

# Socioeconomic Determinants Influencing Nutritional Status of Children in Sekhukhune District of Limpopo Province in South Africa

**Keywords:** Socioeconomic determinants; Nutritional status; Children under 12 years; Limpopo province; South Africa

## Abstract

South Africa has adequate food supplies to feed the entire population at national level. However, reports have shown evidence of under-nutrition among certain parts of the population due to lack of access. The aim of the study was to determine the relationship between socioeconomic status of the household and the nutritional status of children one to twelve years (1-12 years) in Sekhukhune district of Limpopo Province.

The study used exploratory designs. A structured interviewer-led questionnaire was used to determine socio-economic parameters and standard anthropometric procedures. All analyses were done using Statistical Package for Social Sciences version 20. A total number of 180 mother-child pairs participated in the study. The sample distribution for children was 46.1% male and 53.9% females. Most mothers were unemployed and spent less than 500.00 ZAR (~50 USD) per month to purchase food for the household. There was a high (39.6%) prevalence of stunting among children under the age of 60 months, a medium prevalence of underweight, and a low prevalence of wasting in all children. Most caregivers were overweight or obese. Maternal level of education and household income was significantly associated with anthropometric status indicators ( $p < 0.05$ ).

This study revealed a high rate of unemployment, poor household income and purchasing power, and high level of food insecurity. This might have contributed to the high prevalence of stunting and a medium prevalence of underweight recorded in the study. There is urgent need to address basic needs to improve access to nutrient rich foods and health care.

## Introduction

Malnutrition remains a problem in many parts of the world, 815 million people throughout the world are malnourished due to insufficient food in 2016, up from 777 million in 2015 [1]. Chronic undernutrition could result in stunting, wasting, and underweight. According to recent studies, approximately 52 million children under five suffer from wasting; their weight is too low for their height, while 155 million suffer from stunting globally [2]. In Africa, an estimated 47 million children are stunted, 35 million are underweight, and 11 million are wasted according to Kleynhans et al. [3]. These children begin their lives at a marked disadvantage: they face learning difficulties in school, earn less as adults, and face obstacles to contribute in their societies [2].

The South Africa Demographic and Health Survey 2016 for children aged between one to five years showed a high rate (27% and 22%) of stunting at national level and in Limpopo Province respectively [4]. Another study in South Africa by Shisana et al.

reported 26.5%, 11.9%, and 9.4% stunting in one to three year old's, four to six year old's [5], and seven to nine year old's respectively at national level. Sekhukhune district exhibited a high rate of stunting (36%) in children 13 to 215 months of age according to Food Insecurity and Vulnerability Information Management System for South Africa [6]. Greater Sekhukhune District Municipality (GSDM) is an underprivileged area and was identified as a nodal site by Integrated Sustainable Rural Development Programme (ISRDP), due to its high unemployment rate of 69% to 82.4% [7].

United Nations International Children's Emergency Fund (UNICEF) conceptual framework of child malnutrition explained the determinants of undernutrition. This framework classifies factors into three levels: the immediate, the underlying, and basic causes. Dietary intake and infections are classified as immediate causes [8-10]. Household food security, inadequate care and feeding practices, unhealthy household environment, and limited access to healthcare services are the underlying causes [11,12]. While basic causes include limited land for cultivation, parental low level of education, employment status, and household income, just to name a few [13,14].

This study was conducted in Limpopo province because of the high (49.9%) unemployment rate compared to other provinces and because of the inadequate information available on the child nutrition status at the Sekhukhune district level [15]. The high rate of unemployment and poverty in the province could have an impact on nutritional status of the children between 1 to 12 years. This study, therefore, aimed to investigate determinants associated with underweight, stunting, and wasting in the Sekhukhune District in Limpopo Province of South Africa.

