

# Dietary Diversity Among Women of Reproductive Age in the Kolda Region in 2020

Alioune Badara Tall<sup>1,\*</sup>, Agnès Kamoye Yade<sup>2</sup>, Ndèye Marième Sougou<sup>2</sup>, Anta Agne<sup>1</sup>,  
Boubacar Guèye<sup>1</sup>, Daouda Faye<sup>3</sup>

<sup>1</sup>Department of Community Health, Health and Sustainable Development Training and Research Unit, Alioune Diop University, Bambey, Senegal

<sup>2</sup>Department of Public Health and Preventive Medicine, Faculty of Medicine, Pharmacy and Dentistry, University Cheikh Anta Diop, Dakar, Senegal

<sup>3</sup>Dental Public Health Department, Faculty of Medicine, Pharmacy and Dentistry, University Cheikh Anta Diop, Dakar, Senegal

## Email address:

aliounebadara.tall@uadb.edu.sn (Alioune Badara Tall), khyas13@gmail.com (Agnès Kamoye Yade),

nmsougou@gmail.com (Ndèye Marième Sougou), antaagne.djigo@uadb.edu.sn (Anta Agne),

boubacar.gueye@uadb.edu.sn (Boubacar Guèye), daouda\_faye2004@yahoo.fr (Daouda Faye)

\*Corresponding author

## To cite this article:

Alioune Badara Tall, Agnès Kamoye Yade, Ndèye Marième Sougou, Anta Agne, Boubacar Guèye et al. (2024). Dietary Diversity Among Women of Reproductive Age in the Kolda Region in 2020. *Central African Journal of Public Health*, 10(1), 1-7.

<https://doi.org/10.11648/j.cajph.20241001.11>

**Received:** December 21, 2023; **Accepted:** January 2, 2024; **Published:** January 18, 2024

**Abstract:** *Introduction:* The lack of diversity in the diets of women of reproductive age (WRA) is a public health problem in Senegal. The good nutritional status of women is one of the factors in the fight against maternal mortality. The aim of this study was to investigate the state of dietary diversity among WRA in the Kolda region. *Methods:* The study was cross-sectional and descriptive and took place in January-February 2020 in the Kolda region. Data were collected at household level using a questionnaire administered after informed consent. *Results:* The mean age of the women was 27.62 years, with a standard deviation of 7.2 years. The median age was 27. Majority of women surveyed lived in rural areas (72.1%) and 58.5% were uneducated. The average dietary diversity score for WRA was 4.4, with a standard deviation of 1.7. Taking classification into account, 44% of WRA in the region had moderate dietary diversity, compared with 24.7% with low diversity and 31.3% with high diversity. *Conclusion:* In the fight against food insecurity and malnutrition, the synergy of actions from all sectors, such as health, agriculture, the economy and social development, is therefore essential for a good nutritional status of WRA.

**Keywords:** Dietary Diversity Score, Food, Women of Reproductive Age, Kolda

## 1. Introduction

Dietary diversity is an essential concept in the fight against malnutrition, whether excessive or deficient, in all age groups, especially in developing countries. It is the secret of a healthy, balanced diet, particularly for WRA (rural families) who have specific nutritional needs to ensure the growth, development, health and care of their offspring. Dietary diversity refers to the number of different food groups consumed by an individual or household over a given period [1].

Internationally, dietary guidelines recommend consuming a sufficient variety of foods, which is supposed to ensure

adequate intakes of essential nutrients for good health. However, with the current recognition of the importance of dietary factors in increasing the risk of chronic disease, a good-quality diet must also meet criteria of balance and moderation in the consumption of certain foods that can be harmful to health if consumed in excess [2, 3].

Today, more than 820 million people in the world still suffer from hunger. Some two billion people, including 675 million in Africa, are moderately or severely food insecure. Without access to enough nutritious food on a regular basis, these people - the majority of whom are women - are more exposed to malnutrition, and their health is jeopardized.

