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ORIGINAL ARTICLE

Knowledge and Practices on Complementary Feeding among Mothers of Children Aged 6-12 Months in Sissili Province, Burkina Faso

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ABSTRACT

Background: For prevention of malnutrition of children older than 6 months, Léo Health District of Sissili province in Burkina Faso promoted best complementary feeding practices. So this study evaluated evolution of the knowledge and practices of mothers of children aged 6-12 months on complementary feeding in the district.

Methods: A cross-sectional study assessed 163 mothers-children couples at enrollment and after their participation at least 5 sessions of consultation healthy infant.

Results: The proportions of mothers who knew the age of children when complementary foods must administered, the minimum frequency of children's meals from 6 to 8 months and 9 to 23 months showed an increase of 5.6%, 16.5% and 2.4%, respectively. Mothers' knowledge level about the reasons to introduce complementary foods, the names of the three food groups and the ingredients to be added to cereal porridges to enrich them demonstrated a significant improvement. No significant difference was observed between the proportions of mothers with good complementary feeding practices even an increase was noticed. A correlation was visible between the level of knowledge and the complementary feeding practices too.

Conclusion: Health service should emphasize the introduction of complementary foods, the three food groups and the enrichment of porridges in order to have a greater impact on optimal complementary feeding practices.

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Introduction

Around the world, about 200 million children under the age of five years suffer from malnutrition; while at least 340 millions of these children suffer from unsuspected hunger due to vitamin and mineral deficiencies (1). In Burkina Faso, 0.5 million children under the age of five years suffer from global acute malnutrition (2). The prevalence of global acute malnutrition in children aged 6-11 months was estimated 10.2% in comparison to 12.3% among children12-23 months (3). Although the causes are multifaceted and multisectoral, it is evident that inappropriate infant young feeding practices (IYCF) can be a significant contributing factor to the persistent high prevalence of malnutrition in children under five years old (4). The Centre-West region, particularly the Sissili province, benefited from the interventions of the implementation of IYCF's scaling-up plan (5). However, it has been noted that certain indicators of complementary feeding for children are falling and the prevalence of malnutrition is increasing in the province. Indeed, overall chronic malnutrition among children aged 6-12 months has increased from 13.8% in 2018 to 23.9% in 2020 (6, 7).

Complementary feeding indicators such as timely introduction of complementary foods showed a decrease from 79.5% in 2018 to 66.2% in 2020, and the minimum acceptable feeding has remained stable from 19.1% in 2018 to 19.6% in 2020 (6, 7). These low rates of these indicators could be due to non-assimilation of nutritional education messages received by mothers and a socio-demographic environment. Therefore this study was carried out to assess the evolution of knowledge and practices on complementary feeding among mothers of children aged 6-12 months attending a public health center in the Sissili province of Burkina Faso.

Materials and Methods

In a descriptive cross-sectional study based on a longitudinal follow-up of a cohort of mothers-children couples aged between 6 and 12 months, an initial evaluation was carried out from February to July 2021 together with a final evaluation conducted from July 2021 to March 2022 in relation to knowledge and practices on complementary feeding among among mothers for their children aged 6-12 months. Mothers participated in at least 5 healthy infant consultation sessions regarding the information on their infants and the IYCF. The study was undertaken in all of 7 municipalities of the province of Sissili in Burkina Faso including 16 health and social promotion centers (CSPS) and the medical center of «To» (Figure 1). The selection criteria for these health centers included the attendance rate of children aged 0-11 months in 2018, the presence of at least three health workers in the CSPS, the weekly frequency of healthy infant consultations and the accessibility of the CSPSs during the study period.

Inclusion criteria were being a mother who came to the healthy infant consultations together with a healthy and breastfed child of 6-12 months; to follow the CSPS culinary demonstrations; to reside in the CSPS health area; and to present a free consent to participate in the study. Exclusion criteria were being mothers of severe acute malnourished children; being mothers of moderate acute malnourished children; being mothers with severe physical or

