

## Food Security and Health Risk Behaviours in Selected African Countries During the First COVID-19 Lockdown

Eridiong O. Onyenweaku

*Food Evolution Research Laboratory, School of Tourism and Hospitality, College of Business and Economics, University of Johannesburg, South Africa, Email, [eridiongo@uj.ac.za](mailto:eridiongo@uj.ac.za), <https://orcid.org/0000-0001-6691-8269>*

Hema Kesa

*Food Evolution Research Laboratory, School of Tourism and Hospitality, College of Business and Economics, University of Johannesburg, South Africa, Email, [hentak@uj.ac.za](mailto:hentak@uj.ac.za), <https://orcid.org/0000-0002-1258-9145>*

Alex K. Tchuenchieu

*Food Evolution Research Laboratory, School of Tourism and Hospitality, College of Business and Economics, University of Johannesburg, South Africa  
Centre for Food and Nutrition Research, Institute of Medical Research and Medicinal Plants Studies, Yaounde, Cameroon, Email, [alexkamgain@gmail.com](mailto:alexkamgain@gmail.com)  
<https://orcid.org/0000-0002-2105-5030>*

*\*Corresponding Author*

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### Abstract

This research aimed at evaluating food security in three African populations during the COVID-19 pandemic and assess the health risk associated with their lifestyle during the lockdown. An online questionnaire was used for this cross-sectional survey. Three African countries were selected – Cameroon, Nigeria and South Africa. The questionnaire link was circulated electronically in the three countries via WhatsApp and emails using random and snowball sampling method. No glaring food security problem was observed in the surveyed population (818 respondents) which was mostly highly educated with stable monthly incomes, although Cameroon reported a higher number of respondents with monthly income <300USD. Generally, the food frequency results showed that cooked vegetables, fruits and teas appeared as consumed frequently in South Africa but not Cameroon and Nigeria. In Nigeria, starchy meals such as white rice and yam were more consumed. A low consumption rate of processed/unhealthy foods and drinks was noticed in all 3 countries during this period. South Africa appeared as the country presenting the highest risk of NCDs resurgence due to physical inactivity, alcohol and tobacco consumption related to COVID-19 lockdown. Consumption of healthy diets should be encouraged and promoted by the relevant authorities during this pandemic, food security being a key target.

**Keywords:** food security; food consumption; NCDs; COVID-19; Africa

### Introduction

Globally, the food security of millions of people is currently being challenged by the COVID-19 pandemic - an unfolding human and health dilemma. Prior to this, millions of people were already hungry and malnourished; if immediate action is not taken, a global food crisis could emerge (FAO, 2020). In the coming years, the combined effects of COVID-19 itself, as well as corresponding control measures and the emerging global recession could disrupt the functioning of food systems, if precautionary actions are not taken to forestall such an occurrence. Such a disruption can lead to serious health and nutrition consequences.

Food insecurity is one of the major causes of morbidity and mortality worldwide. Food insecurity is defined as having uncertain or limited availability of nutritionally adequate or safe food, or the inability to acquire personally acceptable foods in socially acceptable ways (Radimer et al., 1992). According to the U.S. Department of Agriculture (USDA), the essential components of food insecurity include inability to access foods of sufficient dietary quality, worry or anxiety over food supplies, insufficient food intake and having to get food in socially unacceptable ways (Bickel et al., 2000). Protein–energy malnutrition, stunting, and wasting are some of the more obvious consequences of severe food insecurity (Food and Agriculture Organization 2012). As of 2012, it was reported that 870 million people worldwide were estimated to be undernourished, many of these in sub-Saharan Africa, Southeast Asia, and parts of Latin America (Food and Agriculture Organization, 2012). The degree of food insecurity varies from mild, moderate, to severe food insecurity (Weiser et al., 2015).

Focusing on the African continent, prior to the pandemic, many countries were already faced with food insecurity challenges (Weiser et al., 2015). According to WFP and UNICEF (2015), nearly half of households in Uganda are currently food insecure with either borderline or poor Food Consumption Score, mainly due to the lean season that has seen a decline in food stocks at household level and contributed to higher food prices. While food security status has marginally improved since June 2014, Global Acute Malnutrition (GAM) levels have deteriorated and are at highest levels since 2010 (Weiser et al., 2015).

On the other hand, certain behaviours exert a strong influence on health and they include: tobacco use, alcohol consumption, physical activity and diet, then disease screening. Although epidemiologic data on the relationships between these behaviours and various health outcomes are available, knowledge is being improved upon progressively. Causal conclusions have been strengthened by sophisticated research designs, dose/response relationships have been clarified, and the influence of these behaviours on overall public health has been quantified (Institute of Medicine (US) Committee on Health and Behaviour: Research, Practice, and Policy, 2001).