Maternal and child undernutrition is responsible for over 10% of the global burden of disease [4].

In developing countries, the concept of dietary diversity has developed considerably over the last few years but experiments to measure dietary diversity are much rarer and mainly concern the diet of young children [5].

The few studies carried out in these countries have highlighted the value of simple indices measuring diversity through the number of food groups or sub-groups consumed over a given period [6, 7]. However, they have also revealed major disparities between the methods used to compile these indices. Despite the lack of homogeneity observed, diversity indices have been shown to be very good tools for helping to measure the overall quality of diets, in both industrialized and developing countries [8, 9].

Moreover, increasing the variety of foods or food groups consumed is essential in these developing countries, where nutrient deficiencies are major problems. Lack of dietary diversity is a particularly serious problem among poor populations, whose daily diet is generally based on one source of starch (cereals, root tubers and plantains) accompanied by one or two additional components. This type of diet tends to be low in several micronutrients, and the micronutrients it does contain often have low bioavailability [10, 11].

In Senegal, around 16% of households have unsatisfactory food consumption (poor and limited), based mainly on cereals and a few vegetables, sugar and oil, with the occasional animal protein and legume. The Kolda region has one of the highest proportions in the country, with 26.7% of households lacking satisfactory food consumption, which remains deficient and concerns at least a quarter of the population [12].

Senegal, like other Sahelian countries, is still suffering the consequences of four consecutive food and nutrition crises (2005, 2008, 2010, 2012). This situation seems to accentuate household vulnerabilities and consequently impacts on eating habits within households, thus altering nutritional quality [13, 14]. The factors involved are often environmental, behavioral, socio-cultural and economic. Several studies have been carried out with the aim of facilitating a better understanding of diet during the life cycle, but these have been carried out in a fragmented way in women of reproductive age, as well as in children under five. Some of these studies have contributed to the development of tools for assessing the quantity and quality of food consumption in these two groups [15-16], while others have addressed the nutritional quality of the diet. However, there are still gaps [17, 18].

In view of all this, it would be timely to study the state of dietary diversity among women of reproductive age in the Kolda region.

## 2. Materials and methods

### 2.1. Type of Study

This was a quantitative, descriptive, cross-sectional study conducted in the months of January - February 2020 in the

Kolda region.

### 2.2. Study Population

The survey covered women of reproductive age (15-49) in the Kolda region.

#### *Inclusion criteria*

All women aged 15-49 living in the selected households or present the night before the survey were eligible to be surveyed. In each household drawn, one woman aged 15-49 was selected.

#### *Non-inclusion criteria*

- 1) Women of reproductive age who did not agree to take part in the survey,
- 2) Any woman included but with a medical/surgical history that could influence diet diversification, such as:
  - a. Diabetes
  - b. Dyslipidemia
  - c. Gastric surgery
  - d. Women who have undergone a voluntary or contextual dietary modification (e.g. fasting, participation in a family ceremony, etc.).

### 2.3. Sampling

#### 2.3.1. The Sampling Unit

The sampling unit was households, and the statistical unit was woman of reproductive age in the Kolda region.

#### 2.3.2. Sampling Procedure

The sampling method for this study was based on stratified random sampling:

- 1) At the first stage, 20 Census Districts (CD) were drawn in each county of the Kolda region (Vélingara, Medina Yoro Foulah and Kolda) from the list of enumeration areas established during the General Census of Population and Housing of, Agriculture and Livestock carried out in 2013, using a systematic draw with probability proportional to size (number of households in the CD). These CDs were divided between Rural/Urban environments, taking into account the urbanization rate. This approach made it possible to capture the differences between the two environments.
- 2) At the second level, 20 households were selected in each CD, i.e. a total of 400 households for each county, after identification of the concessions by raking and elementary sampling of the households to be surveyed.
- 3) In the third stage, one woman aged 15-49 was selected from each household. The women selected were divided proportionally according to their status (pregnant, breast-feeding and neither pregnant nor breast-feeding).

