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ORIGINAL ARTICLE

Differences in the food group consumption among university students in Sarawak during the COVID-19 Movement Control Order: A cross-sectional study

Whye Lian Cheah, Leh Shii Law, Adibah Zamrie, Nur Afiqah Mohd Samsudin, Nur Aiennie Liasin, Nik Noor Arba'iyah Nik Hassan, Audre Siew Ing Liew, Nathalie Grace Nimiet, Wee Hui Ngu, Nur Thaqifah Abdul Manap

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Authors:

Whye Lian Cheah
(Corresponding author)
BSc (UPM), MSc (UNIMAS), PhD (USM)
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.
Email: wlcheah@unimas.my

Leh Shii Law
BSc (UPM), MSc (UPM), PhD (UPM)
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia

Adibah Zamrie
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Nur Afiqah Mohd Samsuding
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Abstract

Introduction: The COVID-19 Movement Control Order (MCO) has caused a concern on the food consumption among university students. This study aimed to assess food diversity and its relationship with accommodation among university students in Sarawak.

Methods: This cross-sectional study was conducted among students of the University Malaysia Sarawak in Kota Samarahan during the MCO. Data on socio-demographic characteristics and food diversity were collected using an online questionnaire.

Results: A total of 478 respondents participated in this study. The majority of the respondents were women (77.4%), and almost half were Malays (49.6%). Half of the respondents stayed at home with their family, while 36.4% stayed in their college dormitories. Except for legumes, nuts and seeds and milk and milk products, all other food groups were common in the respondents' diet, with the highest consumption observed from cereal and cereal products, followed by meat and meat products and water. One-way ANOVA showed that there were significant differences in the intake of fish and seafood; legumes, nuts and seeds; milk and milk products; and fruits between those who stayed in college dormitories, at home with their families and in rented houses ($P<0.01$).

Conclusion: Despite reduction in food availability and accessibility, the total energy intake of the university students did not change. University students should be continuously educated on the importance of a balanced diet consisting of all food groups.

Introduction

COVID-19 is an infectious disease caused by a newly discovered strain of novel coronavirus that is highly contagious and can easily spread via small respiratory droplets produced by an infected person while coughing or sneezing.[1] A person with COVID-19 can manifest symptoms ranging from mild to severe respiratory symptoms. Groups with a higher susceptibility to COVID-19 include persons with underlying medical illnesses and those aged over 60 years.[2] Hence, prevention of the spread of the disease is of utmost importance during the pandemic to flatten the disease curve.

On 31 March 2020, the United Nations stated that COVID-19 endangered the food supply chain globally, and this situation was estimated to deteriorate further in April and May. The food supply, together with safe and adequate access to food, had become the major concern of the general population during the lockdown period. Further, concerns regarding essential needs also intensified among the general population albeit most supermarkets and grocery stores remained open. Market shelves were cleared when the Movement Control Order (MCO) was announced by the government of several countries, thus creating a perception of food shortage for consumers. Additionally, the increasing trend of home cooking had caused the demand for fresh food items to be remarkably high at local markets and supermarkets.[3]

A similar situation was observed in Malaysia. One of the greatest efforts that had been taken by the Malaysian government in halting

Nur Aiennie Liasin
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Nik Noor Arba'iyah Nik Hassan
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Audre Siew Ing Liew
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Nathalie Grace Nimiet
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Wee Hui Ngu
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

Nur Thaqifah Abdul Manap
MD students
Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.

the further spread of COVID-19 is the implementation of the MCO. As the food in Malaysia is either produced domestically or imported, the short-term effect of the MCO was disruption in the delivery of fresh food to local food outlets owing to a shortage of air freight and trucker. In the longer term, the food productive chain could be disrupted as a result of shortage of labour, including planting and harvesting, which was expected to further worsen the shortage and promote rising prices of food.[4] Moreover, populations with a limited or irregular income, especially those who cannot prepare emergency reserves of money or food, those with minimal or zero access to transportation and those who rely on markets for the majority of food purchases, are at a higher risk than other populations in relation to the food security impact of the pandemic.[5]

University students are also categorised as a high-risk group owing to their financial disability.[6] During the early stage of the MCO, universities in Malaysia were closed, and university students were ordered to remain in their dormitories while waiting for further arrangement. Several issues arose during that period. The closure of academic institutions had caused difficulties for most students who depended on their school for basic needs, such as food, accommodation, financial aid, health insurance and on-campus jobs.[7] As an act of taking care of the welfare of university students, the Malaysian government had announced to bear the cost of meals for around 60,000 university students.[8] Online food shopping has also gained popularity during the 'stay-at-home period' because of its apparent role in reducing unnecessary person-to-person contact with the food ordered sent to the front doors of dormitories.[9] Despite such, with the consumption of food that has low nutritional value owing to individual, social and environmental factors,[10] the quality of food consumed by university students became a concern, especially when students experienced drastic changes in their social and environmental conditions.

