ORIGINAL RESEARCH ARTICLE

IMPACT OF COVID-19 PANDEMIC ON FOOD CONSUMPTION PATTERN IN THE POPULATION OF NAIROBI, KENYA

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ABSTRACT

The COVID-19 pandemic has had an impact on food systems globally especially due to its containment measures and this has disrupted food consumption patterns among individuals. The study compared food consumption patterns and diet quality before and upon the onset of the COVID-19 pandemic in urban households in Nairobi City, Kenya. The investigation was cross-sectional in nature with 1460 respondents, conducted between May-June 2020. The survey link was disseminated to respondents using online platforms namely WhatsApp, Twitter, Facebook and emails. A seven-day food frequency questionnaire was incorporated that sought what they consumed 7-days before and 7-days after the onset of the COVID-19 pandemic.

Descriptive statistics and Chi-square tests were used to determine the association among variables. A 95% confidence interval was adopted. The respondents were 1460 in total, a majority (52.7%) being women with a mean age of 49 years, most (58%) were employed and 96% had a college/ university education. There was an increase in the intake of cereals from 62.3% to 72.6%, a decline in consumption of sugar from 42.5% to 30.8% and dairy products from 70.5% to 58.9% amid the COVID-19 pandemic. In addition, there was a rise in the intake of fruits and vegetables among respondents from 56.2% to 66.4% and a decrease in consumption of meat, poultry, fish, and eggs from 30.1% to 25.3% amid the covid-19 pandemic. This inquiry observed a significant association between intake of fats and oils with respondents' occupation ($p=0.011$), income ($p= 0.003$) and age ($p<0.001$). The majority (67.1%) of the participants reported an improvement in food hygiene practices while intake of fresh foods deteriorated (50%). The study showed that the COVID-19 pandemic skewed consumption of healthy diets which may influence body immunity hence the ability to suppress SARS-CoV-2 infection.

Key words: COVID-19 pandemic, food consumption patterns, diet quality, SARS-CoV-2

1.0 INTRODUCTION

World Health Organization declared the novel COVID-19 virus disease a pandemic in early 2020 and several measures were put in place across the world to contain its spread. In Kenya, some of the measures put in place included cessation of movement, dawn to dusk movement curfew, closure of restaurants, mandatory social distancing, case isolation and reduction in transmission of clinical cases pre-isolation (Austrian et al., 2020; Brand et al., 2020). The COVID-19 containment measures were useful. However, they adversely affected the daily lives of individuals with varying

socio-demographic characteristics including income deprivation and access to food (Ahmed, Syed A et al., 2020; Austrian et al., 2020).

The World Bank estimated that majority of urban residents would fall into extreme poverty by the end of 2020 as a consequence of COVID-19 shocks (Al-Samarrai et al., 2020). The pandemic vulnerabilities has had a greater impact on urban dwellers than their rural counterparts. In Kenya, it is estimated that only 26% of urban populations are in salaried employment with only one member in every five households having a stable income amid the COVID-19 pandemic while others are in casual employment and informal trades. A sizeable proportion of the salaried population lost their livelihoods due to layoffs and reduced wages, (Council, 2020). In addition, there have been disruptions in business hours and closure of non-essential businesses thereby influencing access to essential food services (Kansiime et al., 2021).

COVID-19 pandemic has adversely affected the socio-economic status of urban residents leading to variations in food choices and eating patterns. Socio-economic status impacts lifestyle patterns including eating habits hence directly impacting on individual health (Béné, 2020). The affordability of nutritious and healthy foods including fruits and vegetables amid the pandemic has become a major challenge. Consequently, most urban residents have shifted to the consumption of foods that are cheaper, convenient and possibly unhealthy this shift could lead to detrimental nutrition and health status, thus weakening the immune system and making one prone to infections. COVID-19 pandemic, therefore, presents a triple burden of opportunistic infections, malnutrition and non-communicable diseases among urban residents.

