

## Dietary habit, physical activity and perceived barriers during movement control order among undergraduate students in Puncak Alam, Selangor

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### Abstract

The emergence of COVID-19 had affected people in terms of their physical activity and nutritional changes which may increase the risk of various non-communicable diseases (NCD) among them. This study aimed to identify the physical activity level, nutritional changes, and perceived barriers to engage physical activity among students of UiTM Selangor, Puncak Alam Campus during the Movement Control Order (MCO) in Malaysia. A total of 234 students aged 18-24 years old were chosen to participate in this study by using convenience sampling. The International Physical Activity Questionnaire (IPAQ), Physical Activity Resource Assessment (PARA), and adapted questionnaire from the Ministry of Health (MOH) Malaysia were used in this study. Findings reveal that students were able to engage in physical activity level during the pandemic period which required them to be quarantined. Moreover, there was an increase in the frequency of healthy eating behaviour as well as unhealthy eating behaviour during MCO.

## 1. Introduction

A novel coronavirus known as COVID-19 was recently identified and established in Wuhan, China, in December 2019 (Derbyshire and Delange, 2020). The World Health Organization (WHO) later declared this a global pandemic and made this the newest emerging pathogen with a potentially lethal disease that was implicitly a global public health issue (Derbyshire and Delange, 2020). According to Anderson *et al.* (2020), it was observed quarantine and social distancing reduced the emergence of COVID-19 in China by 60%. Previous studies also show that quarantines and travel bans are often seen as the first response to a few infectious diseases such as Ebola in this modern age (Dénes and Gumel, 2019). Hence, most countries have announced a national lockdown to combat this issue.

In Malaysia, the government announced a Movement Control Order (MCO) in which the citizens need to be quarantined and most of the economic sectors were prohibited to operate throughout the period. However, it

has presented a crucial challenge for healthcare systems all around the world as quarantine affects people in terms of their physical and mental health (Hawryluck *et al.*, 2004). During the quarantine period, the majority of social activities and outdoor exercise were restricted which results in a decline in the level of physical activity and an increase in sedentary behaviour among people. Moreover, physical inactivity is one of the leading risk factors for non-communicable disease mortality. Insufficiently active people have a 20% to 30% increased risk of death compared to sufficiently active people (WHO, 2021). It is seen as the fourth major risk factor contributing to global mortality and leads to the development of numerous non-communicable diseases (NCD) such as cancer, heart disease, and diabetes mellitus, with an estimated 3.2 million deaths worldwide (Herazo-Beltrán *et al.*, 2017; WHO, 2021).

Besides, studies also found that an individual's physical activity shows a decline during the transition of young adults into early adulthood, with the steepest

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decline seen at the time of university entry (Jakiwa *et al.*, 2020; Mandic *et al.*, 2020). According to the Malaysian Adult Nutrition Survey (MANS), approximately 7.1 million Malaysian adults between the ages of 18 and 59 years old were physically inactive, with a higher prevalence of females compared to males (Institute for Public Health, 2014). Changes in daily routines, limited spaces, uncertain stress, and social isolation were associated with a sedentary lifestyle during this pandemic period. Studies also show that during the COVID-19 pandemic, there was a significant decline in physical activity levels and similar findings were found in young physically active individuals (Canello *et al.*, 2020). Hence, the decline in physical activity was independently associated with deleterious health outcomes.

Regular physical activity may minimize inflammation in chronic diseases such as obesity, type 2 diabetes mellitus, and cardiovascular disease, which is an underlying pathophysiological process (Mattioli *et al.*, 2020). Because of limited physical activity and restrictions on daily working, some metabolic effects may result in an increased risk of cardiovascular disease throughout this period of quarantine (Arnett *et al.*, 2019). In addition, the study also reported that most of the elderly patients with COVID-19 positive were seriously ill due to their underlying disease (Mueller *et al.*, 2020). The existing NCD is also responsible as a potential cause for the adverse outcomes of COVID-19 for about 72% of the deaths globally (Mueller *et al.*, 2020). Hence, it is necessary to engage in and maintain physical activity routine as it is correlated with various health benefits.