For this survey, we therefore had a total representative sample of 1,200 women of reproductive age for the Kolda region, evenly distributed, i.e. 400 women for each county, who were distributed in proportion to their status. See tables (1, 2, 3 and 4) below.

*Table 1. Sample distribution by place of residence.*

Place of residence	Number of CDs	Sample household	Number of urban CDs	Sample Urban household	Number of rural CDs	Sample rural household
Kolda	20	400	6	120	14	280
Velingara	20	400	6	120	14	280
Medina Yoro Foulah	20	400	6	120	14	280
Kolda Region	60	1200	18	360	42	840

*Table 2. Distribution of the provisional sample of women by county.*

County	Sample women	Pregnant women (10%)	Breastfeeding women (30%)	Women who are neither pregnant nor breast-feeding (60%)
Kolda	400	40	120	240
Velingara	400	40	120	240
Medina Yoro Foulah	400	40	120	240
Kolda Region	1200	120	360	720

*Table 3. Distribution of the sample after data collection according to place of residence.*

Place of residence	Number of CDs	Sample household	Number of urban CDs	Sample Urban household	Number of rural CDs	Sample rural household
Kolda	20	411	6	121	14	290
Velingara	20	415	6	100	14	315
Medina Yoro Foulah	20	406	6	122	14	284
Kolda Region	60	1232	18	343	42	889

*Table 4. Distribution of the sample of women after data collection by county.*

County	Sample women	Pregnant women (10%)	Breastfeeding women (30%)	Women who are neither pregnant nor breast-feeding (60%)
Kolda	400	40	120	240
Velingara	400	40	120	240
Medina Yoro Foulah	400	40	120	240
Kolda Region	1200	120	360	720

## 2.4. Data Collection

### 2.4.1. Data Collection Tools

The questionnaire was administered to the WRA in a discreet and appropriate place that guaranteed the confidentiality of the information provided by the respondent in accordance with the realities of the household. An information and consent letter were presented to them to obtain their free and informed consent before the questionnaire was administered. The data collected for the purposes of the survey was entered directly onto a tablet.

### 2.4.2. Variables Collected

#### 1) Dietary Diversity

Dietary diversity among women is a measure of food consumption that considers the variety of foods to which women have access. At the individual level, it is an approximate measure of the nutritional adequacy of the diet. The dietary diversity score was assessed through the number of food groups consumed by women of reproductive age in the 24 h preceding the survey. The different dietary diversity scores were calculated by counting the food groups consumed by the women in the 24 hours prior to the interview. We used a World Food Programme (WFP) study to classify WRA

according to their level of dietary diversity in each county. Those who had consumed less than 4 food groups ( $\leq 3$ ) had a poorly diversified diet, those who had consumed between 4 and 5 food groups had a moderately diversified diet and those who had consumed more than 5 groups ( $\geq 6$ ) had a very diversified diet [19].

#### 2) Independent variables

- Socio-demographic characteristics
- Socio-economic characteristics
- Knowledge of good eating habits

## 2.5. Data Entry

The data was entered using the Open Data Kit (ODK) software, which enabled us to design an input mask while offering the possibility of collecting and transferring the data to a server.

## 2.6. Data Analysis

Once the survey data had been stabilised, it was analysed using R software. We described the frequency (absolute and relative) for the qualitative variables, and for the quantitative variables, we determined the mean, standard deviation and median.