The pandemic has also resulted in anxiety and stress hence affecting eating behaviour and food choices (Carroll et al., 2020). Anxiety and stress have been associated with unhealthy eating habits. In stressful circumstances, individuals develop food cravings for the consumption of energy-dense foods including carbohydrates, sugar, fats and oils since the body triggers hyperphagia (Chopera et al., 2020). Consumption of energy-dense foods gives a temporarily antidepressant effect by the production of serotonin (Di Renzo et al., 2020; Zabetakis et al., 2020). In turn, this increases the risk of the onset of non-communicable diseases including diabetes, hypertension and cardiovascular diseases which could be detrimental and further complicate the COVID-19 infections. Unhealthy eating habits could also result in morbidity and mortality hence, there is a need to understand dietary practices. However, very few studies have examined eating habits among urban residents in Kenya amid the COVID-19 pandemic. This study compared eating patterns and food preparation practices before and upon onset of the COVID-19 pandemic to support nutritional intervention during and post covid-19 pandemic.

2.0 MATERIALS AND METHODS

The study was cross-sectional in nature with convenience sampling and the study was conducted online using google forms among adults aged 18 years and above in Nairobi County, Kenya. An online questionnaire was developed and the survey link was disseminated to respondents using online platforms namely WhatsApp, Twitter, Facebook and emails. Study respondents voluntarily participated in the study. The introductory part of the study questionnaire clearly explained the study objectives and this was adequately informative to the respondents. To investigate the change in food consumption patterns, a seven-day food frequency questionnaire was incorporated. The 7-day food frequency questionnaire sought to capture foods consumed by the respondent's 7-days before and 7-days after the onset of the COVID-19 pandemic. The following food groups were included in the questionnaire; - grains/cereals and starch foods; dairy products; meat, poultry, fish, eggs; fruits and vegetables; legumes; oils and fat; sugar, sweets, soft drinks.

Similarly, the questionnaire had a section on diet quality that examined variations in food shopping, food hygiene, eating patterns (time of meals), the number of meals and quality of diet (intake of fresh foods) during and pre-COVID 19 pandemic onset.

To increase reliability and validity, the questionnaire was pretested with 100 respondents who were excluded from the final data analysis. Further, the study questionnaire was reviewed by a registered nutritionist/dietitian before administration. The feedback received from the pretests and nutritionists helped in the revision of the questionnaire such that there was clarity and an easy understanding of study questions. Internal consistency was demonstrated with the coefficient alpha of 0.705. The sample size was calculated using Epi-info software as provided by the Centre for Disease Control and Prevention, USA (WHO, 2014; CDC, 2018). The desired sample size was estimated to be 1,037 based on a 99% confidence level and a 4% margin error with an expected 50% response rate. The study respondents were 1460 and they were all included in the study to increase the validity of the results. Data collection was done between May and June 2020 and the filled questionnaires were recovered using google forms and processed for statistical analysis.

All data were analyzed using a statistical package for the social science software (version 26). Descriptive statistics were used and the Chi-square test was used to determine the association among variables. A 95% confidence interval (95% CI) was adopted. Socio-demographic variables collected were categorized as: gender, age, household size, households with vulnerable members, participant education and monthly income and food practices were then presented as frequencies. Comparison between food intake of the 7-food groups included in the study and individual socio-demographic characteristics was done using chi-square tests.

At the beginning of the study, informed consent was obtained from participants using a digital consent form. Participants were allowed to drop from the study at any time they felt so. The google form had an option of clicking 'exit study'.

3.0 RESULTS

Table 1 summarizes the socio-economic profile of the respondents. In our survey, the data collection comprised of almost 90% of household heads: respondents in charge of food acquisition in a household either providing money and/ or going to the market and/ or groceries in the household. The mean age found was 49 years old, with 52% of respondents being female. The majority 58% were employed and among the total respondents, 96% had a college/ university education. Half of the respondents had a monthly total income less than or equal to 50,000 Kenyan Shilling (Ksh) (~$ 490 USD) and nearly 6% had their monthly income below ~$49 USD. It was found that the majority (69%) of household size, comprised of above 4 members, with a mean household member above 3.

