
The Impact of the COVID-19 Pandemic on Food Consumption Habits, Food Purchasing Behaviours, and Food Security Status among South Africans

Ashika Naicker

Durban University of Technology

ashikan@dut.ac.za

Onwaba Makanjana

Durban University of Technology

onwabam@dut.ac.za

Karina Palmer

University of Zululand

palmerk@unizulu.ac.za

Phindile Favourite Nzama

Durban University of Technology

phindilen1@dut.ac.za

DOI: <https://doi.org/10.51415/ajims.v3i1.915>

Abstract

This study assesses the impact of the COVID-19 pandemic on food consumption habits, food purchasing behaviours, and food security status among South African adults. The researchers conducted an online consumer survey for the month of October 2020. Approximately two-thirds of participants were youth and women, predominantly from KwaZulu-Natal. A significant number of participants reported to either having remained the same weight or gained weight. Changes in food consumption habits included a significant increase in snack consumption, increased water consumption, and improved food skills. Notably, no food was eaten significantly more than before COVID-19 and no food was eaten significantly less than before COVID-19. Regarding food purchasing behaviours, a significantly high number of participants indicated that food prices increased during the lockdown. Whilst a significant number of participants indicated that they had no difficulties eating enough food, a significant number of participants reported that they could not afford to buy more food and as a coping strategy resorted to planting vegetables. The findings of this survey provide an advancement of knowledge on food consumption, food purchasing behaviours, and food security status during emergency situations as well as long-term food-related strategies.

Keywords: COVID-19; South Africa; food consumption habits; food purchasing behaviour; food security

Introduction

The first COVID-19 positive case in South Africa was confirmed on 5 March 2020 (National Institutes for Communicable Diseases, 2020). On 15 March 2020, the South African government declared the coronavirus pandemic a national disaster and due to rising numbers the country was put on hard lockdown from the 26 March to 30 April 2020. In this period people were only permitted to leave their homes to seek medical help and buy medicine and essential groceries (Stiegler and Bouchard, 2020). From 1 May onwards, the government employed a 5-level COVID-19 alert system to manage the gradual easing of the hard lockdown to improve, among other challenges facing the country, the economic and social impact of lockdown restrictions (Ramaphosa, 2020).

The COVID-19 pandemic has profoundly affected human health, triggering sudden lifestyle changes, inflicting an unexpected way of life, through social distancing and isolation at home, with social and economic consequences. Optimising public health during this pandemic requires not only knowledge of the medical and biological sciences, but also of all human sciences associated with lifestyle, social, and behavioural studies (Di Renzo, 2020). Mitigation measures such as physical distancing and self-isolation have strongly impacted people's lives, affecting in particular

dietary habits and everyday behaviours. While these measures are imperative to abate the spreading of COVID-19, the impact of these restrictions on health behaviours and lifestyles in South Africa is undefined, and it is very likely that some of these changes will persist until after the crisis.

One of the aspects in which the COVID-19 pandemic has caused significant changes is in people's food purchasing, food consumption behaviours, and food security status due to the lockdown. Understanding food consumption, food purchasing behaviours, and food security status is certainly useful, not only to understand how consumers' behaviours change and adapt during crisis periods but also to provide useful guidance in emergency management efforts. Behavioural countermeasures of both the individual and the community are important determinants to improving resilience and enhancing the efficacy of public health approaches during a pandemic (Naja and Hamadeh, 2020: 1117). Suboptimal nutrition may result in long-term effects linked to unfavourable health outcomes. The potential impact of the lockdown is manifold; people may have consumed more food as a coping strategy against fear and anxiety caused by the uncertain situation, some people may have opted to consume healthier alternatives believing that this form of nutrition would provide protection against the virus, and some people who are highly affected economically may have altered their dietary preferences. Unusual retail consumer behaviour, such as hoarding or stockpiling, was reported when the COVID-19 virus escalated into a pandemic (Miri *et al.*, 2020:1). As restrictions were imposed, consumers were forced to shift their grocery shopping experiences to conform to the new normal (Martin-Neuninger and Matthew, 2020: 2).

In South Africa, food stability in terms of the disruption of the food supply chain and food price inflation was a cause for concern as to whether food would remain available and accessible to all South Africans at prices they could afford (Nyamwanza and Sinyolo, 2020: 8). With the new normal of the lockdown came stress and boredom which triggered changes in dietary habits such as overeating especially comfort foods or under eating due to food security status, which could have a long-term impact on health outcomes. While society navigates the new normal, food security has become a cause for concern. The State of Food Security and Nutrition in the World 2019 report shows that South Africa's food availability status, as measured by the food balances, was higher than the global average, yet a third of the population (29.9%) experienced severe levels of food insecurity (FAO, 2019). It is essential to recognise the people most vulnerable to a food and nutrition crisis in the context of COVID-19 and those already exposed to critical food and dietary deprivations before the onset of the crisis (Nyamwanza and Sinyolo, 2020; FAO, 2020).

