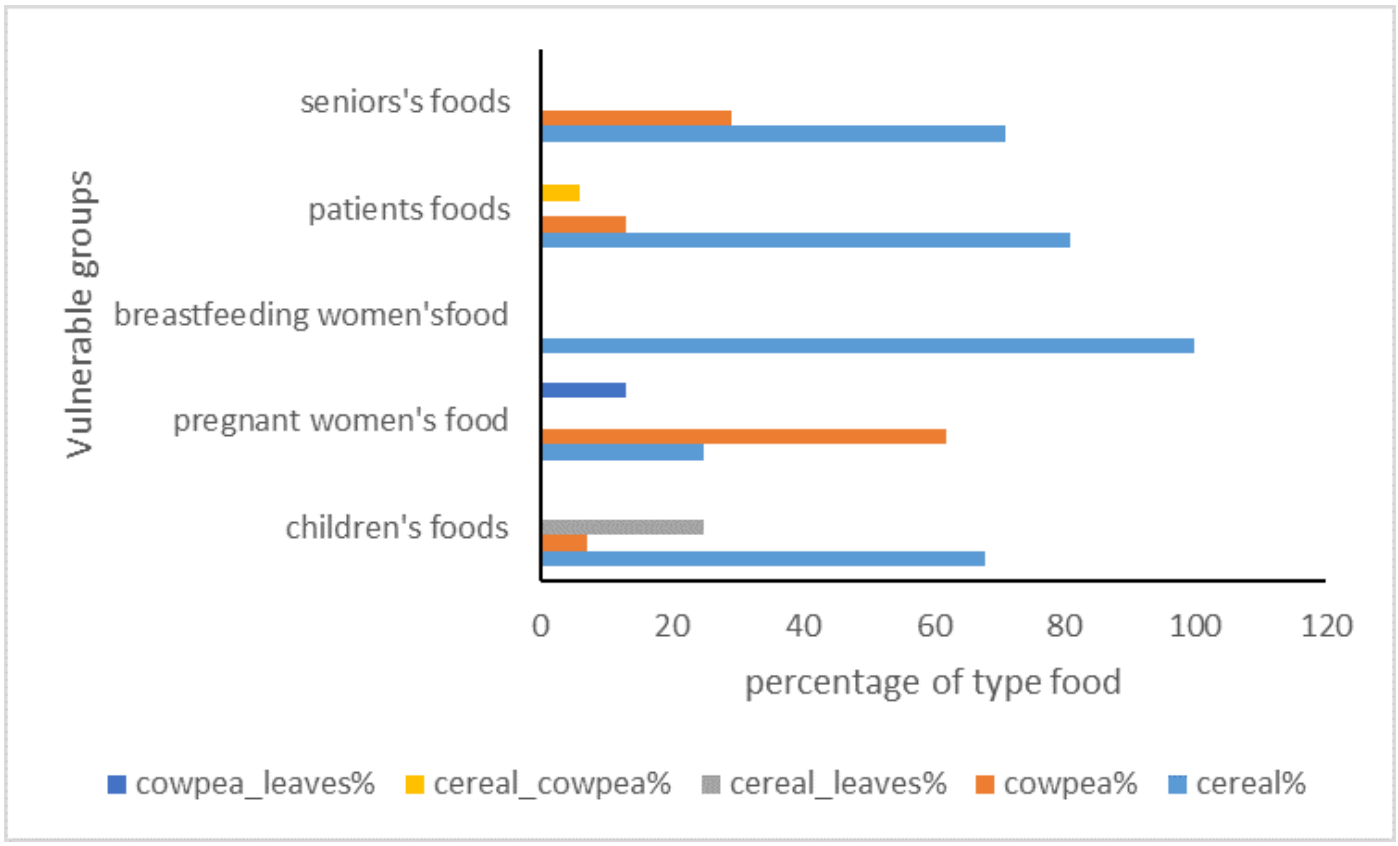

Figure 5. representation of vulnerable group's food

porridge, *wesla_feuille, wesla*, and *kalbenga*.

