

Food price fluctuations and accessibility to nutritious foods by households during COVID-19 in the Senqu local municipality, South Africa

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Abstract

Food insecurity is a major problem at the individual, household, community, and national levels in South Africa. To achieve sufficient food security, the four aspects of food security need to be achieved simultaneously. These aspects are availability, accessibility, utilisation and stability. Studies have shown that South Africa has enough food available for the population, but not everyone has access to food. Food prices play a big role in access to nutritious food, and it is important to draw up policies and implement programmes that increase access to nutritious food for the population so that food insecurity can be reduced. Therefore, the study aimed to assess the effect that fluctuating food prices have on the access to nutritious food by households. The study design used was an observational descriptive cross-sectional design, and the data collected were quantitative. The data was collected using a questionnaire that was administered to the participants. The questionnaire had a section for the Household Food Security Survey Module and Household Food Insecurity Access Scale. Ethics approval was obtained from Stellenbosch University. Most households bought more starchy foods and less meat due to the fluctuating food prices. Households did not consume enough protein, either from animal or plant sources. It is recommended to ensure that education and support are given to grow the proper food gardens to promote a more varied or diversified diet. Also, to educate consumers about more affordable foods to increase dietary diversity, like legumes and traditional vegetables as a protein source, as well as the increased consumption of different forms of dairy products.

1. Introduction

Food prices are on the rise globally, and the onset of the COVID-19 pandemic is no exception from these fluctuations. International food price markets have risen by over 40% in the past year (FAO, 2021), and South Africa (SA) is not exempt from this, as the Pietermaritzburg Economic Justice and Dignity Group indicated an increase in the food basket from September 2020 to July 2021 by 9.6% (PMBEJD, 2021). These price fluctuations are bound to affect the households' food security status. The fluctuating cost of food prices affects food accessibility and influences the quantity of the food procured as well as the quality of the food purchased, which can lead to households being food insecure. Taghizadeh-Hesary *et al.* (2019) investigated energy and food security linkages through price

volatility. They reported the relationship between energy prices and food prices in selected Asian countries in order to capture the possible association between energy and food security. Their results show that there is a linkage between energy and food security through price fluctuations. Changes in the food price can directly affect food affordability. For example, many rural smallholder farmers, particularly in developing countries like South Africa, are net food buyers rather than suppliers, which means they are unable to produce enough food to feed their household, and hence the fluctuations in food prices have a great impact on their livelihoods.

Lin *et al.* (2022) assert that the consumer price index for food provides an insight into the variations in food retail prices at the country and regional level. This

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translates to food accessibility and affordability. Namany *et al.* (2019) argue that the food security challenge has become a major concern for many countries and regions in the light of changing climatic conditions, unpredictable political instabilities and increasing consumption of resources, including price fluctuations. Most studies on price fluctuations concentrate on urban areas (Kurowska *et al.*, 2020; Luo and Tanaka, 2021; Mandal *et al.*, 2021; Shuplar *et al.*, 2022). The four pillars of food security are accessibility, availability, utilisation, stability, and sustainability. Price fluctuations have a significant impact on the stability of food security. High fluctuations or sudden changes in prices suggest drastic changes in food availability and accessibility by households. Many households in South Africa depend on Government social grants, and any increase in prices is unlikely to be attained. COVID-19 is directly and severely impacting access to food, even though impacts are also felt through disruptions to availability; shifts in consumer demand toward cheaper, less nutritious foods; and food price instability (Laborde *et al.*, 2020). Price increases are likely to force families to buy non-nutritious and lower-quality foods. This study was conducted in the middle of the pandemic and will highlight challenges faced by communities in small towns with regard to price volatility.

Devereux *et al.* (2020) posit that it is possible that global food prices could again increase, as it happened in 2008, given the unending Russian-Ukrainian war. Even if global prices remain relatively unchanged, there may well be localised price volatility in South Africa. In a number of countries, including for example, South Africa, retailers have profited from panic buying by raising prices of food excessively during the lockdowns (Competition Commission, 2020). Most socioeconomic studies consider rural and urban settings differently. The same justification is extended to the study of food insecurity and price fluctuations. For rural populations, the emphasis is placed on the socioeconomic and performance of subsistence and small-holder farmers, while in urban economies, the focus is on issues such as price volatility and market stability (Sisha, 2020). Urban dwellers are highly dependent on markets for their food demands and are vulnerable to adverse food price shocks. When the prices of basic foods begin to rise, it could negatively affect people's access to healthy foods and contribute to food insecurity (Jafri *et al.*, 2021). The fluctuations of food prices and the global food price crisis resulted in greater food insecurity for urban households in Africa, accompanied by policies that may have exacerbated price volatility (Mogues, 2020). This study, therefore, seeks to understand the impact of price fluctuations on food security in rural environments.

Moreover, food insecurity affects many aspects of life and can lead to dire health consequences, such as low birth weight, poor growth, and poor cognitive development in children, as well as an increased risk for non-communicable diseases (Hunter-Adams, 2019). To implement interventions that will increase food accessibility, it is important to understand how fluctuating food prices influence consumers' food choices.

