

FEEDING PATTERNS AND DIETARY DIVERSITY PRACTICES OF CAREGIVERS WITH CHILDREN (0 TO 24 MONTHS) ADMITTED WITH ACUTE MALNUTRITION IN HOSPITALS IN MPUMALANGA PROVINCE, SOUTH AFRICA

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ABSTRACT

Malnutrition is a global public health problem more prominent among infants under five years of age, and South Africa is no exception. Caregivers' poor infant feeding practices, including lower exclusive breastfeeding rates, dietary diversity, and meal frequency, are the main causes of malnutrition during the first two years of life. Improving mother practices on infant and young children is crucial for growth and development and prevention of malnutrition. This study aimed to assess feeding patterns and dietary diversity practices of caregivers with children admitted with malnutrition in hospitals in Bushbuckridge Sub-District, Mpumalanga Province. A quantitative study design was applied. Data were collected among 151 caregiver-child pairs using an interviewer-administered questionnaire adapted from the Food Agriculture Organization publication guidelines for assessing nutrition-related knowledge, attitudes and practices using closed-ended multiple choice questions. Descriptive and ANOVA statistics were analysed using STATA 13 statistical software. The results showed that the majority, 90.0% (n=66) of infants < 6 months, were not exclusively breastfed. Most, 34.6% (n= 27) of the children aged 6-24 months had a lower dietary diversity score (DDS) (<5) and 65.0% (n=51) consumed less than the recommended meals for age (4 times a day). Analysis of variance (ANOVA) showed that the effect of continuing breastfeeding was significant for gender [F (1, 71) = 3.90, p=.05] and the diagnosis of the child [F (1, 71) = 8.19, p = .00]. The effect of minimum feeding frequency was significant for residence areas (F (3,74) = 5.23, p =.00) and caregiver education levels [F (3, 74) =3.71, p = .01]. The findings indicated that the majority (90.0%) of mothers did not practise exclusive breastfeeding, the diet lacked diversity, and the children consumed meals less than 4 times a day as recommended for age. Therefore, there is need for targeted infant feeding nutrition interventions, such as nutrition education and promotion of breastfeeding and complementary feeding practices, which will subsequently lead to an improvement of the nutritional status of infants.

Key words: exclusive breastfeeding, dietary diversity, meal frequency, acute malnutrition, complementary feeding



INTRODUCTION

In general, children under five years of age suffer from Severe Acute Malnutrition (SAM), which is considered a serious public health problem [1]. According to Anato [2], 45.4% of children under the age of five are wasted by 2020, the highest prevalence found in Asia and Africa. The South African Demographic and Health Survey (SADHS) reported that nationally 3% of children under five years of age were acutely malnourished [3]. The first two years of a child's life are crucial, as adequate nutrition is vital to ensure optimal physical growth and mental development [4]. Wasting is associated with poor dietary quality in young children [5]. Lack of access to food, disease, lack of safe drinking water, poor hygiene and sanitation practices are some of the underlying causes of malnutrition that leave infants and young children underweight, weak, and vulnerable to infections such as diarrhoea, pneumonia, and measles, which contribute to more than 50% of the infant mortality rate [6].

The World Health Organization recommends early breastfeeding initiation within 1 hour of birth and exclusive breastfeeding for the first six months of life [6]. In developing countries, poor breastfeeding practices, particularly exclusively breastfeeding, have been documented, and only about 25 per cent of African infants were exclusively fed [7]. Vygen *et al.* [8] reported that babies with acute malnutrition under six months in Niger were breastfeeding less than optimally. The SADHS reported that 25.2% of babies under six months were not breastfed [3]. Infants who are exclusively breastfed for six months have a reduction in the risk of diseases such as gastrointestinal, upper, and lower respiratory infections and media otitis [9, 10]. Although exclusive breastfeeding is promoted, mothers introduce complementary feeding earlier than recommended, leading to slow growth in the infant. Thus, family and community awareness are needed to support breastfeeding mothers.

