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## RESEARCH ARTICLE

### Association between Selected Food Purchase Practices, Physical Activity and Sociodemographic Factors among People Living in a Low Socioeconomic Peri-Urban and Rural Area of South Africa

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#### Abstract:

#### Introduction:

This study examined the association between sociodemographic factors, Physical Activity (PA) engagement, and the selected Food Purchasing Practices (FPP) among people living in a low socioeconomic peri-urban and rural area of two provinces of South Africa.

#### Methodology:

Four hundred participants were randomly selected from two communities, a township in Cape Town and a rural community in the Eastern Cape where the Prospective Urban and Rural Epidemiological (PURE) study was implemented. Data collected included socio-demographic characteristics, FPP and PA. Logistic regressions were performed to identify the associations between sociodemographic factors, PA involvement and selected FPP, and Odds Ratios (OR) were calculated with 95% Confidence Intervals (CIs). All statistical tests were two-tailed at  $p < 0.05$ .

#### Results:

A large percent, 76.3% were females and 23.8% were males. Compared to participants aged  $\geq 55$  years, those within the age range of 25-54 years were more likely to travel with motorised transport (OR= 4.7; 95% CI=2.6, 8.3;  $p < 0.001$ ) compared to walking to grocery shop. None-to-low education and with monthly income of  $< R2000$  were more likely to purchase groceries at the supermarkets (OR= 2.7; 95% CI=1.4, 5.0;  $p < 0.05$ ) and (OR= 2.4; 95% CI=1.1, 5.1;  $p < 0.05$ ) compared to spaza or small informal food shop, respectively, while those who engage in PA were less likely to purchase groceries at the supermarkets (OR= 0.36; 95% CI=0.2, 0.8;  $p < 0.05$ ).

#### Conclusion:

Some demographic factors and PA have an influence on FPP among people living in a low socioeconomic peri-urban and rural area of two provinces of South Africa. This might be an area to be focused on for public health interventions which could be directed at supporting adequate FPP among people, especially in low socio-economic areas.

**Keywords:** Adults, Food practices, Groceries, Low socio-economic, NCDs, South Africa.

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## 1. INTRODUCTION

Noncommunicable Diseases (NCDs), including heart disease, stroke, cancer, diabetes, and chronic lung disease, are a major cause of deaths globally [1]. The majority of deaths due to NCD occurs prematurely, that is before the age of 70 years, and those who reside in low- and middle-income countries are most affected [1].

South Africa is currently undergoing a nutrition transition characterized by a shift from traditional diets consisting mainly of vegetables and high in fibre to highly refined diets high in fat, salt and sugar and low in fibre [2]. The dietary shifts are attributed to urbanization and industrialization and accompanied by demographic and epidemiologic shifts, with the consequence of the increased prevalence of diet-related NCD [3]. The environment where people are born, live and work has a significant role in determining the food choices and health outcomes of the populations. Recent research shows that unhealthy food environments contribute to unhealthy food

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choices leading to an increased diet-related chronic disease [4].

The Socio-Ecological Model suggests that there is an overlap in factors that influence food choices and or, food practices of the populations. These include settings, social and cultural norms, and values, and individual factors [5]. Exploring some of these factors among people residing in under-resourced communities may help us understand the range of factors that put people at risk or protect them from the risk factors for non-communicable diseases.

Food practices are a cycle that is understood to be any doings that involve food preparations [6]. Food preparations could be cooking food, donating food, distribution of meals, or tidying up [6], but not limited to food purchasing practices which include where grocery is purchased, reasons for grocery purchase in this particular type of shop, and mode of transportation used when travelling to purchase the grocery. Food purchasing practices have also been seen as a prior activity of food consumption [7]. Further, the probable impact of regional factors on food buying and consumption has received increasing consideration [8]. On the other hand, public health advocates are increasingly interested in what motivates food purchasing from a particular location and how people get to retail food outlets.

The food retail environment in South Africa has thrived [9]. This has, in turn, contributed to people's food choices and purchase in the communities. The increased number of supermarkets and interconnected alterations in diets has been acknowledged as a factor adding to ill health in emerging nations [10]. Consequently, the supermarkets and their food trades tactics could have a straight effect on population's well-being and quality of life [10].

In South Africa, food is purchased either in the supermarket such as ShopRite, Pick 'n' Pay, Spar, U-Save among others, or small, informal convenience food shops popularly known as spaza shops. Perks [11] described the spaza shop as a small, informal convenience store business in a hut or small store where buyers stand outside to buy the basic grocery over a kiosk. Many of these spaza shops are located in strategic points close to the consumer homes for convenience. Although, sometimes regarded as less healthy shops compared to more sophisticated grocery outlets. Kerr *et al.* [12] opined that increased access to food closer to where one lives could lead to the reduced purchase of groceries when going or returning from the workplace. Observationally, grocery purchase and consumption seem strongly dependent on socio-economic characteristics which may include factors such as gender, age, household income, education level, employment status among other factors [13].

