Nutritional Status and Feeding Practices of Children Aged 0 to 36 Months in Thulamela Municipality, Limpopo Province

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Abstract

Background: Poor Infant and young child feeding practices accounts for nutrients deficiency, illness and infections in children that lead to malnutrition at an early age. The objective of this study was to investigate the nutritional status and feeding practices of children aged 0 to 36 months in Thulamela Municipality.

Methods: A cross-sectional survey was conducted between September and December 2019 in Thulamela Municipality. A total number of 250 mother-child pair were recruited in the study using a convenience sampling technique. A structured questionnaire was used to interview mothers. Anthropometric measurements of children were assessed using standard procedure. Anthropometric measurements were calculated using WHO Anthro version 3.2.2. The data obtained were analysed using Statistical Package for Social Sciences (SPSS, Chicago, IL, USA) version 26.

Results: The mean ($\pm$ SD) age of children in months was 10.53 (8.39). Exclusive breastfeeding up to six months was practised by only 7.6% of mothers while 87.5% of mothers introduced complementary feeding before the age of six months. The prevalence of stunting, wasting and underweight were 9.2%, 2% and 3.6% respectively. About 38.1% of children who received water before six months of age were more likely to be stunted as compared to their counterparts (19.9%) ($p=0.001$). Children who were given complementary foods one week after birth, the odds of being underweight were 9.00 times as compared to those who were given complementary foods after six months (OR=9.00; 95% CI=1.325 - 61.138).

Introduction

The first 1000 days of life, from conception to two years of age, is a critical window for the promotion of optimal growth, health, and development [1]. The World Health Organisation recommends early initiation of breastfeeding within an hour after delivery, exclusively breastfeeding for the first six months of life, followed by the introduction of complementary foods at six months while continuing breastfeeding at least two years or even beyond [2]. Globally, it is estimated that only 44% of infants are exclusively breastfed for the first six months of life while most children were introduced to solid, semi-solid or soft foods late or earlier than recommended [3]. In South Africa, exclusive breastfeeding remains very low with only 7.4% of children exclusively breastfed for the first six months while most of the children received solid food and fluids before the recommended age of six months [4]. In the previous study conducted in Limpopo Province, Dzimauli region found that less than 1% of children were exclusively breastfed for up to 3 months, but none of the children were exclusively breastfed for up to 6 months [5].

Poor breastfeeding and complementary feeding practices accounts for nutrients deficiency, illness and infections in children that lead to malnutrition at an early age [6]. Malnutrition in the early stage of life, has been directly linked with poor infant feeding practices, high rates of infectious diseases, especially in developing countries such as South Africa [5, 7]. Furthermore, malnutrition decreases a child's chance of survival, hampering ideal health, growth, and development [8]. Early childhood malnutrition leads to

growth retardation, delaying of mental development and impairment of intellectual level [9]. The long-term effects of nutritional deficiencies have been established and these include compromised educational achievement, low economic productivity, reproductive outcomes, and overall health in adulthood which tends to be difficult to reverse later in life [8]. In 2015, the world agreed to eliminate all forms of malnutrition by 2030 [10]. To reduce malnutrition amongst children under five years, there is need to improve infant and young child feeding practices, since feeding practices is one of the most determinants of nutritional status of children.

Limpopo Province is experiencing high levels of child malnutrition, with 4.2% of children under the age of five years reported to have severe acute malnutrition [11]. In the recent study conducted in Limpopo Province, reported that 25.9% of children died as results of severe acute malnutrition [12]. The prevalence of underweight, stunting and wasting amongst children under five years in Limpopo Province was 5%, 15.5% and 5% respectively [4]. Latest national survey reported that 22% of children under five years in Limpopo Province were stunted, indicating chronic malnutrition [13]. Inappropriate feeding practices such as early introduction of complementary foods and mixed feeding were identified as a major contributor to child malnutrition in Limpopo Province [14, 15]. Therefore, it is important to investigate the nutritional status and infant feeding practices of children aged 0 to 36 months in Thulamela Municipality, Limpopo Province.

Methods And Materials

Study population and design

A cross-sectional study was conducted between September and December 2019 in Thulamela Municipality, which is one of four municipals in Vhembe District. All six local areas in Thulamela municipality were regarded as a cluster in the study. Simple random sampling was used to select three clinics per cluster to make a total of 18 clinics. Convenience sampling technique was used to select 250 mother-child pair aged 0 to 36 months during well-baby clinic visit. Children who were aged 0 to 36 months and whose parents consented and were present on the day of data collection were included in the study. Children who were severely ill were excluded from the study.

