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Dietary practices of adolescents during COVID-19 and the perceived effect of the pandemic on nutrition-related behaviours

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Abstract

Background Though there are suggestions on how COVID 19 has affected nutrition-related practices and the nutritional status of people, few studies have evaluated this among adolescents. This study aimed to assess the perceived effect of the pandemic on nutrition-related practices of adolescents.

Methods The study was conducted among adolescents ($n=290$) in three Metropolitan, Municipal, and District Assemblies (MMDAs) in Accra using a cross-sectional design. Participants provided information on dietary habits, and diet-related messages received during the pandemic. Food consumption during the peak periods of COVID-19 and afterwards was assessed using a 7-day food frequency tool. Food consumption scores (FCS) were generated based on the guidelines of the World Food Programme. The dietary practices of the participants at the two time periods (during and after pandemic) were compared using Pearson's Chi Square tests.

Results While meal frequency remained similar during and after the peak of the COVID-19 pandemic among the participants, meal skipping and dependence on ready-to-use foods were significantly lower during the peak of the COVID pandemic. Though significantly higher proportions of the participants consumed legumes/nuts/seeds and sugar-sweetened beverages (SSB) at the peak of the pandemic compared to afterwards, overall food consumption was similar at the two time points (acceptable diet: 100% vs. 99.3%). More than a third of the study participants indicated that COVID-19 had negatively affected their food quantity, exercise, and overall physical activity level. Additionally, 41% indicated that their screen time increased at the same time.

Conclusion Our study found that food consumption among adolescents in Accra did not vary much with respect to the COVID-19 pandemic. However, the observed high intake of SSBs coupled with reduced physical activity levels call for concerted efforts from various stakeholders to address these habits to avoid an even faster increasing rate of obesity.

Keywords Adolescents, COVID-19, Nutrition-related practices, Food consumption score, Ghana

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Introduction

Adolescence is defined as the time between the ages of 10 and 19 years [1], a period marked by major physical, psychological, and social changes. The adolescent population accounts for 16% of the world's total population [2], with the majority residing in low- and middle-income countries. Adolescents in Ghana comprise almost a quarter of the total population [3]. Thus, to achieve Sustainable Development Goal Two, it is important to prioritize the nutrition and health of adolescents so as to build upon the progress made among infants and young children. Adolescence is a crucial stage of life in terms of nutrition because of the rapid physical growth and development, as well as the lifestyle and dietary choices made during this period. These factors affect both nutritional intake and requirements. Inappropriate dietary behaviours such as unhealthy snacking and skipped meals that are usually adopted by adolescents contribute to their inability to meet the nutritional requirements for their stage of development. There is a general indication that this age group suffers from various forms of malnutrition [4] and poor dietary practices including frequent consumption of sugary and/or calorie-rich snacks and inadequate fruit and vegetable consumption [5–7]. There is a need for more attention to provide evidence for appropriate interventions that will improve dietary practices and increase levels of physical activity among this sub-population to mitigate malnutrition and its consequences.

There are indications from available studies that both undernutrition and overnutrition exist among adolescents in Ghana. While the prevalence of both stunting and thinness are marginally declining among non-pregnant adolescent girls in Ghana, overweight/obesity has continued to show an increasing trend since 2003 [8]. Micronutrient deficiency is also common among this age group, with more than half of adolescent girls being anaemic in parts of the country [9–10]. Poor dietary practices such as high intake of snacks and sweets, meal skipping, low fruit intake, low dietary diversity, and nutrient inadequacies have also been reported among Ghanaian adolescents [11–13]. These studies show that nutritional indicators including the dietary practices of adolescents in Ghana are not optimum and in need of more emphasis and attention.

