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Recommended Citation

Saha, Sanjoy; Abu, Brenda; Oldewage-Theron, Wilna; and Egal, Abdul, "Available food options at local shops in relation to food insecurity among older adults in Sharpeville, South Africa" (2019). *African Journal of Food, Agriculture, Nutrition and Development*, 19 (2), 14500-14516. Accessed from <https://scholarworks.rit.edu/article/1951>

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**AVAILABLE FOOD OPTIONS AT LOCAL SHOPS
IN RELATION TO FOOD INSECURITY AMONG OLDER ADULTS
IN SHARPEVILLE, SOUTH AFRICA**

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ABSTRACT

Due to limited resources and complex food access systems in urban areas, especially older adults are more vulnerable to poor dietary intake and food insecurity in low-income areas in South Africa. This study assessed the prevalence of food insecurity among the older adults and explored the availability of healthy foods in local shops. It was a cross-sectional study conducted in an eldercare centre in Sharpeville, South Africa with an estimated representative sample of 88 participants. Validated tools were used to measure the socio-economic, dietary diversity intake (24-hour dietary recall), household food security and access from the participants. Listing of available foods was carried out on street vendors (n=13) and spaza shops (local community shops) (n=17) within a four kilometre radius of the centre through on-site visit. A binary logistic regression was used to examine the determinants of food insecurity among older adults. More than half (54.5%) of the older adults reported severe household food insecurity. In this study, 34.1% of the older adults consumed foods from <5 food groups in a day out of the 10 food groups. A large number of respondents did not consume any nuts or seeds (n=64, 72.7%), eggs (n=75, 85.2%), dark green leafy vegetables (n=64, 72.7%) or vitamin A-rich fruits and vegetables (n=47, 53.4%). On the other hand, in terms of food availability, fruits and vegetables were more common in street vendors whereas, fish, meat, and high calorie or salt containing snack were more available in spaza shops. All spaza shops sold high calorie or salt containing snack products (such as soda drinks, chips). Households with under-five children were 2.42 times food insecure than the households without any under-five children ($p < 0.05$), and the participants who experienced money shortage always or often to buy food and clothes were more food insecure ($p < 0.05$). Nutrition education along with ensuring availability and easy access to healthy foods in the market are necessary to ensure sustainable food security of older adults.

Key words: older adults, food security, dietary diversity, availability, local shops



INTRODUCTION

Ageing is a natural biological process in the human life cycle [1]. Due to the present demographic transition, the world is experiencing an increased number of older adults aged 60 years or over [2]. The 2011 South African Census reported that 8.0% of the country's population, which is 4.1 million, were older adults, an increase from 2.8 million in 1990. Moreover, it has been projected that the number of older adults in South Africa will increase even further to 7.0 million in 2030 [1]. Poverty, food insecurity, low food access, poor dietary quality, and inactive lifestyles are obstacles for elderly in low-income areas as they struggle to obtain adequate nutrition, so as to lead a healthy life. Thus, the elderly are at risk of non-communicable diseases (NCD) like diabetes and hypertension in South Africa [3-6]. Healthy lifestyles, supported by adequate access to healthy foods and appropriate nutrition, can reduce risk of NCD among older adults [6]. However, access to healthy foods is more complex in urban areas and depends on many factors like access to transport, physical distance to shops, availability, high price of nutrient-dense foods such as fresh fruit and vegetables, and lack of nutrition knowledge [7, 8]. Over the last few decades, availability and selling of processed energy-dense foods like snack bars, ready to eat meals, and soda drinks have increased in urban areas of South Africa [9]. These foods are usually more affordable to low-income people. In addition, research results evidenced that the majority of South Africans are unable to purchase healthy foods [10].

The older adults in low-income societies are, thus, more vulnerable to poor health and nutritional status because of consumption of nutrient-poor and monotonous diets [3]. Poor sensory function, digestive disorders, low physical activity, disability, and established dietary practices [6] are also characteristics of growing older. Many older adults have fewer food options and experience food insecurity due to limited resources [3, 4]. On the other hand, nutrition investments are mainly channelled to the improvement of infant, child, pregnant and lactating women's nutritional status [11], neglecting the growing population of older adults who have these distinct characteristics as a result of aging [2, 11]. To date, there is a paucity of research focusing on food insecurity among older adults and healthy food availability in the low-income areas in South Africa. Therefore, this study aimed to assess the prevalence of food insecurity among the older adults and explore the availability of healthy food options in the local shops in Sharpeville, South Africa.