Most participants spoke of the non-specificity of the food for vulnerable groups. However, a few mentioned some specificity of the food for vulnerable groups. Indeed, enriched porridge for children, *kalbenga* used to treat respiratory illnesses, *Pog-rogdo-benré* porridge for post-partum women, gonré, benyissa for pregnant women.

Figure 6 presents the proportion of specific foods by gender and age group of the participants.

The food eaten by children was identified more by women in group G1 and that of pregnant women by women in groups G2 and G3. Food eaten by the patients was mostly mentioned by the men in group G3 and by the elderly by the men in group G1. Food consumed by postpartum women was cited only rarely.

4. Discussions

Simple cereal-based foods are the most common and account for 50% of traditional foods. Cowpea-based foods represent 18% and mixed foods represent 32%.

Cowpea is sold for family expenses rather than consumed. Studies have shown that cowpeas are grown for commercial purposes while sorghum and millet are grown for household consumption. households practice two cropping systems: a cash crop intended for the household's monetary needs, of which cowpea is a part, and a food crop intended for food needs, of which millet and sorghum are also part. (Bamba and Ouedraogo, 2014). Of the cereal dishes, 64% are millet-based and 36% sorghum-based. Millet and sorghum are used sometimes to prepare the same dishes. In addition to these common foods, millet is more suitable for preparation. Millet and sorghum-based dishes are widely eaten because both of these cereals are available, accessible, and easy to prepare, and are part of the region's eating habits. The high proportion of millet and sorghum-based foods cited by adults (G2) and youth (G3) compared to the old (G1) shows that there are new foods that were not known by the older generation. However, the proportion of cowpea-based dishes cited by the older generation compared to adults and children shows that there is