Wong *et al.* [14] reported that the price of the food estimate, access and being able to afford the price could be viewed also as a vital step in order to understand community food selections, especially among people from low socio-economic areas. Although, very few studies have been undertaken on where people purchase their groceries and the reason behind it, especially on the mode of transportation used in traveling to grocery stores [15]. Significant relationships have been found between socio-demographic profiles and

certain FPP. For example, gender, age and income [15 - 17], employment status [15, 18], and car availability and or transport fare [15, 19] have been found to be associated with FPP. On the other hand, distance, time, and street network connections, and proximity influence peoples' grocery purchase trips.

Physical activity engagement has been understood to result in a better food choice [20]. Consequently, involvement in PA has also been known to be associated with some of the characteristics of the built and food environment [21]. Those who have access to leisure amenities could physically be more active and this helps to prevent the risk factors for NCDs, especially obesity [21]. On the other hand, access to nutritious foods could promote healthy diets consumption [21]. Access gained through PA involvement could be more effective in promoting health than nutritious food alone. Furthermore, regular engagement in PA could assist in the choice of where, why, and mode of travelling to purchase groceries. Meanwhile, the FPP especially where people buy their groceries, reasons for grocery purchase in a particular retail location, and mode of travelling to purchase the grocery in relation to sociodemographic and PA among people living in a low socio-economic area remained understudied.

In 2014, the University of the Western Cape was awarded a Center of Excellence in Food Security (COEFS) by the Department of Science and Technology/National Research Foundation (DST/NRF). The purpose of the CoEFS study was to explore food security, lifestyle, and health status in the poor communities and to use the information to support the development of interventions on lifestyle modification in similar populations. As part of this research initiative, this study aimed at understanding the context in which food choices are made by those living in poor settings to help us begin to explain some of the connections between individual food intake and the environment. Despite the existing information regarding food practices, no study has examined the association between sociodemographic, PA, and selected FPP among people living in low socio-economic peri-urban and rural settings. This study examined the association between sociodemographic, PA, and selected FPP among people living in a low socio-economic peri-urban and rural area in the Western Cape and Eastern Cape Provinces in South Africa, respectively. We hypothesised that there will be an association between sociodemographic, PA, and selected FPP among people living in a low socio-economic peri-urban area.

## 2. MATERIALS AND METHODS

### 2.1. Study Setting, Design and Population

This cross-sectional population-based study sought to identify and respond to the detrimental patterns of nutrition-related health problems in an urban and rural setting in South Africa. Framed around the food environment and the determinants of dietary habits, it was built on data collected as part of the PURE study which sought to identify the population-level factors that drive the development of known risk factors for chronic non-communicable diseases so that their distribution in the entire population can be shifted favourably by appropriate societal interventions (primordial

prevention). The PURE study has collected data on individual risk, population-level risks as well as some environmental factors, including frequently consumed food. However, what is lacking in the PURE study is the assessment of knowledge and practices of individuals, households and community members about healthy food as well as the examination of the food environment and how it drives nutrition-related NCDs and childhood malnutrition. The current study assessed the practices of community members with respect to food choices and related factors.

This study was undertaken in two communities, namely, an urban township (Langa) near Cape Town metropolis and a rural community (Mt Frere) in the Eastern Cape Province using a two-stage sampling described previously in Teo *et al.* [22] study. They were selected through two-stage sampling techniques (i.e. this is where a population were divided into clusters, after which a sample of clusters was selected (first stage), and specified number of participants were selected from each of the selected cluster (second stage). These two communities are regarded as economically disadvantaged communities based on their Socioeconomic Status (SES) [23]. Langa is a black African township near Cape Town which has grown because of migration of persons mostly from the rural Eastern Cape. It is reported that most residents live with an average monthly household income of R2,144 (\$200) and over 40% were unemployed as of 2015 [23]. Generally, the Langa community has been grouped into three development areas namely, “old Langa”, “the Zones” and “the Hostels” which mirror the SES of the residents, while Mount Frere is a rural community located in Alfred Nzo district in the Eastern Cape with an estimated 99.8% black African, and an estimated population density of 519 km<sup>2</sup>. Most residents earn an average monthly income between R1001-2500 (\$80-\$200) with an estimated unemployment rate of over 76% [24].

During a 3-year follow up for the PURE, a sub-study by the Centre of Excellence in Food Security (COEFS) randomly selected participants from the PURE study and conducted a survey focusing on knowledge, beliefs and perceptions towards food and environment. A sample size of 400 (283 from Langa and 117 from Mount Frere) men and women participated in this study.