MATERIALS AND METHODS

Study Design

The study was a cross-sectional study, conducted among older adults in Sharpeville, located in the Vaal Region of South Africa. This region is predominantly black with 45% of households living in poverty [12]. This research was carried out in the only elderly day-care centre in Sharpeville. Breakfast and lunch were provided to low-income older adults (aged ≥ 60 years) on Mondays and Wednesdays (other household members were not included by the centre). The day-care centre also provides skills training, religious activities and physical activity in order to ensure physical wellness of the older adults.



Sampling

The following formula [13] was used to calculate the desired sample size for this study.

$$\text{Sample size, } n = \frac{Z^2 * (p) * (1-p)}{C^2}$$

Where Z represents Z value (1.96 for 95% confidence interval), p indicates expected proportion of a choice (0.5 was used in this study as the population is unknown), C represents confidence interval, indicated as decimal (8.8). Thus, a total of 88 participants were required for this study. There was only one elderly day-care centre in Sharpeville with 300 older adults. Participants were recruited using convenience sampling process, and 88 older adults agreed to participate in this study representing almost 30% of the older adults in the day-care centre.

Variables

Food insecurity

Food insecurity was measured using the validated nine questions from the Household Food Insecurity Access Scale (HFIAS) [14]. The subjects were asked to recall their experiences of food insecurity for each of the nine questions of occurrence and nine follow-up questions indicating the frequency over the last 30 days.

Socio-demographic

Socio-demographic data were collected to understand the background characteristics of the participants. A number of independent variables were included in the questionnaire; number of family members, level of education attainment, household income and source, primary source of acquiring food, frequency of money shortage to purchase foods and clothes in households, and amount of money spent on weekly basis on food [5]. These variables were included to explore their association with food insecurity at the household level.

Dietary diversity

A validated dietary diversity questionnaire with 10 food groups was adapted from the Food and Agriculture Organization of the United Nations (FAO) list of nutritious foods [15]. Participants recalled a single day and night (24-hour) of dietary intake. Local names of the food items were used and matched with another validated questionnaire from a study conducted in South Africa [16]. Both open and list based methods were applied to capture the consumption of food items within the food groups.

Food availability in local shops

Availability of healthy food choices in the local shops affects a community's food purchasing behaviour [9-11]. Only availability of foods in spaza shops (community or local retail shop) and street vendors were observed in this study as these shops are located within a four kilometre radius of the centre. An observation-based food availability questionnaire was adopted from other research studies [10, 17] and administered in this study. Availability of foods from the following food groups was collected: fresh fruit, fresh vegetables, protein (meat, fishes, eggs, pulses, and beans), dairy products, starchy

foods, and high sugar and fat containing (soda drinks, energy drinks, chips, candy, chocolate and maize based-oily snacks).

In this study, “spaza shops” referred to those located near the households and convenient to purchase foods, and also having some basic amenities like electricity to preserve foods in a small infrastructure [18]. Definition of street food vendor shops for this study was adapted from elsewhere [19] and considered as shops where foods and sweetened beverages or flavoured water (mixing up water, ice, coloured chemical and sugar) are prepared and/or sold in households and other public places with no formal infrastructure, such as an open space. In this study, 13 street vendors and 17 spaza shops (30% representation) were randomly selected and observed to list the availability of food products.

Data Collection

Eight university student volunteers were trained for data collection. The students were familiarized with the aim and objectives of the research study and trained adequately to ensure all the questionnaires were completed correctly. Trained volunteers assisted the participants to complete the survey questionnaires at the elderly day-care centre.

