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The Impact of Nutrition Education Provided During Preschool Checkups on Mothers' Adherence to Exclusive Breastfeeding Among Children Aged 0 to 6 Months in the Ngaba Health Zone, in the City of Kinshasa.

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ABSTRACT

The overall objective of this study was to determine the influence of nutrition education provided during preschool checkups on the knowledge, practical skills, and adoption of exclusive breastfeeding among mothers of children aged 0 to 6 months in the Ngaba health zone, Kinshasa.

This was a descriptive, cross-sectional study with an analytical focus, conducted on a convenience sample of 390 mothers found at the study site.

The results showed that 72.6% of the respondents were over 25 years old, with a mean age of 29.1 ± 0.21 years; less than half of the mothers surveyed were aware of the benefits of CPS for their children, and the effect of nutrition education on adherence to CPS was more pronounced among: mothers who had heard of CPS were 2.62 times more likely to have completed this education (ORa = 2.620; 95% CI: 1.384–4.959; p = 0.003); mothers who practiced AME were 4.29 times more likely to have participated in CPS nutrition education than those who did not (ORa = 4.291; 95% CI: 2.178–8.453; p = 0.001), and vaccination was significantly associated with participation in the CPS nutrition education program (ORa = 0.072; 95% CI: 0.034–0.149; p = 0.001).

Ultimately, this study shows that nutrition education provided as part of the CPS is an important factor in improving practices related to exclusive breastfeeding. However, the relatively low proportion of people who are truly aware of the benefits of CPS and certain shortcomings in adherence to the AME recommendations underscore the need to strengthen nutrition education sessions, improve

communication by health care providers and ensure regular follow-up of mothers and children. Strengthening these interventions could contribute to a sustainable improvement in breastfeeding practices and, consequently, in children's health and growth.

Keywords: Education, nutrition, breastfeeding, exclusive, children aged 0–6 months

1. INTRODUCTION

Breastfeeding is the best way to feed a healthy newborn. Early in the lactation period, the benefits of human milk are most evident when the infant is exclusively breastfed for up to six months (Sheard, N., Rev., 1988).

According to the WHO and UNICEF, only 55% of infants worldwide are exclusively breastfed during the first four months of life, which is far from sufficient.

In developing countries, there is a downward trend in breastfeeding, especially in large cities. In Côte d'Ivoire, surveys conducted in certain neighborhoods of Abidjan revealed that 90% of mothers were supplementing breast milk with formula for infants under 4 months of age (Belanger B, 1989). In Senegal, only 5% of infants under 5 months of age are exclusively breastfed, while 61% of this age group receive supplemental water and food. In traditional rural societies in Africa, Asia, and South America, women are valued for their motherhood, in which breastfeeding plays a significant role. However, certain sociocultural or religious practices can prevent exclusive breastfeeding, such as the belief that "colostrum is bad" because it is mistakenly considered dirty. Several reasons have been cited to explain this decline in our countries, including the loss of traditional values, the migration of families to cities, delays in the first breastfeeding session, and excessive commercial pressure (advertising) from formula manufacturers.

In Kinshasa, the practice of exclusive breastfeeding remains insufficient despite the high prevalence of breastfeeding. A descriptive study conducted by Yotebieng et al. (2013) in six health facilities in the city revealed that only 39% of the infants surveyed had been exclusively breastfed during the 24 hours preceding the survey. Furthermore, a prospective study conducted by Babakazo et al. (2015) among 422 mother-infant pairs showed that only 2.8% of infants were still exclusively breastfed at six months of age. The authors identified, in particular, low levels of maternal knowledge, a lack of confidence in their ability to breastfeed, and insufficient breastfeeding support as factors associated with early weaning. These findings underscore the need to strengthen nutritional education and support for mothers at health facilities, particularly during prenatal checkups.

2. RESEARCH QUESTION

What is the impact of nutritional education provided during preschool checkups on mothers' adherence to exclusive breastfeeding among children aged 0 to 6 months?

3. RESEARCH HYPOTHESIS

We hypothesize that nutrition education provided during preschool checkups contributes to improving mothers' knowledge and strengthening their practical skills regarding exclusive breastfeeding during the first six months of a child's life. Its effectiveness would be further enhanced by regular guidance from healthcare professionals as well as support from the family network, thereby promoting the adoption and continuation of this practice.