Hunger can be described using two terms: chronic and hidden hunger. Chronic hunger is when there are insufficient calories to meet the needs of the individual (Gödecke *et al.*, 2018). The 2020 Food Security and Nutrition Report showed that even though data made available allowed for the downward shift in figures for annual hunger, the data show a continuous upward trend since 2014 (FAO, 2021). Retrospectively, it was estimated that 821 million people suffered from chronic hunger – this equates to one out of every 9 people worldwide in 2017 (FAO, 2018). Hidden hunger can be defined as when there is access to food in terms of macronutrients, but the food is not sufficient in terms of providing enough vitamins and minerals to promote a healthy lifestyle. According to the World Health Organisation (WHO, 2014), approximately 2 billion people globally are affected by hidden hunger. Research has shown that the quality of the diet provided to children is more important than the quantity (Otterbach and Rogan, 2019). According to the United Nations Children's Emergency Fund (UNICEF) Conceptual Framework for the determinants of child undernutrition, stunting is caused by inadequate access of a household to food (UNICEF, 2012). In SA, stunting is a major problem amongst children under five years of age, with a prevalence of 27%, which means that almost 3 out of every 10 children in the country are already stunted (UNICEF, 2019). Poor access to food in a household can lead to a higher risk of being born with a low birth weight (< 2500 g) and a higher risk of becoming stunted. Both these conditions lead to a higher risk of becoming overweight and obese later in life (FAO, 2018).

The provision of social grants has increased the level of food security in South African households considerably, yet the level of malnutrition and poor nutritional quality of the diet continues to increase (Coates, 2013). Social grants include child grants, disability grants, as well as old-age pensions, with the COVID-19 Social Relief of Distress (SRD) grant being recently introduced (Köhler and Borat, 2020). One of the main reasons for the poor growth of children in SA is the poor quality of diet that is mainly maize-based. Food insecurity can contribute to the rise in the level of obesity as well as undernutrition, and in many households, both

these conditions exist simultaneously (FAO, 2018). Research has shown that SA is currently experiencing a nutrition transition. Nutrition transition can be defined as a shift in diet to include more foods that are more energy-dense with an increase in added sugar and salt, and are considered more processed (Mbogori and Mucherah, 2019). Healthier food options are considered more expensive, and foods that are higher in energy, like bread and maize, are often cheaper than unprocessed foods like fruit and vegetables (Otterbach and Rogan, 2019).

Food prices play a big role in access to nutritious food, and it is important to draw up policies and implement programmes that increase access to nutritious food for the population so that food insecurity can be reduced. Therefore, the study aimed to assess the effect that fluctuating food prices have on the access to nutritious food by households in the Senqu Local Municipality of the Joe Gqabi District of the Eastern Cape, South Africa.

2. Materials and methods

2.1 Study design

The study followed a descriptive cross-sectional design using a quantitative approach. Descriptive cross-sectional studies are used to characterise the prevalence of the outcome (Wang and Cheng, 2020). A cross-sectional study was chosen with the aim of exploring the relationship between an exposure, price fluctuations, and health outcomes, food access and food insecurity. Cross-sectional studies can be relatively simple in design and are used to look at the prevalence of certain diseases as well as their risk factors (Webb and Bain, 2016). The study collected data on sociodemographic and biophysical environment, price fluctuations of major food groups, food consumption and food security.

2.2 Study setting

The study setting was the Senqu local municipality in Joe Gqabi District in the Eastern Cape. The Eastern Cape Province has a population of 6,522,700 or 11.3% of the total population of SA (Statistic South Africa (Stats SA), 2018). Joe Gqabi is one of the seven districts of the Eastern Cape province of South Africa. The seat of Joe Gqabi is Barkly East. The majority of its 349,768 people speak isiXhosa (Stats SA, 2011). The district is divided into three different local municipalities: Senqu, Elundini and Walter Sisulu. The dominant home language is isiXhosa, while Sesotho, Afrikaans and English are also spoken. The estimated population density per km² was 16.2 people in 2011 for Senqu Local Municipality, and in 2016, the estimated population density per km² was 19.2 people (Senqu Local Municipality, 2017). In 2016, the recorded number of households in the area was

35,597. Sengu has an estimated population of 134,150, of which 52.7% are females. The study location was Barkley East town, which is a rural town in Eastern Cape Province, South Africa, the seat of the Joe Gqabi District Municipality, lying in the mountainous area just south of Lesotho. Barkly East is characterised by rugged mountains and green valleys. Snow falls in winter, and it is within the boundaries of the Senqu Local Municipality



Figure 1. Map showing the town of Barkley East (Source: Senqu Local Municipality). GPS Coordinates: 30.9674°S, 27.5943°E

(Figure 1).

2.3 Sampling technique

Multistage sampling was used, where the population was clustered according to wards. There are seventeen wards in the Senqu municipality. Barkly East Town has 14 areas and was purposefully selected, and convenience sampling was used to select wards 16 and 15 as the areas to conduct the main data collection, and ward 14 was chosen to conduct the pilot study. Systematic sampling was used to select 382 households included in the study. According to the census held in 2011, there are 2,269 households in Ward 16, and Barkly East estimates the number of households at 2,643. This figure was used in the calculations of sample size as it is representative of both Ward 15 and 16, which make up the town of Barkly East, while the figure from the 2011 Census only represents Ward 16. The household informant, an adult above 18 years, was self-selected depending on who gave consent.

The sample was calculated using Slovin's Formula [$n = N/(1+(N \times e^2))$] where n = sample size, N = total number of households in Barkly East, and e = the accepted level of error. An additional 10% was added to account for attrition, making it 382.

2.4 Data collection

The main researcher and five trained fieldworkers collected the data. The interviews were conducted in either isiXhosa, English, Afrikaans or Sesotho, depending on which language the participant felt most comfortable with. Each questionnaire was coded

according to the number of households that were to be interviewed in that section. The consent forms and questionnaires were translated into isiXhosa, Sesotho, and Afrikaans. Every fifth household that was eligible to complete the questionnaire was selected for participation. This was done to limit bias and ensure that a random procedure was followed. This procedure enables a fair selection and representation of the participants who reside in each of the different areas of Barkly East. Barkly East is a small town in Eastern Cape Province, South Africa, the seat of the Joe Gqabi District Municipality, lying in the mountainous area just south of Lesotho.