The pandemic struck the world at a time of serious and huge global challenges. It will be necessary to tackle all the nutrition and food security dimensions of this pandemic (FAO, 2020). In order to effectively address the COVID-19 crisis, people will have to work together across sectors and nations both to mitigate the immediate impacts and to restructure food systems so they produce healthy diets for all. More must be done with the aim of making food production and consumption to align with sustainable development (WFP, 2020).

### **Literature review**

The COVID-19 pandemic control measures that have been put in place are already affecting global food supply chains (Hossain et al., 2020). For instance, the travel bans and lockdowns are slowing down harvests in some parts of the world, leaving millions of seasonal workers without livelihoods, while also constraining transport of food to markets (WFP, 2020). It is also reported that meat processing plants and food markets are being forced to close in many locations due to serious COVID-19 outbreaks among workers (WFP, 2020). Farmers have been burying perishable produce as a result of supply chain disruption and falling consumer demand. Consequently, many people in the urban areas now find it difficult to access fresh fruits and vegetables, dairy, meat and fish (UN, 2020). According to Global Nutrition Report (2020), global markets of staple grains remain robust for now; following good harvests in 2019, stocks of most staple foods are adequate. It should be noted that majority of Africa's population takes its food from local markets, and food security/nutrition is quite at risk (Bremner, 2012; Matemilola & Elegbede, 2017).

The coronavirus pandemic has caused governments across the world to enforce movement restrictions/lockdowns and social distancing rules, in a bid to adhere to public health recommendations aimed at containing the spread of the disease (Hossain et al., 2020). This has necessitated many changes in people's lifestyle ranging from reduced physical activities, more online activities, fluctuations in income and adjustments in eating habits, closure of offices/businesses, employees being asked to work from home except for essential services, while others have even lost their jobs (Bloch et al., 2020). This has led to high levels of unemployment and loss of income, while on the other hand, increase in the prices of foods are making it difficult for many to purchase. In many African countries, prices of basic foods have begun to rise at a time when people have less money. Before this COVID-19 pandemic, over 820 million people globally, were already reported to be highly food insecure. That number could nearly double before the end of the year due to the impacts of COVID-19 globally (WFP, 2020). Also, it has been reported that the number of 'under five' children who are stunted globally, is 144 million (about 20% prevalence worldwide) (UNICEF, 2020). These numbers could grow rapidly if effort is not made to mitigate the adverse effects of the pandemic on food security. The pandemic could push about 49 million people into extreme poverty in 2020 (Sánchez-Páramo, 2020). In many of the African countries, adequate relief/supplies and palliative measures have not been put place for the people. This may cause an increase in the incidence of undernutrition in the future.

The double burden of malnutrition also carries the problem of over nutrition on the one hand. Excessive food intake and consumption of unhealthy foods when indoors for a long-period is common, and this leads to people being overweight and obese (Onyenweaku et al., 2019). On the other hand, many persons might change their eating habits taking into consideration factors like food availability or prices (because of food insecurity). Already, 18 out of 23 nations where undernourishment is prevalent are from Africa and projections point at the situation getting worse in the next decade (Matemilola & Elegbede, 2017). Reports have also shown that in sub-Saharan Africa, there has been an increase in the burden of NCDs over the past two decades as a result of the rising incidence of cardiovascular risk factors such as hypertension, unhealthy diets, reduced physical activity, etc; currently, NCDs are about to overtake communicable, neonatal and maternal diseases, combined as the leading cause of mortality by 2030 (Bigna & Noubiap, 2019). In addition to the increase of malnutrition, the lack of physical activity, consumption of tobacco and alcohol due to distress, are often reported during this COVID-19 lockdown period and these lifestyle habits are risk factors for non-communicable diseases such as diabetes, hypertension and obesity (Cross et al., 1994). This may therefore increase the NCDs risk in Africa.

Food insecurity affects total caloric intake as well as diet quality (i.e., macro- and micronutrient intake) and nutritional status (Dixon et al., 2001). It has a wide range of negative health impacts beyond undernutrition. Studies of adults in resource-rich settings have shown that food insecurity is associated with poor self-reported health status (Stuff et al., 2004) and chronic disease risk factors, such as obesity (Dinour et al., 2007), and abnormal blood lipids (Seligman et al., 2010). Food insecurity has also been linked to high blood pressure, increased rates of diabetes and poor diabetes outcomes (Seligman et al., 2010), and developing gestational diabetes mellitus (Laraia et al., 2010). Household food insecurity has commonly been associated with depression, higher levels of perceived stress, and anxiety among women (Laraia et al., 2006; Whitaker et al., 2006).

