

# Food Security in Urban Cities: A Case Study Conducted in Johannesburg, South Africa

Michael Rudolph<sup>1,\*</sup>, Florian Kroll<sup>1</sup>, Evans Muchesa<sup>1</sup>, Mark Paiker<sup>2</sup>, Paul Fatti<sup>3</sup>

<sup>1</sup>Faculty of Engineering and the Built Environment (FEBE), University of Johannesburg, Johannesburg, South Africa

<sup>2</sup>DMSA, Johannesburg, South Africa

<sup>3</sup>University of Witwatersrand, Johannesburg, South Africa

\*Corresponding author: [michaelr@uj.ac.za](mailto:michaelr@uj.ac.za)

Received February 19, 2021; Revised March 26, 2021; Accepted April 06, 2021

**Abstract** The objectives of the study were to determine the prevalence of food insecurity in greater Johannesburg metropole (South Africa). A total of 1000 households were interviewed using standardised food insecurity scaling and scoring metrics. Findings revealed that 34% of households experienced food insecurity and almost 60% spent R1000(\$57) or less on food per month. Only half of respondents reported adequate food provisioning throughout the year. Many households frequently bought less preferred foods or only what was necessary and almost 50% borrowed food or money to cope with food insecurity. Appropriate interventions to alleviate food and nutrition security are essential.

**Keywords:** food security, City of Johannesburg, urbanisation, nutrition, household, hunger, sources, access

**Cite This Article:** Michael Rudolph, Florian Kroll, Evans Muchesa, Mark Paiker, and Paul Fatti, "Food Security in Urban Cities: A Case Study Conducted in Johannesburg, South Africa." *Journal of Food Security*, vol. 9, no. 2 (2021): 46-55. doi: 10.12691/jfs-9-2-2.

## 1. Introduction

A detailed knowledge on food security in the City of Johannesburg (CoJ) is poor [1]. There is no recent, comprehensive, and representative data on the food security status of CoJ residents [2]. Studies have been conducted in selected locations in Greater City of Johannesburg and revealed the following general insights [1,3,4,5]: Between half and three-quarters of people in poor areas are affected by food insecurity. This translates into as many as 2.2 million people in the CoJ municipality, based on recent population estimates and the 2015 upper-bound poverty line of R992 per person per month [6,7].

The levels of food insecurity vary significantly, depending on the neighbourhood, time of year, and broader economic trends including employment, food price increases, and currency fluctuations [8]. Food sourcing is diverse, with most households accessing foods through supermarkets, albeit infrequently, and a large proportion accessing food frequently through informal trade [2]. Households living in informal settlements and those living in remote peri-urban areas far from job opportunities and markets are most likely to be food insecure. Dietary diversity is poor for at least a third of households, particularly the poorest and those living in informal settlements. Diets show an emphasis on starches, sugar, meat and sweetened beverages. This implies long-term health problems related to non-communicable diseases and infectious illnesses alike [4,9].

The South African National Health and Nutrition Examination Survey (SANHANES) study showed that informal urban areas were particularly severely affected by food insecurity, with 32% of households at risk and 36% experiencing hunger [10]. The survey data were used to inform the location of pilot sites for the implementation of a Food Resilience Programme but weaknesses in the research methodology used in this study limited the usefulness of the data. Demographic information showed that income poverty in the sampled areas appeared pervasive, with over half of households earning less than ZAR4000 a month to support approximately three persons per household [11].

Based on the limitations and shortcomings of previous studies, there was a need to carry out more regular food security monitoring in the City of Johannesburg, using standardised and comparable survey instruments, particularly as population demographics are ever-changing and progression in economic developments [2]. Engagement with urban food security and the food system is essential for the city based on the National Policy on Food and Nutrition Security for South Africa that was gazetted in August 2013 [12]. Although there is no clear local government mandate to engage with urban food security [13], there are several policy frameworks at national, provincial and local government level, which anchor this mandate. These include the Integrated Food Security Strategy [14], the Zero Hunger Strategy Gauteng Growth and Development Strategy 2040, and City of Johannesburg 2012/16 Integrated Development Plan [4]. The National Government Outcome 7 Delivery Agreement frames food security policy by addressing food

availability, accessibility, utilisation and affordability [15]. In contributing to the national agenda, the COJ has adopted Agriculture and Food Security as one of its key Growth Development Strategy 2040 priorities. Therefore, this study aimed to assess food security in the wider CoJ metropole [16].

## 2. Materials and Methods

### 2.1. Conceptual Framework

The conceptual framework for the study was based on several international food insecurity scaling and scoring metrics [1,2,3] which include; the Household Food Insecurity Access Scale (HFIAS); the Household Dietary Diversity Score (HDDS) and the Months of Adequate Household Food Provisioning (MAHFP) [1]. Also, the study looked at the sources of food and food environments dimensions of food insecurity [4] HFIAS is an internationally standardised and validated tool to assess the access dimension of food insecurity by querying the frequency of experiences of food insecurity over the previous month. HDDS is used to record respondents' consumption of various food groups in the previous 24 hours. It is quick to administer and is a proxy indicator for food security and socio-economic status [2].

