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Original Research Article

Impact of nutrition education programs on complementary feeding: a comparative study among Nigerian men and women

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ABSTRACT

Background: The study assessed how nutrition education programs impact complementary feeding behaviours, with a particular emphasis on understanding the experiences of both men and women in Nigeria.
Methods: The study design employed a mixed-methods approach, including a qualitative and quantitative approach, and included 1167 women and 571 men in various places in the north, south, west, and eastern parts of Nigeria. A pre-tested, semi-structured questionnaire about supplemental feeding that was given by interviewers was used to gather the data.
Results: The study reveals that most mothers are between the ages of 20 and 40, with a majority of them having completed primary and secondary school. The majority of respondents belong to the medium class, with 42.7% starting their children on cereal too soon at six months. 82.4% supplement their infant's diet with fortified pap, primarily made with infant formula. The majority of mothers use various feeding methods, with 57.1 percent using cups, plates, and spoons, 8.1% using hand feeding, and 8.4% using bottle feeding. Only 5.7% clean their hands after feeding and sanitize their food utensils. The study also shows that traditional gender norms, where men are primarily breadwinners, are being challenged by more progressive views, with 21.2% believing in equal sharing of caregiving responsibilities.
Conclusions: The study reveals that Nigeria's supplemental feeding practices are insufficient because of early intake, inadequate follow-up, the prevalence of costly commercial formula and local cereal gruels for meals, and a shift toward shared caregiving responsibilities.

Keywords: Breadwinners, Caregiving, Quantitative approach, Questionnaire, Prevalence

INTRODUCTION

Nigeria faces a significant issue of undernutrition, with 23% of children underweight, 14% wasted, and 41% stunted, according to the 2008 National Demographic and Health Survey.[1] To ensure optimal health and development, it is recommended to introduce age-appropriate, safe, and nutritionally enough supplemental feeding by the sixth month of life.[2] From six months to two years, the World Health Organization in 2008 advises continuing nursing with adequate supplemented nutrition.[3,4] However, only 30% of infants aged 6-23 months and up are fed in compliance with feeding guidelines. Issues related to supplemental feeding include improper timing, bottle irregularity, unsupervised feeding, inadequate feeding techniques, hygiene, and childcare procedures.[5]

Malnutrition is a significant cause of death for 2.3 million children aged 6-24 months in developing countries each year, accounting for over 41% of these deaths.[6] Diet is a significant factor in one-third of mortality in children

under five, with over two-thirds of these deaths occurring within the first year of life.[6] Inadequate feeding can negatively impact a girl's nutritional storage, leading to negative reproductive health, stunting, delayed sexual development, decreased muscular mass and strength, impaired cerebral development, weaker immune system, poor cognitive function, and poor learning accomplishment.[7]

Complementary feeding, a transition from exclusive breastfeeding to family meals, is crucial for improving child nutritional outcomes. The World Health Organization recommends breastfeeding until two years old and starting to receive suitable, safe, and supplementary foods at six months.[8] Complementary feeding practices include first food introduction, meal preparation and selection, and feeding style. Nutrition education initiatives have emerged as a crucial technique for improving complementary feeding habits and child nutritional outcomes. Gender norms and roles also impact caregiving obligations and decision-making processes in many countries, including Nigeria. Investigating the comparative impact of nutrition education programs on men and women in the context of complementary feeding is necessary to identify potential gender-specific challenges and opportunities.[9]

Childhood malnutrition in Nigeria continues to impact public health, with the majority occurring during the sensitive phase of supplemental feeding. Insufficient scientific data supports the effectiveness of initiatives to improve supplementary feeding practices.[10] Contrary to "optimal breastfeeding," "optimal complementary feeding" was not a completely developed concept until recently. In 2008, the World Health Organisation established guidelines for tracking supplement feeding habits. There is also limited research on the impact of gender on complementary feeding habits and decision-making. Caregivers play a crucial role in influencing the eating habits of babies and young children, but there is insufficient research on the distinct effects and roles of both men and women.