The introduction of complementary feeding among infants is recommended to start at the age of six months, as the needs for energy and nutrients of infants start to exceed what breast milk provides. A study that combined data from multicounty household surveys from 42 countries in Africa, Asia, Europe and America reported that among all the regions, sub-Saharan Africa had the lowest number of infants between ages six and 23 months who had minimum dietary diversity [11]. The findings of the review of complementary feeding practices in South Africa showed that the majority of infants between six and 24 months did not meet the minimum dietary diversity of having more than five food groups out of eight food groups in the previous 24 hours [12]. If infants do not consume the minimum recommended dietary diversity, their diet will lack adequate and balanced nutrients to support



growth and development [11]. Regarding meal frequency, fewer children from developing countries such as Kenya and South Africa met the recommended minimum meal frequency of eating meals four times a day [3, 13]. However, another study conducted in Ethiopia, reported that most infants between six and 23 months met the recommended minimum frequency [14]. Mushaphi *et al.* [15] reported that in Limpopo among infants aged 0 to 12 months, most had three meals per day, which is less than the WHO recommendations of four meals a day. Without adequate meal frequency, infants and young children are vulnerable to malnutrition, micronutrient deficiencies, increased morbidity, and mortality.

The prevalence of SAM in South Africa was reported at 5 per cent, and South Africa is one of the countries that is not on track to achieve its target of reducing the prevalence of wasting to below 5 per cent [16]. Additionally, the prevalence of SAM in hospitals and associated hospital mortality were high, as reported by Mandla *et al.* [16]. Efforts by communities and relevant stakeholders are needed to curb the prevalence of malnutrition among children.

In South Africa, poor infant feeding practices such as early introduction of complementary feeding at six months of age and inadequate nutrition, quality, and quantity of food contribute greatly to high levels of malnutrition [17]. Regardless of the adopted and implemented intervention strategies such as the Mother-Baby Friendly Initiative (MBFI), Infant and Young Child Feeding Policy (IYCF) to curb the infant and child mortality rates, inappropriate infant feeding practices continue to perpetuate malnutrition among young children. Therefore, this paper aims to present results from an assessment of the feeding patterns and dietary diversity practices of caregivers with children (0 to 24 months) admitted with acute malnutrition in hospitals in Mpumalanga province, South Africa.

MATERIALS AND METHODS

Study Approach and Design

This study used a quantitative descriptive approach to describe feeding patterns, dietary diversity, and meal frequency of children aged 0 to 24 months, admitted with malnutrition in the three hospitals in Bushbuckridge Sub-District, Mpumalanga Province.

Study population, sampling strategy and sample size

All mothers of children aged 0 to 24 months who had been admitted to the three Bushbuckridge hospitals for acute malnutrition were sampled. The Bushbuckridge Sub-District is classified as a rural area and three hospitals have similar sociodemographic characteristics. Mapulaneng Hospital is a regional hospital that receives referrals and provides specialist support to district hospitals, while the



Matikwana and Tintswalo hospitals are district hospitals that receive referrals and provide general support to clinics and community health centres. The type of hospitals provides services mainly to people with lower socio-economic status because they are state hospitals and are subsidised. The study included all caregivers of children aged 0 to 24 months who were admitted with malnutrition to hospitals in the Bushbuckridge sub-district during the collection of data, and all caregivers who gave consent formed the sample for the study. The study excluded caregivers of children who were very sick and/or needed emergency care and premature babies (born before 36 weeks of gestation). Those who met the sampling criteria were included in the study, as the number of participants was less than 100 in each hospital. Therefore, the total sample size was 151 participants (Table 1).