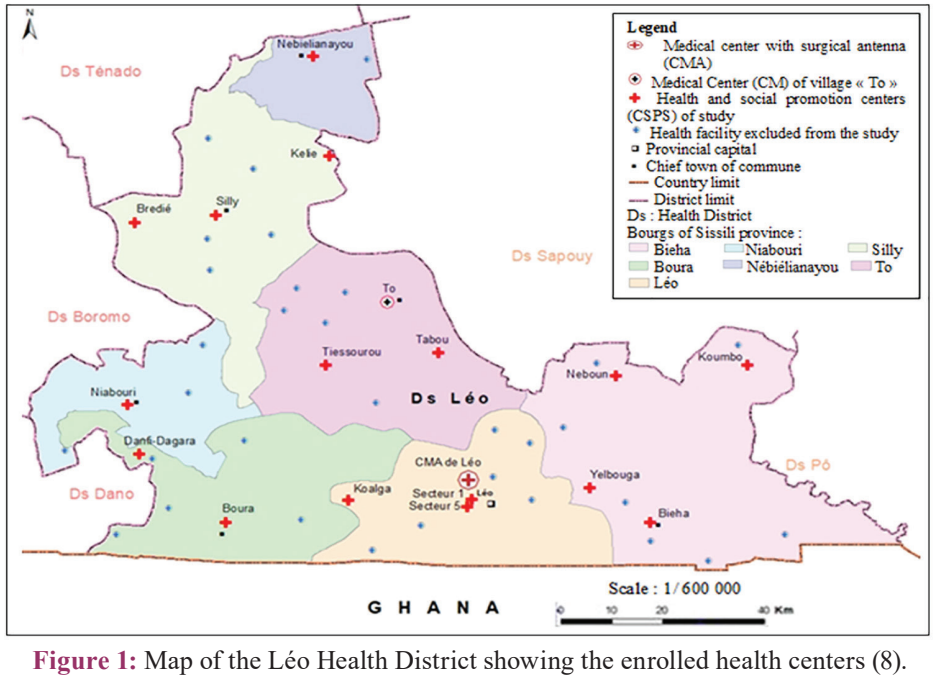

Figure 1: Map of the Léo Health District showing the enrolled health centers (8).

mental disabilities; and being mothers belonging to a family on temporary visit in the health area of CSPS. In compliance with the principles of Helsinki protocol, prior to data collection, the study was approved by Burkina Faso Health Research Ethics Committee (no. 2021-01-028).

The classic Schwartz formula was utilized to determine the minimum sample size of mothers as $N=Z^2P(1-P)/C^2$, where; N: minimum sample size, Z: value corresponds to a given confidence level [1.96 for a 95% confidence level (95%CI)], C: Standard error (5%), P: prevalence of the minimum acceptable diet of the province of Sissili (15.7%) (9, 10). With a retained cluster effect equal to 1.0, the minimum sample size was determined to be 203 mothers; while it was ultimately increased by 10% to a final size of 230 mothers. However, the evaluation of knowledge and practices about complementary feeding was carried out among 163 mothers coupled with their children.

Individual interviews with mothers were undertaken during data collection by investigators and supervisors. The documents used to formulate the questions were World Health Organization (WHO) standard questionnaires to determine indicators for evaluating IYCF practices. The health provider trainer's guide and the health provider's handbook on the integrate package of IYCF services in Burkina Faso and the guide to assess Food and Agriculture Organization (FAO)'s nutrition-related knowledge, attitudes and practices were utilized in this study too (11-13).

Study variables were considered to be socio-demographic characteristics of mothers (the age of the mothers, level of education, profession and marital status), Mothers' knowledge on complementary feeding (the age at which complementary foods should be introduced, the reasons to administer complementary foods, the minimum meal frequency, the three food groups for a balanced diet (energy, building and protective) and the foods to be added to cereal porridges for enrichment), indicators of mothers' complementary feeding practices (minimum meal frequency, minimum dietary diversity and minimum acceptable diet) (14), and mothers' level of knowledge about complementary foods (their knowledge about the reasons to introduce complementary foods, the names of the three food groups for a balanced diet (energy, building and protective), and the ingredients needed to prepare fortified infant porridges) (15).

It was considered one point (+1) when a correct response was presented to each question and no points (0) for each inappropriate answer. The score for the level of knowledge was determined by dividing the sum of the points allocated to each answer by the total number of possible points devoted to the correct responses. The level of knowledge was classified as 'bad', 'insufficient', 'average' and 'good' when the score was determined to be less than 25%, less than 50%, less than 70% and more than 70%, respectively (15). Data were analysed using Microsoft Excel 2021 and Statistical Package for the Social Sciences (version 21, Chicago, IL, USA). The difference between the mothers' knowledge was determined by the Wilcoxon rank test using paired samples. The Chi-Square test was utilized to assess associations between variables. Differences were considered significant when *p* value was less than 0.05.