While South Africa has been undergoing a nutritional transition, the double burden of malnutrition still coexists with an upsurge in obesity and the persistent prevalence of stunting (Nyati *et al.*, 2019; Kimani-Murage *et al.*, 2010). Against this context, the study sets out to understand how a pandemic like the novel coronavirus affects food consumption habits, food purchasing behaviours, and food security status and the potential future impact on the nutritional status of South Africans. The findings of this survey will assist in the advancement of the knowledge of consumer food consumption, food purchasing behaviours, and food security status, and can guide policymakers, communities, and companies to better deal with similar crisis emergency management efforts in the future.

Methodology

A cross-sectional survey was administered online through Microsoft Forms targeting the South African adult population aged ≥ 18 years in all nine provinces of South Africa. The minimum sample size for a population size of +1,000,000 with a 95 per cent confidence level and 5 per cent margin of error is 385 (Taderhoost, 2017: 238). The survey included questions on socio-demographic information, food consumption habits, food purchasing behaviours, and food security status. This study used non-invasive methods and followed standard protocol for approval by the Durban University of Technology (DUT) Institutional Research Ethics Committee

(IREC no: 115/20). The researchers obtained institutional gatekeeper permission from DUT, the University of Zululand, and Mangosuthu University to post the survey onto the student and staff portal. Informed consent and a letter of information was hyperlinked to the online questionnaire. Informed consent was attained through a checkbox at the start of the survey. Participation in the online questionnaire was entirely voluntary and anonymous, with the right to withdraw at any time from the survey.

The survey questionnaire comprised of four sections, and a total of 38 questions were adapted, designed, reviewed, and edited by the researchers (Di Renzo *et al.*, 2020: 1). The reliability of the questionnaire was pilot tested prior to the survey administration among staff in the Department of Food and Nutrition at DUT and the Department of Consumer Sciences at the University of Zululand who were not part of the survey design (n=10). The pilot survey was opened for three days for staff to complete online, and it included questions to determine the usability, ease of comprehension, and routing and sequencing of questions. Results of the pilot survey were considered in the finalisation of the questionnaire before implementation which included the addition of a question to indicate participants' race and the inclusion of a not applicable choice to one question. The final survey link was not shared with participants that completed the piloted survey.

The final survey included an introductory paragraph describing the background and the aims of the survey, ethics information, and a checkbox for informed consent. The survey was shared as broadly as possible. The survey was disseminated through an institutional intranet (DUT, University of Zululand, and Mangosuthu University), and shared with other national university networks, the general public via e-mail, and social networks through LinkedIn™, Facebook™, and WhatsApp™. The general public was also encouraged to share the survey to possible interested participants in their network through snowball sampling. This method of administration provided a statistical collective whose population parameters cannot be controlled as in the case of probabilistic sampling. However, it was deemed effective for the research objectives as it facilitated the wide dissemination of the survey questionnaire during a period where, due to the pandemic, there were many territorial restrictions. The survey took 15 minutes to complete, and the survey was open for a month from 1 October to 30 October 2020. Through the settings of the online questionnaire, the survey was allowed to be taken once per device, limiting duplication.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 25 (IBM Corp, Armonk, NY, USA). Descriptive statistics was used to define the proportion of responses for each question. Chi-square goodness-of-fit test was used for categorical variables and chi-square tests of independence were used to identify relationships between changes pre-COVID and during COVID. Statistical significance was accepted as $p < 0.05$.

Results

Table 1 represents the participant characteristics of the sample. The survey produced an eligible sample of 508 participants, with 89 per cent (n=452) of the participants residing in the KwaZulu-Natal (KZN) area and the remaining participants from the rest of South Africa. A large number of participants (67.5% n=343) were women, and 31.7 per cent (n=161) were men. About two-thirds (65.6%, n=333) of the participants were youth of ages from 18 to 24 years (33.9% n=172) and 25 to 34 years (31.7% n=161), respectively. About half of the participants (55.1% n=280) were black South Africans, 32.7 per cent (n=166) were Indians, and 8.9 per cent (n=45) were white. One-third of the participants (33.3% n=169) were students. A large number of participants (52.7% n=268) were employed and were either going to work as usual (23.4% n=119), working from home (14% n=71), or combining both going to work on certain days and working from home (15% n=78). A significant number of the participants weighed the same since COVID-19 (33.7% n=171) or gained weight (45.1% n=229) ($p < 0.0005$).

Table 1: Participant characteristics

Variable	Categories	N (%)
Gender	Women	343 (67.5)
	Men	161 (31.7)
	Prefer not to say	4 (0.8)
Age (years)	18-24	172 (33.9)
	25-34	161 (31.7)
	35-44	64 (12.6)
	45-54	54 (10.6)
	55-64	47 (9.3)
	65+	10 (2.0)
Race group	Black	280 (55.1)
	Indian	166 (32.7)
	White	45 (8.9)
	Coloured	13 (2.6)
	Other	4 (0.8)
Province	KwaZulu-Natal	452 (89.0)
	Gauteng	33 (6.5)
	Western Cape	8 (1.6)
	Eastern Cape	12 (2.4)
	Mpumalanga	2 (0.4)
	Free State	1 (0.2)
Employment status	Student	169 (33.3)
	Unemployed	63 (12.4)
	I go to work as usual	119 (23.4)
	Combination	78 (15.4)
	Work from home	71 (14)
	Retired	8 (1.6)
Weight change	Weigh the same	171 (33.7) *
	Gained weight	229 (45.1) *
	Lost weight	78 (15.4)
	Not noticed	30 (5.9)