Data Analysis

Statistical data analyses were performed using the IBM SPSS Statistics (version 23.0., Armonk, NY: IBM Corp). Missing values or data inconsistencies were amended through a second visit to the respondents. Frequencies were calculated for socio-demographic categorical variables and reported as percentages. Food insecurity (access) indicators were categorized into four groups: food secure, mildly, moderately and severely food insecure [14]. Dietary diversity was analysed by scoring each food group consumed with “1” for ‘yes’. The total score for the 10 groups was summed for each participant and categorized into two groups, < 5 groups and ≥ 5 food groups. Only frequency of availability of food groups and food items in the spaza shops and street vendors were measured in this study. Univariate analyses were executed to assess the association between dependent (socio-demographic, dietary diversity and food security status) and independent variables. A binary logistic regression was used to examine the determinants of food insecurity among older adults in Sharpeville.

Ethical Considerations

The research protocol was approved by the Senate Research and Innovation Ethics Committee of the Vaal University of Technology. Participation in the survey was voluntary and a signed-informed consent form was obtained from each participant before participating in this study.

RESULTS AND DISCUSSION

Background Characteristics of Respondents

The response rate was 100% for those participants that gave informed consent and they represented 29.3% of the total elderly care centre population, which was 300. In this study, most of the respondents were women (86.4%). The results in Table 1 show that only 19.3% were married and 27.3% were living alone. Most of the older adults’



household size ranged from 2-4 persons (43.2%). In addition, among the households with older adults, 27.3% families had at least one under-five child. The proportion of older adults who acquired education higher than matric (grade 12 or final year of high school) was low (11.4%).

Household Income and Food Procurement Patterns

The majority of respondents (80.7%) had a monthly income of equal to or less than ZAR2000 (US\$~143.47) (Table 2). In this study, participants obtained a monthly government pension that contributed most of the household income as only 13.6% families supplemented the pension with a monthly salary/wage-based income. In 81.8% households, only the older adult person's pension was received to support the family. In response to the question of frequency of experiencing money shortage to purchase foods and clothes, 39.8% participants indicated that they often or always did not have enough money to buy foods and clothes for the household while 36.4% indicated sometimes. The majority of the households (64.8%) spent less than ZAR 301 (US\$ ~ 21.5) per week on food.

Household Food Insecurity

Only 18.2% of the households with older adults had secure access to food, with the majority 54.5% experiencing severe food insecurity (Figure 1). The proportions of respondents who experienced mild and moderate food insecurity were 8% and 19.3%, respectively. The South African National Health and Examination Survey 2013 (SANHANES-1) indicated that 26% of population experienced hunger and 28.3% were at risk of hunger [20], results lower than those of our study. The possible reason could be that our study focused only on households with older adults in a low-income community, and only those older adults attending a free meal program.