## Materials and Methods

The study used an exploratory and correlational research design and it aimed at establishing a relationship between socioeconomic characteristics of the mother and nutritional status of children aged



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Phooko-Rabodiba DA<sup>1</sup>, Tambe BA<sup>2</sup>, Nesamvuni CN<sup>3</sup> and Mbhenyane XG<sup>4\*</sup>

<sup>1</sup>Department of Human Nutrition, University of Limpopo, South Africa

<sup>2</sup>Division Human Nutrition, Stellenbosch University, South Africa

<sup>3</sup>Department of Nutrition, University of Venda, South Africa

<sup>4</sup>Division Human Nutrition, Stellenbosch University, South Africa

### \*Address for Correspondence

Mbhenyane XG, Professor and Research Chair, Division Human Nutrition, Stellenbosch University, PO Box 241, Cape Town, 8000, South Africa; Tel: +27 21 938 9135, E-mail: xgm@sun.ac.za

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1 to 12 years. The study used both quantitative and qualitative data collection techniques to collect data over a period of 24 months.

The study setting was GSDM, one of the five districts of the Limpopo Province contributing to 20% of the provincial population of 5.5 million. One local municipality in GSDM, Makhuduthamaga, was purposively selected.

The study populations were mothers/caregivers with children 1 to 12 years of age living in Makhuduthamaga Local Municipality of GSDM, Limpopo Province. Makhuduthamaga Local Municipality constitutes 27% (262 921) of the total population of GSDM with 13.8% (134 068) children aged 0 to 17 years, and approximately 100 villages [15]. The calculated sample size was 180 households, giving a total of 360 mothers/caregivers and their children calculated using a Slovin formula to give 80% power. Simple random sampling was used to select nine villages, which is approximately 10% of the total number of villages in Makhuduthamaga. All villages from the municipality were identified using a local map, numbers were assigned, and nine villages were blindly selected. Systematic random sampling was used to select households from the selected villages. Upon entering each village, the first house from the point of entry or the chief's kraal was selected and thereafter every fifth house on alternate sides were selected. Twenty households per village were selected until the study population of 180 was reached. From each household, one child between 1 to 12 years was randomly selected to be part of the study group. If the household had more than one child within the selected study age group, every child was allocated a number and the child with the lowest allocated number was selected. If the household had no children in that age group, the household was skipped. The total sample was thus 180 mothers/caregivers and 180 children aged between 1 and 12 years.

#### Data collection

A questionnaire was used to collect data from participants regarding socioeconomic status and anthropometric characteristics in their various households. The socioeconomic characteristics collected included: age of the child; age, educational level, marital status, employment status and income of the mother; total household income and household income spent on food while anthropometric parameters of both adult/caregiver and child included weight, height, and mid upper arm circumference. The questionnaires included close and open-ended questions, and the questionnaires were administered by the researcher and the assistant using the local language. The length of children less than three years who were unable to stand erect, were measured using a height board with the caregiver supporting the torso and legs pressed downwards and the other family member supporting the head as the researcher took measurements. The children were measured twice, and the average was computed. The heights of children who were older than three years were measured using an electronic height rod. The subject was standing erect, looking straight ahead without tipping the head down. The top of the ear and the outer corner of the eye were in a line parallel to the floor (Frankfort plane). Weight was measured twice in light clothing and barefooted using a Tanita electronic scale and the average weight was recorded. However, in cases where the child could not stand on the scale, the mother's weight was taken with and without the baby, the latter was subtracted from the former weight and the difference was recorded as the child's weight. The scale was calibrated daily and

zeroed before collecting data on each participant [16]. The mid upper arm circumference was measured with a measuring tape [17].

#### Ethical considerations

The Higher Degrees Committee of University of Venda approved the research proposal. An approval letter and oral permission was received from the Municipal Manager of Makhuduthamaga Local Municipality, and traditional authorities respectively. The study was explained to the participants, who were then requested to fill a consent form to be part of the research. The procedures complied with requirements of the Declaration of Helsinki (2008).

