

# Infant-feeding practices of mothers and the nutritional status of infants in the Vhembe District of Limpopo Province

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## Abstract

**Objective:** To determine the breast-feeding and weaning practices of mothers and the nutritional status of infants in the Vhembe District of Limpopo Province.

**Design:** A descriptive and exploratory study was done. A sample of 185 mothers with 185 infants 12 months and younger was selected from five primary healthcare clinics. A validated questionnaire, which consisted of questions relating to demographic data, breast-feeding and weaning practices, was used. The weight and length measurements of the infants were taken.

**Results:** The majority (97%) of the mothers were still breast-feeding at the time of the interviews. Only 7,6% practised exclusive breast-feeding, however, while 43,2% had introduced solid foods at three months and 15% before two months. The weaning food given by most of the mothers was maize-meal soft porridge and had been introduced before four months of age. The Z-score classification was used and showed that stunting (18,9%), underweight (7%) and wasting (7%) were present among the infants but that only wasting was found to be a disorder of public-health significance. The nutritional status of the infants was therefore not significantly influenced by the breast-feeding and weaning practices of the mothers or other demographic parameters.

**Conclusion:** Breast-feeding was still practised by many of the mothers but exclusive breast-feeding was rare.

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## Introduction

Breast-feeding has a unique biological and emotional influence on the health of both mother and infant.<sup>1</sup> It is furthermore an important determinant of infant health in the prevention of malnutrition and infections.<sup>2,3</sup> When an infant reaches the age of about six months, however, breast milk alone is no longer sufficient in meeting nutrient requirements and other food(s) should therefore be given. Despite its advantages, however, breast-feeding is declining in developing countries, such as Swaziland.<sup>4</sup> The prevalence and duration of breast-feeding have also declined in many other parts of the world in the past years for a variety of social, economic and cultural reasons.<sup>1</sup> In South Africa, the prevalence of breast-feeding is said to be higher in rural areas than in urban areas. Some of the infant-feeding practices are inappropriate, however, and this may be contributing to the increase in the prevalence of stunting during the first 18 months of life.<sup>5</sup>

Weaning is the period during which an infant's diet is expanded and its dependence on milk as the sole source of nutrition is ended.<sup>3</sup> It is important for the introduction of solid foods not to be delayed beyond the age of six months. Reasons for this are that, apart from solid foods providing in increased nutrient needs, it might then be difficult for the baby to accept the new tastes and textures of food later in life. In this study, which was done in Limpopo Province, 16% of underweight infants was reported to have been introduced to solid foods within the first months of life, compared with only 5% of the

normal-weight infants.<sup>6</sup> It was also reported that the prevalence of stunting increased from 21,5% in the first year of life to 38,5% in the second year, while underweight increased from 7,7% to 19,2%.<sup>7</sup>

Most studies on breast-feeding and weaning have been conducted in urban parts of the country.<sup>5</sup> Very few studies have been conducted in Limpopo Province, especially in the rural areas and on infant-feeding practices.<sup>8</sup> The extent of the issue at present in South Africa has not been adequately documented. It is, however, necessary to implement regular surveys regarding the practices of breast-feeding and weaning and the factors that influence such feeding practices.<sup>8</sup>

## Methods

### Study design

This was a descriptive and exploratory study. The relationship between the breast-feeding and weaning practices of the mothers and the nutritional status of their infants was determined.

### Subjects

The sample was selected from Mutale, which is a rural sub-district in a radius of 36 km to 70 km north of Thohoyandou in the Limpopo valley. The Mutale sub-district is a true rural area where housing is mainly mud huts, there is poor sanitation, electricity is not available in most areas and water is obtained from communal taps. One health centre was selected purposefully and four clinics were selected randomly from the twenty-one clinics in the area. All the mothers

with infants aged 12 months and below who were attending the well-baby clinic on the day of data collection and were available were requested to participate in the study. The sample ultimately consisted of 185 mothers with infants aged 12 months and below who were attending the well-baby clinic.