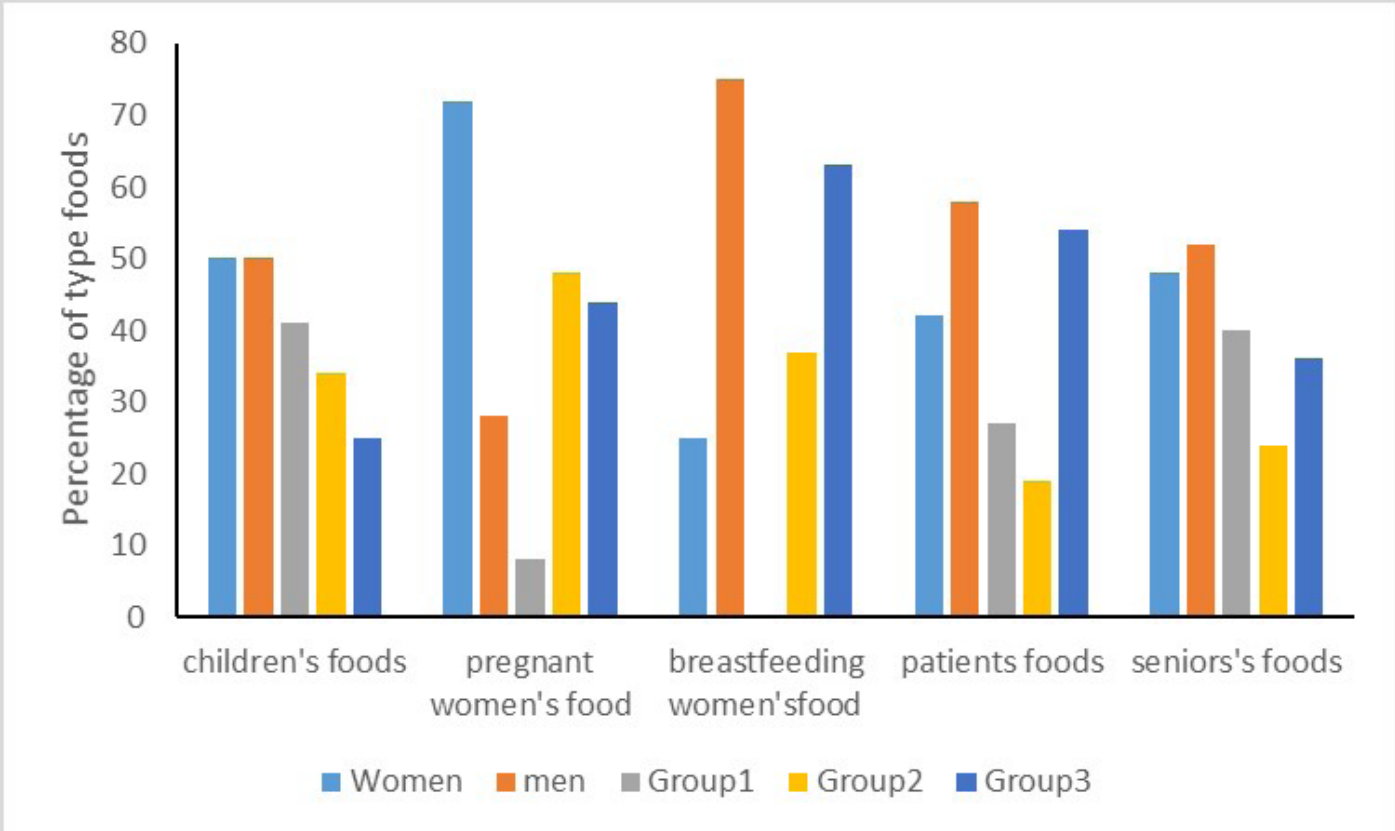

Figure 6. representation of specific foods by gender and age group

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a disappearance of certain dishes that the new generation no longer consumes. The abandonment of certain cowpea-based dishes composite dishes could be explained by the laboriousness of the processes, the cooking time resulting in an intense demand for energy while wood is difficult to obtain, the insufficiency of cowpea, the high cost of cowpea, and ingredients. Some cowpea-based dishes, such as *zabi, bengfale, malguemnore*, and *toubani*, are difficult to cook and took a lot of time. First, the cowpea must be soaked and shelled. The cowpea flour must be rolled before the lumps are obtained for the preparation of *zabi*.

Women in group G2 between the ages of 35 and 50 cited more cowpea foods than women in group G3 between the ages of 15 and 35 because they are generally responsible for meals and are more experienced.

Composite cereal and legume foods are more important than composite cereal and leaf foods, which in turn are more important than composite cowpea and leaves foods. These last two foods are little known by the new generation. They are also disappearing. Simple cowpea foods are less consumed in households because of their flatulence. Studies have shown the presence of anti-nutritional factors, such as protease inhibitors, lectin, phytic acid, tannin, and indigestible compounds among others induce flatulence (Madodé and al., 2013).

Of the known millet, sorghum, and cowpea-based foods cited by the focus group, nearly 80% are traditional foods, of which nearly 45% are endangered, and nearly 20% are new foods (improved traditional foods and imported foods). There are 46 traditional foods and tô is the food most consumed in all households. These similar results were found by other studies which revealed that tô represents 80.45% of the foods consumed in households in Burkina Faso((ENIAM, 2009) (Konkobo and al., 2002)). Another study also revealed that the percentages of children who consume *tô* and porridge of all cereals combined in some cities and villages of Burkina Faso are around 74.6% and 75.9% (Hama-Ba and al, 2019). The cause of the disappearance of the *banigula* was given by the G3 group of women from Lebda, stating: With the arrival of rice, people have abandoned *banigula*. The household that continues to prepare *banigula* is perceived as poor by other households.

Other studies identified new foods similar to those identified by the focus groups. These are improved traditional products ready for use in the cities (flour, semolina, porridge lumps, *deguè*, pre-cooked couscous, infant flours) and new products (bread, cookies, cakes, etc.) (Songre-Ouattara and al, 2015). The *dèguè* is a food imported from some countries bordering Burkina Faso (Tchekessi and al., 2014). It is obtained from cow's milk or fermented milk powder mixed with cereal flour pellets (Tchekessi and al., 2014). These new foods are illustrated by the following passage, by the men of the G3 group of Boussouma: *we notice the entrance of foods like dèguè, soybean brochette, boiled cabbage, salad, improved babenda which is not like the old food called zidparga or zizangsinga*.

In Benin in the past, *dèguè* was consumed during religious holidays among Muslims. For example, during the break of Lent or during the feast of Tabaski (Tchekessi and al., 2014).