Data was collected through interviews using a food frequency questionnaire that was adapted from the PURE study questionnaire. Data collected included socio-demographic characteristics (age, gender, education, marital status, employment, income), knowledge, attitudes, beliefs and perceptions towards food environment, food practices (where do you buy most of your groceries, why do you buy in that particular place, and how do you travel from home to where you purchase most of your groceries), eating habits, PA, nutritional knowledge, and health problem and diseases.

### 2.1.1. Data collection procedure

Data were collected in face-to-face interviews by specially trained field workers. Data collected included socio-demographic variables (age, marital status, education, occupation, monthly household income. Additional information was collected on the number of servings of fruits

and vegetables per week and engagement in PA.

Food practice questions ranged from whether the participants have a food garden to whether they ever eat in informal fast food outlets. For the purpose of this study, out of the twenty-three (23) questions outlined under the food practices, only three questions were selected. The selected questions asked about “where do participants buy most of their groceries”, “why do they buy in that particular place”, and “how do they travel from home to where they purchase most of their groceries”.

To ensure the validity and reliability of the data in this study, all data collectors were trained to carry out face-to-face questionnaire interviews. Completed questionnaires were validated at 2 weeks interval with selected participants after which the repeated interviews were conducted if missing information was found.

Ethical approval was obtained from the University of Western Cape Research Ethics Committee (Ethics number: 15/7/99) prior to the commencement of the study. Permission to conduct the nested study from which this study was sourced was requested from the International Steering Committee (ISC) of the PURE study and the local Principal Investigators (PI). Data were collected from July to September 2017 by trained fieldworkers.

Completed questionnaires were checked for completeness, captured into the Excel datasheet, and exported to the SPSS statistical software version 25. Frequencies and percentages were calculated to identify the distribution of sociodemographic information. Chi-square test for comparing proportions of categorical variables was computed. Logistic regressions were performed to identify the associations between sociodemographic factors, physical activity, and selected food practices, and we calculated Odds Ratios (OR) with 95% Confidence Intervals (CIs). All sociodemographic variables, PA and FPP used for the regression analyses were dichotomised into two groups (sociodemographic variables: age (25-54=1,  $\geq$  55=2); marital status (unmarried=1, married=2); education levels (none-to-low level=1, medium-to-high level=2); employment status (unemployed=1, employed=2); total household income ( $\leq$ R2000=1,  $\geq$ R2001=2); monthly groceries expenses ( $\leq$ R1000=1,  $\geq$ R1001=2); physical activity (yes=1, no=2); food purchase practices - where do you buy your groceries (supermarket=1, spaza shop=2); reason for purchase in a particular location (affordable=1, proximity=2); mode of traveling to purchase groceries (travel with motorised transport=1, walking=2). All statistical tests were two-tailed, and associations were considered to be statistically significant for a  $p < 0.05$ .

## 3. RESULTS

### 3.1. Socio-demographic characteristics of the study participants

A total of 400 (283 and 117 adults from peri-urban and rural, respectively) participated in the study, of which 95 (23.8%) were males and 305 (76.3%) were females. Table 1 shows the socio-demographic, physical activity, and food purchase practice characteristics of the study participants. The

rural (58.8±10.7 years) participants were significantly older than their urban (45.0±12.9 years) counterparts. The majority (48.1%) of the urban participants were not married while 41% of the rural participants were married. The majority of participants had attended high school, 69.6% in urban areas and 50.4% in rural areas, and were unemployed, 67.8% in urban areas and 81.2% in rural areas. Similarly, 44.5% and 72.6% of urban and rural participants earned R2000 or less as monthly income, respectively. The majority 75.5% (urban) and 81.2% (rural) spend ≤R1000 monthly on purchase of groceries,

while 73.9% (urban) and 58.1% (rural) buy their groceries in Shoprite/U-save/Checkers and Spar, respectively, which constitutes the majority of the participants. Furthermore, urban (46.3%) and rural (41%) participants purchase their groceries at the highlighted location due to the affordability and special/promotion offers, while the mode of traveling to purchase groceries were mostly by walking (40.6%) and taxi (70.9) among urban and rural participants, respectively. Also, a majority of urban (81.3%) and rural (91%) participants participate in physical activity.