Data Collection

Data were collected using a questionnaire adapted from the Food Agriculture (FAO) publication guidelines for assessing nutrition-related knowledge, attitudes, and practices, which is also called the KAP manual, previously used and validated by other researchers. The researcher translated the questionnaire into local languages (IsiSwati, xiTsonga, and sePedi). The questionnaire included Section A: Sociodemographic information and Section B: Infant and Young Child feeding patterns and dietary diversity practices of the respondents. Twelve (12) research assistants (dietitians by profession) collected data and were recruited from the nutrition department of each hospital. The researcher trained the research assistants on how to collect data prior to data collection. A list of admitted malnourished children was obtained from the ward administrator during ward rounds. The caregivers of the children were individually approached in the ward, and appointments for the interviews were secured according to the caregiver's availability. The interviews were conducted privately. The questionnaire was pre-tested before the commencement of the main study and there were no changes made. The interviews took 25 minutes to complete.

Measurements

Exclusive breastfeeding refers to feeding an infant only breast milk and no other liquids or solids, not even water, except oral rehydration solution (ORS) or drops or syrups consisting of vitamins, mineral supplements, or medicines for the first six months of life.

The dietary diversity score is defined as the proportion of children aged 6 to 23 months who received at least five food groups out of eight food groups in the previous 24 hours (breast milk, grains, roots and tubers, legumes and nuts, dairy



products, flesh foods, eggs, Vitamin A rich fruits and vegetables) recommended by the World Health Organization [18].

The eight food groups are indicated in Table 1

Data were gathered from a questionnaire administered to the child's caregivers. Respondents were asked to indicate whether the child had eaten any food over the previous 24 hours of each of the eight food groups. The total number of food groups consumed was summed and for the child to meet the recommended meals, they should consume >5 food groups.

The minimum frequency is defined as 4 or more solid or semisolid or soft or milk feeds for non-breastfeeding children aged six to 23 months where at least one of the feeds must be a solid, semi-solid, or soft feed; twice for breastfed infants six to eight months; three times for breastfed children nine to 23 months, and four times for non-breastfed children six to 23 months [19].

Data Analysis

Data were coded and captured on a Microsoft Excel spreadsheet, and statistical analysis was performed using STATA version 13 (StataCorp, LLC, College Station, TX, USA), a statistical package for data analysis. Descriptive statistics were analysed, that is, means and proportions, and an analysis of variance (ANOVA) was conducted for effect between continued breastfeeding, dietary diversity, meal frequency, and socio-demographic characteristics of the participants, and a p-value less than 0.05 was considered statistically significant.

Ethical Consideration

The study was carried out according to the Declaration of Helsinki and the protocol was approved by the Sefako Makgatho Research Ethics Committee (SMUREC/H/166/2017: PG). All respondents gave their informed consent for inclusion before participating in the study.

RESULTS AND DISCUSSION

Socio-Demographics

The study sample consisted of 151 pairs of caregivers and children, which consisted of 51.7% (n=78) of caregivers with children six to 24 months of age and 48.3% (n=73) with infants <6 months of age. Of the total number of children, 56.8% (n=88) were admitted with SAM and 41.7% were admitted with MAM. About a quarter of caregivers, 39.7% (n=60) attained secondary school education and 36.4% (n=55) completed grade 12 or standard ten. Most (78.2% of the caregivers were unemployed, and (68.9%, n=104) received a child support grant. There was a significant positive correlation ($p = 0.01$) between the age of the child and admission with malnutrition (Table 2).



Caregivers' breastfeeding practices of infants <6 months (exclusively breastfed)