#### Data analysis

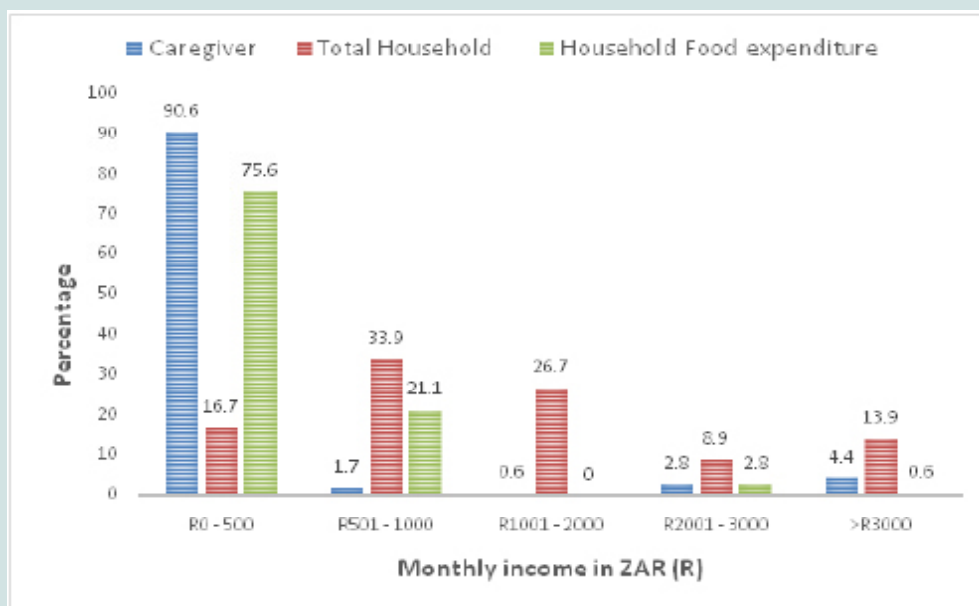
Data was entered to a Microsoft Office Excel sheet and exported to Statistical Package for the Social Sciences (SPSS) version 20 for data processing and analyses. Anthropometric data of children was analysed using Z-scores and comparing it to the National Centre for Health and Statistics (NCHS) for children above five years, and the WHO standards was used for children under five years of age [18]. The anthropometric indices were interpreted as stunting, (height-for-age  $< -2SD$ ) and severe stunting (height-for-age  $< -3SD$ ), wasting (weight-for-height  $< -2SD$ ), severe underweight (weight-for-height  $< -3SD$ ), and overweight (weight-for-age  $> 2SD$ ) using WHO classification of malnutrition in children. Descriptive statistics were used for analysing the socio-economic variables. The relationship between different socio-economic variables, particularly mothers' employment status and nutritional status, was statistically analysed using Pearson's Chi-square Test. Variables were considered significant if P-values were less than 0.05. Income is reported in South African currency rand or ZAR.

## Results

#### Sociodemographic characteristics

A total number of 180 mother-child pairs participated in the study. The sample distribution for the children were 46.1% male and 53.9% female. The minimum age of the children was 12 months, the maximum age 142 months, while the average age was 38 months. Regarding the caregivers' information, 73.9% of children were taken care of by their mothers, 23.3% by their grandmothers, and 2.8% by other siblings or relatives. In addition, 87.2% of the caregivers were between 20 to 59 years of age, 1.7% between 13 to 19 years, and 11.1% greater than 60 years. Majority (53.3%) of the caregivers had high school level of education, 20.6% of caregivers had primary school level, 23.9% never attended formal school, and only 2.2% obtained tertiary level education. A caregiver was regarded as single if he/she was unmarried or widowed, and married if he/she was married or living together with a partner. Most caregivers (53.4%) were single, whilst 46.7% were married.

Regarding the economic status of the households, most of the caregivers (92.2%) were unemployed while only 7.8% were employed. In addition, only 21.1% of fathers were employed, 24.4% unemployed, and 54.5% of households were without fathers living with them. More than half (53.9%) of the children were financially supported by grandparents, 12.2% by their fathers, 9.4% by their mothers, and 7.8% by other members of family, whereas 16.7% had no financial supporter.