Food insecurity is also associated with health behaviours affecting the prevention, management, and treatment of disease. An inability to meet subsistence needs, including household dietary needs, can lead people to make unhealthy decisions that may increase their risk of illness, such as engaging in risky sexual behaviours in exchange for food, or overreliance

on cheap, nutrient-poor but calorie-dense foods. When sick, food insecurity and other competing subsistence needs (e.g., unstable housing) lead to worsened access and adherence to general medical care among low-income adults (Weiser et al. 2010). For example, in research among a national survey of low-income adults in the U.S., food insecurity was associated with postponing needed medications and care, and with increased hospitalizations (Kushel et al. 2006).

In addition, many negative habits can prove quite detrimental to health. Cigarette-smoking leads to an increased risk of heart disease, which is the leading cause of death in places like the United States (USDHHS, 2000). Cigarette-smoking is also linked with cancers of the lungs, pharynx, bladder and kidneys. One World Health Organization (WHO) report showed that the burden of disease and death attributable to tobacco in developed countries was substantially higher than that attributable to any other risk factor, including alcohol use, unsafe sex, hypertension, and physical inactivity (Murray & Lopez, 1996).

Alcohol has been identified as a main contributor to death in many countries (McGinnis & Foege, 1993), after tobacco use, diet and activity levels. Compared with other threats to human health, alcohol causes the widest variety of injuries (Rose, 1992). About 10% of people who begin drinking at age 21 or older develop alcohol dependence at some stage in life (Grant & Dawson, 1997; USDHHS, 2000). People with a family history of alcoholism have a higher prevalence of lifetime alcohol dependence than do those with no such history. The problem of alcohol consumption is mostly one of misdistribution, with many abstaining and many consuming at a hazardous level (Holman & English, 1996). The wide range of alcohol-induced illnesses and injuries is primarily attributable to differences in the amount, duration, and patterns of alcohol consumption as well as to differences in genetic vulnerability to particular alcohol-related consequences (USDHHS, 2000). Long-term excessive drinking increases risk for high blood pressure, irregularities of heart rhythm (i.e., arrhythmias), disorders of the heart muscle (i.e., cardiomyopathy), stroke, and it increases the risk of developing cancer of the mouth, throat, colon and rectum (USDHHS, 2000).

Similarly, diet and physical activity are behaviours that directly influence body weight. Many studies show that physically active people have significantly lower risk of coronary heart disease than do the inactive. Diet could be an etiologic factor in cancer. For instance, a consistent relationship between intake of fruit and vegetables and lower risk of many malignancies supports an anticancer effect of some component of these foods (Steinmetz & Potter, 1991). Epidemiologic evidence exists showing that fruits and vegetables that contain carotenoids reduce the risk of lung cancer (Ziegler et al., 1996). Consequently, a strong relationship exists between food insecurity and health outcomes of populations.

This study therefore seeks to evaluate the effect of the lockdown during the COVID-19 first wave on the state of food security in different African countries and to determine the health risk that may be associated with populations' lifestyle and behaviours. This research will also ascertain whether some populations record positive or negative changes in their dietary and lifestyle habits.

## **Methodology**

Three (3) African countries with high Gross Domestic Production in their respective regions, were selected for this indicative study. The choice of these three countries for this study was also as a result of the 3 researchers being resident in these countries for data collection during the lockdown. The countries are: South Africa (consisting of a large and densely race-mixed population), Cameroon in the Central part of Africa, and Nigeria (being the most populated country in the continent).

The population for the online cross-sectional study consisted of 818 respondents from three selected African countries mentioned above. The three African countries were selected for this study based on their large populations, lockdown duration as well as the availability of researchers/field workers in those places who assisted in data collection. In total, the following number of responses from the participating countries were: Cameroon 306, Nigeria 271 and South Africa 241. The survey was distributed to people across different socio-economic groups.

This study was carried out online for a period of 6 weeks (June-July 2020) and a target sample size of 800 was set. This period was characterized by a general application of lockdown measures across the globe due to the coronavirus pandemic. The findings were thereby reported on the 818 replies to an international online survey on food security and lifestyle behaviours (including dietary habits) during the COVID-19 lockdown.

In the three countries, random sampling was used to select the respondents, alongside the snowball sampling method bringing the total sample size to 818 participants. The questionnaire was circulated online using the survey link that was sent across to respondents electronically since movement was restricted and social distancing was introduced; hence it was not possible to go round physically to collect data during this period. Online surveys have proven to be quite popular and useful now due to the limitations posed by the current global pandemic. In snowball sampling, participants on the researcher's contact who were sent the questionnaire link, fill it and also circulate to their own contacts to fill.

Appropriate ethical approval was obtained for this research from the School of Tourism and Hospitality Research and Ethics Committee, University of Johannesburg.