Table 1: Socio-demographic Characteristics of Respondents

Variable (*N=1460*)	**Respondents (%)**
Gender	
Male	47.26
Female	52.74
Age	
18-24	13.70
25-50	76.72
>51	9.59
Marital status	
Single	32.19
Married	62.33
Divorced	1.37
Widowed	4.11
Education level	
Primary	1.37
Secondary	2.74
College/ University	95.89
Occupation	
Unemployed	15.75
Self-employed	19.86
Employed	58.22
Retired	0.68
Other	5.48
Participant is a household head	89.04
Household size	
1	7.53
2-3	23.29
4-5	36.99
>5	32.19
Monthly income (Ksh)	
<5000	6.16
5000-10000	7.53
10000-2000	10.96
20000-30000	6.85
30000-40000	6.16
40000-50000	12.33
>50000	50

Figure 1 shows that the following food groups were consumed daily by the majority of the study respondents before the onset of COVID-19: oils and fat (78.1%), dairy products (70.5%), fruits and vegetables (66.4%) with minimal consumption of sugar, sweets, and soft drinks. (21.2%). The consumption during the COVID-19 pandemic reveal that the food groups eaten daily by the majority of the respondents were oils and fats (76.7%) and cereals (72.6%). This study reports an increased daily consumption of cereals while the daily intake of sugar and dairy products declined among the respondents.