### Demographic characteristics and anthropometric measurements

A validated questionnaire was used to collect data. The questionnaire was designed and piloted with 10 participants at a primary healthcare clinic. It consisted of questions relating to demographic data (the mother's age, the infant's age and gender, source of income, the mother's educational level) and breast-feeding and weaning practices. The questionnaire survey was conducted by the researcher using the local language, Tshivenda, to increase understanding and accuracy of response.

The infant's anthropometric measurements (weight and length) were measured the same day of interview. All the anthropometric measurements were taken twice and an average computed. Infants were weighed without clothes, using an infant electronic digital scale (model BIS) that was accurate to 0.01kg. The infant's length was measured using a non-stretchable 150 cm tape measure. The tape measure was attached to the table with two boards, one board was movable, and while the other one was attached to the table. The length was recorded to the nearest 0.1cm.

### Data analysis

Statistical analysis was done with the Statistical Package for the Social Sciences (SPSS version 11.5, 2002). The questionnaire responses on breast-feeding and weaning practices were interpreted in percentiles. The weight-for-age, length-for-age and weight-for-length were analysed with Z-scores (NCHS/Who reference curves).<sup>9,10</sup> The normal Z-scores were considered to be between -2 and +2 standard deviation (SD) of the mean.

### Ethical approval

Ethical approval and permission were obtained from the University of the North and permission was obtained from the Department of Health (from Limpopo Province). The researcher also obtained permission from the district health office and the unit managers. The study purpose was explained to the mothers before they were requested to sign the consent form.

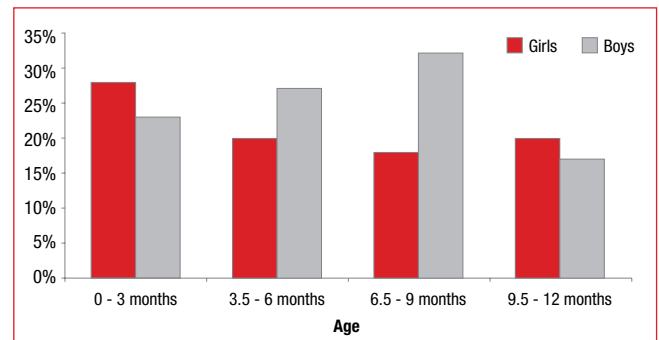
## Results

### Demographic data

The total number of infants in the study was 185. The age of the infants was evenly distributed in all age groups, while gender distribution was 53,5% boys and 46,5% girls (Figure 1). The mothers' mean age was 25,83, with an SD of 6,64 years.

Most of the mothers (79%) had high-school education; only 3% had never attended school. The majority of the mothers (95%) were not working. Half (51%) of the infants were supported by the father, 39% by grandparents and 5% by their mothers.

Figure 1: Age distribution of infants by gender



### Nutritional status of the infants

The nutritional status of the infants was determined by weight-for-age, length-for-age and weight-for-length.

#### Weight

The infant's weight-for-age was assessed using Z-score classification. The mean Z-score for boys was 0.35 (SD) 1.14, while for girls was 0.22 (SD) 1.22. The mean Z-score of all the infants was -0.19 (SD) 1.18 and fell within the normal range. According to the weight-for-age Z-score (WAZ) classification, 7.0% of had low WAZ, while 90.3% had normal WAZ and 2.7% had high WAZ (Table I).

Table I: Weight-for-age Z-score (WAZ) classification of infants

Z-score classification	Percentage (%) n = 185	Interpretation
Z-score -3 SDs or less	0,5%	Severely underweight
Z-score between -3 and -2 SDs	6,5%	Moderately underweight
Normal weight for age	90,3%	Normal weight
Z-score between +2 and +3 SD	2,7%	High weight
Z-score +3 SDs or more	0	Very high weight
Total	100%	

#### Length of the infants

The length-for-age of the infants was assessed using Z-score classification. The mean Z-score for boys was -1.04 (SD) 1.47, while for girls was -0.598 (SD) 1.36. The mean Z-score for all the infants was -0.84 (SD) 1.43, and fell within the normal range. According to the length-for-age Z-score (LAZ) classification, 18.9% had low LAZ, 78.4% had normal LAZ and 2.7% had high LAZ (Table II).