The World Health Organisation in March 2020 declared the coronavirus disease (COVID-19) as a global pandemic, and the world continues to experience its impacts on all aspects of life. Caused by a novel coronavirus that was first reported and identified in Wuhan, China, in December 2019, COVID-19 is a contagious respiratory infection that spreads mainly through inhalation of droplets containing the virus from coughing or sneezing, or by touching infected surfaces. Ghana recorded its first two cases in March 2020 and as of April 2024, about 172,000 cases had been confirmed with more than a thousand dead [14]. In terms of regional distribution, the Greater Accra region recorded the largest proportion of confirmed cases [15]. The COVID-19 pandemic was a serious global threat because its effects have been diverse and include components of basic human needs such as food and nutrition security. As suggested by Naja & Hamadeh, (2020) [16] in a multi-level framework for nutrition actions, COVID-19 and its related management strategies influence nutrition at various levels (individual, community, national, and global). In addition to the direct connection between specific nutrients like protein, vitamin C, zinc, and vitamin E, and an individual's ability to resist and fight infections [17], measures such as lockdowns and social distancing have impacted levels of physical activity, availability and accessibility of food, and ultimately the quality of diet. The strategies used to manage COVID-19 made the economic situation worse for many families. Lots of people lost their main sources of income suddenly and were unable to afford enough food, particularly nutrient-dense items like fruits, dairy, eggs, and other animal source foods [18–20 Alderman et al., 2020; Harris et al., 2020; Kaasime et al., 2021], which meant that many children and teenagers were more likely not get the nutrition they needed. These foods serve as good sources of key micronutrients like iron, zinc, calcium, and vitamin C (for better absorption of non-haem iron) needed by adolescents for optimal development. In a review of the evidence, James et al. (2021) [21] suggested that because all types of malnutrition can weaken the immune system, it is crucial to continue public health efforts to reduce deficiencies in essential nutrients, as well as both undernutrition and overnutrition, to effectively fight the pandemic.

There are various suggestions on how COVID-19 has affected nutrition-related practices as well as the nutritional status and health of people, but few studies have been conducted to evaluate the impact, mainly among adults [22–24]. Huber et al. (2020) [25] reported that 31% of young adults increased the amount of food consumed during the pandemic, while 17% reduced food amount, with more than half of the participants indicating no change during the pandemic. Among those who indicated an increase food intake, confectionaries (64%) and bread (47%) were the most common, while nutrient dense foods such as fruits (34%), dairy, vegetables (28%), and meat (25%) were less common [25]. Thus, there are observed differences when it comes to the pandemic's effect on food consumption. There is also a lack of information on the pandemic's impact on adolescent nutrition. Considering the suggested impact of the pandemic on food and nutrition security, this study investigated how the COVID-19 pandemic affected the nutrition-related practices of adolescents in Accra, Ghana. This

study also identified nutrition-related information that has been linked with the pandemic and whether these influenced the nutrition-related practices of adolescents in the study area.

Methods

The cross-sectional study design was used to obtain information from adolescents living in three Metropolitan, Municipal, and District Assemblies (MMDAs) in Accra. Adolescents living in the selected districts were the target population. Based on a 23.6% proportion of adolescents who consumed a high diversity diet [12], a 95% level of confidence, and a 5% contingency rate, a sample size of 292 adolescents was targeted for the study.

Sampling

Three MMDAs in Accra were conveniently selected and these are Accra Metropolitan (AMA), Ga South, and La-Kwantanang-Madina. These MMDAs were easily accessible by the research team with the available resources, and at the same time, researchers were able to achieve a level of participant diversity within Accra by recruiting from more than one MMDA. All three MMDAs were classified as predominantly urban (about 87% on average) based on the 2021 Ghana Population and Housing census ([26] Ghana Statistical Service, 2021). AMA consists of three sub-districts, and one was selected for this study. In each district, three communities were randomly selected to be included in the study. Each community was then divided into four parts, and within each part, a first household was randomly selected to be the starting point. Thereafter, every other household with the target group was selected until the number needed was obtained. One adolescent was recruited in each selected household. For households with more than one adolescent, random selection via balloting was applied by asking each to pick a piece of paper with yes/no written on it. Once recruited, the adolescents had the option to either complete the questionnaire online via Google form or have the questionnaire administered face to face by researchers.