Breast milk is not sufficient for a child's nutritional needs in the second half of the first year of life, and supplementary foods are needed to provide energy and nutrition. However, breastfeeding alone may not be enough to meet a child's nutritional needs after six months, necessitating the addition of extra vitamins.[11] To maintain a child's nutritional needs while breastfeeding, a variety of foods must be used in complementary feeds, given in sufficient amounts, consistently, and at regular intervals. Safe food preparation is crucial to prevent the spread of pathogens and serve foods appropriate for their age. In West African nations, inadequate newborn feeding patterns suggest that supplemental foods should be introduced either too early or too late. UNICEF reports show that less than 60% of infants in Burkina Faso, Mauritania, Gambia, Liberia, and Guinea were exposed to solid, semi-solid, or soft foods between the ages of 6 and 8 months. Benin, Ghana, and Guinea-Bissau introduced supplemental foods at a better time, with over 70% of infants receiving these meals.[12]

Complementary foods (CF) can be served in various ways, including small doses of CF while breastfeeding is continued until at least one year old. As children grow older and their dietary habits become more varied, they drink less breast milk.[13] High-energy foods like cookies, salty snacks, and candy often make up a significant amount of young children's dietary habits, making up between 28 and 48 percent of their daily energy needs.[14] Rich nations tend to prefer commercial supplemental foods, such as cereals, confections, and prepared meals, which may have added vitamins and minerals and are free from salt. However, these foods can be costly and may cause the kids to be less receptive to lumpier foods. Examples of commercial CF include Cerelac, NAN, and SMA.

In underdeveloped nations, the cost of commercial supplemental foods is prohibitive for households with modest incomes. Traditional home-made complementary foods, such as grains or root vegetables, are used to feed their kids. Traditional African diets consist of guinea corn, sorghum, cassava, and maize, depending on the region and availability of these whole grains. The two most prevalent staple foods in the diets of children in West Africa are maize and millet. Complex carbohydrates can be found in several parts of East Africa, including sorghum, barley, maize, and wheat.[15] For babies and early children, traditional supplemental foods can become viscous and bulky due to the gelatinization produced by cereal grains when cooked.[16] Household technology can contribute to enhancing the safety and quality of supplemental foods through fermentation, soaking, roasting, and malting. Fermentation produces ogi, while roasting produces turn-brown.[17-19]

Poor feeding habits can lead to malnutrition, poor eating patterns, poor hygiene, forced feeding practices, and child care schedules. These habits can result in issues like choking, food allergies, and reduced breast milk or formula consumption. Delayed introduction can hinder an infant's development and make it harder for them to learn to eat in the future. Experts in paediatric nutrition suggest that most children reach their developmental maturity between 4 and 6 months.[20] Time constraints in busy daily life schedules of nursing mothers can impact their weaning and feeding practices. Some parents find ready-made baby food more convenient and time-saving. The conditions surrounding mothers, including socioeconomic level, culture, and surroundings, contribute to malnutrition. Basic nutrition education can help women make better food decisions for their families. Complementary feeding faces difficulties in underdeveloped nations due to poor feeding habits, including inadequate volume, diversity, infrequent feeding, inappropriate timing, and inefficient procedures. Poor quality and variety of food negatively impact

children's development and nutritional health. Factors affecting childcare practices include the knowledge and disposition of the carer, their health, authority over resources, decision-making position, financial status, workload, time constraints, and family support. Mothers' knowledge and ability as carers significantly impact children's growth and nutritional outcomes.[21]

The lack of knowledge and experience in appropriate nutrition has been evident in the context of complementary feeding. Only 8% of women in South India were fully aware of all complementary feeding techniques, while mothers of babies aged from six to twenty-three months in Southern Ethiopia achieved early commencement of supplemental eating, minimum meal frequency, and minimal dietary diversity with corresponding rates of 72.5, 67.3, and 18.8 percent respectively. Only 9.5% of mothers used correct supplementary feeding. Just 13% of Ghanaian babies and young children between the ages of 6 and 23 months fulfilled the basic standards for baby and young child feeding habits.[22]