The *tô* or cereal paste potash the potash porridge and the *kalbenga* (cowpea porridge) are specific food used in the tradition for the care of respiratory diseases (bronchitis, cough). These foods were mentioned by the women of G3 Lebda in the following passage: *If someone is sick, they cooked miltô with potassium sauce or porridge. To treat respiratory illnesses, we prepare millet porridge or kalbenga, which is also a cowpea-based porridge. If one has the means one can make fish or meat soup, leaves balls of kinlebdo or wild obergine to give him the taste of food.*

Among the dishes consumed by children, *mugdugu* and enriched porridge are composite dishes. Fortified porridge is known but very rarely consumed by children according to the statement of focus member. As a result, the specific foods represented 15.8% of the total foods generally consumed by the target groups. This proportion was very low. Seasonality is recognized as a key element of food availability in many developing countries (Savy and al., 2006). Cereal and leaves foods are more common during the growing and harvesting season than during the lean season. However, simple foods are the most consumed, even though households have the capacity to consume mixed foods.

The consumption of simple foods is a matter of dietary habits related to the socio-cultural context. The

lean season, during which households have difficulty meeting their food needs, occurs during the rainy season until the harvest. (UNICEF, 2015). It corresponds to the period of crop depletion and is severe in areas where people depend on the annual harvest of the staple crop after only one year. In addition to the depletion of grain stocks, this period is also characterized by intense agricultural work ((Benefice and Cames, 1999) (Brun and al., 1981)). The food eaten during this period is cereal-based energy food (tô, couscous).

The men in Lebda's G2 group stated the following during the discussion: "*During the rainy season, we consume naturally the tô, the zomparga, the cowpea bouilie simple or mixed with leaves (kinlebdo), the couscous with shea butter*".

Also, a compound food far is consumed by the *babenda*. It is an old food generally consumed at the time of the soudure periods, when there was not enough cereal to support the needs of the families until the harvests (Tarnagda and al., 2018).

During festivals, food in the form of drinks (*dolo* and *zomkom*) and resistance dishes (*banigula, zabi, bohanbola (baska*), and *benga sauce (zambédé*) are consumed. The pancakes are eaten during Muslim and traditional funerals. *Zom-koom* is a non-alcoholic drink made from millet or sorghum. As for the *dolo*, it is alcoholic. It is called *becé* if the raw material used for its preparation is millet. They are much appreciated by the rural population and play an important role in Burkinabe culture. They are very attached to the tradition. *Zomkom* is considered a welcome drink and is consumed during religious ceremonies (baptism, marriage, funerals, doua). *Dolo* is consumed during traditional ceremonies (funerals, *Baska*, Christian feast). Its consumption is forbidden by the Muslim religion. The pancakes are prepared with oil in aluminium or clay pots. These foods were mentioned by the G2 group of Boussouma women in the following passage:" banigula is prepared during the *kidou* festival and is a real treat. Also we prepare the following dishe: zomkom, rice, meat, macaroni, *dolo*, sweets, *tô*, *wesla* of millet".

Other types of cereal-based drinks have been encountered in other African countries. These include pito in Ghana, doro in Zimbabwe, bouza in Egypt, kunun-zaki in Nigeria, and mougoudji in Mali. (Olasupo and al., 1997; Sawadogo-Lingani, 2010; Dje and al., 2008).

The consumption of simple cowpea foods could be encouraged in households to improve the protein deficiencies of the population, especially those children who need protein for their growth. In addition to being an interesting food from a dietetic and nutritional point of view, some studies have associated regular consumption of legumes with various benefits such as better control of diabetes (Venn and Mann, 2004), a decrease in the risk of cardiovascular disease, prevention against obesity and a decrease in the risk of colorectal disease (Giovannucci and Willett, 1994), (Bazzano and al., 2001), (Kabagambe and al., 2005), (Michels and al., 2006) (Rémond and Walrand, 2017).

Studies have shown that legume consumption can optimize glycaemic control in the medium and long term by improving the effects of insulin (Sievenpiper et al, 2009; Ramdath et al, 2016).

The main existing programs for promoting cowpeas are based on farming practices like the cereal-legume association.