Data collection

Structured questionnaire was used to interview mothers on breastfeeding practices and complementary feeding practices. Anthropometric assessments were performed according to standard procedures as described by the International Society for the Advancement of Kin-anthropometry [16]. The following measurements were taken in duplicate with the children wearing light clothing and no shoes: standing height, length, and weight. Height was measured to the nearest 0.1 cm using a portable stadiometer; length was measured to the nearest 0.1 cm using a measuring board. Weight was measured to the

nearest 0.01 kg on a calibrated portable Seca solar scale (model 0213) (Seca, Hammer Steindamm, Hamburg, Germany).

Anthropometrics indicators expressed as weight-for-age (WAZ), height/length-for-age (H/LAZ), weight-for-height/length (WH/LZ) and Body Mass Indices for age (BMI/A). Anthropometric status was interpreted using WHO child growth standards. Z-score classification cut-off point below -2SD for WAZ, WH/LZ, H/LAZ referred as underweight, wasting, and stunting respectively [17]. In addition, the cut-off points below -3SD is referred severe underweight, severe wasting and severe stunting respectively. Furthermore, the cut-off points between +2SD to <+3SD for WH/LZ is referred as overweight while cut-off point above >+3SD is referred as obese.

The Minimum Dietary Diversity (MDD) of children was assessed using 24-hour recall method. Mothers were asked to recall all the foods that the child consumed during the previous 24 hours. The researcher used food cards to assist mothers to remember the food items they fed their children in the previous 24 hours [18]. The minimum dietary diversity (MDD) score was interpreted using the WHO recommended cut-off point with a value of “1” indicates if the child had consumed four or more groups of foods and “0” if less.

Statistical analysis

The data obtained were cleaned, coded, and entered in Microsoft (MS) Excel spreadsheet, then exported to IBM Statistical Package for Social Science version 26 for analysis (SPSS, Chicago, IL, USA). Anthropometric measurements were calculated using WHO Anthro version 3.2.2 [19]. Descriptive statistics was performed for all variables in the study. The categorical variables were presented as frequencies (n) with percentage (%) of the total study sample. Continuous variables were presented as mean $\pm$ standard deviation (SD) for normally distributed data. Chi-Square test for the categorical variables was performed. The chi-square test used to discover the relationship between two categorical variables. Logistic regression analysis was performed to explore associations between nutritional status and feeding practices. The Odds Ratio (OR) together with their corresponding 95% confidence intervals was computed and interpreted accordingly. A P-value<0.05 was considered to declare a result as statistically significant in this study.

Results

A total number of 250 mother-child pair were recruited in the study. The mean ($\pm$ SD) age of children in months was 10.53 ($\pm$ 8.39SD). Most (52.2%) of the children were males, as compared to 47.6% of their female counterparts. The mean ($\pm$ SD) age of mothers in years was 27.79 ($\pm$ 7.13SD). Most (54%) of the mothers were single, while 37.6% were married. About 37.2% of the mother had passed their grade 12 while 16.8% had tertiary education (Table 1).

Table 1

Socio-demographic characteristics of the study participants (n= 250).

Characteristics	Frequency	Percentage	Mean ± SD	
Age of child (months)				
0 – 6	101	40.4	10.53 ± 8.39	
7 – 12	72	28.8		
13 – 24	55	22.0		
25 – 36	22	8.8		
Gender				
Male	131	52.4	27.79 ± 7.133	
Female	119	47.6		
Maternal age (years)				
≤19	31	12.4		
20 - 29	123	49.2	27.79 ± 7.133	
30 – 39	88	35.2		
≥40	8	3.2		
Marital status				
Single	135	54.0		
Married	94	37.6		
Divorced	5	2.0		
Living with partner	9	3.6		
Separated	7	2.8		
Education level				
Never attended	1	0.4		
Grade 1 – 4	2	0.8		
Grade 5 – 7	6	2.4		
Grade 8 – 10	48	19.2		
Grade 11 – 12	58	23.2		
Passed grade 12	93	37.2		
Tertiary	42	16.8		
Employment status				

Employed	62	24.8
Unemployed	188	75.2

Almost all mothers (96%) initiated breastfeeding within one hour after birth, while 3.2% introduced breastfeeding a day after birth. The majority of mothers (95.2%) were assisted by nurses to initiate breastfeeding. Exclusive breastfeeding up to six months were practiced by only 7.6% of mothers. Almost three-quarter of mothers were still breastfeeding at the time of interview while 26% were no longer breastfeeding. Of all the mother, 68.8% exclusively breastfed their children up to 2 months while 23.6% breastfeed their children up to 3 to 5 months. More than three-quarter (38.8%) of the mothers chose breastfeeding because it is perfect food for a child. About 16.3% of mothers stop breastfeeding before 12 months, and the main reason for stopping breastfeeding was going back to school or work (Table 2).