Data collection

The survey tool was a questionnaire that was administered mainly via Google Forms. The questionnaire (supplementary file) had different sections to solicit information on the participants' demography, dietary habits, and diet-related messages received during the COVID-19 pandemic. Information on eating frequency, meal skipping, and consumption of ready-to-eat meals by the adolescents at two time points: during the peak periods of the COVID-19 in Ghana (early to mid-2021), and seven days before the interview period (January to October 2022) were documented. A food frequency tool (FFQ) consisting of foods commonly eaten in Ghana was administered to ascertain participants' intake of foods. The foods on the FFQ were put into ten food groups namely: staples, stews and soups, animal flesh and products, milk and products, legumes, nuts and seeds, fruits, vegetables, fats and oils, sugar-sweetened beverages, and pastries. The participants also answered questions related to their awareness of nutrition-related messages that were promoted during the pandemic and how these could have influenced their dietary practices. The study tools including the food frequency questionnaire were pretested among adolescents living in a nearby community that was not part of the selected areas for the study before data collection started.

Data analysis

Food consumption scores (FCS) were generated for each participant using the information from the seven-day food frequency questionnaire and according to the guidelines of the World Food Programme [27–28]. The food items were re-grouped into eight categories namely: main staples, pulses, vegetables, fruits, meat and fish, dairy, sugar, and oil. The frequency of consumption for each food group was obtained by summing the frequencies of consumption of the food items within the group. Values above 7 were recoded as 7. For each food group, the total consumption frequency was then multiplied by the designated weight as described by the World Food Programme [29–30] to obtain a weighted food group score. A food consumption score (FCS) was computed for each participant by summing up all the weight food group scores. Based on total FCS and the fact that consumption of sugar (97.6%) and oils (96.6%) almost daily (5–7 times per week) was high in the study sample [31], participants were categorized as follows: poor diet (0–28), borderline diet (28.5–42) and acceptable diet (>42). The dietary practices (consumption of different food groups, FCS categories, meal frequency, meal skipping) of the participants for the two time periods (during and after the pandemic) were compared using Pearson's Chi-Square test and the raw FCS were compared using paired t-tests. Data on the perceived effects of nutrition-related messages accessed during the pandemic are presented as categorical data (frequencies and percentages).

Ethics

Ethical approval to conduct the study was sought from the Ethics Committee of the College of Basic and Applied Sciences, University of Ghana and permission to collect data at the selected communities was sought from the appropriate Metropolitan, Municipal, and District Assemblies (MMDAs). In each study household, the parents/primary guardians of adolescents between 10 and 17

Table 1 Sociodemographic characteristics of participants (*N* = 290)

Variables	*n* (%) or mean ± SD
Age (years)	14.70 ± 2.41
Sex:	
Male	121 (41.70)
Female	169 (58.30)
Highest level of formal education*:	
Primary	21 (6.20)
JHS	200 (69.00)
SHS	62 21.40)
Vocational	3 (1.00)
University	4 (1.40)
Currently in school:	276 (95.20)
Household:	
Size	6.8 ± 4.4
Number of children (< 18 years)	3.4 ± 2.0

*JHS: Junior High School level, SHS: Senior High School level. SD: Standard Deviation

Table 2 Eating patterns of adolescents during and after the peak of COVID-19 in Accra

	Peak of pandemic		After peak		*p*-value
	n	%	n	%	
Eating frequency on weekdays					0.628
Less than 3 meals/day	73	(25.2)	68	(23.4)	
3 or more meals/day	217	(74.8)	222	(76.6)	
Eating frequency on weekends					0.791
Less than 3 meals/day	94	(32.4)	97	(33.4)	
3 or more meals/day	196	(67.6)	193	(66.6)	
Meal Skipping Prevalence	141	(48.6)	168	(57.9)	0.025*
Ready-to-eat food usage	169	(58.3)	251	(86.6)	< 0.001*
Types of Meals Skipped					0.758
Breakfast	56	(39.7)	60	(35.7)	
Lunch	60	(42.6)	75	(44.6)	
Supper	25	(17.7)	33	(19.6)	
Mealtimes for ready-to-eat foods.					0.681
Morning	67	(39.6)	100	(39.8)	
Afternoon	67	(39.6)	107	(42.7)	
Evening	35	(20.8)	44	(17.5)	

*p-value is less than 0.05

years of age provided informed consent before the interview was initiated.