Table II: Length-for-age Z-score (LAZ) classification of infants

Z-score classification	Percentage (%) n = 185	Interpretation
Z-score -3 SDs or less	7,0%	Severe stunting
Z-score between -3 and -2 SDs	11,9%	Moderate stunting
Normal length for age	78,4%	Normal length
Z-score between +2 and +3 SDs	2,2%	High length
Z-score +3 SDs or more	0,5%	Very high length

### Weight-for-length of the infants

Weight-for-length was assessed using Z-score for all the infants. The mean Z-score for boys was 0.54 (SD) 1.46, while for girls was 0.44 (SD) 1.63. The mean Z-score for all infants was 0.49 (SD) 1.54 and fell within the normal range. According to the weight-for-length Z-score (WLZ), 7.0% had low WLZ, 75.7% had normal WLZ while 17.3% had high WLZ (Table III).

**Table III: Weight-for-length Z-score (WLZ) classification of infants**

Z-score classification	Percentage (%) n = 185	Interpretation
Z-score -3 SDs or less	0%	Severe
Z-score between -3 and -2 SDs	7,0%	Moderate
Normal weight for length	75,7%	Normal
Z-score between +2 and +3 SDs	12,4%	High
Z-score +3 SDs or more	4,9%	Very high
Total	100%	

### Breast-feeding practices

All the mothers had initiated breast-feeding and the majority (97%) was still breast-feeding at the time of the study, while only 3% had stopped breast-feeding at the time of the interview. The data for the mothers who were no longer breast-feeding revealed that four infants had been breast-fed for less than three months, one infant for less than six months and the other infant for less than nine months. The reasons for the stopping of breast-feeding were reported to be not enough breast milk, going back to school or work, and for health reasons.

### Exclusive breast-feeding

Exclusive breast-feeding was practised by only 7,6% of the mothers at the time of the study, the fourteen infants involved being brought to six months old. About 78% of these exclusively breast-fed infants had a normal WAZ, compared to 91,3% who were given both breast milk and food, and 95,5% who were given a breast milk-and-water mixture. The infants on breast milk plus other foods tended to be of a normal to high WAZ. These comparisons are of less importance, however, due to the unequal numbers of infants on different feeding options.

### Artificial feeding

The majority (78%) of the infants were not on infant formula-milk feeds, with the other 22% already being on infant formula milk. Most (80%) had been introduced to formula milk before three months and fed by bottle. About 17,5% of these had a low WAZ, while only 4,1% of the infants not on infant formula milk had a low WAZ, a difference that was significant ( $p = 0,015$ )

Nearly half (49%) of the infants were given water with or without glucose/salt. About 92,1% of them had a normal WAZ, while 88,7% of those not on such a mixture had a normal WAZ. The glucose/salt water mixture given to the infants did not influence the infants' weight status ( $p = 0,378$ ).

### Introduction of solid foods

About 43,2% of the infants who were on solid foods had been introduced to such foods at the age of three months, 18,9% at four months and above and 15,2% at two months and below. About 45% of the mothers said that they had introduced solid foods because they had been so advised by relatives or friends, 35% because their babies had been hungry and 3,5% because their babies had not been sleeping.

The mothers were asked whether they gave their infants specific foods for medical or cultural reasons. The majority (64%) said "No" while 36% said "Yes". All who said "Yes" named the food tshiunza, which is a dish prepared from maize and roots (from different tree species) and fermented to make a sour soft porridge. Tshiunza was given like any other soft porridge. The WAZ of the infants given this food was similar to that of the others ( $n = 67$ ;  $p = 0,484$ ).

### Number of meals

More than half (59,4%) of the infants were given meals three times a day and 37,8% twice a day. The infants getting two or three meals a day were distributed in all the age groups. Those who were given meals once or five times a day were in the age group of three to six months, while those who were given meals four times a day were in the age group of nine to twelve months. The number of meals given seemed to be influenced by age.