4. GENERAL OBJECTIVE

To determine the impact of nutrition education provided during preschool checkups on the knowledge, practical skills, and adoption of exclusive breastfeeding among mothers of children aged 0 to 6 months in the Ngaba health zone, in the city of Kinshasa.

5. METHODOLOGICAL APPROACH

This is a descriptive, cross-sectional study with an analytical focus, conducted on a non-probability sample of 390 mothers selected on a voluntary basis.

6. RESEARCH RESULTS

6.1 Descriptive Results

Table 1: Distribution of surveyed mothers by sociodemographic characteristics

Variables (n=390)	**Categories**	**n(%)**	**Mean ± Standard Deviation**
1 Age (years)			**29.1 ± 0.21**
	< 25	107 (27.4)	
	≥ 25	283(72.6)	
2 Educational level			
	Low (Elementary, Illiterate)	8(2.1)	
	High (Higher education, High school)	382(97.9)	
3 Marital status			

	Married	86 (22.1)	
	Unmarried	304 (77.9)	
4 Occupation			
	Unemployed	129 (33.1)	
	Self-employed	129 (33.1)	
	Civil servant	89 (22.8)	
	Employee	43(11)	
5 Religion			
	Catholic	89 (22.8)	
	Kimbanguist	43(11)	
	E Revival	258(66.2)	

Table 1 shows that 72.6% of respondents were over 25 years old, with an average age of 29.1 ± 0.21 years.

Regarding educational level, 97.9% of respondents had a high level of education (secondary, higher education).

As for occupation, 33.1% of respondents were unemployed or self-employed.
Regarding religion, 66.2% of respondents were Christians belonging to revivalist churches.

Table 2: Distribution of surveyed mothers by adherence, knowledge, and perceived usefulness of the CPS

Variables	Categories	n(%)
1 Have heard of CPS		
	No	124(31.8)
	Yes	266 (68.2)
2 Awareness of the usefulness of CPS		
	No	226 (57.9)
	Yes	164 (42.1)
3 Different components of CPS		
Vaccination		
	No	60 (36.6)
	Yes	104(63.4
Nutrition education		
	No	15 (9.1)
	Yes	149(90.9
Anthropometric Measurements		
	No	80 (48.8)
	Yes	84(51.2)
Vitamin A supplementation		
	No	100(61)
	Yes	64(39)
Deworming with mebendazole/albendazole		
	No	76(46.3)
	Yes	88(53.7)
Growth monitoring		
	No	52 (31.7)
	Yes	112(68.3)

Table 2 shows that 68.2% of respondents reported having heard of CPS before.

As for awareness of its usefulness, 42.1% stated that they were aware of the usefulness of CPS.

Regarding the various activities considered useful in the context of the CPS, nutrition education (90.9%), growth monitoring (68.3%), immunization (63.4%), deworming with mebendazole/albendazole (53.7%), and anthropometric measurements were the activities most frequently cited by respondents.

Table 3: Distribution of surveyed mothers according to their interpretation of the health curve

Variables (n=390)	**Categories**	**n(%)**
1 Monthly frequency of CPS		
	1 time per month	145 (88.4)
	twice a month	19 (11.6)
2 Healthcare professional schedules the new appointment		
	No	92 (56.1)
	Yes	72(43.9)
3 Healthcare professional interprets the child's growth chart		
	No	75 (45.7)
	Yes	89(54.3)

Table 3 shows that regarding the monthly frequency of the CPS, the majority of respondents (88.4%) reported that the CPS was performed once a month.

Regarding the scheduling of a follow-up appointment by the healthcare professional, only 43.9% reported that the professional scheduled a follow-up appointment at the end of the visit,

Regarding the interpretation of the child's growth chart, 54.3% of participants reported that the healthcare professional interpreted the growth chart.

Table 4: Distribution of surveyed mothers based on nutrition education provided during the CPS

Variables	Categories	n(%)
1. Received nutrition education		
	No	141 (36.2)
	Yes	249 (63.8)

2. Topics covered regarding breastfeeding		
Breastfeeding within one hour of delivery		
	No	20(8)
	Yes	229(92)
Exclusive breastfeeding for 6 months		
	No	74(29.7)
	Yes	175 (70.3)
Continued breastfeeding until 18 months		
	No	20(8)
	Yes	229(92)

Table 4 shows that 63.8% of participants reported receiving nutrition education during the CPS.