Table 2

Breastfeeding practices (n=250)

Variables	Frequency	Percentages
Time of initiation breastfeeding		
Within one hour after birth	240	96.0
A day after birth	8	3.2
Week after birth	2	0.8
Assistance of initiation of BF		
Nurse	237	95.2
Medical Doctor	13	5.6
Sources of BF information		
Health care professionals	209	91
Parents/parents in law	2	0.9
Media (Magazine, Radio & TV)	3	1.3
Mom-connect	15	6.6
Duration of EBF		
0 to 2 months	172	68.8
3 to 5 months	59	23.6
6 months	19	7.6
Breastfeeding status		
Still breastfeeding	185	74
Stopped breastfeeding	65	26
Reasons for choosing BF		
Perfect food for a child	97	38.8
Protect child against diseases	75	30.0
Free	3	1.2
Bonding between mother and child	10	4.0
Breastfeeding frequency		
On-demand	112	44.8
On schedule time	23	9.2
At your own time	50	20

Age of stopping breastfeeding		
Less than 1 month	7	2.8
2 - 5 months	17	6.8
6 - 12 months	18	7.2
13 - 24months	23	9.2
Reasons for stopping breastfeeding		
Medical condition	13	5.2
Child refused breast	10	4.0
Going back to school/work	27	10.8
Not enough breastmilk	8	3.2
Another pregnancy	3	1.2
Was the right time to stop breastfeeding	4	1.6

BF=Breastfeeding

Nearly three-quarter of children (73.6%) were introduced to complementary foods at the time of interview while 26.4% were not introduced to complementary foods. Most children (87.5%) were introduced to complementary food before six months. The majority of children (91.2%) were given water before six months. The reason for introducing water include: child cries a lot (70.1%), advised by parents/parents in law (11.4%). Few children (9.2%) had attained minimum dietary diversity (Table 3).

Table 3

Complementary feeding (n=184).

Variables	Frequency	Percentages
Age of introducing complementary foods		
1 month	7	3.8
2 – 3 months	35	19.0
4 – 5 months	119	64.7
6 months	23	12.5
Age of introducing water		
0 – 2 months	43	17.2
3 – 5 months	142	74
6 months and above	21	8.4
Reasons for introducing CF.		
Child cries a lot	129	70.1
Insufficient breastmilk	15	8.2
Advised by parents/parents-in-law	21	11.4
Advised by health professionals	17	9.2
It was the right time	2	1.1
Sources of CF information		
Health worker (Nurse, Dietician/Nutritionist)	94	87.9
Parents/parents in-law	7	6.5
Media (Newspaper, Radio, TV)	5	4.7
Peers (friends, colleagues).	1	0.9
Type of CF information received		
Child must eat a variety of foods	77	72
Child must eat vegetables and fruit every day	22	20.6
Child must eat meat, eggs as often as possible	4	3.7
Child must start complementary foods at the age of six months	4	3.7
Dietary diversity score		
<4 food groups	167	90.8
≥4 food groups	17	9.2

The prevalence of underweight, wasting and stunting among children was 3.6%, 2% and 9.2% respectively. The mean ($\pm$ SD) weight-for-age (WAZ) for total children was -0.24 ($\pm$ 0.871 SD). The mean ($\pm$ SD) length/height-for-age (L/HZ) for total children was -0.35 ($\pm$ 1.258 SD). The mean ($\pm$ SD) weight-for-length/height (WL/HZ) of total children was -0.06 ($\pm$ 1.049 SD). The prevalence of overweight was 1.6% while 13.2 were at possible risk of overweight. The mean ($\pm$ SD) BMI-for-age for total children was -0.05 ($\pm$ 1.064 SD). About 1.5% had moderate acute malnutrition while 6.5% were at risk of acute malnutrition (Table 4).