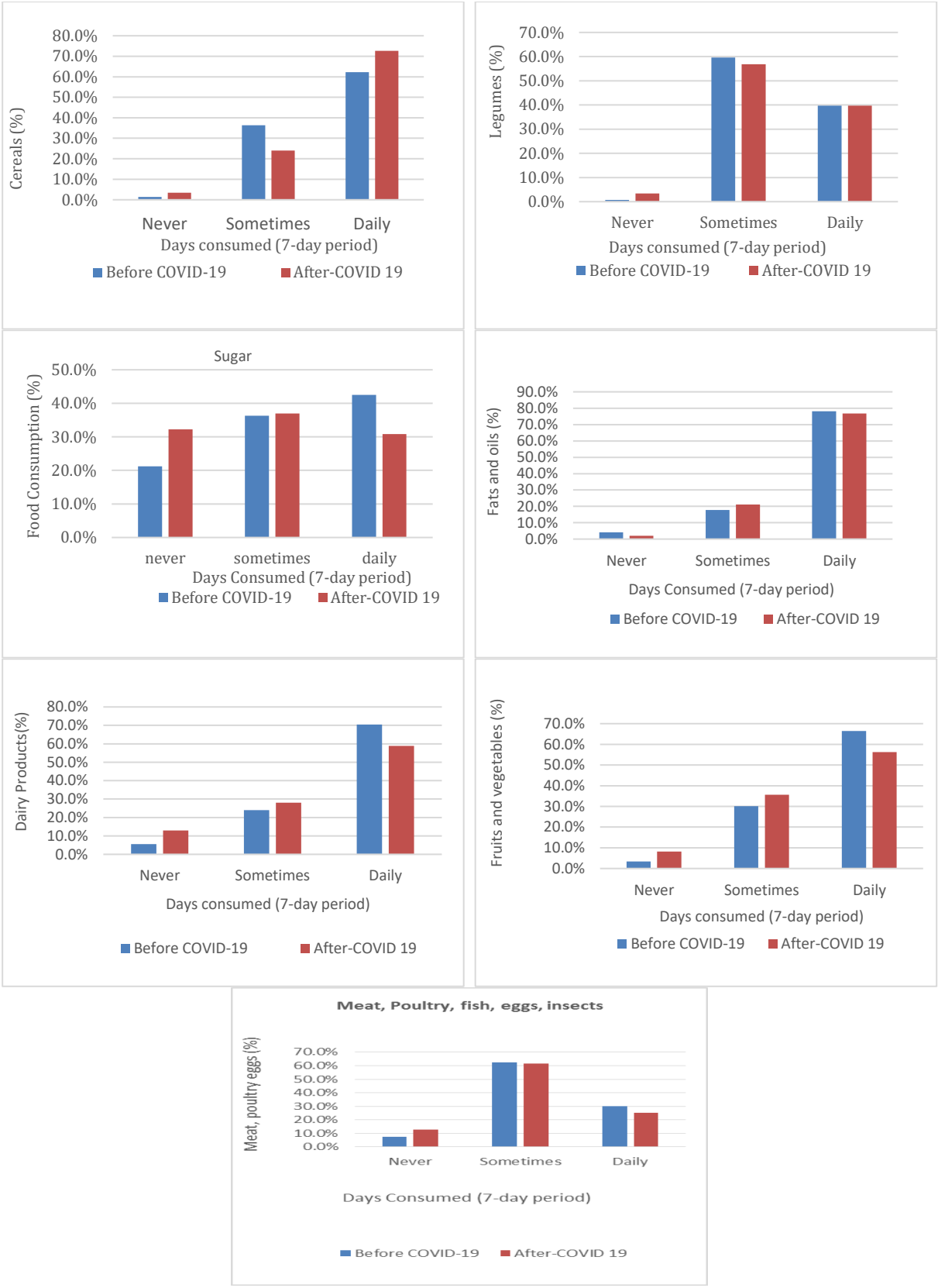

Figure 1: Food groups consumed daily before the onset of COVID-19 and during the COVID-19

Table 2 below shows a significant association between intake of fats and oils with respondents' occupation (p=0.011), income (p= 0.003) and age (p<0.001). The respondents that were employed had a higher intake of fats and oils; sugar, sweets and soft drinks (p=0.011) compared to the unemployed. In the current study, income was significantly associated with intake of dairy products (p<0.001), meat, poultry, fish, eggs (p<0.001); fruits and vegetables (<0.001). The households that had higher incomes increased the intake of the following food groups amid COVID-19; dairy products; meat, poultry, fish, eggs; fruits and vegetables; fats and oils. Similarly, education was significantly associated with intake of meat, poultry, fish, eggs (p=0.007) and fruits and vegetables (p<0.001). The higher the education level the greater the intake of fruits and the less consumption of meat, poultry, fish, eggs. Additionally, this study reports a significant association between age and intake of fats and oils; the older the person the higher the intake of fats and oils. The findings of this study found no significant association between food consumption of either of the seven food groups including grains/cereals and starch foods; dairy products; meat, poultry, fish, eggs; fruits and vegetables; legumes; oils and fat; sugar, sweets, soft drinks and gender.

Table 2: Association between food group consumption and selected socio-demographic characteristics

Socio-demographic characteristics	Occupation		Education		Income		Gender		Age	
Food groups	χ 2	P value	χ 2	P value	χ 2	P value	χ 2	P value	χ 2	P value
Cereals	14.28	0.28	7.87	0.96	13.06	0.22	0.63	0.73	5.19	0.27
Dairy products	19.76	0.07	5.91	0.21	44.79	<0.001*	1.00	0.61	2.47	0.65
Meat	15.83	0.19	14.21	0.007*	48.82	<0.001*	1.85	0.39	1.76	0.78
Fruits & vegetables	12.59	0.39	24.45	<0.001*	35.97	<0.001*	1.18	0.56	3.47	0.48
Legumes	17.56	0.13	2.18	0.70	16.86	0.08	5.99	0.05	0.85	0.93
Fats and oils	26.0	0.01*	0.73	0.95	26.81	0.003*	0.50	0.78	20.58	<0.001*
Sugar	24.1	0.02*	8.33	0.08	15.40	0.12	1.64	0.44	1.16	0.84

Chi-square tests*: significant (P< 0.05)

Table 3 shows the food practices that were affected by the COVID-19 pandemic. Most (67.1%) of the respondents reported an improvement in food hygiene practices while 50% reported a decline in quality of diet and 43.2% observed that eating patterns deteriorated. In this study majority of the respondents, 61% reported no change in their shopping patterns amid COVID- 19 pandemic.