Regarding informed consent and data privacy, respondents were asked to carefully read and understand the content summary first before proceeding to the questionnaire. During the informed consent process, survey participants were assured all data would be used for research purposes only. Participants' answers were anonymous and confidential according to Google's privacy policy. Participants were not permitted to provide their names nor contact details. Additionally, participants were able to stop study participation and leave the questionnaire at any stage before the submission process; thus, their responses would not be saved. Responses were saved only by clicking on the provided "submit" button. By completing the survey, participants acknowledged their voluntary consent to participate in this anonymous study.

A well-structured questionnaire was developed to gather information pertaining to food security and health risks from respondents. The questions were designed based on detailed literature review findings on the subject matter. The questionnaire was structured to gather socio-economic data, information on dietary intake before and during the COVID-19 lockdown (including a food frequency questionnaire) and lifestyle of the participants. The questionnaire was prepared, content-validated by two nutrition experts and a statistician, then converted into the online survey format using Google forms which ensured anonymity of the participants. Once the online questionnaire link was ready, it was piloted using 20 participants from the 3 countries under study – Cameroon, Nigeria and South Africa. The questionnaire was circulated electronically via the online survey link which was sent across to participants via their emails and other social media platforms such as WhatsApp and Facebook. The dietary choices and eating habits during the lockdown were studied in order to bring out food security issues and ascertain food consumption patterns.

### **Data analysis**

The Statistical Package for Social Sciences software (SPSS, version 25.0) was used to carry out all the statistical analyses. Descriptive statistics such as frequencies, percentages and charts, were used to define the proportion of responses for each question and the total distribution in



the total score of each questionnaire. Participants were asked to rate their consumption frequency of each specific food on a 5-point scale (1: Do not consume; 2: <3times a week; 3: 3-5 times a week; 4: more than 5 times a week) and mean value calculated. An Analysis of Variance (ANOVA) of the Health Risk score of respondents per studied socio-demographic parameter was also performed based on their physical activity practice, alcohol and tobacco consumption, and their NCDs health status. For each of the 6 questions asked to assess this risk, a score from 0 (no risk) up to 3 (high risk) depending on the numbers of answer possibilities was given, and the total score out of 11 calculated. A two-sided  $P < 0.05$  was considered statistically significant.

## Results and discussion

### *Socio-demographics characteristics of the surveyed population*

Table 1 presents the socio-demographic characteristics of the surveyed population (818 people). The countries were represented thus: Cameroon - 37.4%, Nigeria - 33.1% and South Africa - 29.5%. Females constituted 59.3% of this population where five races were represented, the main one being Black followed by Indian, White, Coloured then Asian. Among them, 42.7% were aged between 18-29 years old while 40.8% were aged between 30-49 years. Most of them had a tertiary education level (79.8%) and just few had secondary education level (12.7%) or less (7.5%). A higher percentage of them reported to be single (54.4%) while 32.8% were married. Just 29.6% were living in a household of 1-2 persons, the others in either a 3-5 person households (41.9%) or above (28.5%). They generally had a public (25.4%) or private job (33.5%), a minority having an informal work (11.9%); 29.2% were unemployed. Their monthly income ranged from ‘less than 300USD’ to ‘above 500USD’ with many of them falling within the range of less than 300USD (65.8%) monthly income – below average.

Table 1. Socio-demographics characteristics of the surveyed population

Variable	Frequency (%)	Variable	Frequency (%)	Variable	Frequency (%)
<b>Country of residence</b>		<b>Age</b>		<b>People living in households</b>	
Cameroon	306 (37.4)	18-29	349 (42.7)	1-2	242 (29.6)
Nigeria	271 (33.1)	30-49	334 (40.8)	3-5	343 (41.9)
South Africa	241 (29.5)	50 and more	135 (16.5)	6 or more	233 (28.5)
<b>Gender</b>		<b>Educational level</b>		<b>Employment sector</b>	
Female	485 (59.3)	Primary level	61 (7.5)	Informal	97 (11.9)
Male	333 (40.7)	Secondary school	104 (12.7)	Private (working for a registered private company or organizations)	274 (33.5)
		University/Tertiary institution	653 (79.8)	Public (working for the government)	208 (25.4)
<b>Race</b>		<b>Marital status</b>		Unemployed	239 (29.2)
Asian	38 (4.6)	Divorced	56 (6.8)	<b>Economic status based on monthly income</b>	
Black	573 (70.0)	Married	268 (32.8)	Above average (> 500 USD)	175 (20.4)
Coloured	59 (7.2)	Single	445 (54.4)	Average (301–500USD)	133 (13.8)
Indian	76 (9.3)	Widow	49 (6.0)	Below average (< 100 USD)	509 (65.8)
White	72 (8.8)				