**Table 1. Descriptive statistic of number of deaths.**

Characteristics	Total; n=400 (%)	Urban; n=283 (%)	Rural; n=117 (%)	p-value
<b>Age (years) M±SD</b>	49.1±13.8	45.0±12.9	58.8±10.7	< 0.001
<b>Age (years, %)</b>	-	-	-	< 0.001
25-34	79 (19.8)	77 (27.2)	2 (1.7)	-
35-44	92 (23.0)	80 (28.3)	12 (10.3)	-
45-54	75 (18.8)	53 (18.7)	22 (18.8)	-
55-64	89 (22.3)	49 (17.3)	40 (34.2)	-
≥65	65 (16.3)	24 (8.5)	41 (35.0)	-
<b>Gender</b>	-	-	-	0.08
Men	95 (23.8)	74 (26.1)	21 (17.9)	-
Women	305 (76.3)	209 (73.9)	96 (82.1)	-
<b>Marital status</b>	-	-	-	< 0.001
Never married	163 (40.8)	136 (48.1)	27 (23.1)	-
Married	134 (33.5)	86 (30.4)	48 (41.0)	-
Widowed	65 (16.3)	32 (11.3)	33 (28.2)	-
Divorced/separated/others	38 (9.5)	29 (10.2)	9 (7.7)	-
<b>Education</b>	-	-	-	0.001
None	5 (1.3)	2 (0.7)	3 (2.6)	-
Primary (Grade 1-7)	122 (30.5)	71 (25.1)	51 (43.6)	-
Secondary (Grade 8-12)	256 (64.0)	197 (69.6)	59 (50.4)	-
Vocational/Trade/Tertiary	17 (4.3)	13 (4.6)	4 (3.4)	-
<b>Employment status</b>	-	-	-	0.007
Employed	113 (28.2)	91 (32.2)	22 (18.8)	-
Unemployed	287 (71.8)	192 (67.8)	95 (81.2)	-
<b>House income (ZAR)</b>	-	-	-	< 0.001
≤R2000	211 (52.8)	126 (44.5)	85 (72.6)	-
R2001-R5000	146 (36.5)	117 (41.3)	29 (24.8)	-
R5001-R10000	39 (9.7)	37 (13.1)	2 (1.7)	-
>R10000	4 (1.0)	3 (1.1)	1 (0.9)	-
<b>Groceries expenses (ZAR)</b>	-	-	-	0.22
≤R1000	309 (77.2)	214 (75.5)	95 (81.2)	-
R1001-R2000	1 (0.3)	1 (0.4)	0 (0.0)	-
R2001-R3000	87 (21.7)	67 (23.7)	20 (17.1)	-
>R3000	3 (0.8)	1 (0.4)	2 (1.7)	-
<b>Groceries Purchase location</b>	-	-	-	< 0.001
Shoprite/U-save/Checkers	231 (57.8)	209 (73.9)	22 (18.8)	-
Pick n' Pay	28 (7.0)	28 (9.9)	0 (0.0)	-
Spar	81 (20.3)	13 (4.6)	68 (58.1)	-
Spaza shop/cafe	38 (9.5)	29 (10.2)	9 (7.7)	-
Others	22 (5.5)	4 (1.4)	18 (15.4)	-
<b>Reasons for purchase in a particular location</b>	-	-	-	< 0.001
Fresh/cheap/clean environment	89 (22.3)	45 (15.9)	44 (37.6)	-
Cheap/affordability/special	179 (44.8)	131 (46.3)	48 (41.0)	-

(Table 1) contd.....

Nearness (proximity)	114 (28.5)	95 (33.6)	19 (16.2)	-
All/access to grant	18 (4.5)	12 (4.2)	6 (5.2)	-
<b>Mode of traveling to buy groceries</b>	-	-	-	< 0.001
Taxi	156 (39.0)	73 (25.8)	83 (70.9)	-
Bus	70 (17.5)	70 (24.7)	0 (0.0)	-
Train	16 (4.0)	16 (5.7)	0 (0.0)	-
Own vehicle	36 (9.0)	9 (3.2)	27 (23.1)	-
Walking/others	122 (30.5)	115 (40.6)	7 (6.0)	-
<b>Engagement in PA</b>	-	-	-	0.011
Yes	337 (84.3)	230 (81.3)	107 (91.5)	-
No	63 (15.8)	53 (18.7)	10 (8.5)	-

Note: *N* group size, *ZAR* South African Rand, *PA* physical activity

*M* mean, *SD* Standard deviation.

**Table 2. Association between sociodemographic factors, physical activity, and selected food purchase practices, among the study population.**