5. Conclusion

Millet and sorghum-based dishes are the most numerous and represent half of the known traditional dishes. Women and men between the ages of 35 and 50 are more aware of the usefulness of these dishes, especially in the commune of Lebda. Most of the compound and cowpea-based dishes are abandoned and little consumed. These can be promoted in households to avoid protein deficiencies in the diet of children and recommended in the diet of people suffering from diabetes and high blood pressure.

Conflict of Interest

The authors declare no conflict of interest. Besides, the funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

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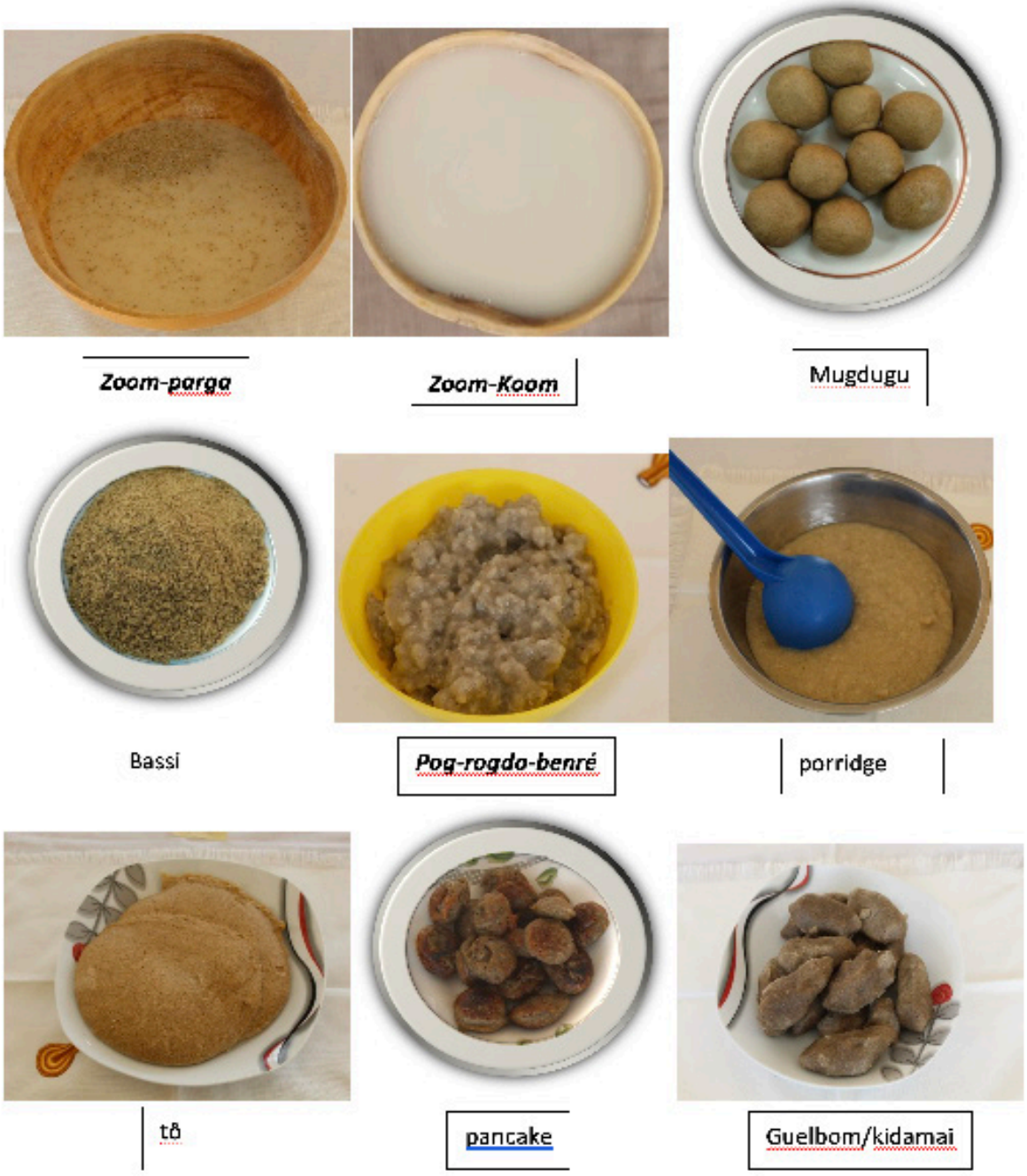
Ethical considerations

The study was conducted under the free and informed verbal consent of the participants after a brief explanation of the purpose of the study. The confidentiality of the study subjects was ensured. We ensured that the participants ensured that the results of the study would remain (UNESCO, 2021)anonymous and would be used only for the purpose of this study.