How and when children are exposed to solid foods depends on factors such as the age of the mothers, their educational attainment, the age at which the infants were first given solid foods, and the ability to recognize signs that indicate the child is ready to try new foods and flavors.[23] Nutrition education plays a crucial role in improving complementary feeding by enhancing program efficacy, promoting policy changes locally, and enhancing community health. State or local health data can be an excellent tool for enhancing program efficacy, promoting policy changes locally, and enhancing community health. A study in Enugu State, Nigeria found that 68.7% of participants had good knowledge about infant feeding, but only 22.4% of mothers had adequate practice.[24] A global meta-analysis of multiple nutrition education strategies found a continuous beneficial relationship between nutrition education exposure and increased supplementary feeding behaviors.[25] To optimize the impact of such programs, personalized and culturally appropriate approaches are necessary.

The primary aim of this research is to assess how nutrition education programs impact complementary feeding behaviours, with a particular emphasis on understanding the experiences of both men and women in Nigeria. The specific objectives were; (a) to evaluate the impact of nutrition education programs on feeding practices that are complementary; (b) to compare the effectiveness of these programs among Nigerian men and women, how do nutrition education programs influence complementary feeding practices? The research findings will contribute to increasing awareness and capacity among caregivers, health professionals, and community stakeholders about the importance of gender roles in promoting optimal feeding practices and providing valuable insights for policymakers and program developers. Supplementary foods, such as liquids, semi-solids, and substances, are consumed by a baby or young child to provide energy and nutrition.

METHODS

Study design

An in-depth interview (qualitative) and a cross-sectional study (quantitative) survey were both used in the study design. In order to ensure representation across a range of demographic and socioeconomic strata, the quantitative approach used the stratified random sampling method.

Inclusion criteria

Nigeria men and women aged 18 and above. Parents of caregivers of infants or young children aged 0-24 months. Individuals who provide informed consent to participate in the study were included.

Exclusion criteria

Individuals with medical conditions and dietary restrictions that may affect their ability to participate in nutrition education programs. Those who cannot communicate effectively in the study's language or context. And those who are not primary caregivers of infants or young children were excluded from study.

Study variables and indicators

The sociodemographic traits of the kids, such the index child's age and sex, are among the independent variables. The study's dependent variables included minimum permissible diet, nutritional diversity, complementary feeding behaviours (such as meal frequency), and complementary feeding knowledge. Age of the mother, marital status, occupation, education level, and number of children are covariates in our study.

The World Health Organization's (WHO) criteria served as the foundation for the variable definitions. The percentage of breastfed and non-breastfed children who are 6-23.9 months that received solid, semi-solid, or soft meals the smallest number of times or more per day was defined as the minimum feeding frequency. The children who were not breastfed were 6-8.9 months, 9-23.9 months, and 6-23.9 months non-breastfed children: twice. The minimum dietary diversity was defined as the percentage of children aged 6-23.9 months who are fed items from four or more of the seven food groups. The percentage of kids ages 6-23.9 months who have a minimum sufficient diet (other than breast milk) was established. The two fractions are usually used to compute this composite indicator: Children who were breastfed and who had satisfied the minimum standards for meal frequency and dietary diversity the day before, aged 6-23.9 months.

Ethical consideration

To maintain confidentiality in data collection, distribution, and reporting, informed consent was obtained from the participants in the study as well as the appropriate health studies committee of Specialist Hospital, Sokoto, and clinics.

Data collection

Data were collected in the following centres in Nigeria: Lagos University Teaching Hospital, Lagos State representing Western Nigeria; Specialist Hopital Sokoto representing Northern Nigeria; Garki General Hopital representing North-central Nigeria; Enugu State University Teaching Hospital and Braithwaite Memorial Specialist Hospital representing Eastern part of Nigeria. Data were collected for a period of one year, between November 2022 to September 2023.

To gather data on nutrition knowledge, feeding habits, and the effectiveness of nutrition education initiatives, a pre-tested semi-structured interviewer-administered questionnaire on supplemental feeding was presented. While interviewing people to learn about the many viewpoints, experiences, and challenges associated with supplementary feeding.