Among infants <6 months, only 10.0% (n=7) were exclusively breastfed while 90.0% (n=66) were not, with no significant difference ($p = 0.74$) between the groups. However, the reasons for caregivers not to breastfeed their children were not established in the current study. Contrary to the study findings, two studies conducted in Kwazulu-Natal, South Africa, among mothers and caregivers of 14 weeks of infants reported that most children were exclusively breastfed beyond three months [20, 21]. The possible explanation of the findings of the two studies mentioned above is that the mothers were still breastfeeding at the time the studies were conducted. Similarly, a study conducted in the Western Cape reported that fewer infants under six months were exclusively breastfed [22]. Furthermore, a review of studies conducted by Sayed *et al.* [12] in South Africa, reported that most children were not exclusively breastfed. In general, these findings show that fewer babies are exclusively breastfed, and this predisposes them to malnutrition, diarrhoea, and infections. In Bangladesh, infants who were not exclusively breastfed were significantly at risk of developing SAM [11]. The benefits of exclusive breastfeeding cannot be ignored, as demonstrated in a study conducted in the United Kingdom, where infants who exclusively breastfed for six months had a lower risk of severe or persistent diarrhoea compared to infants who were exclusively breastfed for less than four months [23]. Improvements in exclusive breastfeeding rates and continued promotion of exclusive breastfeeding could improve the prevalence of childhood malnutrition. Continuously educating mothers about exclusive breastfeeding and its benefits is crucial to the growth and development of the child [24].

Dietary diversity scores for children six to 24 months

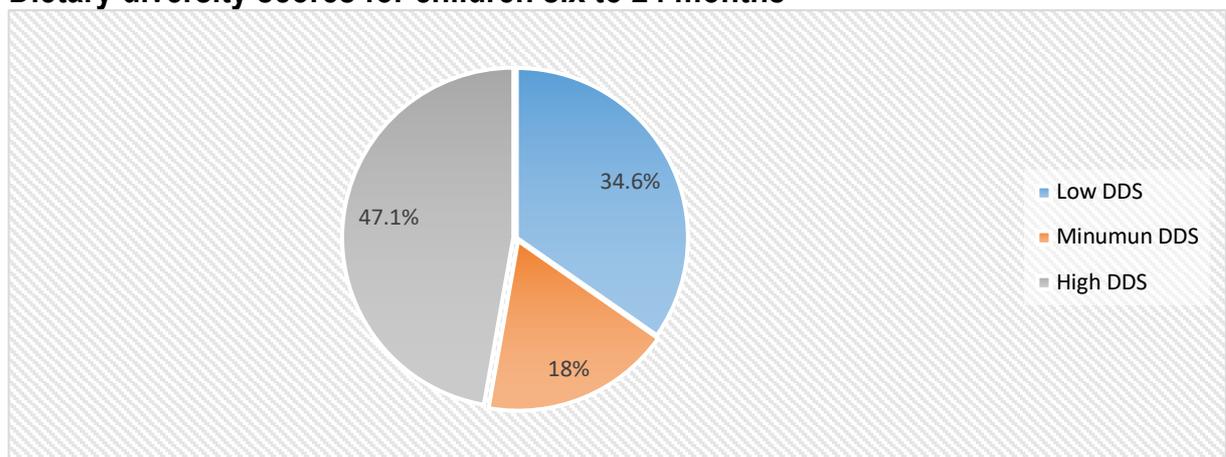


Figure 1: Percentage of dietary diversity scores of children 6 to 24 months old
Low DDS <5 Minimum DDS =5 High DDS >5

The study findings show that even though slightly less than half (47.1%) of the children had a DDS >5 out of the eight food groups, 35% of the children had a DDS (<5) out of eight (Figure 1). There were no significant differences between the groups ($p = 0.66$). Studies conducted in Kwazulu Natal, and the Western Cape in South Africa also showed that less than 50% of infants had a higher DDS [22, 25]. Alamu [26] pointed out in a study conducted in Zambia that a higher DDS does not necessarily indicate higher consumption of food groups, but rather availability. In addition, having 35% of children with DDS lower than five is a concern because they cannot meet daily nutritional requirements for growth and development. Adequate dietary diversity is important to reduce wasting that is associated with poor dietary quality [27]. Thus, increased consumption of diversified foods is important in a child's diet as it provides the adequate micronutrients the body needs for development [28].