Variables	Where do you buy most of your groceries			Why do you buy in that location			Mode of traveling to buy groceries		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
<b>Sociodemographic characteristics</b>									
<b>Age groups (years)</b>	-	-	-	-	-	-	-	-	-
25-54	1.2	(0.6-2.2)	0.58	1.0	(0.7-1.7)	0.85	4.7	(2.6-8.3)	p< 0.001
≥ 55	-	Ref	-	-	Ref	-	-	Ref	-
<b>Gender</b>	-	-	-	-	-	-	-	-	-
Men	1.5	(0.8-3.0)	0.21	0.8	(0.5-1.4)	0.49	1.2	(0.7-1.9)	0.57
Women	-	Ref	-	-	Ref	-	-	Ref	-
<b>Marital status</b>	-	-	-	-	-	-	-	-	-
Unmarried	1.2	(0.6-2.3)	0.58	2.0	(1.2-3.3)	0.005	0.7	(0.4-1.1)	0.09
Married	-	Ref	-	-	Ref	-	-	Ref	-
<b>Education</b>	-	-	-	-	-	-	-	-	-
None –Low level	2.7	(1.4-5.0)	0.002	1.6	(1.0-2.7)	0.045	0.9	(0.6-1.7)	0.88
Medium-high level	-	Ref	-	-	Ref	-	-	Ref	-
<b>Employment status</b>	-	-	-	-	-	-	-	-	-
Unemployed	0.5	(0.2-1.2)	0.13	1.0	(0.6-1.7)	0.87	0.9	(0.5-1.5)	0.67
Employed	-	Ref	-	-	Ref	-	-	Ref	-
<b>Monthly household income (ZAR)</b>	-	-	-	-	-	-	-	-	-
≤R2000	2.4	(1.1-5.1)	0.02	1.0	(0.6-1.6)	0.99	0.6	(0.4-1.0)	0.05
≥R2001	-	Ref	-	-	Ref	-	-	Ref	-
<b>Monthly groceries expenses (ZAR)</b>	-	-	-	-	-	-	-	-	-
≤ R1000	1.2	(0.5-2.9)	0.73	1.4	(0.8-2.5)	0.28	1.6	(0.9-2.8)	0.14
≥ R1001	-	Ref	-	-	Ref	-	-	Ref	-
<b>Engage in PA</b>	-	-	-	-	-	-	-	-	-
Yes	0.36	(0.2-0.8)	0.007	0.5	(0.2-0.8)	0.010	1.1	(0.5-2.1)	0.70
No	-	Ref	-	-	Ref	-	-	-	-

p ≤ .05; OR-odd ratios; CI-class interval; ref-reference group in statistical analysis; %-percentage; PA-physical activity.

The results of the logistic regression model are presented in Table 2. This modelling revealed that being within the age range of 25 to 54 years compared to age 55 years and above was associated with higher likelihood of purchasing groceries at the supermarkets compared to spaza shops (OR=1.2; 95% CI=0.6, 2.2; p > 0.05), and equally likely to purchase groceries based on affordability compared to proximity (OR=1.0; 95% CI=0.7, 1.7; p > 0.05), but more likely to travel with motorised transport compared to walking to purchase groceries (OR= 4.7;

95% CI=2.6, 8.3; p < 0.001). Being a male compared to female was associated with greater odds of purchasing groceries at the supermarkets compared to spaza shops (OR=1.5; 95% CI=0.8, 3.0; p > 0.05), less likely to purchase groceries based on affordability compared to proximity (OR=0.8; 95% CI=0.5, 1.4; p > 0.05), and more likely to use motorised transport compared to walking to purchase groceries (OR= 1.2; 95% CI=0.7, 1.9; p > 0.05). Unmarried individuals were more likely to purchase groceries at the supermarkets compared to spaza

shops (OR= 1.2; 95% CI=0.6, 2.3;  $p > 0.05$ ) and less likely to use motorised transport compared to walking to buy groceries (OR= 0.7; 95% CI=0.4, 1.1;  $p > 0.05$ ), with higher likelihood of purchasing groceries based on affordability compared to proximity (OR=2.0; 95% CI=1.2, 3.3;  $< 0.05$ ). Those with none-to-low education were more likely to purchase groceries at the supermarkets compared to the spaza shops (OR= 2.7; 95% CI=1.4, 5.0;  $p < 0.05$ ). They were also more likely to purchase groceries based on affordability compared to proximity (OR=1.6; 95% CI=1.0, 2.7;  $p > 0.05$ ), and less likely to use motorised transport compared to walking to buy groceries (OR= 0.9; 95% CI=0.6, 1.7;  $p > 0.05$ ). Those who were employed were less likely to purchase groceries at supermarkets compared to spaza shops (OR= 0.5; 95% CI=0.2, 1.2;  $p > 0.05$ ). Similarly, the odds of purchasing groceries based on affordability compared to nearness were equal (OR=1.0; 95% CI=0.6, 1.7;  $p > 0.05$ ), and less where people have to use motorised transport compared to walking when traveling to purchase groceries (OR= 0.9; 95% CI=0.5, 1.5;  $p > 0.05$ ). Those with a monthly income of R2000 or less were more likely to purchase groceries at the supermarkets compared to spaza shops (OR= 2.4; 95% CI=1.1, 5.1;  $p < 0.05$ ). They were also equally likely to purchase groceries based on affordability compared to proximity (OR=1.0; 95% CI=0.6, 1.6;  $p > 0.05$ ), and less likely to travel with motorised transport compared to walking to purchase groceries (OR= 0.6; 95% CI=0.4, 1.0;  $p > 0.05$ ). Those who spend a thousand rand or less were more likely to purchase groceries at the supermarkets compared to spaza shops (OR= 1.2; 95% CI=0.5, 2.9;  $p > 0.05$ ), more likely to purchase groceries based on affordability compared to nearness (OR=1.4; 95% CI=0.8, 2.5;  $p > 0.05$ ), and more likely to use motorised transport compared to walking to buy groceries (OR= 1.6; 95% CI=0.9, 2.8;  $p > 0.05$ ). Those who engage in physical activity were less likely to purchase groceries at the supermarkets compared to spaza shops (OR= 0.3; 95% CI=0.2, 0.8;  $p < 0.05$ ). They were also less likely to purchase groceries based on affordability compared to proximity (OR=0.5; 95% CI=0.2, 0.8;  $p < 0.05$ ), and more likely to travel with motorised transport compared to walking to purchase groceries (OR= 1.1; 95% CI=0.5, 2.1;  $p > 0.05$ ).