Table 4

Nutritional status of the study participants (n=250)

Z-score classification	Interpretation	Frequencies n (%)	Mean ± SD
Weight for age			
<-3SD	Severely Underweight	0 (0)	-0.24 ± 0.871
-3SD - <-2SD	Underweight	9 (3.6)	
-2SD - <-1SD	Mild underweight	41(16.4)	
-1SD - +1SD	Normal	183 (73.2)	
>+1SD - ≤+2SD	Possible growth problems	17 (6.8)	
Length-for-age			
<-3SD	Severely stunted	1(0.4)	-0.35 ± 1.258
-3SD - <-2SD	Stunted	23(9.2)	
-2SD - <-1SD	Mild stunted	59(23.6)	
-1SD - <+3 SD	Normal length	167(66.8)	
Weight for length			
<-3SD	Severely wasted	0(0)	-0.06 ± 1.049
-3SD - <-2SD	Wasted	5(2)	
-2SD - <-1SD	Mild wasted	48(19.2)	
-1SD - +1SD	Normal WHZ	161(64.4)	
>+1SD - ≤+2SD	Possible risk of overweight	33(13.2)	
+2SDto<+3SD	Overweight	3(1.2)	
>+3SD	Obese	0 (0)	
BMI for age			
-3SDto<-2SD	Wasted	6 (2.4)	-0.05 ± 1.064
-2SDto<-1SD	Normal BMI/A	46(18.4)	
-1SDto+1SD	Normal BMI/A	154(61.6)	
>+1SDto<+2SD	Possible risk of overweight	40(16)	
+2SDto<+3SD	Overweight	4(1.6)	
MUAC for age			
<11 cm	Severe Acute Malnutrition	0(0)	0.45 ± 0.77
11.0cm to 12.5 cm	Moderate Acute Malnutrition	3(1.5)	

12.5cm to 13.5cm	At risk of Acute Malnutrition	13(6.5)
>13.5 cm	Well-Nourished	184(92)

Of all the children, (37.4%) who received water were more likely to be underweight as compared to those who did not receive water (13.6%) ($p=0.002$). About 38.1% of children who received water before 6 months of age were more likely to be stunted as compared to their counterparts (19.9%) ($p=0.001$). About (18.5%) of children who received complementary foods were more likely to be wasted as compared to children who did not receive complementary foods (71.2%) ($p=0.003$) (Table 5).

Table 5

The association between infant feeding practices and anthropometric status of children.

Variables	Weight-for-age		df	P-value
Introduction of water	Underweight n (%)	Normal n (%)		
Yes	77(37.4%)	129(62.6%)	1	0.002
No	6(13.6%)	38(86.4%)		
	Height-for-age			
Age of introducing water	Stunted n (%)	Normal n (%)		
6 months and below	72(38.9%)	113(61.1%)	1	0.001
Above 6 months	11(16.9%)	54(83.1%)		
	Weight-for-height			
Introduction of CF	Wasted n (%)	Normal n (%)		
Yes	34(18.5%)	150(81.5%)	1	0.003
No	47(71.2%)	19(28.8%)		
Pearson chi-square test; *Significance at $p < 0.05$; CF=Complementary Foods.				

Association between anthropometric status and feeding practices (Logistic regression)

Children who were given complementary foods one week after birth, the odds of being underweight were 9.00 times as compared to those who were given complementary foods after six months ($OR=9.00$; 95% $CI=1.325 - 61.138$). However, no association between children who were given complementary foods between the age of 2 to 3 months after birth and underweight ($OR=1.067$; 95% $CI=0.301 - 3.785$).

Furthermore, no association was observed between children who were given complementary foods between 4 to 6 months after birth and underweight (OR=0.642; 95% CI=0.211 - 1.948) (Table 6).

Table 6

Association between the age of introducing complementary foods and weight-for-age.

Variables	Weight		
	OR	(95% CI)	P-value
Age of introducing CF			
1 week after birth	9.000	1.325 - 61.138	0.025
2 to 3 months	1.067	0.301 - 3.785	0.920
4 to 6 months	0.642	0.211 - 1.948	0.433

OR: Odd Ratio, CI=Confidence Interval, Significance at $p < 0.05$. CF= Complementary foods

Discussion

Early initiation of breastfeeding is one of the measures of determining the effective practice of feeding infants and young children, and it is also one of the ten effective steps of breastfeeding practice. The WHO/UNICEF recommended that breastfeeding should be initiated within the first hour after birth [20]. Most mothers in the current study initiated breastfeeding within an hour after birth. This may be attributed to the fact that health professional assists with deliveries and this health professional are the one who also encourage early initiation of breastfeeding within the first hour after delivery. In the study conducted in Ghana, reported that women who were assisted by health professionals to initiated breastfeeding within the first hour of delivery [21]. Several health benefits such as increased ability of the immune system to resist infections, reduction in the risk of diarrhoea and increased survival rate of children have been linked to early initiation of breastfeeding [22].