* p<0.005

Changes in Food Consumption Habits

A large number of participants (36.8% n=187) reported to having changed their eating habits for the worse during the COVID-19 pandemic period, followed closely by 34.6 per cent (n=176) who reported no change in eating habits during this period (Table 2). Significantly, 31.5 per cent (n=160) of participants did not change the number of meals consumed a day, while 25 per cent (n=127) participants added one or more snacks between meals, and 17.5 per cent (n=89) skipped one or more meals during the pandemic (p<.0005). Significantly, 48.8 per cent (n=248) of participants reported an increased intake of water during this period (p<0.005), of which 45.1 per cent (n=229) consumed one to two litres a day (45.1% n=229), and those consuming less than a litre made 44.7 per cent (n=227) of the participants (p<0.005). Approximately half of the participants' (51.6% n=262) appetites increased (p<0.005), while 82 per cent (n=416) of participants indicated that they were particularly hungry after dinner during this period (p<.0005).

Significantly, 175 participants (34.4%) consumed leftover food from a previous meal over 50 per cent of the time. In contrast, 22.6 per cent (n=115) of participants indicated that they consumed

leftover food from a previous meal over 10 per cent of the time. Food waste during this period remained the same for 44.3 per cent (n=225) of the participants, while 41.3 per cent of participants (n=210) reported a decrease in food waste (p<0.005). More than half of the participants (55.5% n=282) noted an improvement in their food skills (p<0.005). Regarding healthy eating, 36.4 per cent (n=185) of participants indicated maintaining healthy eating as something they did before the pandemic, whereas 33.5 per cent (n=170) of the participants changed to eating less healthily during the COVID-19 period (p<0.005). Two hundred and forty-six (48.4%) participants indicated that they took vitamin supplements to improve their immunity during this period. Thirty-six per cent (n=182) of the participants used homemade concoctions to boost their immunity during the COVID-19 pandemic. The most common homemade concoctions included citrus (lemon/lime/oranges), ginger, and honey.

Table 2: Changes in food consumption habits (n= 508)

Variable	Category	N (%)
Have your eating habits changed during the COVID-19 pandemic period?	No	176 (34.6)
	Yes, got worse	187 (36.8)
	Yes, improved	145 (28.5)
Did your number of meals change during this period?	No	160 (31.5) *
	Skip 1 or more snacks between meals	23 (4.5)
	Added 1 or more snacks between meals	127 (25.0) *
	Skip 1 or more main meals	109 (21.5) *
	Added 1 or more main meals	89 (17.5)
Fluid intake	Increase in tea, coffee consumption	130 (25.6)
	Increase in water consumption	248 (48.8) *
	Decrease in water consumption	104 (20.5)
	Decrease in tea, coffee consumption	26 (5.1)
Amount of water currently consumed	<1 litre	227 (44.7) *
	1-2 litre	229 (45.1) *
	>2 litre	52 (10.2)
Changes in appetite	No	121 (23.8)
	Yes, less appetite	77 (15.2)
	Yes, more appetite	262 (51.6)
	Have not noticed	48 (9.4)
Did you consume leftover food from a previous meal?	Never	30(5.9)
	< 10%	115(22.6) *
	10-30%	103(20.3)
	>30-50%	85(16.7)
	>50%	175 (34.4) *
Changes in food waste	Remained the same	225 (44.3) *
	Increase	73 (14.4)
	Decreased	210 (41.3) *
Changes in food skills	No	88 (17.3)
	Yes, improved	282 (55.5) *
	Remain the same	138 (27.2)
Change of eating habits compared to before the COVID-19 pandemic?	Eating healthier now than before	153 (30.1)
	Eating the same as before	185 (36.4) *
	Eating less healthy now than before	170 (33.5) *
Vitamin supplements	Taken vitamin supplements	246 (48.4) *
	Home-made concoctions	182 (35.8)
	Nothing	188 (37.0) *

* p<0.005

A significant number of 416 participants (82%) indicated that they were particularly hungry after dinner ($p<.0005$), whilst 54 per cent ($n=275$) and 52 per cent ($n= 265$) of participants pointed out that they were not hungry between main meals and before main meals, respectively (Table 3). More than half of the participants (54% $n=275$) used the internet for recipes to aid in the improvement of food preparation skills, while 20 per cent ($n=100$) used recipe books and magazines, and 16 per cent ($n=82$) used the television for recipes to improve food skills.