### *Food security of the population*

No particular food insecurity problem could be reported from the survey carried out (Table 2a and 2b). This may be as a result of the study population comprising of educated people who generally earned a monthly income. Despite the fact that a large fraction of the study population fell under the lower income earning group (below average), the respondents were not really poor people. The broad classification of <300USD monthly income was adopted in order to embrace differences in the economy of the three countries studied here. It should be noted that South Africa, with a more advanced economy had more people earning higher than respondents from Cameroon and Nigeria (also as a result of their currencies’ exchange rates with respect to



the USD which was used for classification in this study) (Kinuthia, 2021). This does not overrule the challenge of food security that exists in many parts of sub-Saharan Africa. According to the African Food Security Briefs (AFSB) about 33% of people in sub-Saharan Africa are suffering from undernutrition (Matemilola & Elegbede, 2017). Such persons may not have been covered by this survey due to the nature of this research being an online one, hence requiring internet facilities and some level of literacy for participation. Most people reported to generally eat twice a day in Cameroon and Nigeria (55% and 50% respectively), and three times a day in South Africa (40.9%). Respondents reported that they had skipped meals during the lockdown period, and they mostly skipped either breakfast (31.7%) or lunch (29.3%). The main reasons given for skipping meals were fasting or no appetite in Nigeria (36.5%) and South Africa (38.7%) but in Cameroon the main reason was lack of money to purchase enough food (19.9%) – this is worthy of note. Similarly, this country presented the highest proportion of respondents with a monthly income below average. This corresponds with the report of Sasson (2012) which asserted that many low- and middle-income countries in Africa, are plagued with the problem of poverty and inadvertently, food insecurity. In addition to all this, during the COVID-19 lockdown, many jobs were lost, food prices rose and food parcels were insufficient.

Table 2a: Food security across the sub-Saharan regions

Questions	Answers	Country		
		Cameroon	Nigeria	South Africa
How many times do you eat daily now?	Once	4.1%	3.3%	3.9%
	Twice	55.3%	51.7%	40.3%
	Three times	37.8%	37.9%	40.9%
	More than three times	2.8%	7.1%	14.9%
Do you skip meals during the lockdown?	No	38.2%	23.7%	43.1%
	Yes	61.8%	76.3%	56.9%
If yes, which meals do you normally skip?	None	32.1%	13.3%	35.4%
	Breakfast	31.3%	38.4%	24.3%
	Lunch	24.0%	32.2%	33.1%
	Dinner	8.9%	9%	6.1%
	All	3.7%	7.1%	1.1%
What is your most principal reason for skipping meals?	Not skipping	26.8%	6.6%	28.7%
	I am watching my weight	14.2%	23.2%	9.4%
	No money for enough food	19.9%	12.3%	5.0%
	Lack of time	13.4%	7.6%	12.2%
	Others such as fasting, no appetite, etc.	14.2%	36.5%	38.7%

The key cause of food insecurity is inadequate food production. Since the global food crisis of 2007/2008, there has been an increasing awareness throughout the world that production of better/healthy food must be improved; and we must all focus on achieving this goal. Sub-Saharan Africa needs and wants to make its own green revolution (Sasson, 2012). The African challenge indeed is key to mitigating food insecurity in the world. Commitments were made by the heads of states and governments of the African Union to double the part of their domestic budgets devoted to agriculture in 2010 – 2011, so as to reach 10%; efforts must be sustained towards keeping these commitments in order to see results (Kempf, 2010). Thus, Africa must embrace technical solutions and improve its practice of sustainable agriculture while implementing economic and political measures, in order to make the green revolution a total reality (Kempf, 2010). The movement restrictions and closure of workplaces during the lockdown further limited people’s access to income-generating activities and markets, hampering access to food. It is reported that the number of food insecure people in Africa rose to almost 22 million in 2020 which is an increase of almost 70% from the same period in 2019

(WFP, 2020). Without targeted support, the number of food insecure people is expected to keep rising in subsequent years (WFP, 2020). It is also imperative that government policies should be aimed at protecting African farmers and rural communities against unfair trade, competition, and dumping of cheap/excessively processed unhealthy food products from developed Western countries.

Table 2b: Food security across the continent during the pandemic (N=818)

Questions	Answers
How many times do you eat daily now?	Once (3.8%); Twice (49.8%); Thrice (38.7%); More than three times (7.7%)
Do you skip meals during the lockdown?	Yes (65.2%); No (34.8%)
If yes, which meals do you normally skip?	None (26.8%); Breakfast (31.7%); Lunch (29.3%); Dinner (8.2%); All (4.1%)
What is your most principal reason for skipping meals?	I am watching my weight (15.8%); I prefer snacks to food (3.8%); Lack of money to purchase enough food (6.3%); Lack of time (11.1%); No cooked food available (6.9%); Others such as fasting, no appetite, etc. (28.6%)