Meal frequency

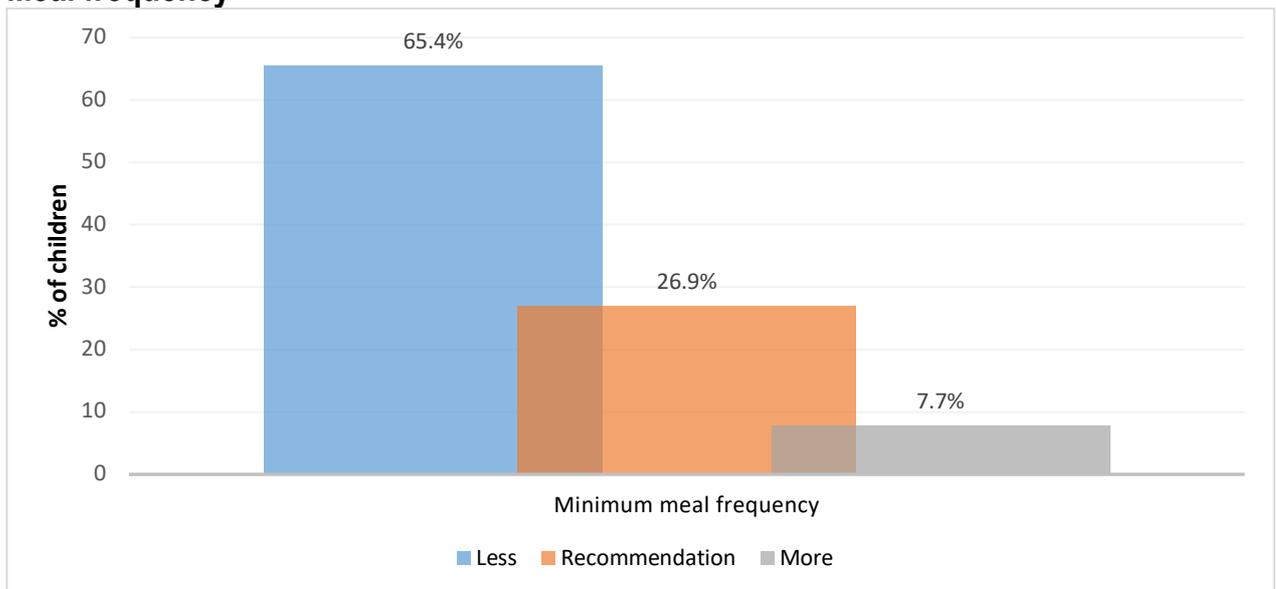


Figure 2: Minimum meal frequency of children 6-24 months

Less= minimum meal frequency <4 times a day
Minimum meal frequency = 4 times a day
More =minimum meal frequency >4 times a day

The results indicate that 65.4% ($n=51$) consumed less, 26.9% ($n=21$) consumed the recommended meals, and 7.7% ($n=6$) consumed more than the recommended number of meals (including liquids) the previous 24 hours (Figure 2). However, the proportions were not significantly different ($p=0.26$). In terms of minimum meal frequency, the study results indicate that most of the children (>6 months) consumed less than the recommended number of meals (4 times a day) in 24 hours. Contrary to the findings, studies conducted in Ethiopia and Kenya by Epheson *et al.* [29] and Macharia *et al.* [13], respectively reported that most

children in the studies had a minimum meal frequency of four meals per day [13, 29]. The mothers in these studies could have had health education related to providing meals to their children. However, food consumption below the recommended intake is not ideal for children because it can lead to energy and micronutrient deficiencies and the subsequent risk of malnutrition [30]. Consumption of less than the recommended meals in the study could be attributed to the low purchasing power of the household as most of the members of the household were unemployed. This is supported by a study conducted by Wagris *et al.* [31], who claimed that lack of food in the home makes children unable to eat the required amount of food. A child who is malnourished can recover faster if he or she consumes a diverse diet and the minimum meal frequency. Predictive factors affecting the continued breastfeeding of infants and young children in Bushbuckridge Sub-District, South Africa