Table 3: Changes in sense of satiety and food skills (n=508)

Item		Frequency (%)		N	p-value
		Yes	No		
Changes in sense of hunger and satiety during lockdown	Between main meals	233 (46)	275 (54)	508	.069 ^a
	Before main meals	243 (48)	265 (52)	508	.351 ^a
	After dinner	92 (18)	416 (82) *	508	.000 ^a
Aids to improve food skills	Internet for recipes	275 (54)	233 (46)	508	.69 ^a
	Recipes books and magazines	100 (20)	408 (80)	508	.000 ^a
	Television	82 (16)	426 (84)	508	.000 ^a

* $p<0.005$

A significant relationship between eating habits regarding eating out and eating in before and during COVID-19 lockdown was noted ($p<.0005$) (Figure 1). Before the COVID-19 pandemic period, 77.2 per cent of the participants ate out once a week or not at all but during the pandemic the number increased to 85.2 per cent however, increased frequencies of eating out decreased during the pandemic. On the other hand, the number of participants who cooked food or prepared dinners at home during this pandemic increased from 62.9 per cent to 69.3 per cent.

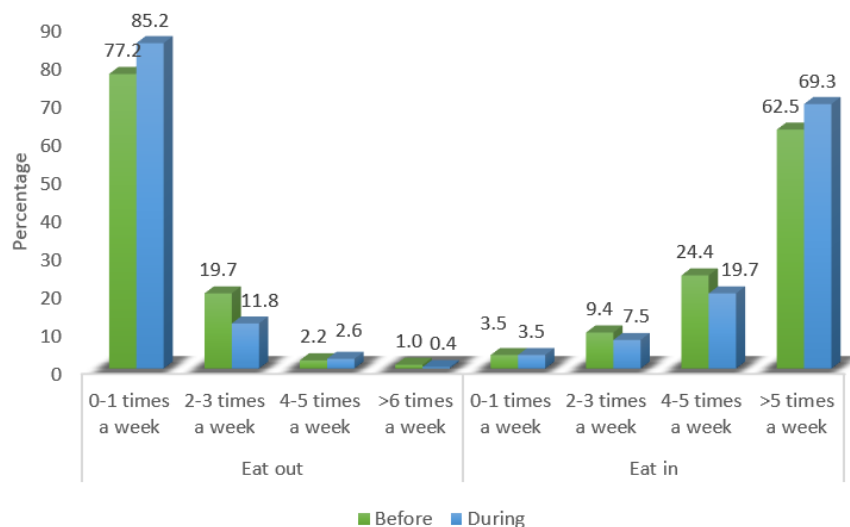


Figure 1: Eating habits regarding eating out before and during the lockdown

No food was eaten significantly more than before COVID-19 and no particular food was eaten significantly less than before COVID-19 (Table 4). Food consumption patterns before and during the COVID-19 period seemed to stay the same for the majority of participants, with the exception of foods such as fruit (54% $n=274$), chicken (49% $n=251$), bread (47% $n=283$), and fresh vegetables (80% $n=408$), in which there was a decrease in consumption to 21 per cent, 17 per

cent, 5 per cent, and 20 per cent, respectively, during this period. Consumption of food such as offal (3%), frozen fish (6%), processed meat (8%), and pizzas and pastries (18%), increased during the COVID-19 period to 8 per cent, 11 per cent, 16 per cent, and 20 per cent, respectively.

Table 4: Increased and decreased consumption of specific foods before and during COVID-19 (n=508)

Item	Before COVID-19				During COVID-19			
	N (Frequency %)		n	p-value	N (Frequency %)		n	p-value
	Yes	No			Yes	No		
Fruits	274 (54)	234 (46)	508	.083 ^a	107 (21)	401 (79)	508	.000 ^a
Fresh vegetables	205 (40)	303 (60)	508	.000 ^a	100 (20)	408 (80)	508	.000 ^a
Frozen vegetables	85 (17)	423 (83)	508	.000 ^a	75 (15)	433 (85)	508	.000 ^a
Mealie meal	128 (25)	380 (75)	508	.000 ^a	56 (11)	452 (89)	508	.000 ^a
Samp	74 (15)	434 (85)	508	.000 ^a	72 (14)	436 (86)	508	.000 ^a
Rice	187 (37)	321 (63)	508	.000 ^a	71 (14)	437 (86)	508	.000 ^a
Bread	238 (47)	270 (53)	508	.169 ^a	86 (17)	422 (83)	508	.000 ^a
Pasta	112 (22)	396 (78)	508	.000 ^a	78 (15)	430 (85)	508	.000 ^a
Noodles	84 (17)	424 (83)	508	.000 ^a	80 (16)	428 (84)	508	.000 ^a
Cereals	112 (22)	396 (78)	508	.000 ^a	93 (18)	415 (82)	508	.000 ^a
Frozen fish	33 (6)	475 (94)	508	.000 ^a	55 (11)	453 (89)	508	.000 ^a
Canned fish	76 (15)	432 (85)	508	.000 ^a	69 (14)	439 (86)	508	.000 ^a
Chicken	251 (49)	257 (51)	508	.824 ^a	25 (5)	483 (95)	508	.000 ^a
Pork	75 (15)	433 (85)	508	.000 ^a	58 (11)	450 (89)	508	.000 ^a
Red meat	143 (28)	365 (72)	508	.000 ^a	79 (16)	429 (84)	508	.000 ^a
Offal	13 (3)	495 (97)	508	.000 ^a	41 (8)	467 (92)	508	.000 ^a
Legumes	135 (27)	373 (73)	508	.000 ^a	45 (9)	463 (91)	508	.000 ^a
Soya	41 (8)	467 (92)	508	.000 ^a	42 (8)	466 (92)	508	.000 ^a
Processed meat	41 (8)	467 (92)	508	.000 ^a	79 (16)	429 (84)	508	.000 ^a
Soup	66 (13)	442 (87)	508	.000 ^a	29 (6)	479 (94)	508	.000 ^a
Cow's milk and yoghurt	157 (31)	351 (69)	508	.000 ^a	54 (11)	454 (89)	508	.000 ^a
Pizzas and pastries	91 (18)	417 (82)	508	.000 ^a	103 (20)	405 (80)	508	.000 ^a
Bakery products	149 (29)	359 (71)	508	.000 ^a	70 (14)	438 (86)	508	.000 ^a
Cheese	158 (31)	350 (69)	508	.000 ^a	48 (9)	460 (91)	508	.000 ^a