Results

A total of 290 adolescents participated in the study with a mean age of 14.5 ± 2.4 years (Table 1). with the majority (58.3%) being males. Most of the participants were yet to complete the senior high school level of formal education (75.2%) and were in school at the time of the study (95.2%).

While meal frequencies for weekdays and weekends remained similar during and after the peak of the COVID-19 pandemic in the country, meal skipping and dependence on ready-to-use foods were significantly lower during the peak of the COVID pandemic (Table 2). Usage of ready-to-use foods was more prevalent after the peak of the pandemic compared to during the peak period (86.6% vs. 58.3%, p-value < 0.001). Comparatively, more study participants depended on ready-to-use foods for morning or afternoon meals.

Table 3 Food consumption of study participants (*N* = 290)

Variables	During pandemic		After pandemic		*p*-value
	n	%	*n*	%	
Food groups:					
Staples	290	100.0	290	100.0	na
Stews and soups	287	99.0	287	99.0	1.000
Animal flesh and products	290	100.0	290	100.0	na
Milk and products	286	98.6	285	98.3	0.737
Legumes, nuts, and seeds	284	97.9	272	93.8	0.012*
Fruits	289	99.7	284	97.9	0.057
Vegetables	290	100.0	289	99.7	0.317
Fats and oils	290	100.0	288	99.3	0.157
Sugar-sweetened beverages	288	99.3	279	96.2	0.012*
Pastries	284	97.9	285	98.3	0.761
Food consumption score categories#:					na
Acceptable	290	100	288	99.3	
Borderline	0	0	2	0.7	
Poor	0	0	0	0	
Food consumption scores (mean ± SD)	103.0	± 13.6	98.0	± 17.1	< 0.001*

*p-value is less than 0.05, #Categorised based on almost daily (5–7 times/week) consumption of sugar (97.6%) and oil (96.6%), according to the WFP cut-off: 0–28 = poor, 28.5–42 = borderline, > 42 = acceptable)

The consumption of foods from most of the food groups assessed did not differ among the participants between the two-time points (peak of COVID-19 in Ghana and afterwards, Table 3). However, a higher proportion of adolescents consumed legumes, nuts, and seeds as well as sugar-sweetened beverages during the peak of the pandemic. Based on the World Food Programme's categorization of total food consumption scores for sub-Saharan Africa, almost all the study participants had acceptable food consumption both during the peak of the pandemic and afterwards (Table 3). However, when the mean food consumption scores of participants at the two-time points were compared using paired t-tests, the food consumption score during the peak of the pandemic was significantly higher than the post-COVID mean score (103 ± 14 vs. 98 ± 17, p-value < 0.001).

Almost half of the adolescents (41.7%) indicated that they received some form of nutrition-related recommendation during the COVID-19 pandemic and vegetables (50%), fruits 40%), and herbs, spices, and related drinks (37%) were the most recommended food items (Fig. 1). The study participants identified diverse sources of these recommendations including social media (68%), online resources (68%), traditional media (70%), family members (68%), and health professionals (67%). Friends were