### Knowledge about infant feeding

The majority (76%) of the mothers said that they had not been taught which foods were good for their babies, while 13,5% said that they had been taught by health workers or nurses and 7% by mothers or mothers-in-law, and 3% said that they had been influenced by the radio, by television or by magazines. The type and quality of information given to the mothers were not determined. About 42,2% of the mothers said that they had been influenced to breastfeed by parents and health workers, 30,3% by health workers, 18,4% by parents, health workers, friends or the radio and 4,3% by parents or parents-in-law. Furthermore, data showed that, of the mothers who had been influenced to breastfeed by health workers, 93,6% of their infants had a normal WAZ, while 91% of the infants whose mothers said that they had been influenced by parents, health workers, friends or the radio had a normal WAZ. The mothers' sources of knowledge on breast-feeding had not influenced the weight status of their infants ( $p = 0,965$ ).

### Food consumption by the infants

The number of infants who had been introduced to solid foods at the time of the interview was 143 (77%). The majority (71%) of the infants were being given soft porridge daily, the average age of the infants introduced to soft porridge being two months. The following foods were among the top 10 given by the mothers: soft porridge (71%); fruit (53,4%); soup (40,4%); tea (37%); vegetables (36%); stiff porridge (33%); chips or sweets (30%); chicken (30%); baby food (Nestum and Purity) (29%); and bread (27%) (Table IV).

Table IV: Consumption of food by infants

Food item	Daily (n)	> 3 x/wk (n)	< 3x/wk (n)	Occasionally	Never (n)	Time of introduction (months)
1. Red meat		3	19	12	151	7
2. Chicken		8	32	15	130	5
3. Fish		2	7	5	171	9
4. Beans	1	4	18	11	151	7
5. Groundnuts	1	4	3	7	170	4
6. Vegetables	20	25	19	2	119	6
7. Tshidzimba*/bean dish	2			3	180	9
8. Soft porridge	132	1	1	1	50	2
9. Stiff porridge	55	3	3		124	5
10. Potatoes	3	4	21	18	139	6
11. Sweet potatoes			3	14	168	6
12. Chicken liver		1	8	9	167	8
13. Pumpkin	1	1	21	14	148	8
14. Pumpkin leaves and groundnuts	4	3	10	8	160	9
15. Mopani worms	1	4	6	6	168	10
16. Maheu	3	3	7	26	146	7
17. Milk	3	3	10	7	162	8
18. Fruit	15	24	51	9	86	3
19. Sorghum	22	1		3	159	2
20. Bread	41	1	4	4	135	5
21. Eggs	3	14	19	10	139	4
22. Tea	50	4	11	4	116	6
23. Chips/sweets	6	5	28	17	129	4
24. Cold drink			2	25	158	8
25. Baby food (Nestum and Purity)	27	11	11	5	131	2
26. Peanut butter	17	15	13	2	138	3
27. Gravy/soup	52	9	12	2	110	5

- (n) = number of infants
- > 3 x/week = more than three times per week
- < 3 x/week = less than three times per week
- Time of introduction: The age was calculated from individual respondents who were giving the particular food at the time and the average was then computed.
- \*Tshidzimba = cow peas, juko beans, groundnuts and samp

## Discussion

The findings of the study indicated that the majority (97%) of the mothers were still breast-feeding at the time of the interview. Similar observations in other parts of the world have been documented earlier, where 90% of mothers in urban areas breast-fed their babies.<sup>11</sup> The reasons given by the mothers who were not breast-feeding (3%) in this study were not enough breast milk, going back to school or work, or health reasons. It has been reported that lack of mother's milk was the reason given by 92% of Cuban mothers who had weaned their infants from the breast or from the breast to the bottle earlier than recommended.<sup>12</sup>

Interestingly, the study documented that only 22% of the mothers were using infant formula milk. In a study done in the United States of America, 45,3% mothers were giving infant formula milk.<sup>13</sup> In the latter study, most (80%) of the infants who were on infant formula

milk had been introduced to it before three months of age. It was also reported that 33% of the mothers had been giving infant formula milk before four months of age.<sup>14</sup> The differences between the two studies may be due partly to the level of development and the socio-economic status and support systems available to the mothers.