Appendix

Appendix 1 and Appendix 2 show simple millet/sorghum dishes and simple cowpea dishes.



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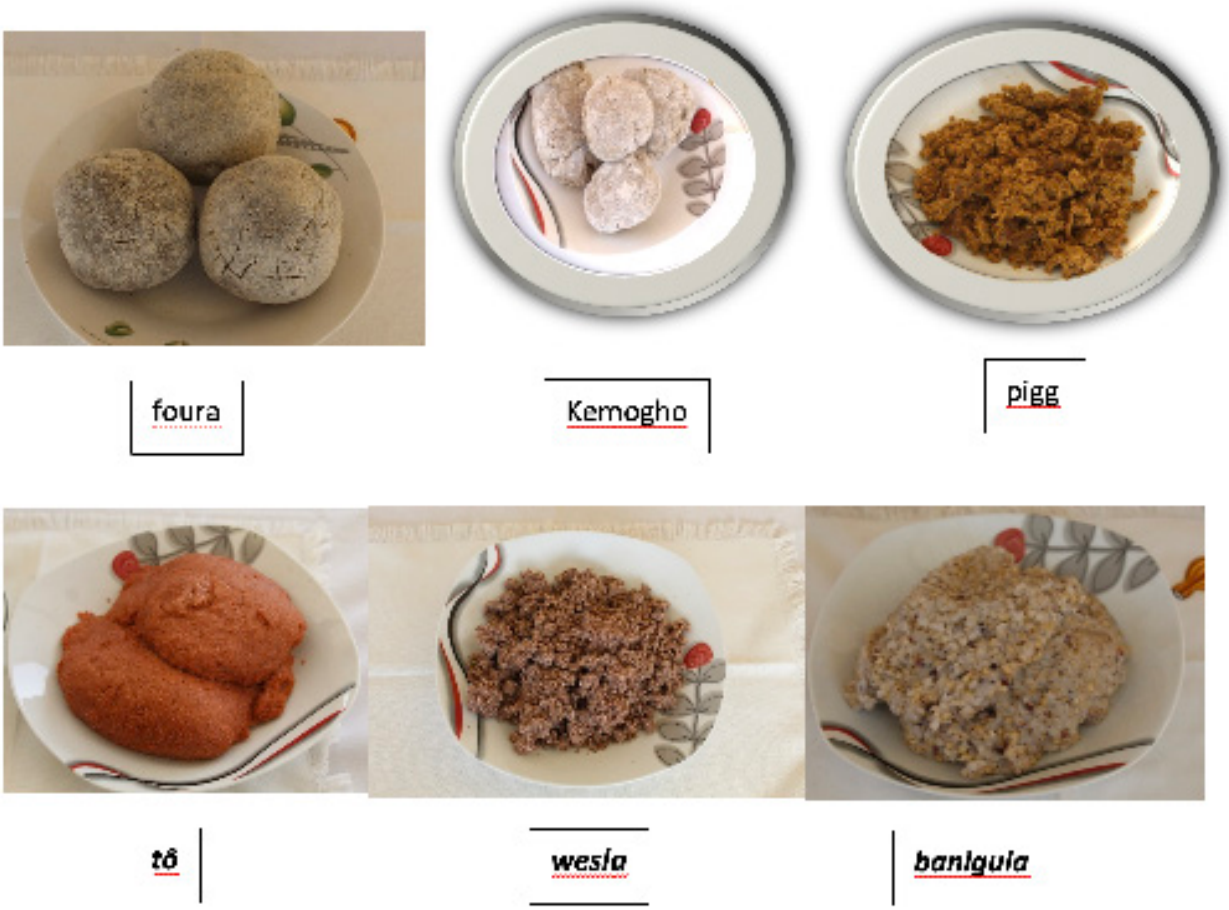