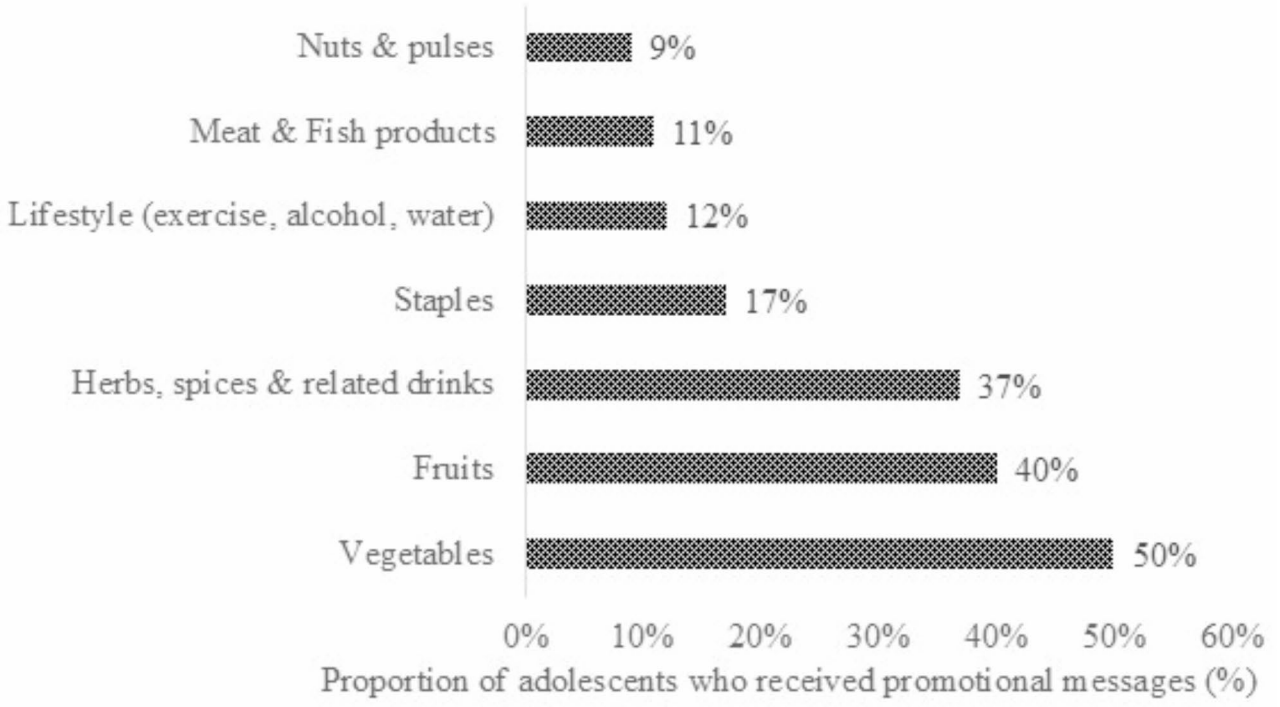

Fig. 1 Specific items promoted during the pandemic ($n = 120$). Figure 1 shows the various food items of food groups that the study adolescents received promotional messages on during the peak of the COVID-19 pandemic. Each bar represents the proportion of participants who answered 'yes' to receiving any promotional message during the period specifically getting a message that promoted the specific food item indicated on the y-axis

the least common source of nutrition-related recommendations for the adolescents during the pandemic.

While more than a third of the study participants thought that COVID-19 had negatively affected their food quantity, exercise, and overall physical activity level, almost half (46%) also indicated that there was no change in the quality of food they consumed (Fig. 2). Also noteworthy is that 41% of the adolescents believed that their screen time increased at the same time.

Discussion

This study sought to assess the dietary practices among adolescents living in Accra, Ghana concerning the COVID-19 pandemic and their perceptions of the effect of the pandemic on food intake and physical activity levels. The study observed a difference in meal skipping and usage of ready-to-use foods between the two time periods (at the peak of the pandemic in Ghana and afterwards).

Meal skipping was less prevalent during the peak of the COVID-19 pandemic. Lack of time and peer pressure have been stated as major causes of meal skipping among adolescents [32–33]. The significantly lower prevalence during the peak of the pandemic is probably due to the elimination of these factors due to some of the safety measures that were put in place at the time, such as restricted movements and the closure of schools. These measures afforded adolescents a break from physically going to school and meant that they stayed home more. There was therefore a reduction in the time the adolescents physically communicated with their peer because of the absence of school time and most social gatherings. Thus, peer pressure, a factor that has been linked with eating habits among adolescents in Ghana [34], was reduced. During the lockdown, most people were at home, on break from work or working remotely from home [35], and only essential shops were actively operating [36]. Thus, that period comparatively provided time for home-made meals. On the other hand, life returned to normalcy afterwards with most people returning to work and/or school physically.