Regarding the topics covered on breastfeeding, the results show that 92% of participants were aware of the message about breastfeeding within one hour of delivery.

As for exclusive breastfeeding during the first six months, 70.3% reported that this topic was covered.

Finally, regarding continuing breastfeeding until 18 months, 92% of participants reported receiving this information during nutrition education.

Table 5: Distribution of surveyed mothers by exclusive breastfeeding practice

Variables (n=390)	Categories	n (%)
1. Practices exclusive breastfeeding		
	No	91 (23.3)
	Yes	299 (76.7)
2. Reasons for non-compliance with AME		
Non-preterm infant		
	No	143 (36.7)
	Yes	247 (63.3)
Maternal death after childbirth		
	No	283 (72.6)
	Yes	107(27.4)
Compliance with AME guidelines		
	No	78 (20)
	Yes	312(80)
3. AME's Recommended Guidelines		
Do not give any liquids other than breast milk		
	No	86(22,1)
	Yes	304(77.9)
Do not give water		
	No	98(25.1)
	Yes	292(74.9)
No sugary drinks		
	No	331 (84.9)
	Yes	59 (15.1)

Table 5 shows that 23.3% reported not having practiced exclusive breastfeeding, and the most common reason cited for not adhering to exclusive breastfeeding was the child's prematurity (63.3%).

Regarding compliance with exclusive breastfeeding guidelines

The majority of respondents (80%) reported following the recommended guidelines for exclusive breastfeeding; specifically, 77.9% reported not giving the child any liquids other than breast milk. Similarly, 74.9% reported not giving the child water.

Finally, the recommendation against sugary drinks was followed in only 15.1% of cases.

6.2 Results of the bivariate analysis

Table 6: Relationship between adherence to nutrition education and factors influencing compliance with exclusive breastfeeding

Variables (n=390)	Attended nutrition education at the CPS			Chi-square test	p-Value
	Categories	No (141)	Yes (249)		
		n (%)	n (%)		
1 Mothers who have heard of CPS				6.39	0.013
	No	56 (45.2)	68 (54.8)		
	Yes	85(32)	181(68)		
2 AME Practice				13,786	0.001
	No	18(19.8)	73(80.2)		
	Yes	123(41.1)	176(58.9)		
3. Compliance with AME requirements				25,593	0.001
	No	9 (11.5)	69(88.5)		
	Yes	132(42.3)	180(57.7)		
4. Scheduling the new appointment for healthcare professionals				26,505	0.001

	No	54(58.7)	38(41.3		
	Yes	87 (29.2)	211(70.8)		
Healthcare professional who is an interpreter the child's growth curve				0.072	0.832
	No	62(35.4)	113(64.6)		
	Yes	79 (36.7)	136(63.3)		
Vaccination				53,842	0.001
	No	51(75)	17(25)		
	Yes	90(28)	232(72)		
Taking anthropometric measurements				0.668	0.417
	No	44(39.3)	68(60.7)		
	Yes	97(34.9)	181(65.1)		

Table 6 highlights a statistically significant association ($p < 0.05$) between participation in nutrition education at the CPS and the following factors: mothers who had previously heard of the CPS ($\chi^2 = 6.39$; $p = 0.013$), participation in AME ($\chi^2 = 13.786$; $p < 0.001$), adherence to AME recommendations ($\chi^2 = 25.593$; $p < 0.001$), scheduling of a follow-up appointment by the healthcare professional ($\chi^2 = 26.505$; $p < 0.001$), and vaccination ($\chi^2 = 53.842$; $p < 0.001$).

6.3 Results of the multivariate analysis

Table 7: Factors Associated with Adherence to Nutrition Education and Compliance with the AME

Variables	$OR_{adjusted}$	95% CI		p-Value
		Lower	Upper	
Mothers who have heard of CPS	2,620	1,384	4,959	0.003
Practice of AME	4,291	2,178	8,453	0.001
Vaccination	0.072	0.034	0.149	0.001

The results presented in Table 7 show that mothers who had previously heard of the preschool consultation (CPS) were 2.62 times more likely to have received nutrition education than those who had never heard of it (ORa = 2.620; 95% CI: 1.384–4.959; p = 0.003).