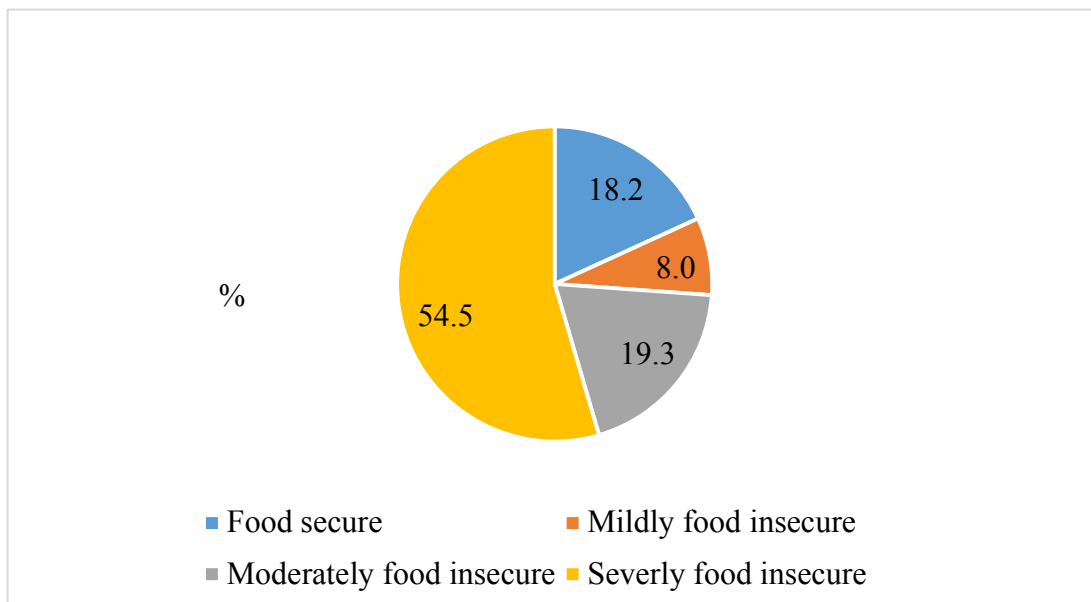


Figure 1: Prevalence of Household food insecurity

Dietary Diversity

Among the 10 food groups, all respondents (100.0%) consumed food products from the grains, roots and tubers groups in the last 24-hours (Table 3). Respondents also consumed foods from the flesh foods (90.9%), other vegetables (79.5%), dairy products (76.1%) and other fruits (72.7%) groups. The maximum number of different types of foods eaten from grains, roots and tubers group was eight (Table 4). A large number of respondents did not consume any nuts and seeds (n=64, 72.7%), eggs (n=75, 85.2%), dark green leafy vegetables (n=64, 72.7%) or vitamin A-rich fruits and vegetables (n=47, 53.4%).

Out of 88 participants, 65.9% consumed equal to or more than five food groups in a day prior to the survey. On the other hand, 34.1% of the participants did not meet the minimum dietary diversity intake. The recommended level is to consume five or more food groups daily [15].

Steyn [21] highlighted that starchy foods like grains, roots and tubers are the main food items for Black South Africans' and even then many of them limit their consumption to maize, bread and sorghum, showing poor variety in the starchy food group. This was consistent with the findings in our study where the majority of older adults consumed between two and four different types of cereals during the 24-hour measurement period. Majority of the study participants did not consume any foods from the vitamin A-rich fruit, dark green leafy vegetables or pulses, nuts and seeds and egg groups, thus indicating a poor dietary diversity. Furthermore, a previous study conducted about 10 years ago in the same study population reported low daily consumption of fruits and vegetables, and of those participants who had consumed fruits and vegetables, only few varieties had been consumed [22]. This shows that in almost 10 years, the dietary diversity of this community has not improved. Low household income, availability, accessibility, poor nutrition knowledge, and health status diminish fruit and vegetable consumption among older adults [23]. Low intake of fruits and vegetables increases the risk of overweight and obesity, hypertension, diabetes and micronutrient deficiency related to vitamin A, iron and zinc [23].

Food Availability in the Local Shops

The study sample included 13 street vendors and 17 spaza shops. The results in Figure 2 show that both the spaza shops and street vendors sold all the products investigated, except for dairy products that were not sold by the street vendors. In general, spaza shops sold a better variety of fresh fruits and juices, starchy food products, and protein-rich food items compared to the street vendors that sold a better variety of vegetables. The majority of spaza shops and street vendors sold foods with high sugar and fat content.