A significant 65 per cent (n=331) of participants shopped at the supermarket in person (p<.0005) during the lockdown period (Table 5). Approximately, an equal number of participants indicated using the retail supermarkets' online services and local street markets during this period (36%) (p<.0005). Thirty-three per cent of participants (n=169) experienced food shortages when purchasing food from food outlets with fresh vegetables, meat, and rice being the most common items.

Table 5: Platforms/outlets used to purchase food and food shortages/availability

Item		N (Frequency %)		n	p-value
		Yes	No		
Shopping	Supermarket/ shop in-person	331 (65) *	177 (35)	508	.000*
	Local street market	181 (36)	327 (64) *	508	.000 ^a
	Supermarket online	184 (36)	324 (64) *	508	.000 ^a
	Other	4 (1)	504 (99)	508	.000 ^a
Food shortages	Food shortages when purchasing	169 (33)	339 (67) *	508	.000 ^a

* p<0.005

A significantly high number of participants, 72 per cent (n=366), indicated that food prices increased during this period (p<0.005) (Table 6). The food items that were observed as having noticeably increased prices during COVID-19 were rice, meat, fruit and vegetables, and cooking oil. When comparing their shopping behaviours to normal times 50.2 per cent (n= 255) of the participants indicated that they were buying in larger quantities than usual during the pandemic.

Table 6: Changes in cost of food commodities and food acquisition methods

Variable	Category	N (%)
Changes in cost of food commodities	Food prices have increased	366 (72) *
	No changes	139 (27.4)
	Food prices have decreased	3 (0.6)
Changes in food acquisition methods	Buying larger quantities than usual	255 (50.2)
	Buying smaller quantities than usual	61 (12.0)
	No changes -no need	97 (19.1)
	Buying cheaper or less preferred food than usual	96 (18.9)
	No changed made -cannot afford to buy larger quantities	37 (7.3)

* p<0.005

Food Security

Whilst 28.9 per cent (n=147) of participants indicated that they had increased their food intake, 17.5 per cent (n=89) of participants skipped meals, 14.2 per cent (n=72) of participants ate less preferred foods, 2.4 per cent of participants went a day without food, and a significant number of participants indicated that they had no difficulties eating enough food (54.9% n=279) (p<0.005) (Table 7). A significant number of participants indicated that they had two to three weeks stock (18.1% n=92), one month stock (16.5% n=84), or sufficient household stock (36.6% n= 186). Using the Pearson Chi-Square test, the situation did not change before and during the lockdown regarding having enough food to eat. A significant number of participants reported that they couldn't afford to buy more food (58% n=113) and as a coping strategy 84 per cent (n=168) planted vegetables (84% n=168) (p<0.005). Six per cent of participants depended on a free meal. Although, 11 per cent and 19 per cent of participants were not confident and somewhat confident that they would be able to afford the kinds of food they need for the next two weeks, a significant number of participants indicated that they were moderately confident (30% n=152) and very confident (40% n=203) that they would be able to afford the kinds of food they need for the next two weeks (p<0.005).

Table 7: Food Security Status of Participants

Variable	Category	N (%)
Meal patterns	Increased food intake	147(28.9)
	Skipped meals and ate less	89 (17.5)
	No difficulties- normal eating pattern	279 (54.9)
	Ate less preferred foods	72 (14.2)
	Went a day with without food	12 (2.4)
Does your household have enough food stock	No	45 (8.9)
	Less than one week	26 (5.1)
	1 week stock	34 (6.7)
	2-3 weeks stock	92 (18.1) *
	1 month stock	84 (16.5) *