In this study, nearly half (49%) of the infants were given water with or without sugar/salt. These findings are in line with those from rural Malawi, where about half of the mothers had given non-nutritive liquids (mostly water) other than breast milk to their infants before they had reached four months of age.<sup>15</sup> In other such studies, it was observed that most mothers were giving pre-lacteals ranging from water or infant formula to herbal tea.<sup>16,17</sup>

The reasons given for the introduction of other foods or liquids early were based on the mothers' own perceptions that their infants were not satisfied with breast milk alone, that their infants were always

crying, that their infants were not sleeping, that they did not have enough breast milk or that their infants were hungry. Other studies concur and report that the reasons for the introduction of solid foods early are indeed based on the mothers' own perceptions that their infants had not been satisfied with breast milk alone: "Baby always crying, not enough breast milk or baby is hungry".<sup>15,18</sup>

Disappointingly, only 7,6% of the mothers had practised exclusive breast-feeding for infants aged nought to three months ( $n = 13$ ) and three to six months ( $n = 1$ ). These findings are in agreement with data from other parts in the country, which report that only 10,4% (in the North West Province)<sup>19</sup> and 6,7% (in Soshanguve, Pretoria)<sup>20</sup> of the infants under six months had been exclusively breast-fed. It is clear from the observations that very few mothers in South Africa (approximately 10%) practise exclusive breast-feeding. This has implications on efforts by health authorities to encourage exclusive breast-feeding up to six months. The benefits of exclusive breast-feeding have been demonstrated; these include high cognitive performance by infants.<sup>1</sup> Further studies are required to investigate the feasibility of exclusive breast-feeding and to establish the support structures and systems that women need to be able to breastfeed exclusively for the recommended period.

About 73% of the mothers had introduced solids to their infants before four months. This is contrary to current recommendations.<sup>1</sup> These observations have been reported before, it having been observed that the majority of infants had been given foods other than breast milk by their second month of life.<sup>19</sup> Another study reports that 87% of infants had been introduced to solid foods at three months.<sup>18</sup> Tshiunza, a traditional porridge, had been introduced immediately after birth because of the belief that the infants were not getting enough breast milk and that this food gave babies energy and helped them to pass stools and grow well. Additionally, the mothers reported that grandparents encouraged the practice, as it formed part of their culture. The early introduction of tshiunza before a baby's gut can digest foods other than breastmilk may interfere with exclusive breast-feeding and reduce the advantages of breast-feeding.

Most of the infants receiving solid foods in this study were being given maize-meal soft porridge daily. Available data from other rural areas of South Africa also report that the food intake of infants reflects a high intake of carbohydrate-rich foods.<sup>21</sup> Potatoes, for instance, were the vegetables consumed by at least half the infants in the urban areas of the Western Cape and rural areas of Kwa-Zulu Natal, while fruits and other vegetables were not consumed regularly.<sup>5</sup> In this study, about 53,5% of the mothers were giving fruits and 36% of the mothers were giving vegetables. The Lowveld geographical area is known for its abundance of fruits and vegetables, particularly in the households, thereby increasing access and possible consumption. Most of the infants in this study were not given vegetables, however, which could be due to issues of consistency and ignorance. Also in this study, the mothers who were giving baby foods, such as Purity and Nestum, were few. The use of commercial foods is low in the rural areas of the country probably because they are expensive and not easily available. Contrary to available evidence,<sup>5</sup> this study documented that only a few of the infants were given potato chips or sweets, tea or cold drinks. The findings of this study,

however, are in overall agreement with other data<sup>5,22</sup> regarding the introduction of meat at approximately seven to nine months of age, with chicken being in the top ten foods introduced and fish being the least common. In terms of meal frequency, the number of daily meals appeared to be influenced by the ages of the infants. This practice did not, however, seem to influence the infants' nutritional status, despite the higher prevalence (58,7%) of the practice when compared with other similar studies (24,2% [in 1990] and 18,9% [in 1993]), in which infants older than six months were offered fewer than three meals a day.<sup>23</sup>