Results

The socio-demographic characteristics of the mothers were demonstrated in Table 1. The mean

Table 1: Sociodemographic characteristics of mothers.

Variable	Modality	Number	Percentage
Age (year)	17-19	12	7.4
	20-24	50	30.7
	25-29	38	23.3
	30-34	41	25.1
	35-41	22	13.5
Level of education	Unschooled	113	69.3
	Alphabetized	13	8.0
	Primary	13	8.0
	Secondary/Higher	24	14.7
Profession	Housewife	37	22.7
	Farmer	96	58.9
	Breeder	4	2.5
	Tradeswoman/Craftswoman	20	12.3
	Public/private employee	3	1.8
	Student/Pupil	3	1.8
Marital status	Married	126	77.3
	Concubinage	32	19.6
	Single	5	3.1

age of mothers was 27.2±5.7 years, while the majority aged between 20 and 24 years. Most of mothers were married (77.3%), did not attend any school (69.3%) and were farmers (58.9%). The frequency of at least 2 meals per day for children aged 6 to 8 months and 3 meals per day and for children aged 9 to 24 months was 47.9% and 54% at initial assessment, respectively. These proportions increased to 64.4% and 56.4% at final assessment, respectively (Table 2). The age recommended by WHO for the introduction of dietary supplements is after 6 months. This age was known by most mothers, 88.3 % and 93.9 % at the initial and final evaluation, respectively (Table 2).

The two reasons that supported the introduction of complementary foods were the insufficiency of breast milk and the fact that the digestive system of the child can digest food other than breast milk that was reported by 79.1% and 37.4% of mothers at initial assessment, respectively; while in final evaluation, these two proportions were 86.5% and 63.8%, respectively revealing an increase (Table 2). Both of these increases reflected a respective decrease in the proportions of mothers with poor or medium levels of knowledge about the reasons for food introduction by 8% and 17.8% at final assessment, respectively. In addition, the proportion of mothers with good knowledge about these reasons was almost doubled at the end of the assessment (Table 2). The Wilcoxon test showed a significant difference between mothers' levels of knowledge on the reasons to introduce complementary foods in initial and final assessments (p=0.00).

At the initial evaluation, 7 out of 10 mothers stated that they knew how to prepare a child's enriched porridge when compared to 9 out of 10 mothers at the final evaluation (Table 3). At the initial evaluation, 55.8%, 41.1% and 28.8% of mothers presented an additional food rich in energy (oil, sugar), in protein (milk, eggs, fish, meat, legumes), and in vitamins and/or minerals (fruit and vegetables) to be added to cereal porridges to fortify them, respectively. In the final evaluation, more than 55% of mothers reported the ingredients needed to prepare fortified infant cereal porridges (Table 3). The proportion of mothers with a good or average level of knowledge about the ingredients to be added to cereal porridges to fortify them was 43% at the

Table 2: Mothers' distribution according to knowledge on minimum meal frequency and introduction of complementary foods.

Variable	Modality	Initial evaluation n (%)	Final evaluation n (%)	*p* value
Minimum frequency of meal intake for children 6-8 months	Once	11 (6.7)	2 (1.2)	0.00*
	Twice	78 (47.9)	105 (64.4)	
	3 times	56 (34.4)	41 (25.2)	
	4 times	15 (9.2)	10 (6.1)	
	5 times	3 (1.8)	3 (1.8)	
	6 times	0 (0)	2 (1.2)	
Minimum meal frequency for children aged 9-23 months	Twice	15 (9.2)	4 (2.5)	0.00*
	3 times	88 (54)	92 (56.4)	
	4 times	32 (19.2)	46 (28.2)	
	5 times	18 (11)	11 (6.7)	
	6 times	10 (6.1)	9 (5.5)	
	7 times	0 (0)	1 (0.6)	
Age of introduction of complementary foods	0 to 2 months	1 (0.6)	0 (0)	0.00*
	4 months	2 (1.2)	1 (0.6)	
	5 months	5 (3.1)	4 (2.5)	
	6 months	144 (88.3)	153 (93.9)	
	7 months	8 (4.9)	0 (0)	
	8 months	2 (1.2)	1 (0.6)	
	Don't know	1 (0.6)	0 (0)	
Reasons for introducing complementary foods	Don't know	19 (11.7)	6 (3.6)	0.00*
	Insufficient breast milk	129 (79.1)	141 (86.5)	
	The child's digestive system can digest foods other than breast milk	61 (37.4)	104 (63.8)	
Level of knowledge about the reasons for introducing complementary foods	Bad	19 (11.7)	6 (3.7)	0.00*
	Average	98 (60.1)	69 (42.3)	
	Good	46 (28.2)	88 (54.0)	

n: Number; *significant p value of the Wilcoxon test (p<0.05).