In recent years, numerous studies have evaluated the association between food diversity and nutrient adequacy,[11] child growth,[12] metabolic syndromes[13] and non-communicable diseases, such as type II diabetes[14] and cardiovascular disease.[15] However, most of these studies were conducted in western countries, with only a few performed under the context of Asian countries. Further, there are limited studies conducted among university students. With the COVID-19 pandemic, food availability and accessibility have reduced. This has raised a concern about eating patterns, especially among university students. Thus, this study aimed to assess food diversity and its relationship with accommodation among university students. Knowing the accommodation-related factors associated with food diversity during the MCO among university students would help in developing cost-effective healthy nutritional intervention programmes in the future. The specific objective of the study is to determine the association between accommodation and food diversity among University Malaysia Sarawak (UNIMAS) students during the MCO.

Methods

This cross-sectional study was conducted among students in the UNIMAS, Kota Samarahan during the MCO. During phase one of the MCO in the UNIMAS, there were a total of 2788 students who were residing within the campus, and their movements in and out of the campus were limited. The students were permitted to go out from 11 am to 2 pm only when there was a need to buy essentials. Food aid for breakfast, lunch and dinner was provided by the federal government to the students residing in residential colleges throughout the MCO. During phase four of the MCO, around 4000 UNIMAS students started their journey home after a sojourn at the campus.

This study evaluated food diversity and its association with the socio-demographic characteristics of UNIMAS students during the MCO. The respondents were recruited through snowball sampling owing to movement restriction and included those who were staying within Kota Samarahan, either in the campus, outside the campus or at home with their families. A link was sent to the eligible respondents through different social media platforms, such as WhatsApp, Telegram and Facebook.

The study was conducted from April to September 2020. The sample size was calculated using the Raosoft sample size calculator (Raosoft Inc., Seattle). The confidence level was set at 95%, and the margin of error was accepted at 5%. The sample size (n) and margin of error (E) were calculated as follows:

$$n = N\,x/((N-1)\,E2 + x)$$
$$X = Z(c/100)2\ r\ (100-r)$$
$$E = Sqrt\ [(N-n)\,x/n\ (N-1)]$$

where N is the population size; r is the fraction of responses of interest; and Z(c/100) is the critical value for the confidence level (c). Considering a non-response rate of 15%, additional 15% respondents were added to round the sample size up to 430.

The data were collected using an online questionnaire. The questionnaire consists of two parts: part A (socio-demographic details) and part B (food diversity). Background information, including name, age, sex, ethnicity, hometown, faculty, course, year of study, place of stay during the MCO, college, financial status and accessibility of other essential needs, was obtained using this questionnaire.

Dietary diversity was assessed using an adapted version of the Food and Agriculture Organization Diet Diversity Questionnaire,[16] with modifications on the list of the food group: Only common items, such as cereal and cereal products; meat and meat products; fish and seafood; eggs; legumes, nuts and seeds; milk and milk products; vegetables; fruits; and beverages (tea, coffee and malted drinks), were included. In addition, fast food was added, as it is a substantial item observed to be highly consumed during the MCO.[17] Each food group is given one mark when any food item within the food group is consumed at least three times during the past 1 week.[18] A higher score indicates a more diverse diet with more food groups being consumed.

The study protocol was approved by the UNIMAS Medical Ethics Committee of the Faculty of Medicine and Health Sciences. The questionnaire was converted into a Google Form. A written detailed explanation regarding the research was given at the beginning of the online questionnaire. Only the respondents who provided a response of 'I agree' could proceed with answering the questionnaire online.

The data were entered and analysed using IBM SPSS version 23.0 (IBM Corp., Armonk, NY). Normality of the dataset was examined using histograms and boxplots. For descriptive analysis, numerical variables were presented as means and standard deviations and categorical variables as counts and percentages. For bivariate analysis, one-way ANOVA paired with the post-hoc test was applied to determine the differences in the frequency of intake of the different food groups among the students living in college dormitories, in rented houses near their university and at home. The significance level was set at a P-value of <0.05.

Results

Socio-demographic characteristics of the students

Table 1 presents the socio-demographic characteristics of the respondents. The majority of the respondents were women (77.4%), and almost half were Malays (49.6%). Half of the respondents stayed at home with their family, while 36.4% stayed in their college dormitories.