Due to the risk of COVID-19 during the data collection period, certain protocols were put in place to protect the fieldworkers and participants from infection. The data was supposed to be collected from March to April 2020, but was moved to October/November 2020. An embargo was placed on research activities by the University following the lockdown enforced by the government to help curb the spread of COVID-19.

The questionnaire covered the following constructs: socio-demographics, household economy, food handling and preparation, food purchasing practices of the households and how these practices are affected by the fluctuating food prices, and food preferences questions based on the South African FBDGs. The questionnaire further enquired about the effect that preferences, practices, and price fluctuations have on nutritional adequacy.

The food groups used in the questionnaire were based on the food groups found in the FBDGs as well as the different food groups found in the SANHANNES study (Vorster, Badham and Venter, 2013). Food groups used also considered the different prices of the food and what can be considered similar. Economic food groups were highlighted in the National Agricultural Marketing Council (NAMC) report (2018), the Bureau of Food and Agricultural Policy (BFAP) report as well as the 2020 versions of both these reports (BFAP, 2020a) to ensure the foods that were highlighted in the questionnaire were current. The main food groups highlighted in the study are starches, meat, dairy, fats and oils, eggs, fruit, vegetables, and legumes. Each of the main food groups is explained using examples of foods that are found in these food groups and the foods consumed locally. Household food security was determined using the Household Food Insecurity Access Scale (HFIAS) (Coates *et al.*, 2007) and the Household Food Security Survey Module (HFSSM).

The HFIAS questionnaire is based on determining the experience. It is an experience-based instrument and

has been used to measure food security across different cultures in different countries. The HFIAS questionnaire is based on four different fields. These include uncertainty of food security in the long term, as well as worry about food security, which focuses on the short term. The quality and quantity of the foods are also determined, and how they affect food security (Coates *et al.*, 2007).

The HFSSM questionnaire was developed to assess whether the households had enough money to meet their basic food needs. The questionnaire also determines the response (behaviour and subjective) to this condition, and also determines the different levels of food insecurity experienced in terms of the quality as well as the quantity of food procured. The questionnaire has been designed for a recall period of 12 months, but a version with a recall period of 30 days has been developed for HFIAS (Leroy *et al.*, 2015).

2.5 Ethical and legal aspects

The study was granted ethical approval by the Research Ethics Committee: Social, Behavioural and Education Research (SBER) of Stellenbosch University (Project number: REC-2019-11026). Permissions were further granted by the Senqu Local Municipality. Participants living in the households that agreed to participate remained anonymous and were assigned a code for reference and statistical purposes. The addresses and contact information of the households chosen remained confidential and were only provided to fieldworkers when needed for data collection. A consent form was signed by each participant before they were able to take part in the study. Participants were allowed to withdraw, and all protocols of good clinical practice and the Helsinki Declaration (2013) (World Medical Association, 2013) were adhered to.

2.6 Data analysis

Data collected was captured into Microsoft Excel 2016 and transferred to Statistical Package for Social Sciences (SPSS) version 26 for statistical analysis. All data were summarised using descriptive statistics for quantitative data. Frequencies and percentages were used for qualitative variables. Statistical significance was set at a two-sided probability value of 0.05.

For HFIAS, the score for food insecurity ranged from 0 to 9 in households (Table 1). A summative score

Table 1. Household food insecurity access scale classification

Category	Score
Food secure	0
Mildly food insecure	1 - 3
Moderately food insecure	4 - 6
Severely food insecure	7 - 9

was created, and households were categorised into four mutually exclusive levels of food security (Table 1).

For the HFSSM, each item was attributed a score of 1 for food insecurity or 0 for food security. The score for food insecurity ranged from 0 to 15 in households with children or teenagers and 0 to 9 in households in which only adults lived. A summative score was created, and the households were grouped into four mutually exclusive levels of food security using the following “equidistant” algorithms (Table 2).

Table 2. Household food security survey module scoring.

Category	Score
Food secure	0
Mildly food insecure	1 – 5 adults only
Moderately food insecure	6 – 10 adults only 4 – 6 for households with children and teenagers
Severely food insecure	11 – 15 adults only 7 – 9 for households with children and teenagers

The Cronbach Internal Consistency Test was determined using households with children or adolescents as a basis because these households responded to all 15 items.

Pearson’s chi-square test was used to examine the association between access to different food groups and the association of food insecurity severity category.

3. Results

A total of 395 households participated in the study at a 103% response rate. Participants were selected from all fourteen areas of Barkly East, which is made up of Wards 15 and 16. A quarter of the households (20.5%) had four members, and 26.6% of households had children 18 years or younger. The age groups identified to be responsible for buying food were 35-55 years

(41.6%). Almost all the participants were female (81.4%). Over half of the participants (54.6%) indicated that they did not have a job, while over a third of participants (31.8%) had a job. A few indicated other forms of income, such as social grants, small businesses (they are entrepreneurs), and informal trading of food and sewing.

3.1 Food accessibility, purchasing practices, and price fluctuations

Different food groups studied include starches, meats, dairy, fats and oils, eggs, fruit, vegetables and legumes. The retail price of the different food items, as well as the food price fluctuations, was highlighted. This information was gathered from the NAMC reports, BFAP reports, FMFA, Food and Grain Annual Report, and the essential food price monitoring report released by the Competition Commission of South Africa in December 2020. The Household Affordability Index was also used to determine food price fluctuations of the different foods. The international food price indices released by the FAO were used, as well as the South African CPI. Figure 2 shows participant perceived price fluctuations, NAMC 2020 actual price inflation and food purchasing practices. This figure shows that rice and lamb had the highest inflation, above 60%.

Figure 3 presents the perceived price fluctuations by participants, whether they decreased, stayed the same or increased. Figure three presents data on whether participants bought more, the same or less of the food items.