### ***Food consumption frequency of the population***

Table 3 describes the dietary patterns of the study population depending on the country and gender. From the list that was presented, the highest consumption of cooked and raw vegetables/salads, fruits and teas was by females in South Africa (consumed 3-5 times). This pattern seemed to vary in Cameroon and Nigeria where teas seemed to be less consumed (<3 times per week); this could be attributed to their relatively hotter climate. In Cameroon and Nigeria, starchy foods such as starchy swallows, white rice and yams were more consumed (up to 3-5 times a week). South Africa appeared as the one consuming the most coffee (3-5 times a week) - which could be due to their cold climatic temperatures and also the highest consumer of alcoholic drinks. The other foods mentioned in the list were generally consumed less than 3 times a week, those close to not being consumed at all were pies (pastries), burgers, grains (like millet and sorghum) and canned meats in Cameroon. Pies, yam, ripe/ unripe plantain and non-alcoholic wine were the least frequently consumed in South Africa; for Nigeria, burger, brown rice and energy drinks were the least consumed. Generally, males tended to consume pies, brown rice energy and alcoholic drinks more in comparison to females who consumed more cooked vegetables, fruits, juices and some other foods. This may be as a result of the fact that usually women cook more than men, and also African women tend to watch their weight a lot due to their physiological tendency to put on weight as they advance in age (Case & Menendez, 2010; Micklesfield et al., 2013). This goes a long way to affect their dietary choices.

In the surveyed population, 96.2% were aware of the importance of a healthy diet in the fight against COVID-19 pandemic and 84.2% agreed that foods such as green vegetables, onions, mushrooms, beans/peas, berries and other micro-nutrients rich foods are helpful in boosting immune system. This corresponds with the report of high nutritional knowledge among school children in Ghana (Antwi, 2020). The nutritional knowledge of the surveyed population can be said to have impacted on their dietary choices and consumption pattern as most of the processed/unhealthy foods and drinks (such as burgers, pies, canned meats, carbonated and alcoholic drinks) were not reported to be consumed too frequently by the surveyed population. The average frequency of consumption of alcoholic drinks was also reasonably low in all three countries among both men and women – maybe due to alcohol bans and uncertainties during the time of the survey. This is commendable because excessive consumption of alcohol has been reported as a risk factor for chronic diseases such as diabetes, cancer and liver failure (Opadijo et al., 2004).





On the other hand, age and monthly income appeared as significantly determining the perception of the impact of lockdown measures on food choices ( $P < 0.05$ ). Indeed, young people and poor people appeared as more affected compared to old people and affluent people, respectively.

Table 3: Food consumption frequency of the different sub-populations

	Cameroon		Nigeria		South Africa	
	Female	Male	Female	Male	Female	Male
Pies	1.11	1.12	1.36	1.37	1.18	1.45
Grilled/fried chicken	1.64	1.66	1.86	1.82	2.10	2.12
Grilled/fried fish	1.94	2.00	1.76	1.82	1.86	1.69
Brown rice	1.53	1.92	1.27	1.51	1.69	1.88
Pasta	1.72	1.81	1.92	1.63	1.97	2.05
Cooked vegetables	2.14	2.04	2.65	2.54	3.08	2.60
Raw vegetables/salads	1.76	1.78	2.11	1.95	2.54	2.40
Fruits (Oranges, mangoes)	2.50	2.20	2.82	2.76	2.93	2.62
Burger	1.10	1.13	1.16	1.20	1.40	1.38
Starchy meals (swallows)	1.89	1.82	2.73	2.68	1.96	1.95
Chips	1.42	1.51	1.56	1.57	1.85	1.79
White bread rolls	2.40	2.43	2.30	2.09	1.72	1.81
Sweet potato	1.52	1.57	1.79	1.66	2.09	1.90
White rice	2.14	2.25	2.58	2.59	2.12	2.31
Yam	1.38	1.49	2.27	2.27	1.18	1.17
Grains – Oats, millet, sorghum (guinea corn)	1.21	1.25	1.99	1.94	2.08	2.38
Pap (maize meal)	1.74	1.83	1.77	1.78	1.85	1.86
Unripe plantain	1.40	1.54	1.81	1.94	1.08	1.10
Ripe plantain	2.00	1.95	1.92	1.89	1.13	1.07
Beans	1.99	2.00	2.45	2.58	2.18	2.12
Boiled/Fried eggs	2.05	2.01	2.58	2.37	2.40	2.38
Red meat e.g beef	1.94	2.02	2.44	2.25	2.24	2.24
Canned meats e.g corned beef, hot dogs, beef chunks	1.15	1.25	1.28	1.43	1.25	1.36
Butter, cheese	1.62	1.48	1.58	1.49	2.37	2.45
Carbonated drinks e.g coke	1.55	1.81	1.82	1.86	1.59	1.86
Teas	1.92	2.18	2.36	2.23	2.82	2.57
Coffee	1.48	1.76	1.39	1.44	2.47	2.57
Energy drinks	1.30	1.46	1.13	1.44	1.18	1.36
Beverages such as Cocoa	1.26	1.34	2.25	2.08	1.58	1.50
Alcoholic drinks	1.29	1.70	1.18	1.37	1.45	1.55
Smoothies	1.35	1.24	1.67	1.47	1.60	1.52
Freshly-squeezed juices	1.82	1.68	1.68	1.73	1.80	1.57
Non-alcoholic Wine	1.27	1.39	1.51	1.62	1.06	1.19
Yoghurts	1.75	1.75	1.63	1.58	2.40	2.07