Table 1 Socio-demographic characteristics of the students (N=478).

	n (%)
Age	
≤22 years	332 (69.5)
>22 years	146 (30.5)
Sex	
Male	108 (22.6)
Female	370 (77.4)
Ethnicity	
Malay	237 (49.6)
Bumi Sarawak	120 (25.1)
Chinese	56 (11.7)
Bumi Sabah	47 (9.8)
Others	18 (3.8)
Year of study	
Year 1	77 (16.1)
Year 2	103 (21.5)
Year 3	185 (38.7)
Year 4	85 (17.8)
Year 5	28 (5.9)
Accommodation during the MCO	
Home	263 (55.0)
College dormitory	174 (36.4)
Rented house	41 (8.6)

Table 1. Continued	
	n (%)
Financial support	
Scholarship	246 (51.5)
Study loan	139 (29.1)
Self-sponsorship	93 (19.5)
Source of pocket money	
Scholarship with parental support	274 (57.3)
Parental support only	105 (22.0)
Scholarship or loan only	91 (19.0)
Other part-time work	8 (1.7)
Financial issues	71 (14.9)
Accessibility of other essential needs apart from food	453 (94.8)

Table 2 shows the type of food groups consumed by the respondents according to their accommodation during the MCO. Except for legumes, nuts and seeds and milk and milk products, all other food groups were common in the respondents' diet, with the highest consumption observed from cereal and cereal products, followed by meat and meat products and water. One-way ANOVA showed that there were significant differences in the intake of fish and seafood; legumes, nuts and seeds; milk and milk products; and fruits between the three accommodation types (P<0.01).

Table 2. Type of food groups consumed by the students.

	All	College dormitory	Rented house	Home	P-value
	Mean (SD)				
Cereal and cereal	1.0 (0.046)	1.00 (0.000)	1.00 (0.00)	1.00 (0.062)	0.665
Meat and meat products	0.98 (0.128)	0.98 (0.131)	0.98 (0.156)	0.98 (0.123)	0.912
Fish and seafood	0.86 (0.343)	0.76 (0.426)	0.80 (0.401)	0.94 (0.239)	<0.01[a]
Eggs	0.96 (0.191)	0.95 (0.222)	0.98 (0.156)	0.97 (0.172)	0.467
Legumes, nuts and seeds	0.67 (0.470)	0.59 (0.494)	0.73 (0.449)	0.72 (0.451)	<0.01[b]
Milk and dairy products	0.74 (0.438)	0.53 (0.500)	0.76 (0.435)	0.88 (0.328)	0.011[c]
Vegetables	0.94 (0.231)	0.93 (0.254)	0.95 (0.218)	0.95 (0.217)	0.672
Fruits	0.90 (0.306)	0.84 (0.363)	0.85 (0.358)	0.94 (0.246)	0.007[d]
Water	0.98 (0.136)	0.98 (0.131)	1.00 (0.000)	0.98 (0.150)	0.597
Fast food	0.9 (0.295)	0.88 (0.327)	0.88 (0.331)	0.92 (0.266)	0.255

[a,b,d] Home>college dormitory; [c] Home>college dormitory, rented house>college dormitory; P<0.01

Discussion

Despite the reduced food availability and accessibility during the COVID-19 MCO, no substantial impact was found in the food group intake among the university students in this study. Although the movement restriction may have caused public fear and panic buying, as reported in the mass media, the food supply was under-controlled. The findings of this study are consistent with those of a local study among Malaysian adult internet users, in which only 54.9% of respondents were reported to have incomplete consumption of all food groups (carbohydrates, protein, fruits, vegetables and milk and dairy products). Lower consumption was reported for milk and dairy products (58.2%) and fruits (74.7%) than for vegetables (90.5%), carbohydrates (98.1%) and protein (98.3%).[19] The low consumption of milk and dairy products raised a concern even before the implementation of the MCO, with 75.6% of Malaysian adults not meeting the daily recommended serving of milk and milk products in the Malaysian Adult Nutrition Survey 2014.[20] Milk and milk products have also been one of the food groups with the least adherence to the recommended serving.[21] However, both studies are incomparable, as different criteria were used to determine the dietary quality.

Herein, cereal and cereal products were consumed the most per day, followed by meat and meat products and eggs, among all university students. These findings are consistent with the report by the Institute for Health Behavioural Research[19] that 91.8% of Malaysian adults consumed food items under the carbohydrate group daily during the MCO. This is expected, as rice appears to be a staple food among Malaysians.[22] The least consumed food group was legumes, nuts and seeds,

consistent with the findings by Leong et al.[23] that the consumption of nuts was comparably low among countries. Leong et al. also found that of the household income on monthly food expenses, less than 2% was allocated for purchasing of nuts and nut products. Similarly, the consumption of legumes was found to be low compared with that of other related protein food groups (meat and meat products and fish and seafood). Before the MCO, the consumption of legumes and nut has already been reported to be low among Malaysian adults, with 82.9% of them not meeting the recommended daily serving.[21] A possible explanation for this finding is that most nuts that are available in Malaysia, such as almonds, pistachios, walnuts or cashews, are expensive.