An analysis of variance was conducted and showed in (Table 3) that the sex of the child [$F(1, 71) = 3.90, p = .05$] and the diagnosis [$F(1, 71) = 8.19, p = .00$] had a positive effect of continued breastfeeding. However, the positive effect of continued breastfeeding on sex can be attributed to the proportion of female children in the study. Preference for male children and bias against females have been reported elsewhere, in India and Vietnam, girls were weaned earlier than boys, leading to higher malnutrition rates among girls [32, 33]. This observation could be related to the preference of sons being ingrained in tradition by families and communities. However, the preference of a male over a female child was not determined in the current study. A study conducted in India among mothers with children diagnosed with malnutrition reported that malnutrition was caused by inadequate breastfeeding, as none of the mothers practised exclusive breastfeeding when their children were admitted to a hospital [34]. It is likely that mothers stopped breastfeeding because the child was admitted to a health facility. Mothers whose children are admitted with malnutrition are allowed to continue breastfeeding where possible. In the current study, some caregivers, especially those with younger children, were admitted with their children, whereas those with older children stayed home and only visited the child.

Distribution of Dietary diversity by predictors (sociodemographic)

An analysis of variance showed no significant effect of continued breastfeeding and the sociodemographic characteristics of the respondents. In the current study, none of the characteristics influenced dietary diversity. Lower dietary diversity can be related to inadequate knowledge of maternal nutrition in child feeding or due to economic reasons. A diverse diet protects against wasting and underweight due to its quality and micronutrient density.



Distribution of the minimum meal frequency given to children by predictors in Bushbuckridge Sub-District, South Africa

An analysis of variance showed (Table 4) that the effect of the minimum meal frequency was significant for area of residence [$F(3, 74) = 5.23, p = .00$] and the level of education of caregivers [$F(3, 74) = 3.71, p = .01$]. The residential area had a positive effect on the provision of recommended minimum meal frequency (4 meals a day) in the study. A study conducted in Ethiopia indicated that mothers who lived in the urban area provided the recommended meal frequency compared to mothers in the rural areas [14]. It is assumed that mothers who live in the urban areas are more aware of child feeding practices due to access to media that promote the importance of feeding practices. These mothers also have access to places of income-generating employment, which allows them to purchase food and mitigate household food insecurity. In the current study the level of education influenced the provision of minimum meal frequency for the children. A study conducted by Mekonnen *et al.* [35] reported that the probability of minimum meal frequency was reduced by 50% for children of illiterate mothers or caregivers compared to mothers or caregivers who reached grade 10 and above. Authors such as Tassew *et al.* [36] reported on the status of mother education as a predictor of a child being fed a minimum acceptable diet. Moreover, education is directly related to women's autonomy, changes in traditional beliefs, and women's control over household resources. Educated women are presumed to be more likely to access nutritional and health promotion programmes on complementary feeding practices [37]. Thus, health education is a key to mitigating the challenges of lack of formal education concerning infant and young child feeding.

LIMITATIONS

The findings of this study should be seen in the light of some limitations. The effect of seasonal variation and cultural practices on food availability, and consumption patterns was not considered when conducting this study.

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

The findings of this study showed that most infants <6 months were not exclusively breastfed. Even though the findings revealed that most of the children had a DDS of >5, still some of the children in the study had a DDS (<5). However, when it comes to the minimum meal frequency (4 meals a day), most of the children consumed less than 4 meals a day. This study contributes to understanding child feeding practices and acute malnutrition in children. More work needs to be done



to determine the nutrition knowledge of mothers about child feeding at community level to support the significant findings reported in the current study. The recommendation is for mothers and caregivers to be educated on how to provide nutritious meals for their children and should be encouraged to have vegetable gardens to provide a variety of food in their homes. The health education provided to mothers should include information on the recommended meal frequency and how to make sure that children consume the minimum number of meals. Additionally, qualitative studies should be conducted to explore caregiver experiences regarding infant and young child feeding.