The MAHFP instrument records the months of the previous year during which households experienced inadequate access to food. Sources of food provide an understanding of where households access food and how often they utilise different sources (including supermarkets, informal trade, street food, fast food, urban agriculture, feeding scheme, remittances, borrowing). This has implications for the planning and regulation of different food retail modes in the city. Food Environments is custom designed to reflect what kinds of food are accessible within 10 minutes' walking distance of respondents' homes [17].

One thousand households were interviewed for the study, which was done by selecting 125 starting points over 17 wards of the CoJ. In order to ensure appropriate samples reflecting the wider CoJ metropole and to ensure comparability with data previously collected in 2013, this survey selected sample wards which corresponded with the wards previously surveyed in 2013. The selection of wards was done in consultation with CoJ in order of socio-economic classification, vulnerability to food insecurity and unemployment levels. The following seven areas, and the number of wards in each, were included in the study: Diepsloot (2 wards); Westbury/Coronationville (1 ward); Cosmo City (1 ward); Soweto (4 wards); Alexandra (6 wards); Turffontein/Rosettenville (2 wards) and Orange Farm (1 ward). Data were gathered in face-to-face structured interviews by enumerators using the standardised survey questionnaires developed. Enumerators were selected based on their experience with social surveys generally and their prior experience with food security surveys as well as their familiarity with vernacular languages commonly spoken in the City of Johannesburg (i.e. isiZulu, seSotho, chiShona).

A questionnaire was designed to incorporate several standardised and validated instruments, along with basic demographic information. The instruments were selected to ensure comparability with similar studies conducted elsewhere in South Africa and abroad. The selection of respondents was conducted on a probability proportional to ward size. Within each ward, starting points were selected at random and eight households were sampled per starting point, the first being chosen closest to the starting point and thereafter every sixth household was selected. The person in the household who was responsible for food was interviewed. If there was more than one person, then one of them was selected at random. If this person was not available, then a return visit was arranged, and if necessary, a second return visit. Data were recorded via smartphones or tablets through a customised survey app that allowed enumerators to upload survey responses in real-time along with geo referencing information.

### 2.2. Statistical Analysis

The three food security indices as defined by USAID were computed from each household's responses: HDDS (Household dietary diversity score); HFIAS (Household food insecurity access scale) and MAHFP (Months of adequate household food provisioning). Additionally, the HFIAP (Household food insecurity access prevalence) sub-index of HFIAS was computed from each household's responses and the results were presented as for the three main indices [1,2,3].

### 2.3. Ethics

Ethical clearance to use human subjects in this study was granted by the University of the Witwatersrand's Faculty of Science Ethics Committee<sup>1</sup>.

## 3. Results

### 3.1. Participants' Description

Table 1 shows that most respondents were female. This reflects common gender roles, according to which household food provisioning and preparation generally falls within women's domain. More than half of respondents reported that four or more people usually ate together in that household. This has important implications for the number of people affected by food insecurity and being dependent on grants. Most of the respondents indicated that they were the heads of the household, although 17% indicated that their spouse headed the household and 18% indicated that a parent headed the household. This shows in most cases, the household head was also the person responsible for purchasing and preparing food. Most of the respondents (61%) were the main breadwinners. A small segment (~20%) indicated being dependent on parents or other relatives. Only 27% of respondents had full-time jobs. More than a third was unemployed reflecting the general high unemployment rate in the country. Female

<sup>1</sup> <https://www.wits.ac.za/research/researcher-support/research-ethics/>

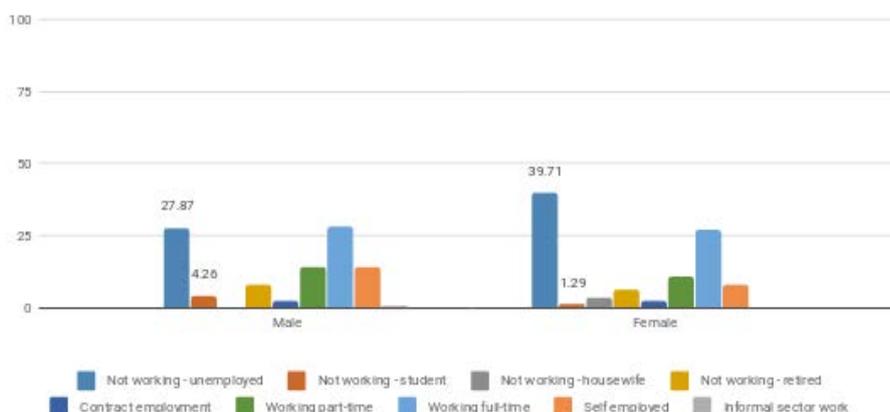
respondents were far more likely to be unemployed (Figure 1). About half of respondents received social grants. Without these grants many of the respondent households would be less able to afford food and thus likely to be more severely food insecure. Less than half of respondents had completed secondary education. This has important implications for employability, income

potentials and dietary knowledge. Female respondents reported lower levels of education (Figure 2). This has important ramifications on employability and consequently on incomes. Considering the important role played by women in household food provisioning, this educational disadvantage contributes to high levels of food insecurity.