3.1.1 Starches

The starches group included mealie meal, bread, rice, samp, mageu, oats, mabele/sorghum, Morvite, Corn Flakes, Weet-Bix and noodles or pasta. Figure 4 presents data on purchasing patterns for starches, reasons for

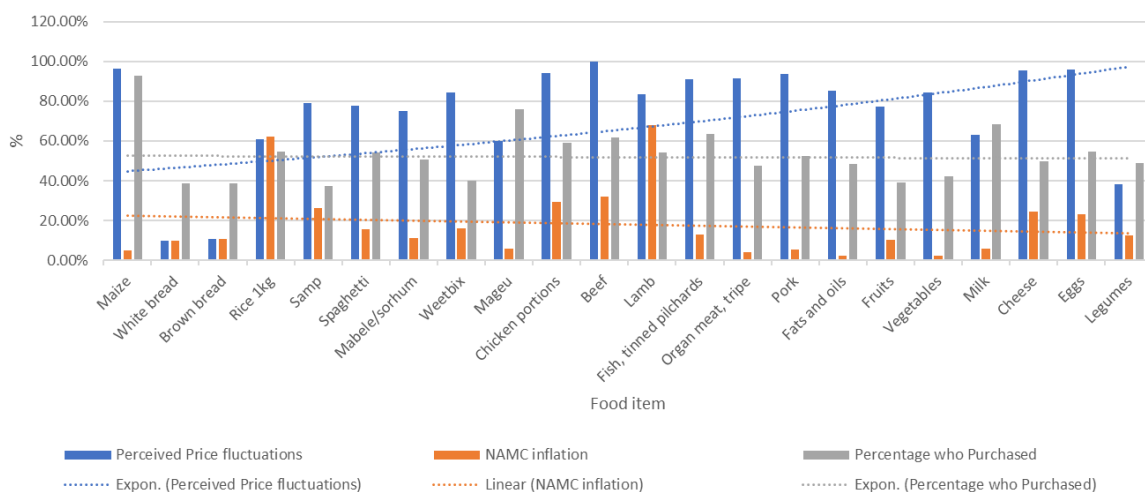


Figure 2. Perceived price fluctuations, NAMC inflation for 2020 and the percentage of who purchased the food item. NAMC: National Agricultural Marketing Council, Expon.: Exponential.

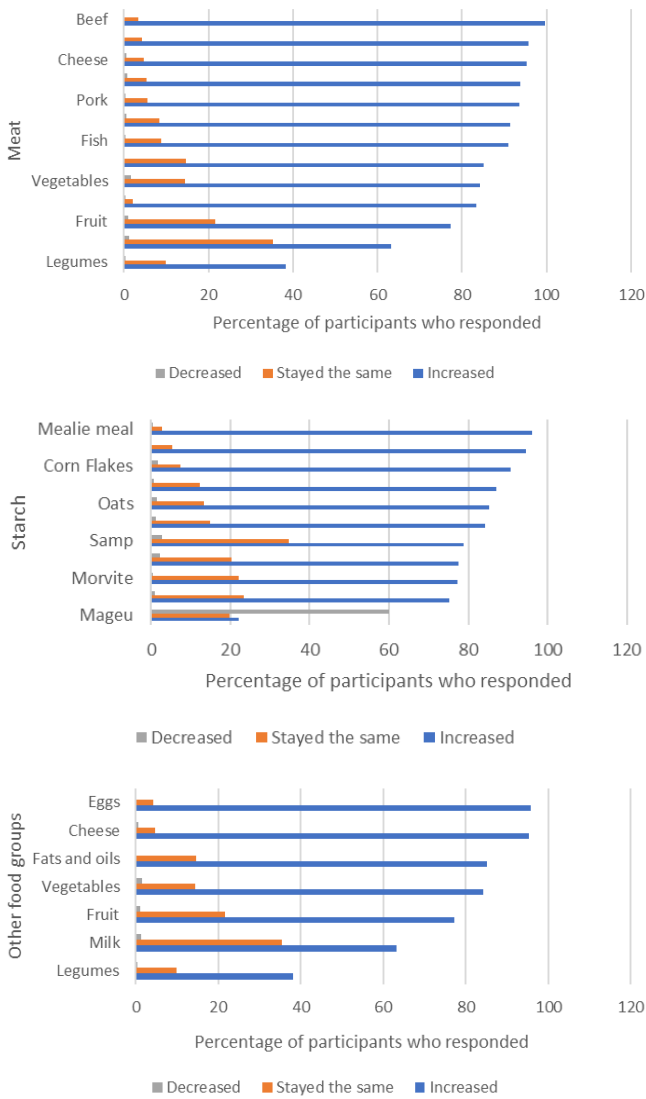


Figure 3. The Perceptions participants with regard to the prices of meat, starch and other food groups.

purchasing and perceptions of food pricing. The most consumed starch was mealie meal (99.7%), and all people who indicated they ate mealie meal also bought it. Most of the participants bought mealie meal once a month (64.5%). The main reason for buying mealie meal was that households liked it (59.1%). Most of the participants who bought maize meal thought that the price had increased (96.2%). Almost all the participants ate bread (98.7%), and nearly all the participants who ate bread bought bread (100%). About 37% of the participants bought bread once a month, and 34.8% of the participants bought bread once a week. The main reason for buying bread was that the households (67.7%) liked it.

3.1.2 Meats

The meat group included chicken, beef, lamb, organ meats (red), fish, pork, and goat. Figures 3 and 4 present data on consumption, price fluctuations, purchasing patterns for the meats and reasons for purchasing and perceptions on food pricing.