Table 3: Food practices affected by COVID-19 Pandemic

Practice	**Improvement (%)**	**No change**	**Deteriorated (%**
Food shopping	21.9%	61.0%	17.1%
Food hygiene	67.1%	5.5%	27.4%
Eating patterns (time of meals)	33.6%	23.3%	43.2%
Number of meals per day	30.8%	36.3%	32.9%
Quality of diet e.g. fresh food	23.3%	26.7%	50%

4.0 DISCUSSION

The current study had more female participants than males. This is similar to other COVID-19 related studies that have reported a higher participation rate of women compared to men (Matsungo et al., 2020; Kudaisi., 2021). Females have been reported to be more health-conscious and willing to participate in research studies to gain knowledge to mitigate themselves against the risk of COVID-19 infection (Geldsetzer, 2020). The majority of the respondents in this study had a high level of education (college or an undergraduate degree). This could be associated with the nature of research that was online based with the educated likely to be in formal employment hence have financial resources with the ability to access and navigate the internet. They are also likely to have an understanding of the benefits they could accrue from such a study.

This study reports an increased intake of cereals with a decline in intake of sugar and dairy products amid the COVID-19 pandemic concurring with reports by (Chege et al., 2020; Ramos-Padilla et al., 2021). The increased cereal consumption could be linked to the fact that the respondents tended to purchase dry foods with longer shelf life. Similarly, cereals are regularly consumed in main dishes even pre-COVID-19. Intake of sugar, sweets and soft drinks declined possibly due to respondents adherence to WHO guidelines (World Health Organization, 2021) that have advocated for reduced consumption of sugary foods. The decrease in consumption of dairy products could be explained by the perceived risk among respondents of being infected with COVID-19 as a consequence of animal products consumption agreeing with Hassen et al., (2020). Additionally, the price of dairy products has been reported to rise due to the pandemic resulting in limited consumption of the products (GAIN, 2020; Liu and Rabinowitz, 2021).

Socio-demographic factors are known to impact food consumption patterns (Carroll et al., 2020; Kansiime et al., 2021). The current study showed that the following socio-demographic factors were significantly associated with food consumption; occupation, income, education and age. However, no significant association was found between gender and food consumption of the 7-food groups included in the study. In this study, the respondents that were employed had a higher intake of fats and oils; sugar, sweets and soft drinks compared to the unemployed. These findings are consistent with reports by Chenarides et al. (2021) and Poelman et al. (2021). The mentioned studies observed that amid COVID-19 most employed people were now indoors and as result prepared palatable foods, explaining the high intake of fats and oils. These findings are in support of Ammar et al. (2020) who reported that most employed people had a high intake of fat diets attributing this to working from home amid COVID-19. Similarly, Sidor and Rzymski (2020) reported that the confinement at home due to COVID-19 led to increased intake of palatable foods and snacks due to boredom. Another study by Scarmozzino and Visioli (2020) on dietary habits amid COVID-19 observed that there was an increase in the consumption of fats and oils. The study attributed this to high anxiety levels due to confinement increasing hunger pangs. Additionally, Gallo et al. (2020) observed that there was an increased intake of hypercaloric diets amid COVID-19 due to increased intake of energy foods. Further, most employed people even pre-COVID-19 have been reported to frequently consume fast foods and other processed foods (Saghaian and Mohammadi, 2018; Mumena, 2020). These foods are rich in fat and oils and hence may predispose one to non-communicable diseases.