**Table 1. Demographics of respondents**

Variable	Attributes	Percentage (%)
Gender	Male	30.5
	Female	69.5
Age	Younger than 20	5.0
	20-30 years	28.7
	30-40 years	27.3
	40-50 years	17.4
	50-60 years	13.7
	Older than 60	7.9
Education	No formal schooling	1.6
	Completed primary	7.9
	Some secondary	42.7
	Completed secondary school	39.8
	University & above	7
Household size	Refused	1
	1	7.5
	2	17.2
	3	19.8
	4	18.6
	5-6	23.5
	7+	13.4
Social grant dependency	Yes	46.7
	No	53.3
Household headship	Self	58.8
	Spouse	17.2
	Son/Daughter	0.5
	Father	8.1
	Mother	10
	Other	5.2
Breadwinner	Other	0.2
	Self	61.3
	Spouse	17.1
	Son/Daughter	2.2
	Father	5.6
	Mother	8
	Other	5.5
	Other	0.3

What is the household head's employment and work situation?



**Figure 1. Employment status of female respondents**

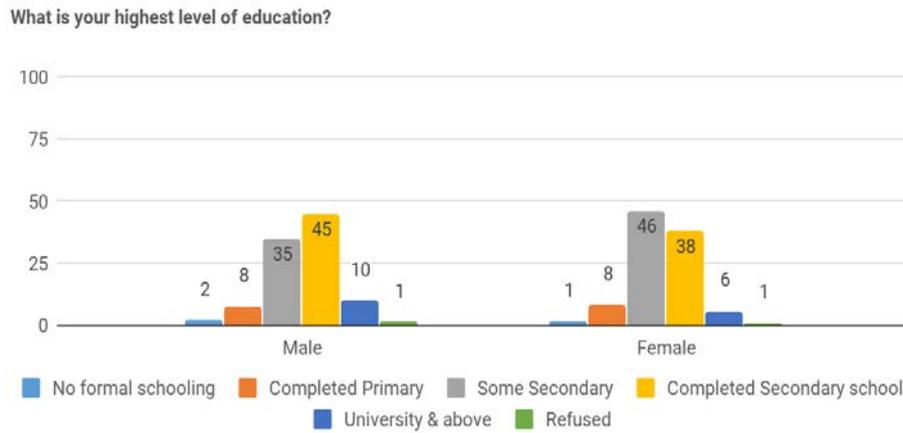


Figure 2. Educational background of respondents

### 3.2. Food Security

We opted to represent frequency distributions for each of the three metrics on its own terms. The mean Household Food Insecurity Access Scale (HFIAS) was 5.7 (Table 2), indicating generally low levels of food insecurity. The percentage distribution indicated that just over a third of respondents experienced no food insecurity

over the past month. 41% of respondents scored between 1 and 9, indicating low levels of food insecurity, 21% between 10-18 showing moderate levels of food insecurity, and 4% scored higher than 18, reflecting high levels of food insecurity. On aggregate, a quarter of respondents showed HFIAS scores which were moderate or high levels of food insecurity.

Table 2. Food security status

Variable	Attributes	Percentage (%)
Security status	0-secure	35
	1-9 low security	41
	10-18 moderate security	21
	19-27 high security	4
Insecurity status	Secure	37.0
	Mildly insecure	10.0
	Moderately insecure	19.0
	Severely insecure	34.0
Expenditure	Less than R500	21.4
	R500-1000	37.2
	R1000-2000	26.6
	More than R2000	14.8

### City of Johannesburg 2017 Food Security Survey - Food Access Insecurity

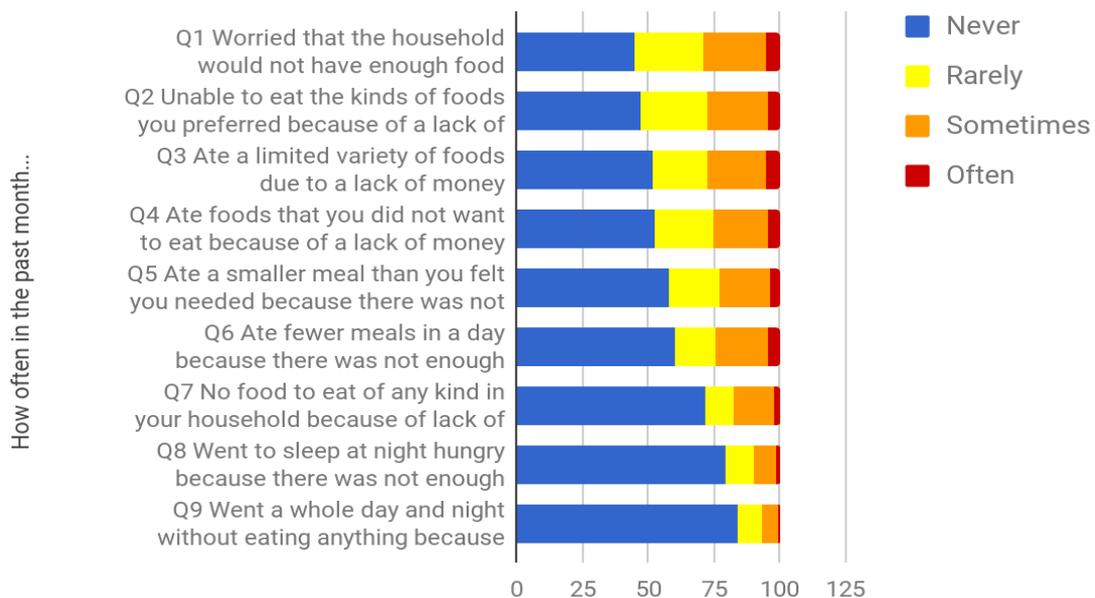


Figure 3. Household Food Insecurity Access Scale (HFIAS)