	>1month stock	41 (8.1)
	Yes	186 (36.6) *
Getting enough food can also be a problem for some people. Which statement best describes the food eaten in your household before the lockdown?	Enough of the foods I want to eat	335 (65.9)
	Enough, but not always the kinds of food I want to eat	138 (27.2)
	Sometimes not enough to eat	27 (5.3)
	Often not enough to eat	8 (1.6)
Getting enough food can also be a problem for some people. Which statement best describes the food eaten in your household during the lockdown?	Enough of the foods I want to eat	312 (61.4)
	Enough, but not always the kinds of food I want to eat	152 (29.9)
	Sometimes not enough to eat	37 (7.3)
	Often not enough to eat	7 (1.4)
Food access	Couldn't afford to buy more food	113(58)
	Couldn't get out to buy food	35 (18)
	Afraid to/didn't want to go out to buy food	60 (31)
	Couldn't get groceries/meals delivered	19 (10)
	The stores didn't have the food I wanted	33 (17)
Coping strategies	Planting vegetables	168 (84)
	Borrowing food from neighbours/ friends/ family	35 (18)
	Depend on food hamper	14 (7)
	Free meal	32 (6)
How confident are you that your household will be able to afford the kinds of food you need for the next 2 weeks?	Not at all confident	58 (11)
	Somewhat confident	95 (19)
	Moderately confident	152(30) *
	Very confident	203(40) *

* p<0.005

Discussion

In this paper, a cross-sectional survey was administered online to investigate the impact of the COVID-19 pandemic on food consumption habits, food purchasing behaviours, and food security status among South African adults. Participants were mainly youths residing in KZN and predominately black, followed closely by Indians. This could be a result of acquiring gatekeeper permission from three large universities in the KZN province and the survey being shared on online platforms with the rest of the country. More than two-thirds of the participants were women. Studies show that women are more responsive and are on the frontline of community issues, especially those that affect families, because women are primary caregivers within the family unit (Wenham *et al.*, 2020). Further, demographics showed that the youth and employed people mostly participated in this online survey. According to Kansime *et al.* (2020), young people are comfortable in using the internet and can access social media platforms; and also employed people can afford internet services at home and are more likely to use the platforms that were used to conduct this survey. The socio-demographic results also show that with being restricted to staying at home and the closing of recreational places and services like public pools, beaches, parks, and gyms, many the participants gained weight during this period. However, a third of the participants indicated that their weight remained the same and this could be the result of some challenges people faced during the COVID-19 pandemic lockdown (Stiegler and Bouchard, 2020).

Results from a study conducted in the United States with 861 participants from two major metropolitan areas (Chenarides *et al.*, 2021), reported similar results in terms of majority of the

participants' eating habits not changing during COVID-19. Moreover, eating out before and during COVID showed slight changes as the frequency of eating out increased (from 77.2% to 85.2%), a significant number of those who had dinner at home once a week or not at all, now had dinner two to three times a week at home, contrary to the US study which indicated that the participants consumed somewhat more take-out during COVID-19 (29.65%). Improved food skills with more time to prepare home-cooked meals were reported by more than half the participants in this study, in line with another COVID-19 study done in Qatar (n=579) (Hassen *et al.*, 2020). Although purchasing food items in-person from supermarkets was mostly preferred, 36 per cent of participants used online shopping. Even though the South African e-tailing industry is still in its emerging phase, the lockdown influenced some consumers to adapt to this form of making purchases, and the benefits of these behaviours are likely to continue as a norm.

Overall, the COVID-19 lockdown brought about divergent trends in food consumption habits. Unfavourable trends in food consumption patterns included the change of food habits for the worse, increased snacking, increased appetite, and eating less healthy foods, whilst favourable trends included an increased consumption of water, increased use of left-over food, decreased food waste, and improvement of food skills. The results presented here imply that lockdown conditions and contextual factors, such as anxiety related to COVID-19, loss of income, and food security status, were drivers of the divergent trends in food consumption habits during the pandemic. Similar results were reported by other studies. In a large cross-sectional online survey among 2680 participants from Denmark, Germany, and Slovenia, diverging trends in all food categories were observed, with some participants decreasing and others increasing their consumption frequencies, demonstrating that the pandemic had different impacts on people's lifestyles and food consumption patterns (Jansen *et al.*, 2021).

Likewise, in a scoping review, a total of ten studies reported an increase in the number of snacks consumed, six studies found that participants increased the number and frequency of meals consumed during the pandemic, whilst eleven studies reported favourable changes in dietary habits with an increase in fresh produce and home cooking (Bennett *et al.*, 2021). Further to this, two studies conducted at the start of the pandemic on eating habits and changes in dietary behaviour also reported divergent trends. In an Italian study, the perception of weight gain was observed in 48.6 per cent of the population (Di Renzo *et al.*, 2020: 1). While the population group aged 18-30 years showed higher adherence to the Mediterranean diet, the younger and the elderly population showed lower adherence to the Mediterranean diet, showing a change that was brought about due to the lockdown (Di Renzo *et al.*, 2020: 1). On the other hand, in a Spanish study, it was found that the COVID-19 confinement in Spain led to the adoption of healthier dietary habits and behaviours as reflected by a higher adherence to the Mediterranean diet (Rodríguez-Pérez *et al.*, 2020: 1).