Sample size calculation

Based on the difference between two population proportions, the sample size (n) was calculated as shown in equation 1 below. P_1 and P_2 were taken as the proportion of men and women respectively on complementary feeding programs. The power (1- β) 100% was taken to be Z_2, and the degree of confidence (α) at 95% confidence interval was taken to be 0.05 as Z_1.

$$n = (Z_1+Z_2^2*2P1-P) \div (P_2-P_1^2)$$

Data analysis

Software called Epi Info Statistical 7.1 was used to analyse the data. The correlations involving the categorical variables were examined using chi square test statistics, and a statistically significant relationship (p value <0.05) between programme involvement and adherence to suggested feeding habits was found.

RESULTS

Socio demographic characteristics of the respondents

A study comprising 1167 mothers and 571 fathers with children between the ages of 6 and 23 months was carried out. Table 1 displays the age of the index baby together with the sociodemographic details of the parents (both male and female). The majority of the mothers were 20 to 40 years old (95.6%), while the majority of the men were 31 or older (97.9%). A significant number of the respondents have completed primary school (38.4%) and secondary school (28.7%). The majority of the respondents belong to the medium class (873, or 50.2%), while 635 (36.5%) belong to the low class and 230 (13.2%) belong to the high class. The respondents were mostly from the rural region 986 (56.7%), while 752 (43.3%) were from the urban part of Nigeria. The age of the index baby was mostly ≥12 months old, with 699 (40.2%), 475 (27.5%) being 6 to 8 months, and 9 to 11 months were 564 (32.5%).

Table 1: Socio-demographic characteristics of the participants.

Characteristics	Frequency	Percentage (%)
Age of female parents (in years)		
>20	14	1.2
20-30	463	39.7
31-40	652	55.9
>40	38	3.2
Age of male parents (in years)		
>20	0	0
20-30	12	2.1
31-40	192	33.9
>40	367	64
Educational level of respondents		
No formal education	378	22.0
Primary education	667	38.4
Secondary education	498	28.7
Tertiary education	183	11.0
Socio-economic status		
Medium	873	50.2
Low	635	36.5
High	230	13.2
Urban-rural residence		
Urban	752	43.3
Rural	986	56.7
Age of index baby at interview		
6 to 8 months	475	27.3
9 to 11 months	564	32.5
≥ 12 months	699	40.2

Program participation and participant's knowledge on nutrition program

The program's frequency and the number of men and women who participate are displayed in Table 2. It indicates that compared to men, who numbered 232, or 40.6%, women attended nutrition programmes in greater numbers (967, or 82.9%). Additionally, the outcome demonstrates a strong correlation between gender and programme attendance. Complementary knowledge on nutrition were classified as good, fair and poor knowledge. The percentage of women with good knowledge is slightly higher 397(34.1%) than that of men which is126 (22.1%), this is due to the fact the percentage of women attended nutrition related are higher than that

of the men. The chi square value is 14.02 and the p-value of 0.015 suggests that the observed differences are unlikely due to random chance, hence the chi-square analysis identifies these differences as statistically significant (Table 2).

Complementary feeding practices among respondents

As shown in Table 3, the recommended minimum feeding meal frequency was greatly practiced by mothers at 12-24 months with a percentage frequency of 750 (64.3), followed by 6.-8.9 months with a percentage of 269 (23.1%), while the lowest minimum meal frequency was practiced at 9-11.9 months with a percentage of 148 (12.7%).

Perception of gender roles

Table 4 indicates the wide range of conceptions of gender roles (men and women) that determine the extent of male engagement in decision-making. According to the findings, the majority of participants (23.1%) regarded males as aggressively opposing traditional norms and promoting equal sharing. While a significant proportion (21.2%) perceives shared caring obligations with substantial male engagement, low percentages were also connected with beliefs of traditional gender norms with 1.3 percent (%) and cultural expectations mandating strict roles with 3.7 percent (%).

Table 2: Program participation and participant's knowledge of nutrition.

Program attended	Frequency of participation	Percentage (%)	X^2	P value
Men			231.52	<0.001
Yes	232	40.6		
No	339	59.4		
Women				
Yes	967	82.9		
No	200	17.1		
Level of knowledge	**Frequency score**			
Men			14.02	0.015
Good knowledge	126	22.1		
Fair knowledge	168	29.4		
Poor knowledge	277	48.5		
Women				
Good knowledge	397	34.1		
Fair knowledge	201	17.2		
Poor knowledge	569	48.8		

Table 3: Complementary feeding practices among respondents.