The food consumption score is a composite score that is based on dietary diversity, food frequency, and relative nutritional importance of different food groups [28–31]. As an indicator, it is widely used by the World Food Programme to determine food accessibility, a proxy for diet quantity and quality at the household level. However, the indicator has also been used to describe individual food security status and food consumption [37–38] among adolescents and women. Based on their food consumption score, almost all the adolescents in the current study were classified as having received an acceptable diet. The mean FCS observed for the adolescents both at the peak of COVID-19 in Ghana and afterwards were higher than

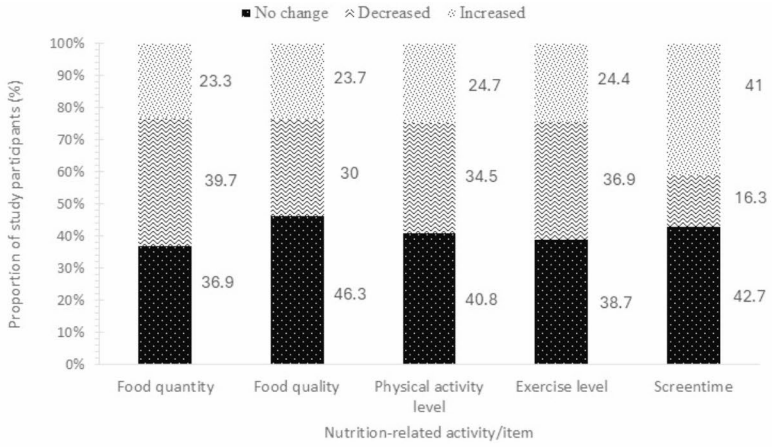

Fig. 2 Participants' perceptions of the effect of the COVID pandemic on food and physical activity levels ($n = 290$). Figure 2 shows the different changes that occurred regarding the different nutrition-related practices indicated on the x-axis, based on the perception of the study participants. The white background with black dots represents the proportion of participants who said that they observed an increase during the pandemic, the zig-zag line pattern represents the proportion of adolescents who observed a decrease during the pandemic, and the black background with the white dots represents the proportion of adolescents who said that they did not observe any change in the nutrition-related practices of interest during the pandemic

that observed among adolescents in Lebanon [39] and a rural setting in Ghana [38]. Ambaw et al. [37] found a significant association between residence and food consumption score, and this explains the relatively high mean FCS recorded in the current study when compared to the findings by Wiafe et al. [38]. This means that food quantity and quality consumed by adolescents vary significantly according to where they reside (rural/urban). There is evidence that the level of food insecurity is worse in rural settings compared to urban areas [40], and contributory factors include education and sex of household head, income, farm size, access to agricultural credit, and household size [41]. Additionally, urban dwellers are exposed to a wider variety of foods as compared to those in rural areas. This then translates into better food consumption in the urban setting, as observed in the current study. It is however, important to note that FCS is considered a suitable food security indicator and a proxy for both diet quantity and quality at the household level [27], its capacity as an individual level indicator still needs to be well established by research.

More than a third of our study participants(41%) indicated that the pandemic led to an increase in their screen time and a decrease in their level of physical activity. This is similar to observations among children and adolescents in other settings [42–43], young adults, and adults [44–45]. According to Lua et al. [46]., staying indoors due to the lockdown and social distancing consequently led people to socially connect with others and entertain themselves using electronic devices, causing an increase in screen time. Further, among students, schools resorting to virtual classes for lesson delivery during the lockdown contributed to this observation. Although lockdown measures are over, there is minimal evidence that the average pre-pandemic screen time levels have been reinstated [47]. Incidentally, increased usage of electronics and screen time have also been linked to unhealthy dietary practices [42] such as frequent and late-night snacking, and together these increase the risk of overweight/obesity and related morbidities. In the current study, consumption of sugar-sweetened beverages and legumes, nuts, and oil seeds group (including groundnuts) were significantly higher during the pandemic. Reason(s) for this observation are unclear. However, there was a lot of emphasis on fluid consumption during the pandemic and this might have contributed to a higher intake of sugar-sweetened beverages, particularly those that were prepared using local herbs and spices such as ginger and hibiscus flower petals (*sobolo*).