In this study, increased food prices and food shortages in supermarkets contributed to the participants purchasing cheaper and less preferred foods. Some participants reported that they had low stock levels of food in the house, whilst others stated that they could not afford to buy food, and some skipped meals. On the other hand, panicked shopping behaviours resulted in stock-outs displaying a lack of confidence and distrust in the food supply chain. The Food and Agricultural Organisation (2020: 8) highlighted that among the pillars of food security, COVID-19 affects access to food the most. Devereux *et al.* (2020: 770), agree that lockdown restrictions disrupted food access, especially for poor consumers who rely on informal food markets to purchase affordable food. Similarly, Borsellino *et al.* (2020) reported that for some consumers the COVID-19 pandemic led to a decrease in the amount spent on food, resulting in many making bulk purchases consisting of predominantly grains and staples. This may lead to lower diet quality and, in the long-term, can cause a decline in nutritional status.

Food security during emergency situations is always a cause for concern and retracts years of development gains. Some of the participants in this study were not highly confident that their

households would be able to afford the kinds of foods they needed in the next two weeks. This suggested that among some participants there was some level of anxiety regarding having consistent access to food to meet their needs. These results align with findings by Chiwona-Karltun *et al.* (2021:2) who reported a significant increase in food-acquisition-related worries among participants in countries where there was full or partial lockdown. Furthermore, a report by Statistics South Africa (2020: 27) indicated that the percentage of participants who reported experiencing hunger a month prior to the implementation of lockdown increased during the second wave of the COVID-19 pandemic. Planting one's own vegetables was one of the coping strategies used by most participants. Agriculture improves livelihoods and household food security in many countries (Gassner *et al.*, 2019: 313). A study by Modibedi *et al.* (2020: 5) indicated that community gardens improved availability and access to a variety of vegetables in households in South Africa. This study's findings also showed some participants depended on borrowing food from friends or family, food hampers, and free meals. The coping strategies used by participants in this study are similar to those reported by Statistics South Africa (2020: 22), which indicated that reliance on help from family, friends, or the community, reducing one's own spending, reliance on social relief from the government, and claiming from the unemployment insurance fund were strategies used by many to cope with the income gap during the COVID-19 pandemic. This suggests that there is a need for COVID-19 relief programmes and that food and nutrition assistance should also be prioritised in social protection programmes.

Conclusion

This study is not without limitations. First, although the study was open to all South Africans, most participants were from the KZN region. Future research should explore food purchasing and consumption in rural areas and income levels of households to get a better sense of the food situation in households. Second, the researchers conducted the survey at a time when stay-at-home orders were being partially lifted. Hence, behaviours might have been affected by this. Third, as with all survey work, the researchers relied on the recall ability of the participants which may lack accuracy. Purchasing patterns and consumption behaviours will continue to evolve, in some cases reverting to pre-COVID-19 norms; however, this may have both short- and long-term consequences on health outcomes. The multiple effects associated with the COVID-19 pandemic identified those vulnerable to nutritional changes, which now includes people that are both food secure and insecure. Whilst there is evidence to suggest that action is required to encourage people to re-adopt healthy lifestyle habits, the pandemic also pointed out the vulnerabilities, as a country, in South Africa's food system. More attention should be paid to the availability and affordability of nutrient-dense value chains to solidify nutrition and food security. This study pointed out that while the pandemic poses some serious challenges for the food system in the short term, it also presents an opportunity to accelerate transformations in the food and agriculture sectors, harnessing food system resilience into the future.

References

- Bennett, G., Young, E., Butler, I. and Coe, S. 2021. The impact of lockdown during the COVID-19 outbreak on dietary habits in various population groups: A scoping review. *Frontiers in Nutrition*, 8: 1-10. Available at: <https://doi.org/10.3389/fnut.2021.626432> (Accessed 1 June 2021).
- Borsellino, V., Kaliji, S. A. and Schimmenti, E. 2020. COVID-19 drives consumer behaviour and agro-food markets towards healthier and more sustainable patterns. *Sustainability*, 12: 1-35. Available at: <https://doi.org/10.3390/su12208366> (Accessed 3 December 2020).
- Chenarides, L., Grebitus, C., Lusk, J. L. and Printezis, I. 2021. Food consumption behaviour during the COVID-19 pandemic. *Agribusiness*, 37: 44-81.

Chiwona-Karltun, L., Amuakwa-Mensah, F., Wamala-Larsson, C., Amuakwa-Mensah, S., Hatab, A. A., Made, N., Taremwa, N. K., Melyoki, L., Rutashobya, L. K., Madonsela, T., Lourens, M., Stone, W. and Bizoza, A. R. 2021. COVID-19: From health crises to food security anxiety and policy implications. *Ambio*, 50: 794–811. Available at: <https://doi.org/10.1007/s13280-020-01481-y> (Accessed 10 March 2021).

Devereux, S., Béné, C., and Hoddinott, J. 2020. Conceptualising COVID-19's impacts on household food security. *Food Security*, 12: 769-772. Available at: <https://doi.org/10.1007/s12571-020-01085-0> (Accessed 2 February 2021).

Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attinà, A., Cinelli, G., Leggeri, C., Caparello, G., Barrea, L., Scerbo, F., Esposito, E. and De Lorenzo, A. 2020. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *Journal of Translational Medicine*, 18(229): 1-15.