Although quarantines measures have been recognized as effective measures in all parts of the world to terminate the disease outbreak (Hawryluck *et al.*, 2004), quarantine may also be seen as a traumatic experience, such as lack of freedom, confusion regarding certain illnesses and boredom, which then may result in negative health status among people. Boredom has been correlated with higher energy consumption and increased macronutrient intake which includes fats, carbohydrates, and protein (Muscogiuri *et al.*, 2020). Therefore, these unhealthy eating patterns will increase the risk of obesity and other NCD such as heart disease, and lung disease (Wu *et al.*, 2020). Other than that, the key consequences of quarantine-related stress are changes in lifestyle and nutritional habits. This could be due to the reduced ability of goods, restricted access to food caused by restrictions on store opening hours, and change to unhealthy food choices (Mattioli *et al.*, 2020).

To avoid potential food shortages, people often prefer to buy processed and long-lived food that is designed to be ready for long-term storage compared to

fresh food. Foods with a longer shelf-life may undoubtedly contain high levels of salts, sugar, and trans-fat, which can contribute to poor antioxidant diets that can be contained in fresh foods such as fruits and vegetables (Sivasankaran, 2010). Similarly, nutritional changes among Malaysian also were discovered throughout the MCO period and most of them failed to practice healthy eating such as including fruits and vegetables in their daily diet. Improving the body's immunity is very important. One of the strategies to protect against viruses may also be to improve the immune system via dietary sources (Derbyshire and Delange, 2020). Hence, this current research estimated and explored students' eating habits, physical activity and perceived barriers during MCO in Puncak Alam, Selangor.

## 2. Materials and methods

### 2.1 Study design

This study is a cross-sectional study. This study design is widely used among the researcher as its best suited to studies at finding out the prevalence of a phenomenon, situation, problem, attitude, or issue by taking a cross-section of the population.

### 2.2 Subjects and sampling

Respondents in this study consisted of students from UiTM Selangor, Puncak Alam Campus which involved fifteen programs from social science studies. Out of 600 students, a total of 234 students participated in this study by using convenience sampling. By using this sampling method, the target population who are willing and reachable to participate in the study were selected.

### 2.3 Data collection

The data collection was collected by using three sets of questionnaires which include demographic and anthropometry data, the International Physical Activity Questionnaire (IPAQ), the Physical Activity Resource Assessment (PARA), and designated questionnaires from the Ministry of Health (MOH) Malaysia for the nutritional changes during the MCO. The survey was conducted from June to November 2020 by using Google Forms, an online platform, accessible through any device with an Internet connection.

#### 2.3.1 International Physical Activity Questionnaire

International Physical Activity Questionnaire (IPAQ) short version was used to measure the physical activity level among the participants (Lavelle *et al.*, 2020). The reliability and validity of this instrument are validated by several researchers and adopted in 12 countries in 2000 (Lavelle *et al.*, 2020). This instrument

was used to measure and assess the types of the intensity of physical activity and sitting time that people engage in as part of their activity.

It consists of seven items of open-ended questions which include a 7-day recall of self-reported physical activity. Questions include three specific types of activity undertaken in four domains. These include walking, and moderate, and vigorous-intensity activities. The level of physical activity is presented as Metabolic Equivalent (MET). Based on this, 1 MET = a resting energy expenditure assuming oxygen consumption of 3.5 ml-min/kg weight. Walking = 3.3 METS, moderate physical activity = 4.0 METS, and vigorous physical activity = 8.0 METS. The respondents were categorized into three different categories of physical activity level which is high, moderate, and low, and assessed by using the formula:

$$\text{Physical activity level} = \text{MET level} \times \text{minute of activity/day} \times \text{days per week}$$

The MET level was multiplied by mins of physical activity and by days per week. Respondents who were categorized into three different levels of physical activity had to meet the following criteria a) high level of physical activity of at least 3000 MET-mins/week or b) moderate physical activity of achieving at least 600 MET-mins/week. Those who did not meet the criteria for high and moderate physical activity levels were considered to have low levels of physical activity. Body Mass Index for participants was classified based on the WHO classification (WHO, 2006).

### 2.3.2 Physical Activity Resource Assessment

The Physical Activity Resource Assessment (PARA) was used to measure the type, features, amenities, quality, and incivilities of a variety of physical activity resources available as environmental factors and safety may also influence physical activity among people (Hoehner *et al.*, 2005). Features, amenities, and incivilities were rated by using discrete operational definitions with the rating of not present, poor, mediocre, or good. The type of resource and details on the resource was also assessed by using descriptive statistics.