**Figure 1:** Percentage monthly income and food expenditure (n = 180).

Figure 1 shows that most caregivers earned less than 500 ZAR monthly and therefore lived below the poverty line, which is estimated at 1 USD/day or R10.00/day [19]. Household additional income was also assessed. Out of the 81.1% of households who had an additional income, 76.7% received income from child support grant, 1.1% received old age pensions, and 3.3% received resources from family members. The total household income was the sum of the income from the caregiver and additional income from other sources. Figure 1 shows that half (50.6%) of the households had a total income of less than 1000.00 ZAR per month per household, 35.6% had a total income of between 1001.00 ZAR and 3000.00 ZAR. This shows very poor households falling into the low-income group. Regarding food purchasing power per household, the majority of caregivers (96.7%) spent 1000.00 ZAR or less on food on a monthly basis Figure 1.

#### Anthropometric status of children and caregivers

Table 1 shows the anthropometric indices of children. These have been separated according to age starting with below 60 months and the other above 60 months. There was a high rate of stunting at 39.6% for children below 60 months, which is a significant health concern since it is above 20% [20, 21]. There was a low rate of wasting and undernutrition, while the children who were overweight and obese were 20% and 18.8% respectively.

The data shows that 16.9% of the children above 60 months were stunted and low rate of underweight. Low overweight and obese rates are observed in this group compared to the below 60 months old children Table 1.

Table 2 illustrates associations between variables using the Chi square test. Only variables which have shown significance at  $p < 0.05$  have been included. The data shows that the anthropometric indices are associated with socio-demographic parameters that are typical for a poor household, such as mother's income and number of people in the household Table 2.

#### Discussion

The results from the current study showed that most children were cared for by their mothers (73.9%) or grandmothers (22.2%). A similar care pattern was observed in the 1999 NFCS-SA wherein 63% of children were taken care of by their mothers and 21% by grandparents. The findings are contrary to the research results by Madhavan and Townsend which showed that high unemployment rate push men and women to migrate to urban areas [22], leaving children in the care of aunts and grandparents. The majority (87%) of mothers/caretakers were between 20 to 59 years of age. This reflected the available time and physical strength for taking care of children. It also showed that the information given was reliable as it was given by mature adults. Others reported that increased maternal age may reflect the maturity and the availability of resources in terms of money and time for rearing children [23]. There were few child-headed households.

The current findings revealed that approximately half of the mothers/caregivers had attended high school, whilst 20.6% had attended primary school, and 23.9% were illiterate. In addition, maternal level of education was significantly associated with wasting ( $p = 0.028$ ) and risk of underweight ( $p = 0.000$ ). This is because education increases awareness and understanding of health issues, proper hygiene practices, and financial security [23]. The results are similar to the findings from the SADHS 2016 whereby 34% of mothers had attended high school and 6% primary school [24]. The 2011 South African census showed that 20.9% adults above 20 years were illiterate, 21% had grade 12, while only 6.1% had tertiary qualifications [25]. The study findings also concurred with the 1999 NFCS-SA findings, which showed that maternal education was significantly associated with wasting and underweight in all groups of children [26].

Approximately 92.2% of mothers were unemployed, which is

**Table 1:** Anthropometric status of children in Makhudutamaga Local Municipality Province.

Children characteristics	<60 months of age		>60 months of age	
	Frequency(n)	Percentage (%)	Frequency(n)	Percentage (%)
<b>Weight for height (Z scores)</b>				
Wasting	2	2.4	NA	NA
Normal	66	77.6	NA	NA
Overweight	17	20	NA	NA
Total	85	100	NA	NA
<b>Height for age(Z scores)</b>				
Stunting	38	39.6	14	16.9
Normal	58	60.4	69	83.1
Total	96	100	83	100
<b>Weight for age (Z scores)</b>				
Underweight	6	6.3	7	9.6
Normal	88	91.7	66	90.4
Overweight	2	2.1	0	0
Total	96	100	73	100
<b>BMI for age (Z scores)</b>				
Underweight	3	3.1	8	9.6
Normal	64	66.7	73	88
Overweight	11	11.5	2	2.4
Obese	18	18.8		
Total	96	100	83	100
<b>HAZ Classification</b>				
1	1	1.6	6	7.2
3	51	82.3	8	9.6
4	8	12.9	68	82
5	2	3.2		
Total	62	100	83	100
<b>MUACZ<sup>a</sup></b>				
Normal	82	89.1	NA	NA
Moderate undernutrition	8	8.7	NA	NA
Severe undernutrition	2	2.2	NA	NA
Total	92	100	NA	NA