#### 4. DISCUSSION

This study examined the association between sociodemographic factors, physical activity, and selected food practices among people living in Langa (peri-urban area) and Mount Frere (rural area) in the Western and Eastern Cape Provinces in South Africa. Understanding where people purchase their groceries and the reasons behind it has been established to be important in health improvement [25]. Our findings indicate that the majority of participants from both urban and rural spend a thousand rand or less per month on the purchase of groceries and purchase their groceries at the supermarket. This result corroborates those of Hillier *et al.* [25] who reported that the majority of participants purchased groceries at the supermarket. On the other hand, the distance travelled for food purchasing either by walking or with the use of motorised transport could also be related to health. For instance, traveling more than a mile for food shopping has been

linked with elevated Body Mass Index (BMI) and as a better predictor when controlled for some sociodemographic factors [25]. Pechey *et al.* [26] also advocated that having a choice of purchasing groceries at the supermarket could be related to well-being.

Our analyses also showed that people purchased groceries based on whether the groceries are cheap and affordable, or most probably when the food products are on special discount. One Australian study on monitoring the price and affordability of foods and diets globally has shown that being able to afford food prices are an important factor in food choices [27], as it influences where individuals purchased their food. It is also important to understand that the targeted price discounts or promotions could influence individuals to consistently purchase groceries at a particular location, especially people of low socioeconomic status. In this study, the majority of the participants in the urban area walked to purchase groceries. This is understandable as there are various easy accessible large, medium, or small groceries store in urban areas compared to the rural area where participants mostly use taxis as their mode of transportation to purchase groceries. Hamrick & Hopkins [28] stated that many people who reside in rural areas do not have access to supermarkets. Subsequently, they travel by taxis to a large grocery store in the nearest populace center as one trip at the month-end.

This study also revealed that younger participants were likely to travel by motorised transport compared to walking to buy groceries at the supermarket. As this age group (25- to 54)-years age are currently the workforce they may be able to afford a car or travel with public transport. Similar to our findings Zenk *et al.* [29] and Jiao *et al.* [15] also found that younger individuals in their studies purchased groceries in a faraway grocery store. Jiao and colleagues in their study also found that 88% of their participants drive to grocery stores to purchase their groceries. Furthermore, transiting remained one of the ways to access food, especially for people of low socioeconomic status [15]. These findings show us that it is not only the immediate environment that matters in influencing food choices as people could shop primarily outside their built-up environment and accessibility [15, 30].

Our study also revealed that unmarried people purchased groceries at supermarket based on the price compared to proximity. These findings are contrary to the findings of Steinhofner [31] who described unmarried individuals as people who seek comfort, not bothered by the price of goods, and ready to pay more for convenience.

It has been reported that people with a low educational accomplishment may be vulnerable in purchasing less healthy food compared to those with advanced knowledge [32]. Education status has been known to play a vital role in food purchase practices. Zenk *et al.* [29] reported that an individual with advanced education status was more likely to purchase their groceries in the environs when compared to an individual with lesser education.

In the current study, people with none-to-low education achievement mostly purchased groceries at supermarkets compared to spaza outlets. Similarly, people with a monthly

income of R2000 or less significantly mostly purchased groceries at the supermarket based on affordability and cheapness, and mostly used public transport. Since these individuals seem to travel once a month to purchase groceries in bulk from a supermarket where they could also have access to grants vouchers, this helps in saving frequent traveling expenses. Some studies have shown that inadequate food resources in people's districts could force many to purchase their groceries outside their locality [25, 29]. This again is an indication that when planning interventions we should look at a broader environment rather than the immediate one. Similarly, unemployed participants purchased groceries at the supermarket and used motorised transport. An individual with no incomes could have lesser movement, little prospects with reverence to the quality of food and choices.