Complementary feeding practices	Frequency	Percentage (%)
Age at which cereal is initiated		
>3months	179	10.3
3 to <6 months	267	15.4
At 6 months	742	42.7
>6 months	550	31.6
Type of cereal used as complementary feed		
Fortified pap	1432	82.4
Plain pap	121	6.9
Commercial cereal	116	6.7
Fortified pap + commercial pap	69	3.9
Item used for pap fortification		
Infant formula	1542	88.7
Follow up-/growing up formula	110	6.3
Regular full cream milk powder	42	2.4
Locally prepared soya bean flour	32	1.8
Cocoa beverage	12	0.8
Age at which family diet was initiated (n=1738)		
< 3 months	46	2.6
3 to < 6 months	125	7.2

Continued.

Complementary feeding practices	Frequency	Percentage (%)
At 6 months	319	18.4
7 to < 12 months	996	57.3
≥12 months	252	14.5
Minimum meal frequency (1167)		
6-8.9 months (2 times)	269	23.1
9-11.9 months (3 times)	148	12.7
12-24 months	750	64.3
Bottle feeding	98	8.4
Hand feeding	94	8.1
Feeding with cup/plate and spoon	679	58.1
Feeding whenever child gave a cue	296	25.4
Correct frequency of introducing new feeds per week	231	19.8
Adding salt to feeds	134	11.5
Appropriate consistency of feed	224	19.2
Always wash hands before feeding	511	43.8
Always wash and sterilize feeding utensils after feeding	67	5.7

Table 4: Perceptions of gender roles.

Perceptions of gender role	Male involvement in decision making	Frequency	Percentage (%)
Traditional gender norms persist. Men are breadwinners	Low	23	1.3
Women primarily responsible for caregiving	Moderate	121	6.9
Men and women share caregiving responsibilities	High	368	21.2
Evolving gender roles; shared responsibilities emphasized	Moderate	201	11.6
Gender roles are fluid, with no strict division of duties	High	347	19.9
Men actively challenge traditional roles, equal sharing	High	402	23.1
Cultural expectations dictate rigid gender-specific roles	Low	65	3.7
Emphasis on equal contribution; men engage in caregiving	High	211	12.1

Demographic factor from different region of the participants

The participants' demographic characteristics from various regions of Nigeria are displayed in Table 5. It illustrated how varied conventional gender roles exist in the north, south, west, and east based on demographic factors.

Table 5: Demographic factor from different region of the participants.

Region	Cultural context
North	Strong cultural emphasis on traditional roles
South	Emerging trend towards more equitable roles
West	Blend of traditional and modern caregiving
East	Cultural practices influence feeding choices

DISCUSSION

Ensuring healthy nutrition for infants and children through appropriate feeding methods is crucial for their general well-being, development, and maturation of the body and mind.[26] The crucial time from birth to one year of age is known as infancy, and it is still very important for a child's healthy growth and development. This study's primary goal was to record how nutrition education programmes affect supplementary feeding behaviours in Nigeria. According to the study's findings, there were more women than men who attended nutrition programs-967 out of 967 or 82.9%-than men-232 out of 206, or 40.6% fewer people. The chis-square result demonstrated that there is significant association between program attendance and gender of men and women. Women percentage with good knowledge is slightly higher 397 (34.1%) than that of men which is 126 (22.1%), this is due to the fact the percentage of women attended nutrition related are higher than that of the men. This suggests that the observed differences are unlikely due to random chance. The recommended minimum feeding meal frequency was greatly practiced by mothers at 12-24 months with a percentage frequency of 750 (64.3), followed by 6.-8.9 months with a percentage of 269 (23.1%), while the lowest minimum meal frequency was practiced at 9-11.9 months with a percentage of 148 (12.7%).