NA: not applicable to this range of children.

higher compared to the national unemployment rate of almost 50% and expanded the unemployment rate of 55.7% in Limpopo Province and 51.6% in Greater Sekhukhune district [26]. Although most (92.2%) of the mothers were unemployed, the official unemployment rate, which is the rate of people who were actively looking for a job, in the past four weeks prior to the study was 15%. This was lower compared to the South African rate of 23.3% in 1999 [26].

Unsurprisingly, almost 91% of mothers had an income of less than 500.00 ZAR per month and 33.9% of the households had a total income of less than 1000.00 ZAR. Furthermore, maternal income was significantly associated with stunting among children under the age of 12 in the study area. Similar results were reported by Statistics SA in 2005 and 2007, which showed that the majority (67%) of children

in South Africa lived in households that had a monthly income of 1200.00 ZAR or less. Census 2011 showed that the average household income was 45 977.00 ZAR [25]. These results clearly indicate that most children lived in poor households because they lived below the poverty line of approximately 8.00 ZAR (US \$1) per person per day, as stipulated by the World Bank. Shariff and Khor conducted a similar study where demographic [28], socio-economic, expenditure, and coping strategies were collected from 200 women of poor households in Malaysia. They observed that most of the food insecure (58%) was living below the poverty line.

The results of this study also showed that approximately 54% of the households were financially supported by their grandparents. This shows that the majority of households relied on pension

**Table 2:** The association between socio-demographic data and anthropometry.

	Variables	N	Chi-square	P value
<b>WHZ</b>	Mother's highest qualification	85	14.12	0.028
	Uncle as the financial supporter	85	13.75	0.001
	Mining as the occupation/s of the person/s mentioned above	85	46.02	0.000
	Additional source of income per household	85	12.35	0.015
<b>HAZ</b>	Mother's monthly income	180	13.18	0.01
	Additional source of income per household	180	11.61	0.009
<b>WAZ</b>	Mother's highest qualification	180	32.39	0.000
	Money spent purchasing food per month	180	85.48	0.000
<b>BAZ (body mass index)</b>	Mother's highest qualification	180	65.94	0.002
	No of people living in the household	180	49.69	0.002
	Contractual worker as the occupation of the person/s mentioned as additional financial supporter	180	30.89	0.009
	Additional source of income per household	180	24.22	0.04
	Money spent purchasing food per month	180	17.35	0.043

Note: n = 85 is for children under 60 months whereas n = 180 is for all children

grants as a source of income. These findings were contrary to the findings that showed 31.25% of rural households relied on pension as a source of income [29]. When applying the Statistics SA (2007) recommendations of 431.00 ZAR per person per month, more than 77.3% of households were impoverished, especially taking into consideration that more than 60% of households had 6 to 10 people per household, this translates to 2586.00 ZAR to 4310.00 ZAR per household per month [30].

Approximately 50.6 % of the households earned less than 1000.00 ZAR per month; this is high compared to 21% of urban households who earned less than 1000.00 ZAR per month. This shows that the geographic location has a close relationship with poverty, since the wages of the employed people in rural areas tend to be too low to support them and their families compared to urban households [27]. The GSDM had a 77.3% rate of child poverty and only 25.5% of children lived with employed parents, compared to a higher rate (83%) of child poverty in Limpopo Province and only 28% of children living with an employed parent/s [30].

Most households (75.6%) spent less than 500.00 ZAR per month on purchasing food. The results are almost similar to findings from Statistics SA, which showed that poorer households spent an average of 200.00 ZAR per month on food, whilst the affluent spent 1350.00 ZAR on food, irrespective of the household size [31]. Thus, indicating that the majority of households had low household income. Household expenditure on food can be used as a proxy for household income [32].