The relationship between physical activity and healthy eating had previously been confirmed especially when it comes to reducing the risk factors for chronic diseases [20]. In the current study, those who engaged in PA were less likely to purchase groceries due to affordability but highly likely to travel to grocery stores with motorised transport. Some individuals seem conscious of their health which then gives them an opportunity to search for quality foods whenever they want to purchase their groceries. There is an assumption that those who regularly engaged in PA could have good knowledge about the benefits of physical activity and healthy eating.

This study has some limitations of only including the participants from a rural and a peri-urban black community from two Provinces of Eastern and Western Cape, respectively. The findings of this study should be interpreted with caution and should not be generalised to the entire population of adults in South Africa. Further, studies with a larger sample size are desirable. In addition, data concerning food practices were collected using self-report questionnaires from which response bias might be present.

Furthermore, the findings of this study have vital indications. Firstly, in advising that where most of the groceries purchasing is performed [33]; secondly, reasons for the grocery shopping in a particular location; and thirdly, modes of transportation to groceries location might be a focus for public health interventions which could be directed at supporting adequate food practices [33] among people, especially in low socio-economic areas.

## 5. CONCLUSION

Our study begins to shed light on factors that are related to where, why and transportation mode to where people shop for their groceries. This study revealed that it is not only the immediate environment that shapes food choices and food practices as people could travel far to purchase food items that they need. Supermarkets seem to be the preferred place to purchase food probably due to specials/promotions which makes some food more affordable than buying in small, informal convenience stores popularly regarded as Spaza shops.

## LIST OF ABBREVIATIONS

<b>FPP</b>	= Food Purchase Practices
<b>PA</b>	= Physical Activity
<b>PURE</b>	= Prospective Urban Rural Epidemiological
<b>NCDs</b>	= Noncommunicable Diseases
<b>OR</b>	= Odd Ratios
<b>CI</b>	= Class Interval
<b>COE</b>	= Center of Excellence
<b>DST/NRF</b>	= Dept of Science and Technology/National Research Foundation
<b>CoEFS</b>	= Center of Excellence Food Security
<b>ZAR</b>	= South African Rands

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research was approved by the University of Western Cape Research Ethics Committee (Ethics number: 15/7/99) and International Steering Committee (ISC) of the PURE study and the local Principal Investigators (PI).

## HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the Helsinki Declaration revised in 2008.

## CONSENT FOR PUBLICATION

All the participants who participated were informed verbally about the study and those who gave written informed consent were enrolled.

## AVAILABILITY OF DATA & MATERIALS

The authors confirm that the data supporting the findings of this study are available within the article.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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## REFERENCES