In terms of overall food intake, more than a third and almost a third of the study participants reported reductions in the quantity and quality of food consumed, respectively. Similarly, 39% and 30% of adult participants in a multi-country study reported lesser food quantity and quality during the pandemic, respectively [22]. This observation is not surprising because households are known to employ various coping strategies during a crisis [48], such as the world experienced during the COVID pandemic. Commonly identified dietary coping strategies include a reduction in portion sizes and frequency of meals [22].

According to Alagawany et al. [49], at the peak of the pandemic and before the certification of any vaccine for it, the strength of the immune system was the main factor

in the protection against the virus. As such, it is not surprising that nutrients deemed important for the normal functioning of the immune system were promoted. Vitamins and minerals were especially targeted. This study observed that almost half of the participants (41.7%) received messages that promoted various food items as being protective against COVID-19 infection. These messages were aimed at educating the public on nutrients and practices that boost the immune system, so they were mostly from food groups noted to be good sources of micronutrients and phytochemicals, such as vegetables, fruits, and some herbs and spices. These were highly promoted for the immune system [49] during the pandemic. Social media and online resources were the most common sources of information for nutrition-related recommendations. This finding is in line with findings by Quaidoo et al. [50] where online resources were the most common source of information among young adults. It is, however, contrary to another study among adolescents in Bangladesh that reported family members as the most common source of nutritional information on nutrition for this age group [51], although this source was associated with poor knowledge. Differences in the importance of information sources are likely to depend on factors such as location, cultural values, level of education, and accessibility to the Internet.

The findings of this study help fill a knowledge gap that exists in the effects of the COVID-19 pandemic on nutrition practices of different sub-populations especially in Africa. However, it is limited by the fact that data collection for the pandemic period was a recall and therefore highly dependent on participants' memory. The convenience sampling of the MMDAs may limit the generalizability of the study findings. Additionally, effect of the pandemic on some nutrition-related practices such as physical activity levels were based on the perceptions of the participants, not on actual measurements. The use of the FFQ to solicit information on dietary intake of participants enabled the research team to assess qualitatively the consumption of food groups but limited the ability to evaluate quantitatively the adequacy of the adolescents' diet. The information for deriving the food consumption scores were based on the ability of the participants to remember food intake during the pandemic and seven days before interviews, thus errors from recall bias were possible.

Conclusion

During the peak of the COVID-19 pandemic in Ghana, meal skipping and dependence on ready-to-use foods were significantly lower among the study participants, compared to the period afterwards, but meal frequency remained similar at the two time points. Overall acceptable diet consumption based on food consumption scores were also similar at the two time points. More than a third of the study participants indicated that COVID-19 had negatively affected their food quantity, exercise, and overall physical activity level. Thus, our study found that food consumption among adolescents in Accra did not vary much with respect to the COVID-19 pandemic. However, the observed high intake of SSBs coupled with reduced physical activity levels is concerning and call for concerted efforts from various stakeholders to address these habits to avoid an even faster increasing rate of obesity adolescents.

Abbreviations

AMA	Accra metropolitan assembly
COVID/COVID-19	Respiratory illness caused by severe acute respiratory syndrome coronavirus 2
FCS	Food consumption score
FFQ	Food frequency questionnaire
MMDAs	Metropolitan, municipal, and district assembly
SSB	Sugar sweetened beverages
UNICEF	United nations international children's emergency fund
WHO	World health organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-22548-z.

Supplementary Material 1

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Author contributions

AO, NAA, and TT designed the research. NAA, TT, and JA collected the research data. AO analysed the data and wrote the first draft of the manuscript. All authors read and approved the submitted manuscript.

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Data availability

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained prior to data collection from the College of Basic and Applied Sciences, University of Ghana Research Ethics Board. All procedures undertaken under this study was approved by the Ethics Committee of the College of Basic and Applied Sciences, University of Ghana. All procedures of this study were conducted according to the guidelines and regulations laid down in the Declaration of Helsinki. All participants indicated their willingness to participate by completing an informed consent form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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