In this study, education was significantly associated with intake of meat, poultry, fish, eggs and fruits and vegetables, the higher the education level the greater the intake of fruits and vegetables and the less consumption of meat, poultry, fish, eggs. Similar findings were reported by (Poelman et al., 2021). A study by Hassen et al. (2020) on food consumption patterns amid COVID-19 reported that those with higher education levels consumed more fruits and vegetables compared

to those with lower education levels. The study attributed this to the knowledge that fruits and vegetables boost immunity, especially amid the COVID-19 pandemic. Another study by Celorio-Sardà et al.(2021) on dietary changes in adults amid COVID-19 reported an increased intake of fruits and vegetables. The findings in this study and other previous studies suggest that education has a fundamental role in individual food choices, purchase and consumption decisions.

The low consumption of meat, poultry, fish, and eggs among the most educated respondents in this study could be associated with the health consciousness of the population that was under investigation. Consumption of meat, poultry, fish, eggs has been linked to non-communicable diseases including cancer and cardiovascular diseases (Ministry of Health Kenya, 2020). Meat, poultry, fish, eggs are considered rich sources of cholesterol and saturated fatty acids (Schmid et al., 2017) recommendations have been made that intake of these foods should be reduced amid COVID-19 to decrease the risk of the onset of non-communicable diseases (Ministry of Health Kenya, 2020).

Concerning income, our study findings revealed that consumption of the following food groups: dairy products; meat, poultry, fish, eggs; fruits and vegetables and fats and oils increased with income. Similar to the current work, other earlier studies reported increased consumption of fruits and vegetables and animal products that are considered expensive and linked to the availability of finances (Valsta et al,, 2005; Hirvonen et al., 2021). A study by Janssen et al.(2021) reported that income was correlated with intake of fruits and vegetables amid COVID-19, those who had higher incomes increased fruits and vegetable consumption. Income, therefore, impacts on quality of diets since its plays a role in food choices and purchases. This study reports a significant association between age and intake of fats and oils; the older the person the higher the intake of fats and oils. Radwan et al. (2020) reported that older adults were consuming high fat and oil diets amid COVID-19 probably because they were confined at home and were looking for more palatable foods. Ageing weakens the immune system and is a leading risk factor for most non-communicable diseases being an important indicator of susceptibility to COVID-19 infections (Martirosyan and Polamarasetti, 2020) Susceptibility to non-communicable diseases and COVID-19 infection is enhanced by consumption of high fat and oil diets (Radwan et al., 2020). The findings of this study, therefore, reveal the urgent need for putting in place measures to provide nutrition education to the elderly to address their dietary intake patterns, especially during public health pandemics.

The current study results reflect the repercussions of COVID-19 containment measures on diet quality with reduced consumption of fresh foods and late timings in intake of meals. This then creates concerns on the need to have in place measures to improve diet quality amid the emergency. Some of these measures may include education sessions on the role of diet in health to boost immunity and minimize the dangers of contracting the COVID-19 virus. It was expected that the shopping behaviour of respondents would change with the onset of the COVID-19 pandemic, yet our study reports contrary findings. The most probable reason being the characteristics of the respondents that were from an urban setting hence their shopping patterns remained the same.

5.0 CONCLUSION

This study highlights significant variations in food consumption patterns among an urban population amid a public health pandemic and the relevance of investigation of these patterns with socio-demographic factors. This then provides evidence on the need for public health officials and nutritionists to focus on the development of programmes to increase nutrition awareness for healthy food Choices and consumption amid pandemics. The study of food consumption patterns to socio-demographic factors is therefore relevant to nutrition and public health policy.

Additionally, the study revealed that food hygiene practices improved among the respondents. It is then evident that even with a return to normalcy there will be a need to emphasize the importance of preparing meals at home since food hygiene reduces the risk of infections. The impact of food intake patterns on health cannot be ignored amid pandemics and therefore there may be a need for future research studies to focus on the long-term effect of COVID-19 pandemics on dietary habits and the overall nutrition status of individuals.

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