Similarly, mothers who practiced exclusive breastfeeding (EBF) were 4.29 times more likely to have received this nutrition education than those who did not practice EBF (ORa = 4.291; 95% CI: 2.178–8.453; p = 0.001).

Furthermore, vaccination was also significantly associated with participation in the CPS nutrition education program (ORa = 0.072; 95% CI: 0.034–0.149; p = 0.001).

7. DISCUSSION OF RESULTS

This study, conducted among 390 mothers, aimed to analyze the factors associated with participation in nutrition education during the preschool health checkup (CPS), as well as their relationship with exclusive breastfeeding (EBF) practices.

The results show that the majority of mothers (72.6%) were 25 years of age or older, with a mean age of 29.1 years. Furthermore, 97.9% had a high school education or higher, while 77.9% were unmarried. In terms of employment, unemployed women and self-employed women each accounted for 33.1% of the participants. Finally, 66.2% belonged to evangelical churches.

The predominance of adult, relatively well-educated women could facilitate understanding of health messages and the adoption of recommended nutritional practices. However, educational level alone does not guarantee the adoption of behaviors that promote child health. Indeed, Victora et al. (2016) emphasize that breastfeeding practices are influenced by several individual, family, socioeconomic, and institutional factors. Similarly, work-related constraints and insufficient family support can limit mothers' ability to follow nutritional recommendations.

These results therefore suggest the need to tailor educational interventions to mothers' socioeconomic and family realities, paying particular attention to those with less social support.

Regarding knowledge of the CPS, 68.2% of participants reported having heard of it, but only 42.1% understood its purpose. Nutrition education was the most frequently cited component (90.9%), followed by growth monitoring (68.3%) and immunization (63.4%).

These results reveal a disconnect between awareness of the CPS's existence and an understanding of its objectives. This situation could be explained by insufficient awareness-raising and communication efforts between health professionals and communities.

This observation is consistent with the findings of Tchibindat et al. (2004), who emphasize the importance of communication between health care professionals and mothers to improve the monitoring and promotion of child growth. The World Health Organization (WHO, 2016) also recommends systematically combining growth assessment

with tailored nutritional counseling to help parents understand their children's needs.

Thus, raising community awareness appears essential to improve knowledge of the various services offered by the CPS and to encourage their use by mothers.

The results on growth monitoring and nutrition education show that 88.4% of participants reported that the CPS was held once a month. However, only 43.9% stated that a new appointment was scheduled for them at the end of the visit, while 54.3% indicated that the health care provider interpreted their child's growth chart.

Furthermore, 63.8% of mothers reported receiving nutritional education during the CPS, compared to 36.2% who did not.

These results show that nutrition education is relatively well integrated into CPS activities, but that its coverage remains insufficient. Furthermore, the lack of systematic scheduling of appointments and inadequate interpretation of growth charts could limit the continuity and quality of children's follow-up care.

Tchibindat et al. (2004) emphasize that growth monitoring must be accompanied by discussions between health professionals and mothers to promote understanding of the results and the adoption of appropriate behaviors. Similarly, the WHO (2016) stresses the importance of interpreting anthropometric measurements and providing individualized nutritional counseling.

Regarding the topics covered, 92% of mothers reported receiving information on breastfeeding within one hour of delivery and on continuing breastfeeding until 18 months, while 70.3% reported receiving advice on exclusive breastfeeding during the first six months.

This discrepancy indicates that the message regarding exclusive breastfeeding needs to be further reinforced. Indeed, the WHO and UNICEF recommend exclusive breastfeeding for the first six months, followed by the introduction of appropriate complementary foods and continued breastfeeding until two years of age or beyond (World Health Organization, 2023).

Furthermore, Sinha et al. (2015) show that counseling and support interventions help improve breastfeeding practices. These findings therefore underscore the importance of strengthening nutrition education sessions and ensuring their systematic integration into preschool checkups.

The results regarding exclusive breastfeeding practices in our study show that 76.7% of mothers reported having practiced exclusive breastfeeding, compared with 23.3% who did not. The child's prematurity was the main reason cited for not following this practice (63.3%).

Furthermore, 80% of participants reported following the recommendations regarding exclusive breastfeeding. Specifically, 77.9% stated that they did not give their infants any liquids other than breast milk, and 74.9% reported not giving their infants water. However, only 15.1% reported following the recommendation to avoid sugary drinks, according to the coding presented in the table.