- [1] World Health Organization (WHO). Noncommunicable diseases Fact Sheet 2019. Available from: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- [2] Steyn NP, Nel JH, Parker W, Ayah R, Mbithe D. Urbanisation and the nutrition transition: A comparison of diet and weight status of South African and Kenyan women. *Scand J Public Health* 2012; 40(3): 229-38.
- [3] Nnyepi MS, Gwisai N, Lekgoa M, Seru T. Evidence of nutrition transition in Southern Africa. *Proc Nutr Soc* 2015; 74(4): 478-86.
- [4] Belon AP, Nieuwendyk LM, Vallianatos H, Nykiforuk CI. Perceived community environmental influences on eating behaviors: A Photovoice analysis. *Soc Sci Med* 2016; 171: 18-29.
- [5] Centers for Disease Control and Prevention (CDC). Division of Nutrition, Physical Activity, and Obesity. National Center for Chronic Disease Prevention and Health Promotion. Addressing Obesity Disparities: Social-Ecological Model 2018. Available at: [http://www.cdc.gov/obesity/health\\_equity/addressingtheissue.html](http://www.cdc.gov/obesity/health_equity/addressingtheissue.html)
- [6] Neely E, Walton M, Stephens C. Young people's food practices and social relationships. A thematic synthesis. *Appetite* 2014; 82: 50-60.
- [7] Hartmann-Boyce J, Bianchi F, Piernas C, *et al*. Grocery store interventions to change food purchasing behaviors: a systematic review of randomized controlled trials. *Am J Clin Nutr* 2018; 107(6): 1004-16.
- [8] Thornton LE, Crawford DA, Lamb KE, Ball K. Where do people purchase food? A novel approach to investigating food purchasing locations. *Int J Health Geogr* 2017; 16(1): 9.
- [9] Igumbor EU, Puoane T, Tsolekile L, Muzigaba M. PURE Cape Town Investigators. Conducting prospective cohort studies on chronic non-communicable diseases in urban and rural communities in South Africa: Possibilities and Challenges. Proceedings of the 6th Annual Conference of the Public Health Association of South Africa. East London, South Africa. 29 November-01 December 2010;
- [10] Demmler KM, Klasen S, Nzuma JM, Qaim M. Supermarket purchase contributes to nutrition-related non-communicable diseases in urban Kenya. *PLoS One* 2017; 12(9):e0185148
- [11] Perks S. Exploring the management abilities of spaza shop owners in the Nelson Mandela Metropolitan Municipality. *South African Journal of Economic and Management Sciences* 2010; 13(4): 447-63.
- [12] Kerr J, Frank L, Sallis JF, Saelens B, Glanz K, Chapman J. Predictors of trips to food destinations. *Int J Behav Nutr Phys Act* 2012; 9(1): 58.
- [13] Krige SM, Mahomoodally FM, Subratty AH, Ramasawmy D. Relationship between socio-demographic factors and eating practices in a multicultural society. *Food Nutr Sci* 2012; 3(03): 286.
- [14] Wong KC, Coveney J, Ward P, *et al*. Availability, affordability and quality of a healthy food basket in Adelaide, South Australia. *Nutr Diet* 2011; 68(1): 8-14.
- [15] Jiao J, Moudon AV, Drewnowski A. Grocery shopping: how individuals and built environments influence choice of travel mode. *Transp Res Rec* 2011; 2230(1): 85-95.
- [16] Guo JY, Bhat CR, Copperman RB. Effect of the built environment on motorized and non-motorized trip making: substitutive, complementary, or synergistic? *Transp Res Rec* 2007; 2010(1): 1-1.
- [17] Handy S. Non-work travel of women: patterns, perceptions and preferences. In Women's Travel Issues Second National Conference Drachman Institute of the University of Arizona; Morgan State University; Federal Highway Administration 2000. Available from: <https://www.fhwa.dot.gov/ohim/womens/wtipage.htm>
- [18] Bhat CR. Analysis of travel mode and departure time choice for urban shopping trips. *Transp Res, Part B: Methodol* 1998; 32(6): 361-71.
- [19] Chen IWH, Gross F, Pecheux K, Jovanis PP. Modal Preference for ITS-Enhanced Ridesharing and Paratransit Services for Disabled and Elderly Travelers. *Advances in Transportation Studies* 2005; 5: 53-67.
- [20] Lowry R, Galuska DA, Fulton JE, Wechsler H, Kann L, Collins JL. Physical activity, food choice, and weight management goals and practices among US college students. *Am J Prev Med* 2000; 18(1): 18-27.
- [21] Sallis JF, Glanz K. Physical activity and food environments: solutions to the obesity epidemic. *Milbank Q* 2009; 87(1): 123-54.
- [22] Teo K, Chow CK, Vaz M, Rangarajan S, Yusuf S. The Prospective Urban Rural Epidemiology (PURE) study: examining the impact of societal influences on chronic noncommunicable diseases in low-, middle-, and high-income countries. *Am Heart J* 2009; 158(1): 1-7.
- [23] Statistics South Africa. Statistics South Africa. Formal Census 2011.
- [24] Okop KJ, Levitt N, Puoane T. Factors associated with excessive body fat in men and women: cross-sectional data from black South Africans living in a rural community and an urban township. *PLoS One* 2015; 10(10):e0140153
- [25] Hillier A, Cannuscio CC, Karpyn A, McLaughlin J, Chilton M, Glanz K. How far do low-income parents travel to shop for food? Empirical evidence from two urban neighborhoods. *Urban Geogr* 2011; 32(5): 712-29.
- [26] Pechey R, Monsivais P. Supermarket choice, shopping behavior, socioeconomic status, and food purchases. *Am J Prev Med* 2015; 49(6): 868-77.
- [27] Lee A, Mhurchu CN, Sacks G, *et al*. Monitoring the price and affordability of foods and diets globally. *Obes Rev* 2013; 14: 82-95.
- [28] Hamrick KS, Hopkins D. The time cost of access to food—Distance to the grocery store as measured in minutes. *International Journal of Time Use Research* 2012; 9(1): 28-58.
- [29] Zenk SN, Schulz AJ, Israel BA, *et al*. Food shopping behaviours and exposure to discrimination. *Public Health Nutr* 2014; 17(5): 1167-76.
- [30] Joewono TB, Tarigan AK, Rizki M. Segmentation, Classification, and Determinants of In-Store Shopping Activity and Travel Behaviour in the Digitalisation Era: The Context of a Developing Country. *Sustainability* 2019; 11(6): 1591.
- [31] Steinhofner K. Honors Theses. Paper 2005; 375: 2005.
- [32] Vogel C, Ntani G, Inskip H, *et al*. Education and the relationship between supermarket environment and diet. *Am J Prev Med* 2016; 51(2): e27-34.
- [33] Chaix B, Bean K, Daniel M, *et al*. Associations of supermarket characteristics with weight status and body fat: a multilevel analysis of individuals within supermarkets (RECORD study). *PLoS One* 2012; 7(4):e32908