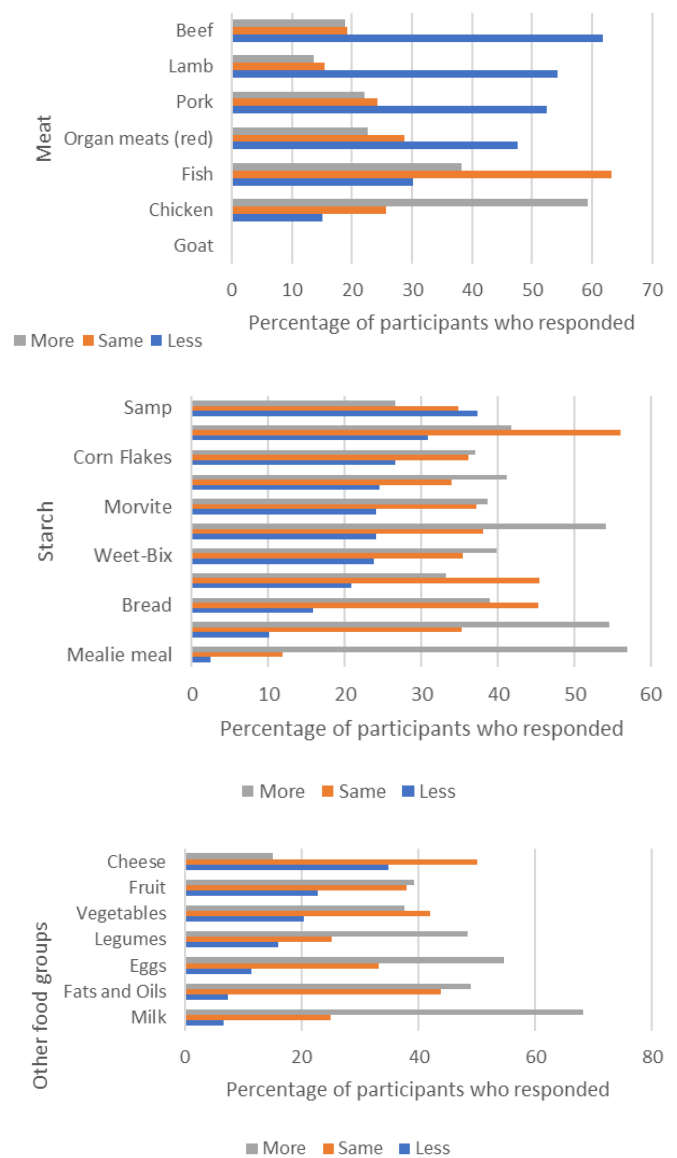


Figure 4. Meat, starch and other food groups purchasing patterns of participants.

Almost all participants (99.5%) ate chicken, and all the participants (100%) bought chicken. More than one-third of the participants (39.2%) bought chicken once a month, and 37.9% of the participants bought chicken once a week. The producer prices for fresh and frozen chicken decreased, while the price for chicken portions increased. Beef was consumed by 85.1% of participants. Most participants (96.1%) ate beef than those who bought beef. Most of the participants (79.9%) who ate beef bought it once a month. The main reason for buying beef is that households like it (70.6%). None of the participants thought the price of beef had decreased over the past year. More than half of the participants (61.9%) bought less beef despite the fluctuating food prices of the food item, as shown in Figure 4.

3.1.3 Fat and oils

The terms fats and oils refer to margarine, butter, and cooking oil. All participants (100%) ate and bought these

food items. Most of the fats and oils were bought once a month by 86.6% of participants. Some participants (52.4%) said they only bought this food item for cooking, and the main reason for buying this food item was that the households liked it. Notably, most of the participants (85.1%) thought that the price of fats and oils had increased, and 48.9% of participants bought more of them despite changing food prices.

3.1.4 Fruits and vegetables

Most of the participants (97.2%) ate fruit, and the same number of participants bought fruit. Less than half of the participants (33.6%) bought fruit once a month, and less than half of the participants (26.6%) bought fruit once a week. Over a third of the participants (36.4%) grew their fruit, but not all the participants who grew their fruit ate it (96.5%). The fruit grown was mainly peaches (90.7%). The main reason for buying fruit was that the participants (77.8%) thought it was healthy. Notably, most of the participants (77.3%) thought that the price of fruit had increased, with 39.3% of participants buying more fruit despite the fluctuating food prices.

Most of the participants (95.2%) ate vegetables, and 99.7% bought vegetables. Most of the vegetables were bought once a month (37.1%). Less than half of the participants (49.6%) grew vegetables, and of those participants who grew vegetables, the majority (91.3%) grew spinach, as shown in Figure 5. The main reason for buying vegetables was that they are considered healthy (75.7%).

Notably, most of the participants (84.3%) who bought vegetables thought that the price had increased and bought the same number of vegetables throughout the year despite the fluctuating food prices (42.1%). Most of the participants (65%) in the study used wild or traditional vegetables. Different wild vegetables were

identified: tjuthu (*Amaranthus dubius*), imbilikicane (*Chenopodium album* L.), ihlaba (*Sonchus oleraceus* L.), isqwashumbe (*Sisymbrium thellingii* O. Schulz) and umsolo (*Solanum nigrum* L.). Some of the Sesotho names for traditional vegetables identified are: tenane (*Wahlenbergia*), bubatsi/bobatsiv (*Urtica dioica* L.) and leharaswana (*Sonchus dregeanus* DC).

3.1.5 Dairy

Almost all the participants (96.7%) consumed milk. Most of the milk was bought once a week (47.6%). The term milk refers to full cream milk, low-fat milk, long-life milk, fresh milk, as well as Amasi, but not coffee creamers such as Cremora. Almost all the participants (99.5%) who consumed milk bought milk with the main reason cited for buying milk as that the households like it (57.6%). Over half of the participants (63.2%) who bought milk thought that the price had increased, and most of the participants thought that the price of milk had stayed the same over the past year (68.2%).