### City of Johannesburg Food Security Survey 2017 - Experiences of Food Insecurity by Gender

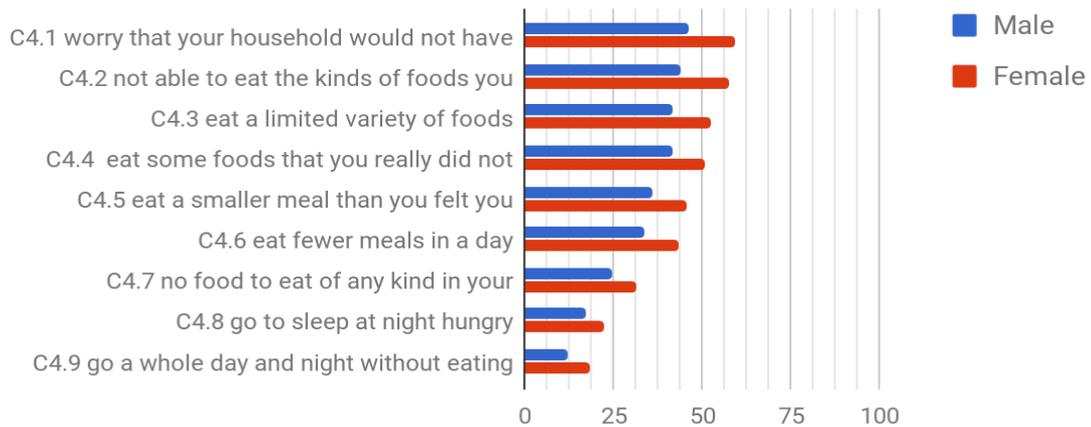


Figure 4. Household Food Insecurity Access Scale (HFIAS) by gender

The HFIAS was calculated from the responses to 9 questions which probed the frequency with which households experienced increasingly severe conditions of food insecurity. Figure 3 shows that about half of respondents experienced some of the milder forms of food insecurity in the previous month, but about a quarter experienced actual hunger. Data of HFIAS responses by gender consistently indicated greater levels of food insecurity reported by female respondents (Figure 4). The Household Food Insecurity Access Prevalence (HFIAP) reflected the degree of food insecurity of the sample population in terms of four discrete categories of increasing severity (Table 2). The overall HFIAP findings clearly showed high levels of severe food insecurity (37%), with slightly more than a third considered as food secure. This is in alignment with previous studies which found that between 27% [2] and 41% [1] of households surveyed were severely food insecure, with about a third positioned in the middle ground of mild or moderate food insecurity. The apparent discrepancy between this finding and the HFIAS scores reported above can be explained by reference to the scoring criteria for responses to the questions which explored more severe experiences of food insecurity (questions 7, 8 and 9).

Disaggregated by survey sample areas, it was apparent that there were great spatial disparities in levels of food insecurity with Orange Farm, Soweto and Diepsloot reflecting very high levels of severe food insecurity (Figure 5). In contrast, respondents from Rosettenville, Turfontein and Westbury reported far lower levels of severe food insecurity. Female respondents consistently reported higher levels of food insecurity, with 36% severely food insecure compared to 29% of male respondents who reported severe food insecurity (Table 3). This once again highlighted the multiple disadvantages faced by women as the primary custodians of food provisioning in the household.

As previously observed these disadvantages included lower levels of employment and education. Also, more vulnerable, were the households of older respondents - 38% households with respondents between 41 and 50 were severely food insecure as opposed to 29% of households whose respondents were between 30 and 40 (Table 3). Older respondents were even more likely to be severely food insecure (45%). Similarly, level of educational attainment correlated negatively with food insecurity - 48% of people who had completed only primary school were severely food insecure compared with 25% of respondents who had completed secondary school (Table 3).