Scale: 1: Do not consume; 2: <3times a week; 3: 3-5 times a week; 4: more than 5 times a week

### ***Change in health risk associated with COVID-19 measures***

The analysis of the surveyed population habits in relation to risk of non-communicable diseases (Table 4a) revealed an increase in sport habits for some respondents (as high as 40.3% in Nigeria), but also a decrease for many others (as high 45.9% in South Africa). Majority of the people were not consuming alcohol (58.5% in Cameroon, 81.5% in Nigeria and 64.6% in South Africa) or consumed less than 3 times a week (Cameroon – 37%), the pandemic having led mostly to a consumption reduction (about 31% average for the 3 countries). It is also possible that the bans on consumption of alcohol in public places during the initial strict lockdown in most countries, may also have resulted in this decline (Butler et al., 2021). Similar tendency could be observed regarding smoking (over 95% of non-smokers in Cameroon and Nigeria, 87% not smoking in South Africa - 18% of this reported smoking reduction with the COVID-19 lockdown). Just less than 15% of this surveyed population in all 3 countries reported to be already affected by an NCD before the pandemic. The use of a scoring approach to assess the

health risk level (Table 4b) pointed out country, gender, race and number of people in the household as determining variables which affected the health risk factors. In fact, the health risk tended to be higher in South Africa, among males, white people, concubines, those living in a household of maximum 2 persons and in those with primary level education. There was no observed significant difference in health risks among respondents based on their age, educational level or monthly income.

The reduced physical activity observed in the study population is in consonance with that of Ammar et al. (2020) who documented a similar report from an international survey of over 1000 participants. This phenomenon is attributable to the lockdown, closure of offices, business and schools. This may also be responsible for the general drop in consumption of alcohol and tobacco as people could not go out with friends to drinking/bars parlours. The WHO (2020) published an article on the need for people to embrace a healthy lifestyle and ensure they are physically active during the lockdown; the published guidelines aim at reducing the incidence of chronic diseases such as obesity, hypertension, and diabetes, during the pandemic. This is expedient in these times, as reports show that morbidities associated with COVID-19 are more severe in people living with NCDs and recovery rates are relatively lower than for healthy persons (Narici et al., 2020). Looking at the overall picture, the countries showed some positive changes in lifestyle habits as seen in Table 4a where 25 – 40% of the respondents in the 3 countries recorded increase in physical activities and also about 23% (Cameroon and Nigeria) – 40% (South Africa) of alcohol consumers admitted a decrease in their alcohol intake. It is also worthy of note that in Nigeria, there was no respondent report of alcohol intake more than 5 times a week.

Table 4a: Lifestyle habits and health risks associated with NCDs

Questions	Answers	Country		
		Cameroon	Nigeria	South Africa
Do you exercise more frequently during the lockdown period? (indoor & outdoor exercises).	No – Less	34.6%	31.3%	45.9%
	Same – No difference	40.7%	28.4%	27.1%
	Yes – More	24.8%	40.3%	27.1%
How often do you take alcohol in a week?	I do not consume	58.5%	81.5%	64.6%
	Less than 3 times	37.0%	15.2%	28.7%
	3 to 5 times	4.1%	3.3%	5.5%
	More than 5 times	0.4%	-	1.1%
What is your alcohol consumption like now compared to before the lockdown?	Less important	23.6%	23.7%	40.3%
	No change	71.5%	73.5%	54.7%
	More important	4.9%	2.8%	5.0%
How often do you smoke in a week?	I do not	99.2%	98.1%	87.3%
	Less than 3 times	0.8%	-	6.6%
	3 to 5 times	-	0.9%	2.8%
	More than 5 times	-	0.9%	3.3%
What is your smoking habit like now compared to before the lockdown?	Less important	6.5%	17.1%	18.2%
	No change	91.5%	82%	77.3%
	More important	2.0%	0.9%	4.4%
Have you been previously (before lockdown) diagnosed of any chronic disease? (e.g diabetes, obesity, cancer, respiratory disease, mental illness)	No	91.1%	92.4%	86.7%
	Yes	8.9%	7.6%	13.3%

This may also be partly responsible for the low incidence of chronic diseases reported by the surveyed population. This is in slight contrast to a recent poll (in Australia) conducted by the Foundation for Alcohol Research and Education (FARE, 2020) from 3 - 5 April, 2020 which found that 20% of Australians reported buying more alcohol than usual during the COVID-19 pandemic, and in these households 70% of Australians were drinking more than usual since the COVID-19 outbreak (FARE, 2020). Aside depression, an assumption given for this



increase in alcohol intake was the myth that alcohol kills COVID-19. In another scenario, a recent opinion survey carried out in the United Kingdom reported that about 33% were taking steps to reduce or stop drinking, while 6 had stopped completely (Holmes, 2020).