### 3. Results

#### 3.1. Socio-Demographic Characteristics

*Table 5. Distribution of WRA by socio-demographic characteristics (N=1231).*

Variables	Modalities	absolute (relative) frequency n (%)
Counties	Kolda	410 (33.3)
	Médina Yoro Foulah	406 (33)
	Vélingara	415 (33.7)
Physiological state of women	Neither pregnant nor breastfeeding	732 (59.5)
	Breastfeeding	378 (30.7)
	Pregnant	121 (9.8)
WRA age group	[15-22]	334 (27.1)
	[23-32]	604 (49.1)
	[33-49]	293 (23.8)
Living environment	Urban	343 (27.9)
	Rural	888 (72.1)
Age group head of household	[16-29]	129 (10.5)
	[30-59]	832 (67.6)
	[60 and more]	270 (21.9)
Gender of head of household	Masculin	1087 (88.3)
	Féminin	144 (11.7)
Marital status head of household	Monogamous	705 (57.3)
	Polygamous	454 (36.9)
	Widowed	50 (4.1)
Ethnic group	Single	14 (1.1)
	Divorced / separated	8 (0.6)
	Al poulaar	969 (78.7)
Number of people in household	Ouolof	105 (8.5)
	Mandingue	69 (5.6)
	Other ethnic groups	88 (7.2)
	[0-8]	378 (30.7)
	[9-16]	575 (46.7)
	[17 and more]	278 (22.6)

#### 3.2. Socio-Economic Characteristics

*Table 6. Distribution of WRA by socio-economic characteristics (N=1231).*

Variables	Modalities	absolute (relative) frequency n (%)
WRA education level	None	720 (58.5)
	Primary	300 (24.4)
	Secondary	201 (16.3)
	Higher	10 (0.8)
	No	645 (52.4)
Type of income-generating activity / WRA	Salaried employment	83 (6.7)
	Small business	293 (23.8)
	Cash crop	160 (13)
	Other IGA	50 (4.1)
	Yes	538 (43.7)
Member of EIG	No	693 (56.3)
	None	790 (64.2)
	Primary	276 (22.4)
Level of education head of household	Secondary	137 (11.1)
	Higher	28 (2.3)
	Civil servant	68 (5.5)
	Worker/craftsman	119 (9.7)
	Farmer/breeder/fisherman	685 (55.6)
Occupation of head of household	Shopkeeper	132 (10.7)
	Surface technician	13 (1.1)
	Driver/Truck driver	32 (2.6)
	Retired	27 (2.2)
	Unemployed	68 (5.5)
	Other professions	87 (7.1)
	Below the minimum wage	261 (21.2)
Household income over the last 30 days, including money transfer	Above or =l to the minimum wage	970 (78.8)
	Less than 50%	644 (52.3)
Proportion of expenditure controlled by women	Greater than or equal to 50	587 (47.7)

Variables	Modalities	absolute (relative) frequency n (%)
Proportion of land managed by women	Less than 50%	978 (79.4)
	Greater than or equal to 50	253 (20.6)
Family security grant	Yes	387 (31.4)
	No	844 (68.6)
Existence of fruit trees in the household	Yes	1049 (85.2)
	No	182 (14.8)
Activities focused on the production of food products	Yes	270 (21.9)
	No	961 (78.1)
Financing or support production of local products	Yes	50 (4.1)
	No	1181 (95.9)
Livestock rearing by the household	Yes	984 (79.9)
	No	247 (20.1)
Household gardening	Yes	396 (32.2)
	No	835 (67.8)

### 3.3. Knowledge of Good Dietary Practices

Table 7. Distribution of WRA according to knowledge of good eating habits (N=1231).

Variables	Modalities	absolute (relative) frequency n (%)
Knowledge of different micronutrient-rich foods for the household	Yes	1067 (86.7)
	No	164 (13.3)
Knowledge of good nutrition practice	Low level	378 (30.7)
	Medium level	394 (32)
	Good level	459 (37.3)
Level of knowledge of good hygiene practice Food	Low level	491 (39.9)
	Medium level	371 (30.1)
	Good level	369 (30)
Knowledge of good food preparation practices	Low level	851 (69.1)
	Medium level	215 (17.5)
	Good level	165 (13.4)
Level of information on good nutritional, hygiene and care practices	Low level	816 (66.3)
	Medium level	326 (26.5)
	Good level	89 (7.2)

### 3.4. Dietary Diversity Score

Table 8. Distribution of women's dietary diversity score (WDDS) by county.