United Nations Children's Emergency Fund, World Food Programme, and World Health Organisation. 2019. *The state of food security and nutrition in the world 2019: Safeguarding against economic slowdowns and downturns*. Rome, FAO.

Food and Agricultural Organisation. 2020. Policy brief: the impact of covid-19 on food security and nutrition. Available at: https://www.un.org/sites/un2.un.org/files/sg_policy_brief_on_covid_impact_on_food_security.pdf (Accessed 01 August 2020).

Gassner, A., Harris, D., Mausch, K., Terheggen, A., Lopes, C., Finlayson, R. F. and Dobbie, P. 2019. Poverty eradication and food security through agriculture in Africa: Rethinking objectives and entry points. *Outlook on Agriculture*, 48(4): 309-315. Available at: <https://doi.org/10.1177/0030727019888513> (Accessed 22 March 2021).

Hassen, T. B., El Bilali, H. and Allahyari, M. S. 2020. Impact of COVID-19 on food behaviour and consumption in Qatar. *Sustainability*, 12: 1-18.

Janssen, M., Chang, B. P. I., Hristov, H., Pravst, I., Profeta, A. and Millard, J. 2021. Changes in food consumption during the COVID-19 pandemic: Analysis of consumer survey data from the first lockdown period in Denmark, Germany, and Slovenia. *Frontiers in Nutrition*, 8: 1-20. Available at: <http://doi.org/10.3389/fnut.2021.635859> (Accessed 2 June 2021).

Kansiime, M. K., Tambo, J. A., Mugambi, I., Bundi, M., Kara, A. and Owuor, C. 2020. COVID-19 Implications on household income and food security in Kenya and Uganda: findings from rapid assessment. *World Development*, 137: 1-10.

Kimani-Murage, E. W., Kahn, K., Pettifor, J. M., Tollman, S. M., Dunger, D. B., and Gómez-Olivé, X. F. 2010. The prevalence of stunting, overweight and obesity, and metabolic disease risk in rural south African children. *BMC Public Health*, 10: 1-13.

Martin-Neuninger, R. and Matthew, R. B. 2020. What Does food retail research tell us about the implications of Coronavirus (COVID-19) for grocery purchasing habits? *Frontiers in Psychology*, 11(1448): 1-4.

Miri, S. M., Roozbeh, F., Omranirad, A. and Alavian, S. M. 2020. Panic of buying toilet papers: a historical memory or a horrible truth? Systematic review of gastrointestinal manifestations of COVID-19. *Hepatitis Monthly*, 20(3): 1-3.

Modibedi, T. P., Masekoameng, M. R. and Maake, M. M. 2020. The contribution of urban community gardens to food availability in Emfuleni Local Municipality, Gauteng Province. *Urban Ecosystems*,

24: 301-309. Available at: <https://doi.org/10.1007/s11252-020-01036-9> (Accessed 21 March 2021).

Naja, F. and Hamadeh, R. 2020. Nutrition amid the COVID-19 pandemic: a multi-level framework for action. *European Journal of Clinical Nutrition*, 74: 1117-1121.

National Institutes for Communicable Diseases. 2020. *First case of COVID-19 announced – An update*. Available at: <https://www.nicd.ac.za/first-case-of-covid-19-announced-an-update/> (Accessed 10 November 2020).

Nyamwanza, A. M. and Sinyolo, S. 2020. Projecting the likely impact of COVID-19 on food and nutrition security in South Africa. *HSRC Review*, 18(2): 1-9.

Nyati, L. H., Pettifor, J. M. and Norris, S. A. 2019. The prevalence of malnutrition and growth percentiles for urban South African children. *BMC Public Health*, 19: 1-13.

Ramaphosa, C. 2020. South Africa's response to Coronavirus COVID-19 pandemic. Available at: <https://www.gov.za/speeches/president-cyril-ramaphosa-south-africas-response-coronavirus-covid-19-pandemic-23-apr-2020> (Accessed 18 March 2021).

Rodríguez-Pérez, C., Molina-Montes, E., Verardo, V., Artacho, R., García-Villanova, B., Guerra-Hernández, E. J. and Ruíz-López, M. D. 2020. Changes in Dietary Behaviours during the COVID-19 Outbreak Confinement in the Spanish COVIDiet Study. *Nutrients*, 12(6): 1730. Available at: <https://pubmed.ncbi.nlm.nih.gov/32531892/> (Accessed 20 November 2020).

Statistics South Africa. 2020. *Results from wave 2 survey on the impact of COVID-19 pandemic on employment and income in South Africa*. Available at: <http://www.statssa.gov.za/publications/Report-00-80-03/Report-00-80-03May2020.pdf> (Accessed 10 March 2021).

Stiegler, N. and Bouchard, J. P. 2020. South Africa: Challenges and successes of the COVID-19 lockdown. *Annales Medico-Psychologiques*, 178(7): 695-698.

Taherdoost, H. 2017. Determining sample size; how to calculate survey sample size. *International Journal of Economics and Management Systems*, 2: 1-3.

Wenham, C., Smith, J. and Morgan, R. 2020. COVID-19: the gendered impacts of the outbreak. *Comment*, 395(10227): 846-848.