In terms of education, most mothers (76%) had not received any education on infant feeding, while 13,5% had been taught by health workers or nurses and 7% by mothers or mothers-in-law, and 3% had been influenced by the radio, by television or by magazines. Whether the mothers were taught or not seemed not to influence their infants' nutritional status. This indicates that the training or influence of parents or parents-in-law is as important as in the case of health workers. An earlier study also reports that clinic sisters and doctors both played a role in advice on bottle-feeding, while mothers or mothers-in-law advised on breast-feeding.<sup>6</sup>

Growth faltering in respect of weight gain in black infants is known to occur from three months and continue until fifteen months of age.<sup>24</sup> In this study, the majority (90%) of the infants had a normal WAZ, with only 7% being underweight, the latter being in line with the findings of the 1999 National Food Consumption Survey (NFCS).<sup>25</sup> Nutrient intake was not determined in this study because most infants were under 12 months and were still being breast-fed, and quantifying breast milk would have been difficult. Most of the infants had been weaned with maize-meal porridge by the fourth month. Weight-for-age and length-for-age deficits were found to be considerably higher among the bottle-fed infants than among the breast-fed infants.<sup>26</sup> It is also known that breast-fed infants are generally leaner than formula-fed infants at the age of 12 months.<sup>27</sup> It should, however, be borne in mind that, in a study in rural Hubei in China, breast-feeding was associated with greater weight for age 28 but that infants who were breast-fed for a shorter duration had a significantly lower mean WAZ than those who were breast-fed for a longer duration.<sup>28</sup> In this study, a significantly higher percentage (17,5%) of the infants on formula had a low WAZ versus 4,1%, who were not on formula. This difference was statistically significant. This study did not, however, aim to compare breast-fed and formula-fed infants, which means that the sample size was not based on choice of feeding and that the findings should be interpreted with caution. In line with international experience indicating that more than 90% of exclusively breast-fed infants have normal growth for age,<sup>29</sup> the majority (78,6%) of the exclusively breast-fed infants in this study had a normal WAZ, while 21,4% had a high WAZ.

Stunting was documented in almost one out of five (18,9%) of the infants, with the majority (78,4%) of the infants having a normal LAZ. This indicates that stunting is of low public-health significance in the population studied, which is, in broad terms, in line with the findings of the NFCS.<sup>25</sup> A Bolivian study reports that approximately 38% of infants between the ages of 3 and 36 months were either short for their age or stunted.<sup>30</sup> A similar trend was observed in this study when

the infants' length was compared with NCHS standards. This revealed that the infants of the age group nought to six months were of normal length, while the infants of the age group six to nine months were significantly shorter ( $p = 0,028$ ). Other researchers have also reported stunting in preschool infants in developing countries.<sup>23,31,7</sup>

The 7,0% prevalence of wasting among infants in this study is much lower than that (42%) reported in Brazil<sup>32</sup> but is in agreement with the findings of the NFCS<sup>25</sup>, which showed that at least 11% of the infants aged one to three years were wasted in Limpopo Province, while the national average was 4%. Furthermore, the prevalence of 7,0% indicates that wasting is a medium public-health problem in the country and calls for action to be taken, since wasting is an indication of acute malnutrition.

## Conclusion

In conclusion, the findings of this study indicate that 97% of the mothers practised breast-feeding and 7,6% did so exclusively. Most of the mothers (73%) had introduced solid foods by four months, soft porridge being the main weaning food. Seven per cent of the infants were underweight, 18,9% were stunted and 7,0% were wasted. Breast-feeding and weaning practices had no significant effect on the infants' nutritional-status outcome. Nutrition surveillance is important, particularly in this age group, in measuring the success of interventions aimed at improving the feeding practices for infants.

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