Cheese was eaten by just over half of the participants (53.9%), and most of those participants bought cheese as well (99.5%). More than half of the participants (86.8%) ate cheese once a month. The main reason cited for buying cheese was that the households liked it (54.2%). Most of the participants (95.3%) who bought cheese thought that the price had increased over the year, and half of the participants bought the same amount despite the fluctuating food prices (50%).

3.1.6 Eggs

Almost all the participants (93.4%) ate eggs, and most of those participants (99.7%) bought eggs. Most of the eggs were bought once a month (78.3%). The main reason for buying eggs was that it is considered healthy by 63% of the participants. Notably, most of the participants (95.7%) thought that the price of eggs had

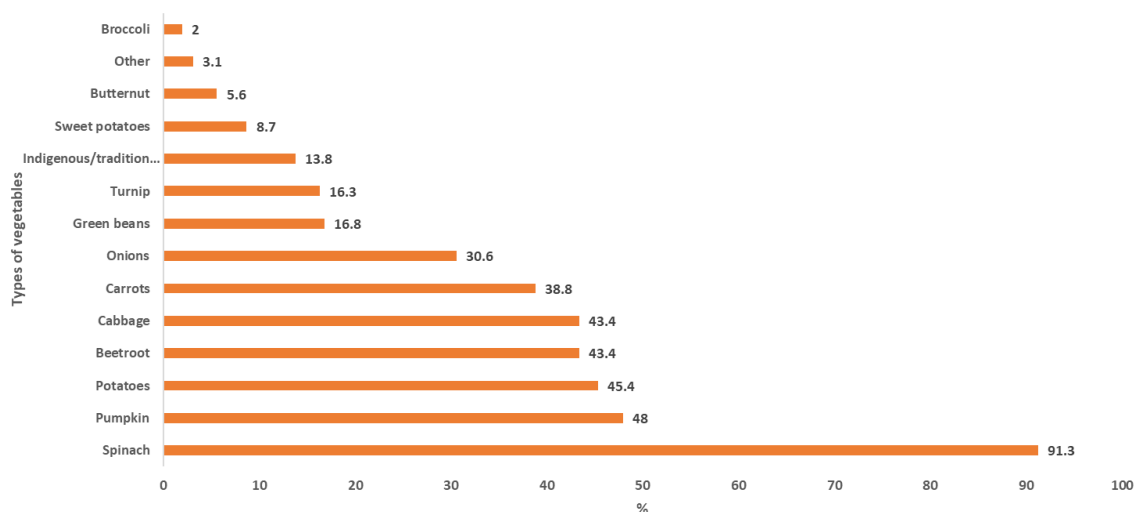


Figure 5. Types of vegetables grown in home gardens (n = 196).

increased, but 54.6% bought more eggs despite the changing price.

3.1.7 Legumes

Most participants (92.4%) ate legumes, and almost all the participants (99.7%) bought legumes. Most legumes were bought once a month (78.3%). Legumes refer to soup mix, soya mince, legumes, and dried beans. Some participants bought it once every three months or only during the winter. The main reason for buying this food item was that the household liked it (57.1%). The participants who bought the food item thought that the price had increased (38.2%). Just below half of the participants bought more of the food item throughout the year despite the fluctuating food prices (48.8%) (Figures 3 and 4).

3.2 Household food security data based on the Household Food Insecurity Access Scale and Household Food Security Survey Module

Households were considered food secure (n = 86, 21.8%), moderately food insecure (n = 156, 39.5%), mildly food insecure (n = 73, 18.5%) and severely food insecure (n = 80, 20.3%) using HFIAS (Table 3). Figure 6 shows the food security status by HFIAS.

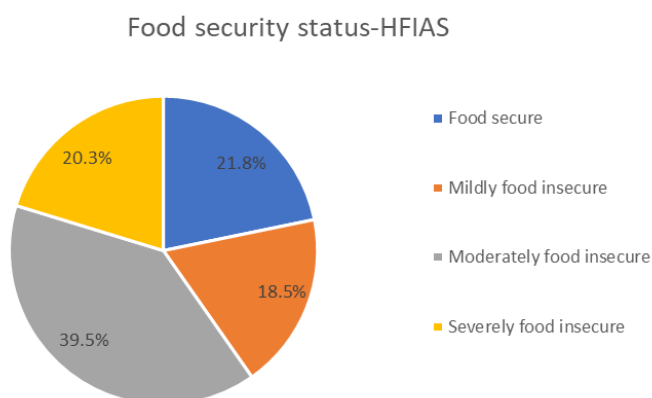


Figure 6. Food security status of households using HFIAS.

Table 3. Comparison of food security by measurement revealed that there is acute food insecurity.

Category	HFIAS (30 days)	HFSSM (12 months)
Food Secure	21.80%	81.30%
Mildly food insecure	18.50%	2.50%
Moderately food insecure	39.50%	5.60%
Severe food insecurity	20.30%	10.60%

HFIAS: Household food insecurity scale, HFSSM: Household food security survey module.

The HFSSM focuses on self-reports of uncertain, insufficient, or inadequate food access, availability, and utilisation due to limited financial resources, and the compromised eating patterns and food consumption that may result. The majority of the households (81.3%) were

considered food secure, as measured by food security in 2020. Further findings revealed that households containing children (below the age of 18 years) had an increased risk of being more insecure ($p = 0.001$) (Figure 7).