Counties	Women's dietary diversity score (WDDS)			
	Average	Standard deviation	Median	Workforce
Kolda	4.7	1.6	5	410
Medina Yoro Foulah	4.3	1.6	4	406
Vélingara	4.2	1.7	4	415
Kolda region	4.4	1.7	4	1231

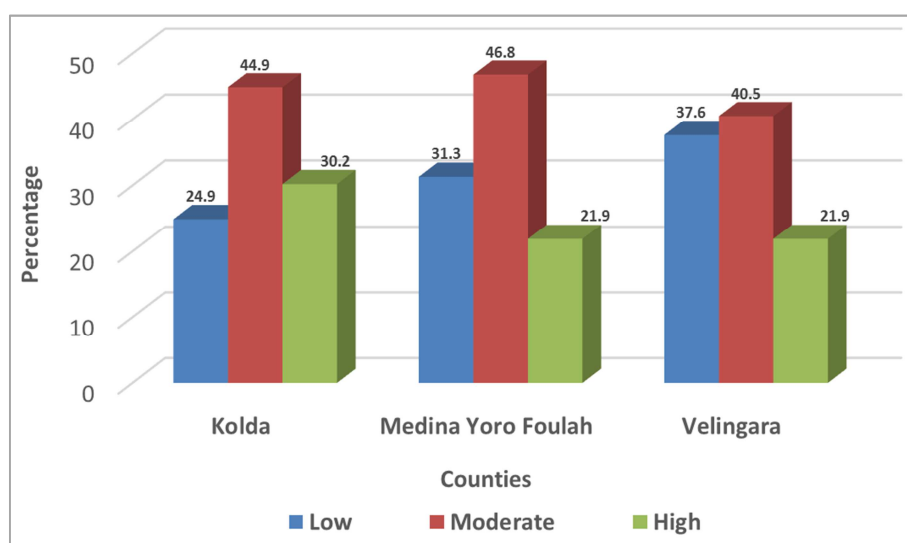


Figure 1. Distribution of the level of dietary diversity among WRA according to county in the Kolda region.

## 4. Discussion

The Women Dietary Diversity Score (WDDS) is used as a proxy measure of the nutritional quality of the diet of women of reproductive age (pregnant, breastfeeding or neither pregnant nor breastfeeding). At the individual level, it is an approximate measure of the adequacy of the macronutrient and/or micronutrient diet in women [20, 21].

This study found a mean dietary diversity score for women of reproductive age of 4.4 with a standard deviation of 1.7 in the Kolda region. This is comparable with the results of the study by Béchir *et al.*, who found a mean diversity score of 4.5 for a sample of 734 women [22].

On the other hand, a study conducted in Senegal in 2015 found an average dietary diversity score for women of reproductive age of 3 with a standard deviation of 1.4 in the Kolda region [23]. There has therefore been a positive change in the dietary diversity of women of reproductive age between 2015 and 2020 in the Kolda region, which could be explained by the various actions carried out in the field by the different technical and financial partners working in the field of nutrition in the area. Notably Nutrition International through its Integrated Nutrition Project in the Kolda and Kédougou regions (PINKK) which adopts a multisectoral approach to improve the nutritional status of the most vulnerable population groups, in particular women and children [24].