### City of Johannesburg Food Security Survey 2017 - HFIAP by Area

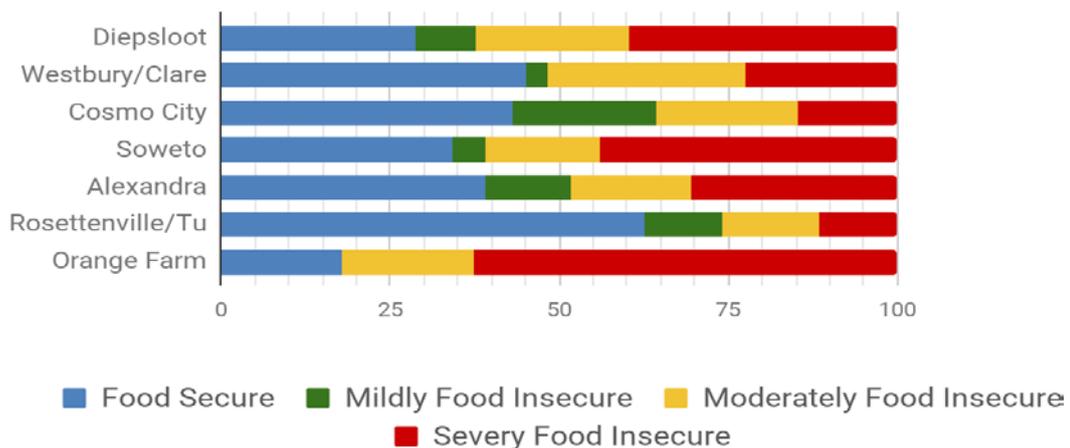


Figure 5. Household Food Insecurity Access Prevalence (HFIAP) by area

**Table 3. Food security by demographics of respondents**

Variable	Attributes	Secure	Mildly insecure	Insecure	Severely insecure
Gender	Male (n=305)	45	8	18	29
	Female (n=695)	33	11	20	36
Age	Younger than 20 (n=50)	62	4	10	24
	20-30 years (n=287)	45	9	16	29
	30-40 years (n=273)	35	14	22	29
	40-50 years (n=174)	33	10	19	38
	50-60 years (n=137)	23	7	26	45
	Older than 60 (n=79)	33	9	18	41
Education	No formal schooling (n=16)	6	6	25	63
	Completed primary (n=79)	29	5	18	48
	Some secondary (n=427)	27	10	23	40
	Completed secondary school (n=398)	46	12	17	25
	University & above (n=70)	67	7	10	16
	Refused (n=10)	30	10	10	50
Household size	1	53	7	5	35
	2	42	12	15	31
	3	35	14	20	31
	4	46	6	22	26
	5-6	30	10	21	39
	7+	25	9	25	40
	Employment status	Not working (n=475)	26	9	20
Working part-time (n=147)		36	11	16	37
Working full-time (n=273)		53	11	21	15
Self-employed/informal (n=104)		46	9	18	26

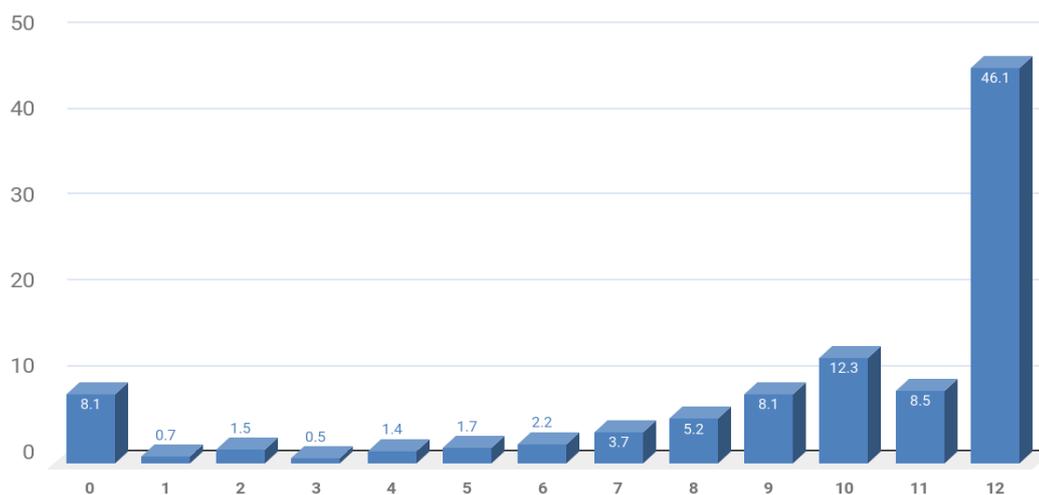
However, even completing tertiary education was no guarantee against severe food insecurity, with 16% of respondents in this category who reported severe food insecurity. Educational attainment influences peoples' employment opportunities and access to higher-paying jobs translates into greater food security. Thus, 44% of respondents who were not working were severely food insecure, while only 16% of respondents reporting full-time employment reported severe food insecurity (Table 3). The need to stretch incomes to feed more mouths in larger households meant that larger households tended to be more food insecure than smaller ones. 40% of households of 7 or more members sharing food were severely food insecure, while households of four appeared

least food insecure, with 26% reporting severe food insecurity (Table 3).

### 3.3. Food Availability and Food Insecurity Coping Strategies

The Months of Inadequate Food Provisioning (MAHFP) score showed that about 30% experienced 3 months or less of inadequate food (Figure 6). A small minority (8%), however, reported experiencing inadequate food provisioning every month of the past year, reflecting a small group of households which appeared to be trapped in chronic food insecurity. Most households spent a thousand rand or less each month on food (Table 2).