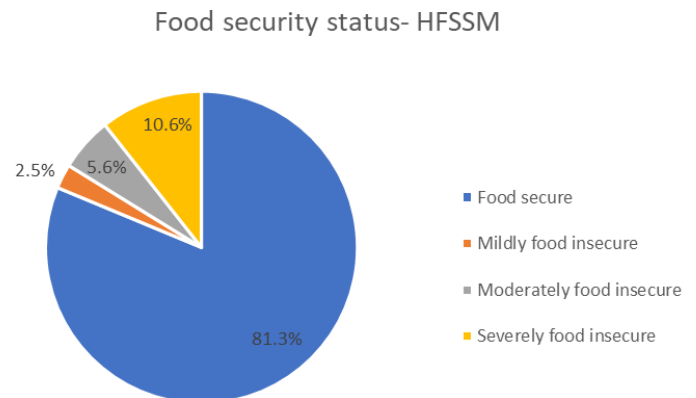


Figure 7. Household food insecurity access scale.

No association was found between the level of food security experienced by a household and that household rearing its livestock ($p = 0.271$). The association between households that grow their fruit and their level of food security is not statistically significant ($p = 0.915$) (Figure 3).

The differences indicate the impact of COVID-19 on food access.

4. Discussion

Most households' informants were females, an overwhelming majority. Women are known as home providers. Most households also have women procuring food items, preparing food and distributing. Women are also tasked with the arduous task of ensuring financial resources to be able to access food. Women are more likely to be aware of food price fluctuations due to their role in food procurement. Asadullah and Kambhampati (2021) highlight in their review that empowered women improve household food security. Women and girls have a significant role in household food provisioning, but are more vulnerable to various forms of malnutrition. Women are key to household food provisioning (Roy et al., 2023). This study confirmed the role of women in food provisioning. Gender has been recognised as a significant factor in food security, and women contribute towards the achievement of food availability, accessibility and utilization according to Drammeh, Hamid and Rohana (2019). When women contribute to the household economy and income and are able to participate in the decision-making of the household, they are more likely to prioritise the household budget on food, health services and childcare.

This study showed, as illustrated in Figure 1, that

there were perceived price fluctuations and that rice and lamb were the worst. In this study, participants perceived that the price of food had increased. Some of the prices had increased, as confirmed by NAMC price fluctuations. Jafri *et al.* (2001), reported that respondents in their study reported that the prices of food items increased during the lockdowns; the most affected food groups were fruits and vegetables, cereals and meat. Increased prices of staples like cereals were most reported in African countries; 74% in East Africa, 61% in West Africa and 52% in Southern Africa. Similarly, this study reported maize, meat, chicken, beef, fruit and vegetables. Price increases have been identified as an obstacle to food acquisition by 32.7% of respondents in the Jafri *et al.* (2001) study. According to Kurowska *et al.* (2020), price fluctuations reflect the stability of food security in a country. High fluctuations, shocks or sudden changes in prices suggest drastic changes in food availability or accessibility. This is likely to influence what households can buy.

Households with severe food insecurity in this study were reported to be approximately 20.3% in the previous month (acute), whereas for the year (chronic), it was approximately 10.6%. Acute food insecurity is more prevalent than chronic food insecurity, highlighting an increasing problem where access to food is insufficient to allow households to become food secure.

The current findings of the HFSSM module showed that even though some participants indicated that they “have enough of the kinds of food [they] want to eat” or “enough but not always the kind of food [they] want to eat”, they also indicated there was often not enough food to feed their children properly. This shows that children do not always receive enough nutrition to grow and develop properly. In addition, households with children were statistically more at risk of becoming food insecure (p -value = 0.000). We could not link food insecurity with price fluctuations, as it seems prices are on the rise all the time, but it does not keep households from buying food.

Food security in the region of southern Africa is considered one of the serious challenges that are faced by the region (Giwa and Choga, 2020). One of the main food challenges in the region is food availability, especially at the agricultural level. Accessibility in the markets is not a problem, as most food is imported. The southern Africa region is faced with the problem of a diversified production structure, which can hinder successful trade integration and economic development. These problems can eventually lead to unstable food prices because of fluctuations in production and price volatility.

As stated in the South African food-based dietary guidelines, people should enjoy a variety of foods. Eating a varied diet can positively influence the health status of the household and the individual. Following a diet that is low in dietary diversity can lead to poor food security and malnutrition (Steyn, 2013). Households in this study did not have a variety, probably due to pricing. The most affordable was maize, while meat, fruits and vegetables were not affordable. Another guideline is to “make starchy food the basis of most meals” (Vorster, 2013). The guideline is met as most of the participants bought starchy foods even though the majority indicated that the price of the food items had increased. This shows that more starchy food is bought despite the fluctuating food prices. “Eat dry beans, split peas, lentils and soya regularly” is guideline number five (Venter *et al.*, 2013). The results show that legumes are being purchased by more than half of the participants; therefore, more emphasis should be put on the consumption of legumes and pulses on their own or added to dishes. Legumes and pulses are important sources of protein and have many health benefits (Kumar and Pandey, 2020). Types of legumes in South Africa include black beans, black-eyed peas, Boston beans, cannellini beans, fava beans, garbanzo beans (chickpeas), kidney beans, cowpeas, lima beans, lentils, mung beans, navy beans, peanuts, pinto beans, soybeans (edamame), split peas and jugo beans. The most consumed are baked beans, butter beans, kidney and red beans. These are usually affordable for many households. Napier *et al.* (2019) reported that consumption of legumes and nuts was very low in KwaZulu-Natal.

“Eat plenty of fruit and vegetables every day” is food-based dietary guideline number six (Naude, 2013). The cost of vegetables amongst South Africans is higher than that of staple foods, but lower than that of fruit. This contributes to the tendency of South Africans to decrease the amount of fruit and vegetables they buy in favour of staple foods (BFAP, 2020b). Most of the participants bought fruit and vegetables. Just under half the participants grew fruit, and just over half of the participants grew vegetables. The growing of fruit and vegetables in a home garden would improve food security due to the consumption of important micronutrients as well as the creation of employment opportunities (Ferdous *et al.*, 2016).