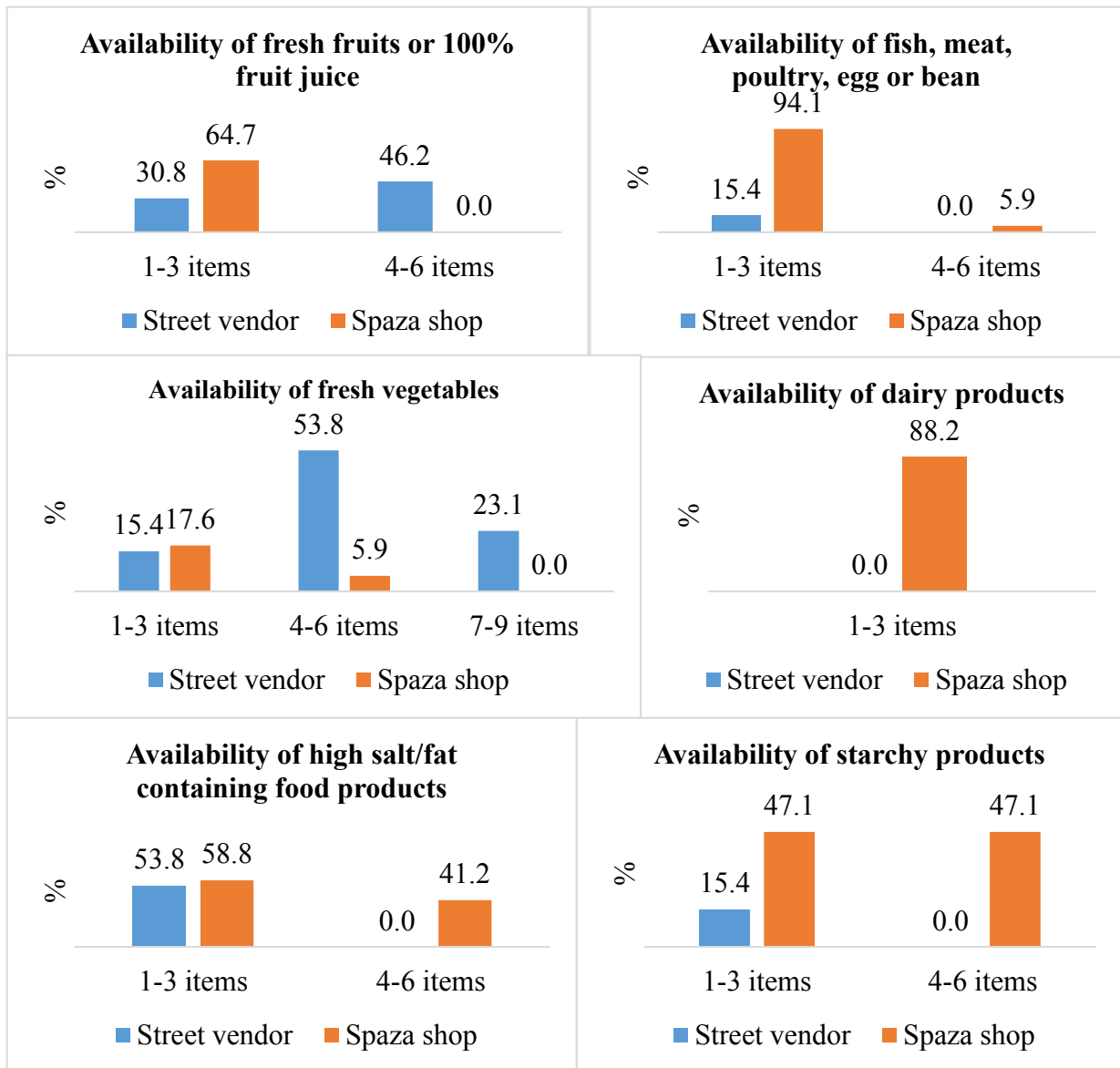


Figure 2: Proportion of spaza shops and street vendors selling food items from specific food groups

The most commonly available food items from each food group sold in the spaza shops and by street vendors were apples (n=10) and fruit juice (n=10), cabbage (n=11) from the vegetable group, eggs (n=17) from the protein-rich food group, and whole milk (n=14) from the dairy group. Apples were mainly available from street vendors (n=9) whereas 100% fruit juices were common in spaza shops (n=9). Fresh vegetables like carrot, chili and spinach were available from street vendors whereas protein-rich foods items like beef, beans (canned), boerewors (a type of sausage that contains mainly beef), canned pilchard fish, chicken and soy mince were only sold in spaza shops. Dairy products were only available in spaza shops and mainly whole milk in 14 out of 17 spaza shops. White bread was more common than brown bread in spaza shops. However,

maize-based oily and salted snacks were available from both street vendors (n=7) and spaza shops (n=15). In addition, all spaza shops (17) were selling soda drinks and almost half of them were also selling sugary candy and chocolate.