Table 3: Mothers' distribution according to knowledge about ingredients of enriched porridges and the food groups.

Variable	Modality	Initial evaluation n (%)	Finale evaluation n (%)	*p* value
Knowledge on how to prepare enriched infant porridges	No	47 (28.8)	16 (9.8)	
	Yes	116 (71.2)	147 (90.2)	
Ingredients to be added to cereal porridges to enrich them	Don't know	47 (28.8)	16 (9.8)	
	An additional foods rich in energy: oil, sugar	91 (55.8)	135 (82.8)	
	A foods rich in protein: milk, eggs, fish, meat, pulses	67 (41.1)	110 (67.5)	
	Foods rich in vitamins and minerals: fruits and vegetables	47 (28.8)	90 (55.2)	
Knowledge on ingredients to be added to cereal porridges to enrich them	Bad	64 (39.3)	23 (14.1)	0.00*
	Insufficient	29 (17.8)	18 (11.0)	
	Average	34 (20.9)	49 (30.1)	
	Good	36 (22.1)	73 (44.8)	
Names of the three food groups	Don't know	82 (50.3)	60 (36.8)	
	Foods for strength or energy: cereals, roots, tubers, sugars, oils	72 (44.2)	103 (63.2)	
	Construction food: pulses, meat, fish	66 (40.5)	99 (60.7)	
	Protective foods: vegetables and fruit	60 (36.8)	87 (53.4)	
Knowledge on the names of the three food groups	Bad	82 (50.3)	60 (36.8)	0.00*
	Insufficient	15 (9.2)	2 (1.2)	
	Average	15 (9.2)	16 (9.8)	
	Good	51 (31.3)	85 (52.2)	

n: Number; *significant *p* value of the Wilcoxon test ($p<0.05$).

Table 4: Factors associated with indicators of complementary feeding practices by mothers.

Associated factor	*p* value					
	Initial evaluation			Final evaluation		
	Minimum meal frequency	Minimum dietary diversity	MAD	Minimum meal frequency	Minimum dietary diversity	MAD
Age of mother	0.65	0.94	1.00	0.86	1.00	1.00
Level of education	0.45	0.22	0.25	0.33	0.44	0.33
Profession	0.28	0.02*	0.01*	0.69	0.21	0.54
Marital status	0.47	0.01*	0.01*	0.27	0.96	1.00
Level of knowledge about the reasons to introduce complementary foods	0.17	0.23	0.16	0.76	0.00*	0.00*
Level of knowledge on 3 food groups	0.55	0.14	0.15	0.87	0.05*	0.08
Knowledge on ingredients to be added to cereal porridges to enrich them	0.41	0.09	0.06	0.71	0.05	0.03*

MAD: Minimum acceptable diet; *significant *p* value of the Chi^2 test ($p<0.05$).

initial evaluation and 74.9% at the final assessment (Table 3). Regarding mothers' knowledge on the three food groups (energy, building and protective), the findings revealed an increase of 13.5% for mothers who knew in initial and final assessments. It should be noted that more than one-third of the mothers reported not to know the names of the three food groups at the final assessment (Table 3). In relation to the level of knowledge of mothers on the names of the three food groups 62% of mothers had a good or an average level of knowledge at the final evaluation and 40.5% at initial assessment (Table 3). The Wilcoxon test illustrated a significant difference between the level of knowledge at the two assessments ($p=0.00$).

The mothers' practice regarding complementary food for their children from the initial evaluation to the final evaluation showed the minimum meal frequency to increase from 83.4% to 90.2%. Similarly, mothers reported practicing a minimum dietary diversity and a minimum acceptable diet from 61.3% to 35.6% and from 57.7% to 61.3%, respectively. The Wilcoxon

test displayed that a difference between the two assessments; but the difference was not statistically significant for the minimum meal frequency (p=0.08), minimum dietary diversity (p=0.32) and minimum acceptable diet (p=0.43).