These results reflect a relatively high adoption rate of exclusive breastfeeding but also reveal the persistence of certain practices that contradict nutritional recommendations. According to Victora et al. (2016), breastfeeding helps reduce infectious morbidity and infant mortality, while providing lasting health benefits for both the child and the mother.

Regarding prematurity, the WHO (2022) emphasizes the importance of breast milk in the nutritional care of preterm or low birth weight infants. Prematurity is therefore not automatically a contraindication to breastfeeding, but requires appropriate support.

Thus, nutrition education sessions should place greater emphasis on the comprehensive definition of exclusive breastfeeding, particularly the exclusion of water, herbal teas, juices, and other foods or liquids during the first six months, except in recognized medical cases.

The bivariate analysis revealed a statistically significant association between participation in nutrition education and several variables: prior knowledge of CPS ($p = 0.013$), the practice of exclusive breastfeeding ($p = 0.001$), adherence to exclusive breastfeeding guidelines ($p < 0.001$), scheduling a follow-up appointment ($p < 0.001$), and vaccination ($p < 0.001$). However, no significant association was observed with the interpretation of the growth chart ($p = 0.832$).

Prior knowledge of the CPS may encourage mothers' participation in educational activities, as women who are aware of this service are more likely to seek out the available services. This finding is consistent with Tchibindat et al. (2004), who highlight the importance of communication between health professionals and mothers.

Similarly, the observed association with scheduling a new appointment suggests that the organization of health follow-up promotes opportunities for awareness-raising and the continuity of educational interventions. Furthermore, the

association with vaccination underscores the value of integrating nutritional counseling into various child health services.

The multivariate analysis identified three variables statistically associated with adherence to nutritional education: prior knowledge of CPS (ORa = 2.620; 95% CI: 1.384–4.959; p = 0.003), participation in AME (ORa = 4.291; 95% CI: 2.178–8.453; p = 0.001), and vaccination (ORa = 0.072; 95% CI: 0.034–0.149; p = 0.001).

Prior knowledge of CPS was associated with a higher likelihood of receiving nutrition education. This finding confirms the importance of information and awareness-raising activities in improving mothers' participation in child health services.

The observed relationship with the practice of AME also underscores the importance of nutritional support in the adoption of recommended practices. Sinha et al. (2015) show, in particular, that educational interventions and breastfeeding support help improve mothers' feeding behaviors.

However, a discrepancy emerges between the bivariate and multivariate results regarding AME and vaccination. Indeed, the proportions in Table 6 indicate a positive association between vaccination and adherence to nutritional education, whereas the adjusted OR of 0.072 indicates an inverse association according to the model's reference coding. A similar discrepancy is observed for AME. These results therefore require verification of the variable coding and reference categories before any definitive interpretation can be made.

Overall, our results show that knowledge of CPS, breastfeeding practices, and the use of health services are important factors to consider in improving nutrition education. They support strengthening community awareness, improving the quality of consultations, and systematically integrating nutritional counseling into immunization and growth monitoring activities.

CONCLUSION

At the conclusion of this study of 390 mothers, which examined factors associated with the implementation of nutrition education during preschool health checkups (CPS) and their relationship to exclusive breastfeeding (EBF) practices, the results show that, despite relatively high awareness of the existence of the CPS, understanding of its usefulness remains insufficient.

Furthermore, more than two out of three mothers reported having received nutrition education during the CPS, while seven out of ten mothers reported practicing EBF. However, certain shortcomings persist, particularly regarding the understanding of and adherence to all recommendations related to exclusive breastfeeding.

The multivariate analysis identified three factors statistically associated with adherence to nutritional education: prior knowledge of the CPS (ORa = 2.620; p = 0.003), the practice of AME (ORa = 4.291; p = 0.001), and vaccination (ORa = 0.072; p = 0.001). However, the direction of the associations regarding AME and vaccination requires verification of the coding of the variables and reference categories.

Ultimately, this study highlights the importance of strengthening awareness-raising activities on infant and young child feeding, improving the quality of preschool checkups, and systematically integrating nutrition education into child health services. Particular attention should be given to supporting mothers to promote and maintain optimal exclusive breastfeeding practices.

Thus, improving the coverage and quality of nutrition education at the CPS is an important strategy for promoting optimal infant and young child feeding practices and contributing to the prevention of child malnutrition.

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