The results of this investigation are consistent with earlier studies regarding the unsatisfactory and untimely nature of supplemental feeding practices in Nigeria.[27] Just 61% of babies were given extra feeding on schedule. Breast milk is the best source of nutrition for children under six

months old, and supplemental meals can interfere with its production if they are introduced too early. Excessive weight gain is the main issue with early supplemental feeding in affluent nations. Excessive weight gain is the primary problem associated with early supplemental feeding in industrialized nations. This ran counter to the results of our study and other research conducted in Africa, which indicates that undernutrition and early cereal introduction are negatively correlated.[27]

Differences in complementary food quality between industrialized and underdeveloped nations may be the cause of the discrepancy. Conversely, supplemental meals that are added too late may result in insufficiencies in energy and nutrition. The finding that children exposed to cereals after the age of six months had a higher risk of undernutrition than those introduced earlier. This emphasizes how crucial it is to provide newborns with appropriate feeding counselling, emphasizing the prompt introduction of supplemental meals. The previously established primary drivers of early supplemental feeding, such as the need to resume work and the belief that the newborn's breast milk supply is insufficient and causes excessive screaming or poor weight gain, should be explicitly addressed in counselling sessions. It has been observed that mothers who have less education or poverty should receive extra attention because they are more likely to start supplemental feedings earlier.

Moreover, the results of the study align with previous research suggesting that the predominant supplemental diet in Nigeria and other West African countries is cereal gruels.[27,28] Adejuwon discovered that prior studies have indicated that these stews had poor protein, fat, and nutritional density, and are somewhat substantial.[29] Yet, these cereal gruels' high phytate content hinders the absorption of iron.[30] Consequently, when these foods are limited to supplements, they often do not satisfy the baby's needs for protein and micronutrients and have been associated with a higher risk of malnourishment. The majority of neonates fed plain, unenriched pap were found to be malnourished, which confirmed this.

The findings in this research on gender roles and the degree of male involvement in decision-making reflect a range of perspectives, from more progressive ones that emphasize equitable responsibility sharing and men actively challenging old roles (23.1%) to more traditional gender norms that emphasize males being perceived primarily as breadwinners (1.3%). Remarkably, a sizable portion of respondents (21.2%) believe that caring for others should be a shared duty between men and women, indicating a departure from traditional roles. These findings are consistent with the broader discussion regarding changing gender dynamics and show how modern society is beginning to embrace more flexible and equal roles.

Ijarotimi and Abeshu support the premise of altering society attitudes toward gender roles.[31,32,20] Olatona et al identified a tendency of males actively contesting traditional norms, emphasizing a larger movement of growing male participation in caring chores.[27] These comparisons highlight the coherence of the current results with prior literature, implying a progressive movement toward more equal gender roles. The study provides vital insights into the continuing evolution of society attitudes and expectations regarding gender roles, reinforcing the premise that traditional stereotypes are increasingly giving way to more inclusive and diverse perspectives.

A notable gap is the limited research examining the impact of gender on complementary feeding habits and decision-making. However, caregivers play an essential role in influencing the eating habits of babies and young children. As a result, there is inadequate research or literature available to examine the distinct affects and roles of both men and women in this current research study.

CONCLUSION

The results of this study indicate that supplemental feeding methods are not ideal in Nigeria. Many women start taking supplements too soon and don't follow the recommended minimum number of times per day for complementary feedings. Local cereal gruels were the most common supplemental meal, although they were reinforced with expensive commercial formula, which many moms did not use. Unhygienic practices and high rate of bottle feeding underscore the safety of complementary feeds. Therefore, urgent innovative interventions are needed to improve complementary feeding practices in Nigeria. The nuanced analysis pointed to a collective embrace of more equal and fluid gender roles.

Recommendations

To improve mothers' comprehension and feeding practices especially those of young, single, and illiterate moms the government or stakeholders should offer appropriate supplemental feeding instruction that emphasizes quick initiation and meal diversity. Promote community participation tactics that include local leaders and influencers to promote cultural acceptance and long-term sustainability of nutrition education programs. Provide participants with knowledge that not only resonates with their cultural values but also allows them to make informed complementary feeding decisions. Provide educational materials that showcase a variety of cultural customs. Rather than using a one-size-fits-all strategy, provide a range of scenarios and examples that will connect with people from different backgrounds.

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