**City of Johannesburg 2017 Food Security Survey - Months of inadequate food provisioning**



**Figure 6. Months of Inadequate Food Provisioning**

### City of Johannesburg 2017 Food Security Survey - Coping Strategies

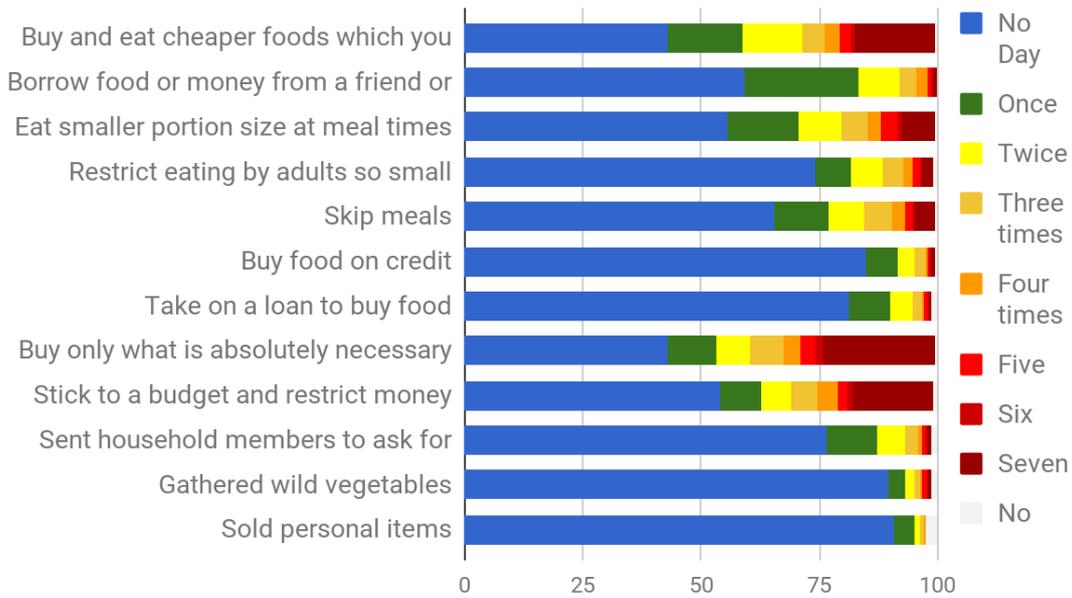


Figure 7. Food insecurity coping strategies

### City of Johannesburg Food Security Survey 2017 - HDDS Percentage Distribution

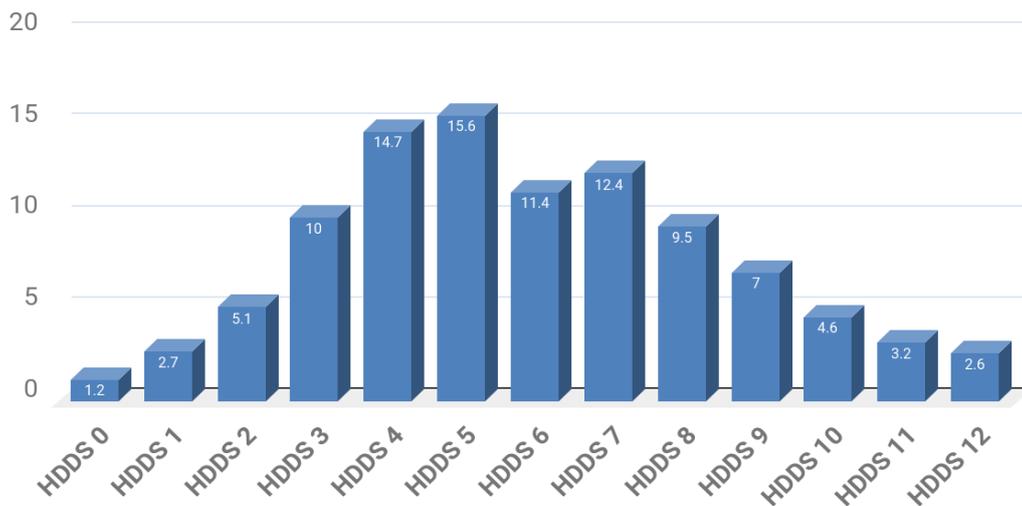


Figure 8. Household Dietary Diversity Score

According to PACSA food price barometer 2017, a basic diet for a family of four costs R2068.35; a minimum nutritional basket R4480.76 per month [20]. This clearly revealed that most respondent households were unable to afford even the basic food basket, while a nutritionally adequate diet was simply unaffordable for most respondents. Food insecure households used various strategies to make ends meet despite lacking money. The most commonly used and frequently employed strategies reported by respondents to this survey for the preceding week included buying and eating foods which are less preferred (56% at least once in the previous week), buying only what is absolutely necessary (57%), sticking to a budget (45%), reducing portion sizes (44%), and borrowing food or money from friends or relatives (40%) (Figure 7). Very few households reported selling personal

items, gathering wild vegetables, or taking on credit in order to buy food.

The average household dietary diversity score (HDDS) for this sample was 5.8 (Figure 8) which tended towards the middle of the distribution. However, the distribution reflected that approximately 19% reported a HDDS lower than 4, indicating a very low dietary diversity. The Dietary Profile chart showed that the most consumed foods were on starchy grain-based foods, sugar, sweetened hot beverages and meat (Figure 10). Although the aggregate scores reflected a high consumption of vegetables, the detailed chart revealed that the consumption of Vitamin-A rich vegetables was low (38% dark green leafy vegetables; 29% butternuts etc.). This dietary profile reflected consumption patterns which promote the development of non-communicable diseases and undermine immunity to infectious illnesses.