Taking the classification into account, 44% of women of reproductive age in the Kolda region had average dietary diversity, compared with 24.7% who had low diversity and 31.3% who had high diversity. In other words, most women had consumed between 4 and 5 food groups. A study carried out in Burkina Faso showed that women who had consumed fewer than six food groups had low or inadequate diversity, whereas those who had consumed more than six groups were considered to have adequate diversity. These differences in results reflect the fact that eating habits differ from one country and community to another. In fact, it is very difficult for dietary diversity indices to be the same from one locality to another [25]. According to Prével, women who achieve minimal dietary diversity, i.e. those who consume five or more of ten groups, are likely to have more adequate micronutrient intakes. They are also more likely to have eaten one animal food, one legume or nut and two fruits or vegetables on the day before the survey [26].

## 5. Conclusion

A diversified and balanced diet for women of reproductive age is essential to meet their nutritional needs and is positively associated with maternal, foetal and child health. This study gave us an overview of the current situation in Kolda in terms of dietary diversity. Women of childbearing age in the Kolda region have an average level of dietary diversity.

More in-depth studies on the foods to be mapped, food consumption over the seven days and biological analysis of the nutritional status of women of reproductive age could be

envisaged in order to gain a better understanding of both quantitative and qualitative factors. Anthropological studies of current eating habits and ways of adapting to particular events or crises (lean season, drought, pandemic, etc.) would provide a better understanding of the nutritional status of women and of the intervention zone, so that more effective and efficient strategies can be put in place to improve the dietary diversity of women.

## ORCID

0009-0005-7266-6412 (Alioune Badara Tall)

## Acknowledgments

Special thanks to the women who took part in the survey.

To the management team of the Kolda medical region, and to the various district chief medical officers who accommodated the interviewers in the field.

The community leaders who facilitated access to the target group for the survey.

## Conflicts of Interest

The authors declare no conflicts of interest.

## References

- [1] Picciano MF. Pregnancy and lactation: physiological adjustments, nutritional requirements and the role of dietary supplements. *J Nutr.* 2003; 133(6): 1997S–2002S.
- [2] Randall E, Nichaman MZ and Contant CF, Jr. Diet diversity and nutrient intake. *Journal of American Dietetic Association.* 1985; 85(7): 830-6.
- [3] Krebs-Smith SM, Smiciklas-Wright H, Guthrie HA and Krebs-Smith J. The effects of variety in food choices on dietary quality. *Journal of American Dietetic Association.* 1987; 87(7): 897-903.
- [4] FAO, FIDA, OMS, PAM et UNICEF. L'état de la sécurité alimentaire et de la nutrition dans le monde 2019. Se prémunir contre les ralentissements et les fléchissements économiques. [The state of food security and nutrition in the world 2019. Protecting against economic slowdowns and downturns. Rome]. 253p. Rome, 2019.
- [5] Organisation mondiale de la santé (OMS). Les 10 faits sur la nutrition. Aout 2017. <https://www.who.int/features/factfiles/nutrition/fr/> (consulté le 20 juin 2020).
- [6] Tarini A, Bakari S and Delisle H. The overall nutritional quality of the diet is reflected in the growth of Nigerian children. *Sante.* 1999; 9(1): 23-31.
- [7] Leroy JLP, Habicht JP, Ruel MT, Simler K and Dittoh S. Household dietary diversity is associated with child dietary diversity and nutritional status. *Federation of American Societies for Experimental Biology (FASEB) Journal.* 2003; 17(4): A483.1 p. A713.