The analysis of factors in relation to the practice of complementary feeding by mothers showed that only minimum dietary diversity and minimum acceptable diet (MAD) were associated with initial and final assessments (Table 4). At the initial evaluation minimum dietary diversity and MAD were both statistically correlated with the mothers' occupation and marital status. At the final evaluation, a link was noticed between minimum dietary diversity and level of knowledge about the reasons for introducing complementary foods and about the 3 food groups. MAD was also statistically associated with level of knowledge about the reasons to introduce complementary foods and about the ingredients to be added to cereal porridges to fortify them (Table 4).

Discussion

The present study was carried out in an initial and final assessment about the knowledge and practices on complementary feeding among 163 mothers of children aged 6 to 12 months who participated in at least 5 sessions in healthy infant consultation service together with a culinary demonstration. The average age of the mothers enrolled in the study was 27.2±5.7 years. This mean age is close to a previous study (16) in the Tchaoudjo health district in Togo, to be 27.5 years. This mean age is also similar to that of breastfeeding mothers in another study (17) in the rural community of Dissihn in Burkina Faso to be 27±6.0 years. However, the proportion of mothers attending school (30.7%) in our study was lower than other studies revealing 42.8% (17) and 58.1% (18) in the community of Kaya in Burkina Faso, respectively. These differences show the disparity in school enrolment rates by locality. The low enrolment rates observed in these three studies in Burkina Faso could be explained by the socio-economic situation of the households.

Indeed, as described before (19), the school enrolment rates, especially for girls and women, were linked to the presence and access to school infrastructures and also to the cost of schools. The high proportion of farming mothers in our study could be explained by the fact that Sissili province is an agricultural area. According to an in-depth analysis of the characteristics of agricultural households in Burkina Faso, 90.2% of households in the province of Sissili were agricultural households (20). The proportion of married mothers in our study was shown to be higher than those found at national level in Burkina Faso among women aged 12 or older in 2019 and among women aged 15-49 years in 2021 (21, 22).

In initial and final evaluations, the proportion of mothers who knew the age of introduction on complementary foods increased from 88.3% to 93.9%, respectively. This shows that the healthy infant consultation and culinary demonstrations have improved mothers' knowledge of the right age to introduce complementary foods. These proportions were higher than those reported before in Niger (23), in Ethiopia (24), (25) in Ghana and in Niger (26) to be 10.8%, 61.2%, 72% and 64.2%, respectively. The proportion obtained at the final evaluation was slightly higher than findings reported in Congo to be 92.4% (27). The proportion of mothers at the initial and final evaluations who were familiar with the two reasons in introduction of complementary foods at 6 months of age was higher than those reported in Niger (26) and in Ghana (25). A total of 47.4% and 6.6% of these mothers, respectively (26) stated that at 6 months, breast milk could no longer cover the child's nutritional needs and the child was old enough to eat food (26).

These correct answers were also found by 5.5 % of the mothers in another study (25). The differences observed between these findings can be due to the level of mothers' awareness on complementary feeding in different regions. The knowledge on minimum meal frequency was 47.9% and 54% at the initial evaluation for at least 2 meals and 3 meals among breastfed children aged 6 to 8 months and 9 to 23 months, respectively. At the final evaluation, the proportion of mothers who found the minimum meal frequency for breastfed children aged 6 to 8 months and 9 to 23 months increased to 64.4% and 56.4%, respectively. This shows that the follow-up of the healthy infant consultation and culinary demonstrations by the mothers also significantly improved their knowledge of the minimum meals frequency for the children. These proportions compared with those found by (28) in Pakistan to be 37 % for the frequency of at least 2 meals and 52.9 % for the frequency of at least 3 meals, show a superiority of the results.

Mothers' knowledge on the name of the three food groups and on ingredients to be added to cereal porridges to fortify them showed an improvement due to follow-up at the demonstrations. The proportion of mothers who found the three food groups to fortify porridge was much higher than the findings among mothers in the urban community of Lubumbashi in the Democratic Republic of Congo (27). Totally, 49.05%, 9.72%, 6.74% of mothers had found foods groups of the strength, the protection

and construction, respectively (27). These differences may be due to the effectiveness of the awareness-raising campaigns on child nutrition followed by the mothers in the study during their visits to health facilities or in the communities (27).