Table 4b: Change in lifestyle/associated health risk factors with sociodemographic variables

Variable	Score		ANOVA between groups							
	Mean	Std. Deviation	Minimum	Maximum	Sum Squares	of df	Mean Square	F	Sig.	
Country	Cameroon	1.73	1.020	0	5	59.809	2	29.904	19.430	0.000
	Nigeria	1.29	1.149	0	7					
	South Africa	2.07	1.573	0	8					
Gender	Female	1.55	1.242	0	8	16.011	1	16.011	9.973	0.002
	Male	1.88	1.307	0	7					
Race	Asian	2.00	0.000	2	2	48.837	4	10.959	6.984	0.000
	Black	1.57	1.159	0	7					
	Coloured	2.26	1.711	0	7					
	Indian	2.20	1.522	0	6					
Age	White	2.39	1.840	0	8	2.137	2	1.069	0.656	0.519
	18-29	1.62	1.210	0	7					
	30-49	1.74	1.290	0	8					
Education level	50 and more	1.65	1.466	0	7	2.696	2	1.348	0.827	0.438
	Primary level	3.00		3	3					
	Secondary school	1.82	1.483	0	6					
	University/ Tertiary institution	1.67	1.260	0	8					
Marital status	Concubined	2.38	0.916	1	4	7.959	4	1.990	1.224	0.299
	Divorced	1.75	0.967	0	4					
	Married	1.61	1.264	0	9					
	Single	1.68	1.274	0	8					
Numbers of people in the household	Widow	2.15	1.951	0	7	23.436	2	11.718	7.340	0.001
	1-2	1.92	1.402	0	7					
	3-5	1.69	1.275	0	8					
Employment sector	6 or more	1.40	1.077	0	6	6.813	3	2.271	1.397	0.242
	Informal	1.83	1.410	0	7					
	Private	1.78	1.252	0	8					
	Public	1.54	1.283	0	7					
Monthly income	Unemployed	1.64	1.257	0	7	3.993	3	1.331	0.817	0.485
	Affluent (> 500 USD)	1.85	1.587	0	8					
	Above average (300-500 USD)	1.67	1.171	0	5					
	Average (100 – 300 USD)	1.68	1.326	0	7					

\*Parameters with p <0.05 are significant

### Conclusion and recommendations

The results of this study showed no serious food security issues for educated people with stable monthly incomes in the surveyed populations. This does not undermine the fact that there are countries in sub-Saharan Africa experiencing food insecurity and are in need of interventions. The COVID-19 lockdown measures appeared to have particularly affected the food choice of young people and poor people. The high education level of the population tends to determine the healthy eating lifestyle during that period. Nevertheless, consumption of vegetables and fruits was a bit low for some people; there is need for enlightenment/advocacy in the area of healthy dietary choices. Particular attention should be paid to South Africa where the risk of NCDs resurgence related to lack of physical activity, alcohol and tobacco consumption - in the COVID-19 context, appeared as the highest among the three surveyed countries. These observations have potential implications that could assist in the development of recommendations to maintain good health and eating habits during the COVID-19 pandemic and beyond with the aim of boosting immunity, promoting wellbeing and longevity.

Governments should regulate policies to avoid inequities in the delivery of nutrition interventions. Financial and non-financial incentives should be offered to the private sector to ensure that people have access to healthy foods and sufficient information to help them make better/healthier dietary choices. For example, food assistance programs, fiscal policies such as taxes on sweetened beverages and highly processed foods, correct nutrition labels, subsidies for healthy foods, social media campaigns and food reformulation to proffer healthier diets.

This study was limited to an online survey by the COVID-19 lockdowns which did not allow the researchers to move to certain rural/semi-urban settings to include participants from those areas. The researchers were not allowed to physically collect data, hence the online surveys but due to the snowball method, the surveys were circulated randomly and the issue of affordability of network data/internet connection in the lower socio-economic areas was a problem. Hence, this study only covers a particular socio-economic class of people who are educated and over 30% of them earn above 300USD per month. It needs to be noted that the study was focused on the food security situation during the COVID-19 lockdowns and not before COVID-19 although some literature review helped get an idea of the ‘pre-covid’ situation. The validity of answers is also a general problem of online surveys which may be difficult to ascertain.

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