- [8] Arimond M and Ruel MT. Progress in developing an infant and child feeding index: an example using the Ethiopia Demographic and Health Survey 2000. Washington, D.C.: IFPRI, 2002.
- [9] Hatloy A, Hallund J, Diarra MM and Oshaug A. Food variety, socioeconomic status and nutritional status in urban and rural areas in Koutiala (Mali). *Public Health Nutrition*. 2000; 3(1): 57-65.
- [10] Dop MC, Milan C and N'Diaye AM. The 24-hour recall for Senegalese weanlings: a validation exercise. *European Journal of Clinical Nutrition*. 1994; 48(9): 643-53.
- [11] Drewnowski A, Henderson SA, Driscoll A and Rolls BJ. The Dietary Variety Score: assessing diet quality in healthy young and older adults. *Journal of American Dietetic Association*. 1997; 97(3): 266-71.
- [12] Republic of Senegal. SECNSA. Rapport enquête nationale de sécurité alimentaire au Sénégal. [Report national food security survey in Senegal]. 2016. 48p.
- [13] Republic of Senegal. ANSD. Enquête Démographique et de Santé Continue [Continuous Demographic and Health Survey] 2017.
- [14] Republic of Senegal. SECNA/SAP. Enquête nationale sur la sécurité alimentaire et la nutrition. [National survey on food security and nutrition]. 2013. 12p.
- [15] Gibson, R. S., Charrondiere, U. R. & Bell, W. Measurement Errors in Dietary Assessment Using Self-Reported 24-Hour Recalls in Low-Income Countries and Strategies for Their Prevention. *Adv. Nutr.* 2017, 8, 980–991.
- [16] Korkalo, L., Hauta-alus, H. & Mutanen, M. Food composition database for Mozambique. (2011).
- [17] Institute of Medicine. Dietary Reference Intakes: Applications in Dietary Assessment. National Academies Press, 2000. Doi: 10.17226/9956.
- [18] Lauritsen JM & Bruus M. A Comprehensive Tool for Validated Entry and Documentation of Data. EpiData version 3.1 2004.
- [19] Programme alimentaire Mondial (PAM), Système d'Alerte Précoce du Mali (SAP). Enquête de mis à jour des indicateurs de la sécurité alimentaire au Mali. Février 2014 [Early Warning System of Mali (EWS). Survey to update food security indicators in Mali. February 2014].
- [20] Kennedy G, Ballard T, Dop MD. Guide pour mesurer la diversité alimentaire au niveau ménage et de l'individu. FAO. Rome, 2013, ISBN 978-92-5-206749-8. <http://www.fao.org/3/a-i1983f.pdf>.
- [21] Martin-prével, Y., et al. Relationship between food variety/diversity scores and nutritional status of adults and adolescents in rural Burkina Faso.
- [22] Bechir M, Schelling E, Moto DD, Tanner M, Zinsstag. État nutritionnel et diversité alimentaire des femmes rurales nomades et sédentaires de la rive sud-est du lac Tchad. *J. Med Trop.* 2011 décembre; 71 (6): 582-7. [Nutritional status and dietary diversity in nomadic and sedentary rural women on the southeast bank of Lake Chad. 2011 december].
- [23] Tine J. A. D, Niang K., Faye A., et Dia A. Évaluation de la diversité alimentaire des femmes dans le sud du Sénégal. 2018. [Assessing women's dietary diversity in southern Senegal. 2018.] *Sciences de l'alimentation et de la nutrition*, 9, 1192-1205. doi: 10.4236 / fns.2018.910086.
- [24] NI-PINKK. Bulletin d'information Projet PINKK Sénégal FINAL FR. [https://old.nutritionintl.org/fr/content/user\\_files/sites/2/2019/12/NI-PINKK-Factsheet-Senegal-FINAL\\_Fr\\_WEB.pdf](https://old.nutritionintl.org/fr/content/user_files/sites/2/2019/12/NI-PINKK-Factsheet-Senegal-FINAL_Fr_WEB.pdf) (consulté le 03 juin 2021).
- [25] Savy, M., Sawadogo, P., Kamély, Y. and Martin-Prevel, Y. Measures of Diet Quality with Variety of Scores/Diversity Relationship with the Nutritional Status of Mothers in Rural Burkina Faso. *Nutrition Food Companies*, 2004. 303-308.
- [26] Martin-Prével, Y. Allemand, P. Wiesmann, D. Arimond, M. Ballard, T. Deitchler and al. Moving forward on choosing a standard operational indicator of women's dietary diversity. Food and Agriculture Organization of the United Nations ROME, 2015.