The consumption of all food groups, except for cereal and cereal products and meat and meat products, was lower among the students who stayed in college dormitories than among those who stayed in rented houses and at home. The differences were significant for fish and seafood; legumes, nuts and seeds; milk and dairy products; and fruits. Under normal circumstances, a significant difference in the eating behaviours among university students who were living in dormitories and at home has already been reported.[24] It is expected that the eating behaviour of an individual is further modified during the precedential outbreak-related lockdown in Malaysia. Although three meals were provided throughout the MCO, the provision of meals was subjected to the availability of the food items that can be accessed by the food caterers, as the food supply chains were disrupted owing to restriction of transportation and market opening hours.[25]

Disturbance of the normal dietary intake might also be occurring, as the students were not allowed to choose their preferred food – the food delivered to them was fixed. The meals were provided by the universities via food caterers who might have opted for a cheaper source of protein – meat and meat products, such as chicken, and eggs. In contradiction, for those who stayed at home, family members could access supplies of fish and seafood at the nearby market or supermarket. This might explain the lower consumption of fish and seafood among those who stayed in college dormitories than among those who stayed at home. For the general population, a similar pattern has been observed, as people were reported to be shifting more to consumption of food items that could be accessed easily and that were cheaper, such as chicken and eggs instead of fish and seafood as a source of protein, with the reduction in household incomes and closure of seafood restaurants.[26]

Milk and dairy products, as well as fruits and vegetables, were also consumed more by the students who stayed in rented houses and at home than by those who stayed in college dormitories. One possible reason is the restricted movement in the college, which limited the access of the students to the supply of milk; any intention to leave the college without a rigid reason (e.g. buying essential items for their personal care) during the MCO was prohibited. In this case, alternative beverages might be chosen as a substitute for milk, such as sweetened condensed milk or non-dairy creamer made from palm oil derivatives, as these food items do not require refrigeration for storage. A similar reason could be applied to vegetables and fruits, which are more perishable and not suitable to be purchased in large quantities, and cooking activities are prohibited in dormitories. Nevertheless, the college dwellers were likely to have difficulties in accessing fruits in this study, as their daily meals were provided by caterers, unlike those who stayed at home.

Although this study provides an insight into the influences of the MCO during the COVID-19 pandemic on the dietary pattern according to the accommodation type, some limitations must be acknowledged. First, selection bias was unavoidable during the survey. In addition, only those who had access to the internet were able to participate in the survey. Therefore, representativeness or generalisation of the results could not be guaranteed. Second, the study had a cross-sectional design; therefore, cause-and-effect relationships could not be established. Lastly, the present study provides an overview of the dietary habits and modifications during the MCO, but its results cannot be interpreted as long-term practices. The present findings could not be compared with data under normal circumstances to observe the changes before and during the MCO.

Conclusion

There was a significant difference in the dietary intake between the university students who stayed in college dormitories and at home with their families, particularly with fish and seafood; legumes, nuts and seeds; milk and dairy products; and fruits. Nevertheless, such differences did not affect the total energy intake, as all food groups were consumed

accordingly despite the reduction of food availability and accessibility. Deficiencies in certain micronutrients could be a concern, since consumption of calcium-rich milk and milk products is less frequent. The public, especially university students, should be continuously educated on the importance of a balanced diet consisting of all food groups and on how to choose a healthy food alternative. Experience during this MCO is valuable in the preparation for handling similar emergency events in the future, especially in the context of diet.

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Author contributions
Cheah Whye Lian, Law Leh Shii was involved in the conceptualization of the study, formal analysis. Adibah Zamrie, Nur Afiqah Mohd Samsudin, Nur Aiennie Liasin, Nik Noor Arba'iyah Nik Hassan, Audre Siew Ing Liew, Nathalie Grace Nimiet, Wee Hui Ngu, Nur Thaqifah Abdul Manap was involved in the conceptualization of the study and data collection. All authors involved in the writing of the original draft, reviewing, editing and finalizing of the final draft, and approved to the manuscript publication.

Ethical approval
Ethical approval granted by Medical Ethics Committee of Universiti Malaysia Sarawak (UNIMAS/NC-21.02/03-02 Jld 4 (79)).

Conflicts of interest
None

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Data sharing statement
The dataset generated and analysed are available from the corresponding author upon reasonable request.

How does this paper make a difference in general practice?

- The study findings indicate the importance of understanding the intake of different food groups between university students staying in college dormitories and at home with their families and how this information affects the food availability and accessibility for university students who stay in college dormitories.
- University students should be continuously educated on the importance of a balanced diet consisting of all food groups.
- Experience during the Movement Control Order can help in the preparation for handling similar emergency events in the future in the context of diet.

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