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Table 1: Minimum Dietary Diversity (MDD) food groups

Minimum Dietary Diversity (MDD)	MDD Food groups
1	Breastmilk
2	Grains, roots, and tubers
3	Legumes and nuts
4	Dairy products
5	Flesh foods
6	Eggs
7	Vitamin A rich fruits and vegetables
8	Other fruits and vegetables

Table 2: Sociodemographic characteristics of caregivers (N=151) of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa

Sociodemographic characteristics of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa			
Characteristics	Frequency	Percent	P value
	n	%	
Number of caregivers per Sub-District hospitals in Mpumalanga Province, South Africa			
Mapulaneng Hospital	37	25	
Matikwana Hospital	56	37	
Tinswalo Hospital	58	38	
Age of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa			
<6 months	73	48	
6-24 months	78	52	*0.01
Diagnosis of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa			
Moderate Acute Malnutrition	63	42	*0.01
Severe Acute Malnutrition	88	57	
Sociodemographic characteristics of caregivers of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa			
Caregiver's age			
<18 years	19	13	
18-24 years	41	27	
25-30 years	46	31	0.15
31-35 years	24	16	
>35 years	21	14	
Marital status of caregivers of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa			
Single	59	39	
Married	27	18	
Separated	7	5	0.08
Co-habiting	50	33	
Widowed	1	0.7	
Divorced	7	5	

Education level of caregivers of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa

No formal education	6	4	
Primary education	30	20	
Secondary education	60	40	0.57
Completed matric (Gr. 12/ Std. 10)	55	36	

Employment status of caregivers of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa

Unemployed	118	78	
Casual worker	9	6	
Contract worker	6	4	0.60
Permanent worker	9	6	
Self-employed	9	6	

Residential area of children admitted in Bushbuckridge Sub-District hospitals in Mpumalanga Province, South Africa

City/Town	4	3	
Township	9	6	0.27
Village	134	89	
Section	2	1	
Other (Squatter camp)	2	1	

*p value <0.05 statistically significant

Table 3: Distribution continued breastfeeding practice by sociodemographic characteristics

Predictor	Sum of Squares	df	Mean Square	F	p-value
Caregivers' age	0.17	4	0.04	0.47	0.75
Within groups		64			
Marital status	0.26	4	0.06	0.73	0.57
Within groups		68			
Area of residence	0.30	3	0.10	1.16	0.33
Within groups		69			
Caregiver's education level	0.02	3	0.00	0.08	0.97
Within groups		69			
Employment status	0.13	4	0.03	0.38	0.82
Within groups		68			
Income	0.35	3	0.11	1.37	0.26
Within groups		69			
Child' gender	0.32	1	0.32	3.90	*0.05
Within groups		71			
Child's diagnosis	0.65	1	0.65	8.19	*0.00
Within groups		71			

*p value <0.05 statistically significant



Table 4: Distribution of minimum meal frequency by sociodemographic characteristics

Predictor	Sum of Squares	df	Mean Square	F	p-value
Caregivers' age	2.16	4	0.54	1.37	0.25
Within groups		73			
Marital status	2.42	5	0.48	1.22	0.30
Within groups		72			
Area of residence	5.42	3	1.80	5.23	*0.00
Within groups		74			
Caregiver's education level	4.06	3	1.35	3.71	*0.01
Within groups		74			
Employment status	1.24	4	0.31	0.76	0.55
Within groups		73			
Income	0.62	3	0.20	0.51	0.67
Within groups		74			
Infants' gender	0.85	1	0.85	2.16	0.14
Within groups		76			
Malnutrition diagnosis	1.19	1	1.19	3.05	0.08
Within groups		76			

*p value <0.05 statistically significant

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