Daily consumption of balanced diet is necessary for older adults to lead a healthy and enjoyable life [4]. Unfortunately, low-income households, like the present study participants, have a tendency to consume more calorie-dense foods because of their availability, affordability, and satiety value [24]. Consumption of nutrient-dense foods is affected by the availability of healthy foods in local market. Food insecure households are more likely to procure foods from the informal market [25]. This was not consistent with our findings where the majority of the participants primarily procured food from supermarkets. In this study, the majority of foods were procured from supermarkets but 30% of the study participants procured food from spaza shops and street vendors. In South Africa, almost 35-45% of food markets encompassed informal shops like street vendors and spaza shops [26]. Hence, informal food shops are important for the community's food security status in terms of availability [26]. These small community shops offer mainly starchy (maize-based food), and processed foods and sweets but do not often sell fresh food products because of poor storage and spoilage issues [9, 10, 27]. However, it was found in this study that fresh vegetables like carrots, chili and spinach, and fruits like, apples were sold by all the street vendors in Sharpeville, which was very positive. Starchy, processed, dairy and protein-rich foods were more available in the spaza shops, maybe due to preservation facilities (refrigerators) being available in spaza shops. Although, it was not tested in this study, the foods that were available from the street vendors and spaza shops were also highly reflected in the dietary diversity measurements of the older adults at Sharpeville.

Associations

No association of household food insecurity with other independent variables were observed except households with under-five children (coefficient 0.306, $p < 0.01$), and also households that experienced money shortage to purchase foods and clothes (coefficient 0.486, $p < 0.01$). For the binary logistic regression, mildly food insecure groups were merged into food secure group, and moderately food insecure group and severely food insecure group were combined to a food insecure group. A binary logistic regression model indicated that households with under-five children were 2.42 times food insecure than the households with no under-five children ($p < 0.05$), and the older adults who experienced money shortage always or often were more food insecure ($p < 0.05$, Table 5). No significant associations of household food insecurity with other independent variables were found. These results were inconsistent with other studies that showed household food insecurity depends on many factors such as low household income, low education, minority status, poor health, depression, and large household structure [28, 29].

STRENGTHS AND LIMITATIONS

The strengths of this study were that household food insecurity, and dietary diversity of older adults were assessed and in parallel, an observation was carried out to list the available foods in local street vendors and spaza shops. However, this study only



assessed one-day's dietary diversity and cannot be interpreted as representative of dietary diversity with time, and the survey did not consider supermarkets where 70% of the participants obtained their food. In this study, gender was not equally represented in the sample. Moreover, not all the older adults in Sharpeville attend the eldercare centre investigated. These study results, therefore, cannot be generalized to other older adults living in South Africa.

CONCLUSION

Food insecurity is a concern for older adults. Although fruits and vegetables were available from street vendors, the dietary diversity of older adults showed low reported consumption of fruits and vegetables. Low fruit and vegetable consumption is associated with hidden hunger and incidence of chronic diseases. Nutrition education has the potential to encourage the older adults to consume a variety of foods and lead a healthy life [30]. It is, thus, recommended that a nutrition education program can be implemented in this older adult community to enable them to make informed healthy food choices that are affordable. It is also necessary to mitigate the food access barrier, namely the low household income for the older adults. Furthermore, owners of the local community shops should also be educated on the importance of healthy eating and having healthy food choices available at affordable prices for the community.

ACKNOWLEDGEMENTS

We want to acknowledge the Centre of Sustainable Livelihoods, Vaal University of Technology, and the management committee of the elderly care centre in Sharpeville. We also want to acknowledge all the older adult participants for their voluntary participation in this study as well as the volunteers who assisted with data collection.

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest with respect to the research activity, authorship, and/ or publication of this article.



Table 1: Participants' background characteristics (n= 88)

Variable	n	%
Gender		
Men	12	13.6
Women	76	86.4
Age in years		
60-69	14	15.9
70-79	39	44.3
80 - ≥89	35	39.8
Marital status		
Single	5	5.7
Married	17	19.3
Widowed	61	69.3
Separated/Divorced	5	5.7
Educational attainment		
No schooling	10	11.4
Primary school	40	45.4
High school	28	31.8
≥ Metric	10	11.4
Family structure (Family members)		
Living alone	24	27.3
2-4	38	43.2
5 - ≥7	26	29.5
Households with under-five children	24	27.3

Table 2: Household income and food procurement patterns (n= 88)