Despite the benefit of breastfeeding, less than ten percent of children in the current study were exclusively breastfed up to 6 months. Congruently, South African National Health and Nutrition Examination Survey (SANHANES-1) found that seven percent of children aged ≤ 6 months were exclusively breastfed [23]. Previous studies have reported that exclusive breastfeeding is rarely practiced in South Africa [5, 13, 24, 25, 26,]. Poor exclusive breastfeeding practice in the current study is due to the fact that most mothers indicated that returning to schools, influence by the family members and insufficient milk as the main reason for terminating breastfeeding and introducing complementary food. Similarly, several studies have also reported going back to school or work, insufficient breastmilk as the main reasons for introducing complementary foods early [15, 24, 27, 28, 29, 30, 31]. Despite a high level of awareness by health professionals and Department of Health on exclusive breastfeeding, practicing exclusive breastfeeding is still a problem in many rural areas of South Africa. Exclusive breastfeeding is one of the strategies which can be used to achieve sustainable development goals 1 and 2 (zero hunger, and good health and well-being respectively).

Even though, WHO/UNICEF recommended that complementary foods should be introduced at six months of age to ensure that the child obtains all the required nutrients. Most mothers in the current study were unable to do this [20]. Congruently, several studies conducted in South Africa reported introduction of complementary foods before the recommended period of six months [15, 32, 33, 34, 35, 36]. Most children were given soft maize meal porridge mixed with water only and this was given as breakfast, lunch, and supper throughout the week. Despite maize meal being fortified with minerals and vitamins, introduction of maize meal as the main or sole solid ingredients during complementary feeding provide adequate energy, fibre, and B vitamins only and is deficient in protein and minerals such as iron, calcium, and zinc. Introduction of variety of food during childhood is necessary to meet the energy and nutrient requirements and prevent deficiencies that could result into undernutrition [37]. Children who are likely to be wasted are those who are weaned only on the maize meal porridge [38].

Appropriate feeding practice during the first 1000 days of life, from conception to two years of age, is a critical period for the promotion of optimal growth, health, and development. In the current study, early introduction of water was associated to underweight and stunting, while introduction of food early was associated to children being wasted. Introduction of solid food may have detrimental effects on the child's growth and development as infant below six months of age have the gastrointestinal track that is not fully developed to digest other solid foods apart from breastmilk. Insufficient intake of quality diet is one of the contributing factors of undernutrition [37, 39]. Timing of introducing complementary feeding is nutritionally crucial as requirements for nutrients are greater during the second half of infancy [38]. Introduction of fluid and food before six months may increase the risk of diarrheal disease, food allergies, hamper optimal growth and development of the child [40, 41]. Short-term adverse effects of undernutrition include recurring illness, weakness, delayed physical and mental development, irritability, poor appetite, low weight for age while the long-term adverse effects are short height for age, poor learning ability, poor performance at school and poor general health [42].

Conclusion

This study reveals that exclusive breastfeeding for the first six months was rarely practiced, as most mothers introduced to complementary feeding before the recommended age. The prevalence of underweight, stunting and wasting among children were of low public concern. Health professionals should promote the use of mass media and South African mom-connect as the platforms that may be utilised more optimally to disseminate information on infant and young child feeding practices to young mothers.

Abbreviations

BF: Breastfeeding; BMI: Body Mass Index; CF: Complementary Foods; MUAC: Mid Upper Arm Circumference; n: number; OR: Odd Ratio; CI: Confidence Interval; SD: Standard Deviation

Declarations

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Authors' contributions

Mugware A conceptualized the study, its design, coordination of data collection, data entry and analysis, interpretation of the data and drafting the manuscript. Mushaphi LF and Motadi SA supervised the whole process and review of the manuscript. All authors have read and approved of the final version of the manuscript.

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Ethical approval and consent to participants

Ethical approval for the study was obtained from the University of Venda Research Ethics Committee (SHS/19/NUT/01/1503). The permission to undertake the study was obtained from Provincial Department of Health Research Committee, Vhembe district and then clinics. All mothers were informed about the voluntary and anonymous nature of the study and were told that they could withdraw their participation at any time during the study. Mothers were also informed about possible risk before commencement of the study. Informed consents were obtained. Furthermore, the study was conducted in accordance with the principles of the Declaration of Helsinki, Good Clinical Practices, and the laws of South Africa.

Availability of data and materials

The datasets generated and analysed during the current study are not publicly available online because university has the copyright. The datasets used during the current study are available from the corresponding author on reasonable request.

Conflict of interest

The authors declare that they have no conflict of interest.

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