“Have milk, maas, or yoghurt every day” is guideline number seven of the food-based dietary guidelines. Milk is considered a good source of protein and increases the nutrient value of other staple foods like maize and wheat. The consumption of dairy products is encouraged as it helps to increase dietary variety, leading

to an optimally healthy diet (Vorster *et al.*, 2013). An important part of this guideline is to highlight the consumption of maas. This fermented milk product is more culturally acceptable and has many health benefits, like decreasing the risk for cardiovascular disease (Du Plooy *et al.*, 2018). Milk is readily available in Barkly East as two franchise grocery stores sell both fresh and long-life milk. The price of milk did fluctuate, but some households still purchased it.

“Fish, chicken, lean meat or eggs can be eaten daily” is guideline number eight of the food-based dietary guidelines (Schonfeldt and Hall, 2013). It is unclear whether these products were consumed daily, as recommended by the FBDG. It has been indicated by the study that most of the food items were procured once a month. These items were also affected by price fluctuations. Red meat is especially inaccessible for many households. The tendency is to buy organ meat such as tripe, liver, kidneys, intestines, bones, chicken feet and giblets, which are cheap and affordable for low-income households.

For this study, the food items included were based on the reports written by NAMC, that includes the 28-food item basket, the BFAP report that includes the food items in the thrifty food basket, as well as the different food items included in the food-based dietary guidelines. Products that are available locally also influenced which food items were included in the study. All the food groups in the study experienced an increase in retail price. Due to fluctuating and high food prices, participants had to buy more from the starch group and less from the meat group. A coping strategy to prevent hunger from increasing in a household when there is not enough money is to buy food items that are considered cheaper and less nutritious. Another way is to decrease the variety of the food purchased (Van der Berg *et al.*, 2021). Despite the price fluctuations, we observed that it did not deter households from buying the food that they liked.

In this study, severe inadequate access was observed with the HFIA for eighty households (20.3%) and HFSSM for forty-two households (10.6%). These are similar to the findings of the General Household Survey results. Food security is a chronic problem facing the community. This is not surprising given the high unemployment rate in the area, at the time many households were registering for Government COVID 19 relief grants.

It cannot be said that most participants bought less or more fruit and vegetables due to fluctuating food prices, but rather many participants bought the same number of fruits and vegetables, despite the fluctuating food prices.

Thus, a deficiency in micronutrients, which can lead to both over- and undernutrition and ultimately malnutrition, is likely and can be lessened by eating a diet higher in vegetables.

Milk is considered one of the more affordable sources of protein for consumers (BFAP, 2020b). As shown through the analysis of the purchasing patterns of the consumers, most fruit and vegetables are bought once a month. It can be speculated that purchasing fruit and vegetables once a month does not always lead to a healthy and diverse diet because of the increasing price of fruit and vegetables, the food security status of households, and the low income of households in the area as most of the participants are unemployed. Milk is bought by most of the participants every two weeks. Research recommends that animal products can be consumed daily (Schonfeldt *et al.*, 2013). Most of these products are bought once a month. It has been shown that the unemployment rate is increasing, sufficient access to food is decreasing, and the prices of animal products are increasing; therefore, the participants are buying less. Job opportunities in the study area are limited.

Traditional vegetables are an important source of vitamins and minerals (Bvenura and Afolayan, 2014). Twelve varieties produced in gardens were identified in the data collection process in the area. Wild or traditional vegetables were used by 65% of the households in this study. Wild or traditional vegetables form an important component in optimal nutrition as they contain many micronutrients needed for optimal growth (Bvenura and Afolayan, 2015). It is important to emphasise the use of traditional wild vegetables in the South African population, especially in rural areas where it is readily available. Producing one's own vegetables would free up some finances to be able to purchase other food items.

As shown in the analysis of the results, food items necessary for achieving a healthy diet have increased in price. This puts more pressure on households to buy enough of the different foods needed to achieve a healthy and nutritious diet. Legumes can be considered an important alternative and sustainable protein source for the consumption of meat and meat products like beef, lamb, pork, and dairy products. Legumes are less expensive and are also considered good for the environment as they need less water and less fertiliser to promote growth (Conti *et al.*, 2021). The use of legumes in the diet as an alternative source of protein is not as widely accepted, although legumes form part of traditional diets.

5. Conclusion

The study findings have shown that there were perceived price fluctuations confirmed by NAMC data. All food groups were impacted by price fluctuations. However, households still accessed food they could afford; the price fluctuations did not deter them from buying food items they liked. More food is bought from the starch group and less from the meat group. This includes meat and meat alternatives, as well as milk. Rice, chicken portions, lamb and milk had price fluctuations; however, more than 50% of households still purchased the food items. The purchasing of these food items with fewer fruits and vegetables, as indicated in the study, does not allow for a healthy, nutritious and diversified diet. The trend analysis of Figure 3 shows that households are not deterred from food access by price fluctuations.

Over half the participants used traditional or wild vegetables. The use of these should be encouraged to help decrease the risk of food insecurity. Legumes and pulses are bought, but more education should be provided to consumers to use more legumes or pulses instead of meat. This is more sustainable due to the cheaper price of legumes or pulses compared to meat, and it is more sustainable for the environment as well. It is also positively affecting the climate. Households have reported that there is enough food, but some of these households have also indicated that there is not enough food to feed their children adequately. The food insecurity observed in this study could not be directly linked or associated with price fluctuations. There were other complexities, including unemployment and COVID-19.

Conflict of interest

The authors declare no competing interests.

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