Appendix1. simple millet/sorghum foods

Appendix 2. simple millet/sorghum foods

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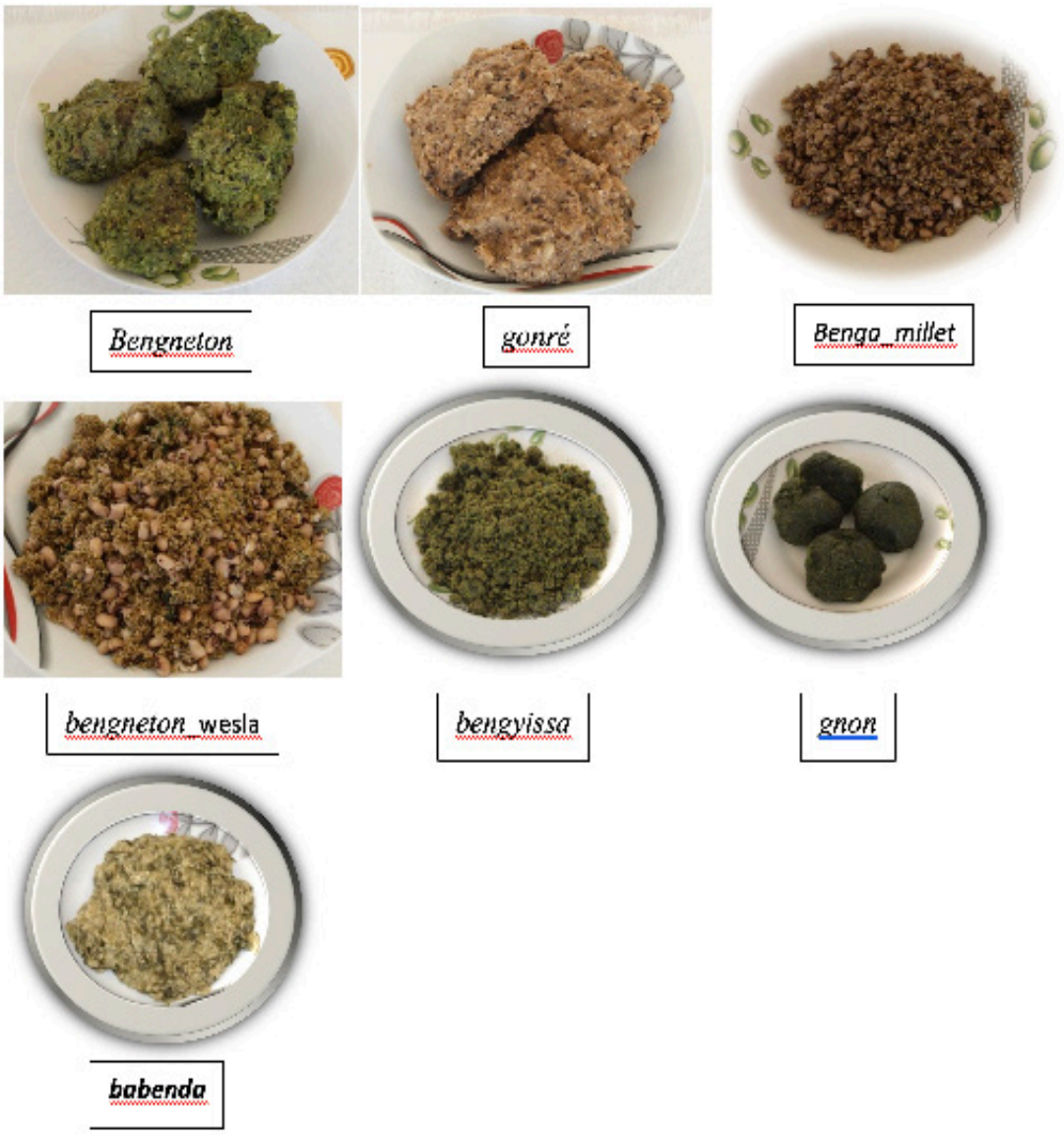
Appendix 3 shows the millet/sorghum+legume, millet/sorghum+leaves and cowpea+leaves dishes.



Appendix3. composite food

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