The proportions obtained with the study's complementary diet indicators are higher than those determined in Burkina Faso's national nutrition survey in 2020, 2021, 2022 in Sissili province and in Centre-West region. Indeed, more than 80% of the mothers in this study practiced the minimum meal frequency of children's at both assessments, while at the three national nutrition surveys in 2020, 2021 and 2022, the proportion of mothers who practiced the minimum meal frequency was between 67.1% and 75.1% in the province of Sissili and in the Centre-West region of Burkina Faso (7, 29, 30).

Regarding the minimum dietary diversity and minimum acceptable diet for children, their practice was done by more than 57% of mothers at both assessments. These proportions are also higher than those reported in a national nutritional survey in 2020, 2021, 2022 in Sissili province and in Centre-West region of Burkina Faso. These values for the two indicators in national nutritional survey from 2020 to 2022 were less than 34% (7, 29, 30). These differences can be explained by the inclusion criteria of the present study which were limited to women attending health centres, whereas the national nutrition survey included all mothers in the selected households, even if they did not attend health facilities. These differences can reveal the positive effect of health facilities on infant and young child feeding practices through nutritional education and an awareness-raising plan. The proportion of mothers who practiced dietary diversity, dietary frequency, and minimum acceptable diet was higher than another study to be 27.3%, 69.3 %, and 19.8% (31) and 45%, 52%, 49% (32) on feeding practices among children aged 6-23 months in Wolaita Sodo, in Jijida, Ethiopia, respectively.

The observed differences with other studies (30, 31) may be due to the fact that all mothers in the study attended the healthy infant consultations and followed the advice on child feeding practices. In addition, the age range of the children who were included in the studies was different. The results showed that health providers still need to make an effort to promote optimal complementary feeding practices, because at the final evaluation, some mothers were unable to answer the questions asked. In addition, there was no significant difference between the proportions of mothers who had practiced minimum meal frequency, minimum dietary diversity and minimum acceptable diet at the initial and final assessments. Analysis of the factors associated with complementary food indicators at both assessments showed that, at the final assessment, nutritional education and sensitization by mothers cancelled out the statistical links initially observed between the practices of minimum dietary diversity and minimum acceptable diet with occupation and marital status. It highlights statistically significant links between these practices and the level of knowledge about the reasons for introducing complementary foods, the level of knowledge about the 3 food groups and the level of knowledge about ingredients to be added to cereal porridges to fortify them. These observed associations could guide health care providers during healthy infant consultation and culinary demonstration sessions to emphasize their theme on the reasons of introducing complementary foods, and on the three food groups and finally on ingredients to be added to cereal porridges to fortify them. These themes could improve the practices of minimum dietary diversity and minimum acceptable diet. There were also some limitations in this study. Limitations of the study were the 24-hour dietary recall method, which represents a unique temporal phenomenon that is not representative of children's typical dietary intake. Furthermore, the study was conducted in Sissili province and may not reflect the reality of all provinces of Burkina Faso.

Conclusion

The present study showed that the proportions of mothers with good knowledge on the age of introduction of complementary foods and the minimum meal frequency for children aged 6-8 months and 9-23 months increased between two sets of evaluations. Similarly, the proportions of mothers with a good or an average level of knowledge increased significantly. Justification for introducing complementary foods were the names of the food groups and added ingredients to cereal porridges to fortify them. Furthermore, despite the increase in the proportions of mothers practicing minimum meal frequency, minimum dietary diversity and minimum acceptable diet at the final evaluation, no significant difference was observed with the initial evaluation. In the final evaluation, the statistical analysis showed only the links that did not exist in the initial evaluation between the indicators of complementary feeding practices and the level of knowledge about the 3 food groups, the reasons to introduce complementary foods and the ingredients to be added to cereal porridges to fortify them. These findings could improve mothers' complementary feeding practices and thus prevent malnutrition in Sissili province of Burkina Faso.

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Authors' Contribution

K.A.W.A.: conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, manuscript original draft, manuscript review and editing, visualization, supervision, project administration. O.O. and R.D.: methodology, manuscript original draft, manuscript review and editing, visualization. W.R.E.C., D.O., A.O., M.B. and V.P.: supervision, manuscript review and editing, visualization. T.O./S. and M.H.D.: conceptualization, methodology, validation, resources, manuscript review and editing, visualization, supervision, project administration.

Conflict of Interest

None declared.

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