### City of Johannesburg Food Security Survey 2017 - Household Food Sources



Figure 9. Food sources for households

### City of Johannesburg Food Security Survey 2017 - Dietary Profile based on HDDS - Simplified

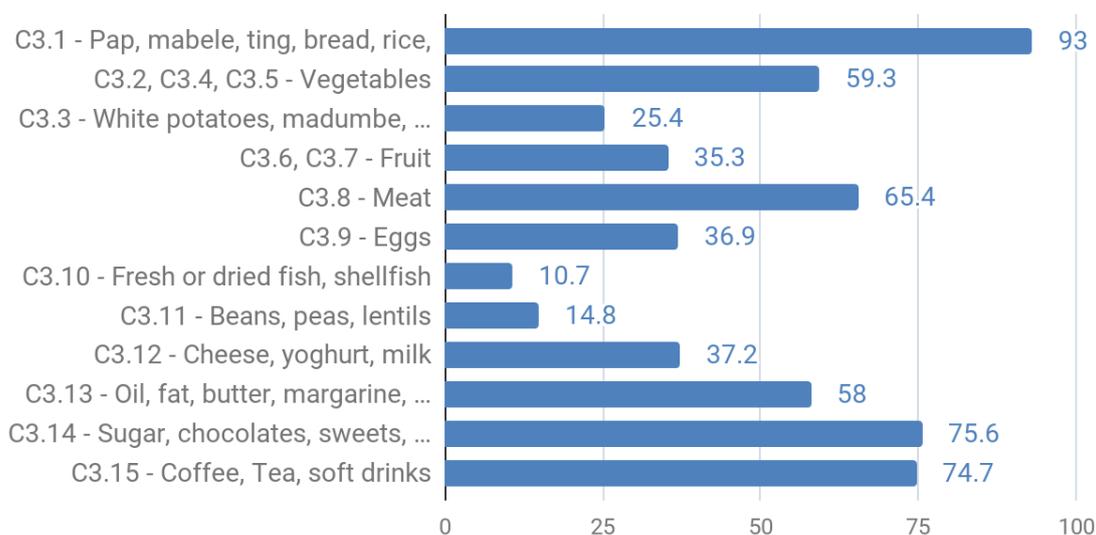


Figure 10. Dietary Profile based on HDDS

### 3.4. Food Sources

A review of food sources suggested that supermarkets are a common source of food for respondents, with over 90% indicating this as a food source (Figure 9). However, supermarkets were frequented mostly on a monthly basis. By contrast, small shops and spazas were far more frequent sources of food, with almost half of respondents reporting this source at least 5 days a week, and more than 85% reporting it at least once a week. Informal markets and street foods were also important sources of food, with more than 35% indicating this as a source at least once a week. Food service outlets were also commonly frequented, though less often than other sources, with

about half of respondents reporting this source at least once a month. Social networks appeared to be important sources for a minority of respondents; about 10% reported relying on various social relations at least once a week. By contrast, food aid via NGOs or the City of Johannesburg, community food kitchens and CoJ peoples' restaurants was negligible. This could have been as a result of few such programmes operating within the areas sampled, but also suggested that such initiatives are too few and poorly resourced to offer significant alternative channels for food access. Food gardens also represented a small and infrequently used source of food, with less than 5% of respondents reporting this source at least once a month. This confirmed previous findings by AFSUN (Crush et al., 2010).

## 4. Discussion

Most of the respondents were female and youth exposing a considerable number of households that were female and youth headed, and these household categories are the most vulnerable. This phenomenon is also noted in a number recent of studies on food security [17,18,19]. A considerable number of the respondents indicated that they were the breadwinners with almost half of them having completed secondary education and also being unemployed. They also indicated they mostly survive on social grants or street vending and reported spending less than ZAR2000 each month on food, which is significantly below the ZAR R2068.35 minimum food basket [4]. Most households were unable to afford even the minimum food basket, while the more costly nutritionally balanced food basket was almost entirely unattainable. The findings show high levels of unemployment, low levels of education and low food expenditure. Nevertheless, large numbers of people generally ate meals together, implying that the limited resources were stretched quite far to feed household members.

According to HFIAP at least one in three respondent households were severely food insecure, and one in three mildly or moderately insecure. This suggests that within the greater Johannesburg metropolitan area [7], about two million people may be food insecure. This number is likely to be much higher due to the current COVID-19 crisis [20]. The sheer scale of food insecurity confirmed that this is an issue with massive negative consequences for public health, human development, economic productivity, and social cohesion. By comparison, budgetary allocations, food security planning and intervention programmes are desperately under-resourced and inadequate, particularly considering that most interventions are agriculturally oriented and focused on the distribution of tools or food parcels.

The coping strategies employed by most households include buying only what is necessary, eating foods less preferred, reducing portion sizes, sticking to a budget and borrowing food or money from friends or relatives. These strategies indicate that most households are compromising on dietary quality and diversity. Most households end up consuming starchy and sugary food and drinks along with meat, while healthier fruit, vegetables (dark green leafy vegetables, vitamin-A rich vegetables and pulses are consumed less widely. This dietary profile implied a high risk of non-communicable diseases such as diabetes, obesity, hypertension and heart disease as well as reduced immunity to infection. The compromise on dietary quality and diversity is further compounded by half of the respondents indicating that they experience periodic food shortages, while there is a small but significant segment which is trapped in chronic food insecurity requires continuous support to avoid acute and long-term consequences of food insecurity.

This findings related to sources of food highlighted the important role played by the informal food retail sector in making food available close to where poor people live, and in quantities affordable to them, reflecting a complementary relationship between supermarkets and informal food retailers [16].

Food environments appeared to offer most of the respondents' access to most foods within 10 minutes' walking distance, especially starchy staples and affordable proteins, but it was clear that sugar-sweetened beverages and chips were particularly accessible. This suggested that food environments promoted diets which contribute to non-communicable diseases. A minority of the respondents indicated that they grow some of their own food. Urban farming, despite the obvious limitations of inadequate land to permit cultivation of food, water scarcity, inadequate or poor training, inadequate tools, poor pest management, nevertheless presents an opportunity to provide a range of nutritious food for urban dwellers gardens and can create multifunctional green assets which can contribute to addressing a range of issues in the urban setting [1,12,15].