Variable	n	%
Monthly household income		
< ZAR 1000 (< \$71.74)	13	14.8
ZAR 1001- 2000 (\$71.81 – \$143.47)	58	65.9
ZAR 2001- ≥ 3000 (143.54 – ≥215.21)	17	19.3
Source of income*		
Salaries/Wages	12	13.6
Pensions/grants/UIF	88	100.0
Donations	1	1.1
Number of earning person/s in the family		
1	72	81.8
≥2	16	18.2
Frequency of money shortage to purchase foods and clothes in household		
Seldom/Never	21	23.8
Sometimes	32	36.4
Often/Always	35	39.8
Primary source of obtaining food*		
Own production, gathering, hunting or fishing	6	6.8
Purchased	88	100.0
Borrow, exchanged for labour, gift from friends or relatives	3	3.4
Food aid	1	1.1
Household food mainly purchased from		
Street vendor	1	1.1
Supermarket	62	70.5
Spaza shop	25	28.4
Money spent by household for purchasing food per week		
≤ZAR 51- 100 (\$3.66 – \$7.17)	8	9.1
ZAR 101- 150 (\$7.25 – \$10.76)	13	14.8
ZAR 151- 200 (\$10.83 - \$14.35)	14	15.9
ZAR 201- 250 (\$14.42 - \$14.93)	11	12.5
ZAR 251- 300 (\$18.01 – \$21.52)	11	12.5
≥ ZAR 301 (≥ \$21.59)	31	35.2

*Multiple responses recorded; 1 US dollar ≈ ZAR 13.94

Table 3: Summary of the food consumption variety among and within the food groups (n= 88)

Food groups	n	%	mean±sd
Grains, roots and tubers	88	100	3.0±1.5
Pulses	17	19.3	0.2±0.5
Nuts and seeds	24	27.3	0.2±0.4
Dairy	67	76.1	1.0±0.8
Flesh foods (meat, poultry and fish)	80	90.9	1.3±0.8
Eggs	13	14.8	0.1±0.3
Dark green leafy vegetables	24	27.3	0.3±0.7
Vitamin A-rich vegetables, root and tubers, and fruits	41	46.6	0.7±0.9
Other vegetables	70	79.5	1.7±1.5
Other fruits	64	72.7	1.4±1.1

Table 4: Food variety within the food groups consumed from 24-hour recall (n= 88)

Number of food items consumed within each group	Number of participants consumed within each group, % (n*)									
	Grains, roots and tubers	Pulses	Nuts and seeds	Dairy	Flesh foods (meat, poultry and fish)	Eggs	Dark green leafy vegetables	Vitamin A-rich vegetables, root and tubers, and fruits	Other vegetables	Other fruits
0	0 (0)	80.6 (71)	72.7 (64)	23.8 (21)	9.1 (8)	85.2 (75)	72.7 (64)	53.4 (47)	20.4 (18)	27.3 (24)
1	9.1 (8)	14.7 (13)	27.3 (24)	51.1 (45)	59.1 (52)	14.7 (13)	19.3 (17)	27.3 (24)	30.6 (27)	27.3 (24)
2	36.3 (32)	3.4 (3)		21.5 (19)	23.8 (21)		5.6 (5)	17.0 (15)	23.8 (21)	28.4 (25)
3	22.7 (20)	1.1 (1)		1.1 (1)	4.5 (4)		2.3 (2)	1.1 (1)	13.6 (12)	12.5 (11)
4	14.7 (13)			2.3 (2)	2.3 (2)			1.1 (1)	6.8 (6)	3.4 (3)
5	10.2 (9)				1.1 (1)				1.1 (1)	1.1 (1)
6	4.5 (4)								1.1 (1)	
7	0 (0)								2.3 (2)	
8	2.3 (2)									

n=number of participants



Table 5: Determinants of household food insecurity

Variables	Food insecurity	
	Odds ratio	95% CI
Households with under-five children		
No	Ref*	
Yes	2.42	1.28-9.24
Frequency of money shortage to purchase foods and clothes in household		
Seldom/Never	Ref*	
Sometimes	2.61	0.01-0.63
Always/Often	3.96	0.01-0.17

CI= Confidence Interval; *p<0.05; Ref: Reference category was food secure households; Variables that had association with household food insecurity, were only included in the binary logistic regression



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