The current study showed that stunting was of high significance for children below 60 months (39.6%). This high stunting prevalence is likely to have serious consequences on child development, contrary to a study by NFCHS [33], which showed an overall national, stunting prevalence of 18% for children under 60 months. According to Dewey and Begum there is growing evidence of the association between slow growth in height early in life and impaired health [34], educational and economic performance later in life. Trials in Guatemala indicated that stunting can have long term effects on cognitive development, school achievement, and economical productivity in adulthood and maternal reproductive outcomes.

The current study indicated that approximately 84% of all the children had normal weight-for-age. This implies that most children

had normal weight. The study results concur with the findings by Oldewage-Theron and Egal of a study conducted in the rural areas of South Africa with a similar setting as that of the current study [35]. However, approximately 11.1% and 3.9% of the children were underweight and severely underweight respectively [35]. Furthermore, Kimani-Murage conducted a study among children aged 1 to 14 years and revealed that the prevalence of underweight in rural South African children was higher [36]. The difference in the prevalence between the above-mentioned studies could have been caused by the variation in the age group, and therefore a difference in growth patterns would be expected.

The prevalence of wasting was low at 2.2% in children below 60 months. WHO concurs with our findings since it indicates that provided there is no severe food shortage [37], the prevalence of wasting is typically below 5%, even in poor countries. An equally important fact is that approximately 57% of children in this study group had normal weight-for-height, indicating that they were neither under- nor over weight. The low prevalence of wasting was also found in rural areas as reported by the SADHS 2016 and Schoeman et al. [38]. They also reported a low (2.5%) prevalence of wasting and low (1.3%) severe wasting [26]. However, Kimani-Murage showed a medium prevalence of wasting at 7% for ages one to four years and 6% for five to nine years old [34]. Remarkably, there was a 0% prevalence of wasting in the 10 to 14 years of age category in the Kimani-Murage study. Bhattacharya et al. indicated that nutritional outcomes among school age children are not closely related to family resources [39]. Implying that the nutritional status of school going children might be normal although the family is food insecure. This could be due to children being able to supplement their food consumption at school, friends, or at a neighbor's home. In the case of South Africa, through the school feeding programme.

The study findings reveal that 2.2% of children were overweight whilst 8.9% were obese. Evidence now demonstrates that overweight and obesity in childhood and adolescence have adverse consequences on premature mortality and physical morbidity in adulthood [40]. The result of this study concurs with the study conducted by Kimani-Murage [36], which showed low prevalence of overweight (7%) and obesity (1%) respectively. In contrast, a study by Oldewage-Theron and Egal showed a 17% prevalence of overweight and 4% obesity [34].

The head circumference for-age, computed only for children

below three years of age, indicated that the majority of children had normal brain growth/volume. Head circumference for age is also used as a predictor of mortality, indicating that they were at the lowest risk of mortality. Large head circumference has been associated with conditions such as hydrocephalus and Autism Spectrum disorder, while a small head circumference indicate microcephaly or poor brain development which was not observed in this study population [41]. A study conducted by Bartholomeusz et al. indicated that there was a close relationship between head circumference and brain volume [42]. Moreover, head circumference for age is an excellent predictor of brain volume in 1.7 to 6 years old.

The current study results are applicable to GSDM, which is predominantly rural and underdeveloped and therefore cannot be generalised to other areas. Measurements of socio-economic parameters cannot rule out the possibility that the control for socio-economic parameters was not complete (e.g. measurement of household assets in order to determine wealth of each household). The study only assessed the quality and not the quantity of foods consumed. This is known to have an effect when measuring the socio-economic parameters such as food poverty and the nutritional status.

## Conclusion

The determinants of stunting among children were unemployment, poor purchasing power, and low household income. Access to nutrient rich foods, health care, and nutritional health knowledge could reduce the high prevalence of stunting among children. In addition, empowering mothers with vocational skills might reduce unemployment and increase the household income.

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