## 5. Conclusion

This study clearly highlighted the severe food security problem in the City of Johannesburg with women, youth and the elderly being the most vulnerable. Both immediate and longer-term integrated strategies need to be implemented to address matters such as policy, management, planning and operational support for food gardens.

## Acknowledgements

Tinashe Mushayanyama and Elaine Molotsi from City of Johannesburg Strategy, Policy, Coordination & Relations Unit under the auspices of the City Manager;

## Declaration of Interest Statement

The authors declare that there is no conflict of interest related to publication of this article and the data has been presented objectively.

## References

- [1] Rudolph, M., Kroll, F. 2016. City of Johannesburg Food Resilience Programme Evaluation Final Report, Wits Commercial Enterprise, Wits Siyakhana Initiative, School of Geography, Archaeology and Environmental Studies (GAES), October 2016.
- [2] Rudolph, M., Muchesa, E. and Kroll, F., 2020. Use of Urban Agriculture in Addressing Health Disparities and Promotion of Ecological Health in South Africa. *current health*, 10, p.12.
- [3] Rudolph, M., Kroll, F., Ruysenaar, S., Dlamini, T. 2012. The state of food insecurity in Johannesburg. AFSUN Urban Food Security Series No. 12. Kingston: Queen's University and Cape Town: AFSUN.
- [4] Bartels, P., Rijgersberg, H., Groot, J., Bos-Brouwers, H., & van Gogh, B. (2018). Future Food Basket: methodology for the forecasting of the future food demand (No. 1842). Wageningen Food & Biobased Research.
- [5] Battersby, J. and Watson, V., 2018. Addressing food security in African cities. *Nature Sustainability* 1(4):153-155.
- [6] Stats S.A., 2017. Poverty trends in South Africa. An examination of absolute poverty between 2006 and 2015. Report No. 03-10-062015. Statistics South Africa. Pretoria.
- [7] Stats S.A., 2018. Statistical release P0302: Mid-year population estimates. Pretoria, South Africa.

- [8] Bilinsky, P., Swindale, A., 2017. Months of Adequate Household Food Provisioning (MAHFP) for measurement of household food access: Indicator guide (v. 4). Washington, DC: FHI 360/FANTA; 2010.
- [9] Crush, J., Frayne, B. 2011a. Urban food insecurity and the new international food security agenda. *Development Southern Africa* 28(4): 527-544.
- [10] DAFF. 2014. The National Policy on Food and Nutrition Security for the Republic of South Africa. Pretoria: Government of South Africa.  
<http://www.daff.gov.za/docs/media/NATIONAL%20POLICYon%20food%20and%20nutrition%20security.pdf>.
- [11] Drimie, S., Faber, M., Vearey, J. Nunez, L. 2013. Dietary diversity of formal and informal residents in Johannesburg, South Africa. *BMC Public Health* 2013: 13: 911.
- [12] GCRO OCCASIONAL PAPER # NO. 15. Urban agriculture in the Gauteng City-Region's green infrastructure network. JULY 2020, Compiled by Hannah Benn. Downloaded 18/08/2020 [https://www.gcro.ac.za/m/documents/Urban\\_Agriculture\\_OP\\_final\\_July\\_2020.pdf](https://www.gcro.ac.za/m/documents/Urban_Agriculture_OP_final_July_2020.pdf).
- [13] Haysom, G. and Tawodzera, G., 2018. "Measurement drives diagnosis and response": Gaps in transferring food security assessment to the urban scale. *Food Policy* 74:117-125.
- [14] Holdsworth, M., Landais, E., 2019, January. Urban food environments in Africa: implications for policy and research. In *Proceedings of the Nutrition Society*. Cambridge University Press.
- [15] Khumalo, N. Z., & Sibanda, M. (2019). Does Urban and Peri-Urban Agriculture Contribute to Household Food Security? An Assessment of the Food Security Status of Households in Tongaat, eThekweni Municipality. *Sustainability*, 11(4), 1082.
- [16] Lappeman, J., Litkie, J., Bramdaw, S., & Quibell, A. (2020). Exploring retail orientated rotating savings and credit associations: festive season 'stokvels' in South Africa. *The International Review of Retail, Distribution and Consumer Research*, 30(3), 331-358.
- [17] Masa, R., Graham, L., Khan, Z., Chowa, G., & Patel, L. (2019). Food insecurity, sexual risk taking, and sexual victimization in Ghanaian adolescents and young South African adults. *International journal of public health*, 64(2), 153-163.
- [18] Chakona, G., Shackleton, C.M. 2019. Food insecurity in South Africa: To what extent can social grants and consumption of wild foods eradicate hunger? *World Development Perspectives* 13: 87-94.
- [19] Tumushabe, J. T. (2018). Climate change, food security and sustainable development in Africa. In *The Palgrave handbook of African politics, governance and development* (pp. 853-868). Palgrave Macmillan, New York.
- [20] Wegerif, M. C. (2020). "Informal" food traders and food security: experiences from the Covid-19 response in South Africa. *Food Security*, 1-4.



© The Author(s) 2021. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).