### 2.3.3 Nutritional changes

Designated Likert-scale by MOH were used to assess the nutritional changes among respondents during the MCO period. The questions were classified into two categories which are healthy eating behaviour and unhealthy eating behaviour to evaluate the changes in eating behaviour among students. Categorical scales which include no changes in frequency, more often compared to before the MCO and less often compared to

before the MCO were used to evaluate the changes. No changes in frequency indicated that the respondents have no nutritional changes throughout the MCO. While more often or less often compared to before the MCO stated that the respondents were having nutritional changes during the MCO period.

### 2.4 Data analysis

The data were analysed by using SPSS 25.0 version. Results of the perceived barriers and nutritional changes were presented using descriptive statistics. All variables were measured using frequency, central tendency as well as variation.

## 3. Results and discussion

A total of 234 students from UiTM Puncak Alam Campus completed an online questionnaire which includes the demographic and anthropometric section, International Physical Activity Questionnaire (IPAQ), Physical Activity Resource Assessment (PARA), and nutritional changes during the MCO period. Out of 234 students, 23.9% were males and 76.1% were females. Body mass index (BMI) status indicated that half of the participants were classified as normal, 12.8% were underweight and 37.2% were classified as obese class I, II, and III, respectively (Table 1).

The physical activity level of the participants was shown in Table 2. The mean total activity was  $1253.2 \pm 12.5$  (MET-mins/week). The majority of the participants (52.6%), have moderate physical activity levels. Whereas 11.5% and 35.9% of the participants have high and low physical activity levels respectively. Physical inactivity has been linked to an increased risk of multiple adverse effects including major NCD such as coronary heart disease, type 2 diabetes mellitus, breast, and colon cancer, as well as reduced life expectancy (Lee *et al.*, 2012). Moreover, the current pandemic of COVID-19

Table 1. Demographic and anthropometric data of the participants

Variable	n	%
Gender		
Male	56	23.9
Female	178	76.1
Age (Mean, SD)	21	0.5
Height in m (Mean, SD)	1.6	0.0
Weight in kg (Mean, SD)	61.9	16.8
BMI status (kg/m <sup>2</sup> )*		
Under weight	30	12.8
Normal	117	50.0
Overweight	46	19.7
Obese class I	28	12.0
Obese class II	10	4.3
Obese class III	3	1.3

\*WHO Criteria (WHO, 2006)

Table 2. Physical activity level of the participants

Mean activity (MET mins/week)	N	Mean	Physical activity level	n	%
Mean vigorous activity	234	441.5±81.8	High	27	11.5
Mean moderate activity	234	366.6±56.0	Moderate	123	52.6
Mean walking	234	457.7±6.92	Low	84	35.9
Total	234	1253.2±12.5		234	

worsens the physical activity level of people all around the world as they enforced to do social quarantine to prevent the spread of the disease.

WHO has also released new updated global guidelines on physical activity and sedentary behaviour to ensure that people can still be active during this pandemic (Bull *et al.*, 2020). According to the guidelines, it is recommended that adults, including people living with chronic disabilities, engage in at least 150-300 mins of moderate to vigorous aerobic activity per week. In addition, an average of 60 mins of activity per day was recommended for children and adolescents. This includes physical activity as any movement which it can be done as part of work, sport and leisure or transport (walking, wheeling, and cycling), dance, play, and everyday household tasks such as gardening and cleaning.

The present study revealed that 52.6% of the participants are under moderate physical activity level which shows that the students were still engaging in physical activity and maintaining active lifestyles even during the COVID-19 pandemic. This is similar to the study by Robinson *et al.* (2020), who reported that 45% of the participants increased in exercise frequency compared to 40% of participants who reported less exercise during the lockdown. However, the association between physical activity and the effects of the COVID-19 pandemic was lacking (Ng *et al.*, 2020).

In contrast, several previous studies have reported on the reduction of physical activity levels among students during COVID-19 outbreaks (Shahidi *et al.*, 2020; Ng *et al.*, 2020; Robinson *et al.*, 2021). A study by Ng and colleagues (2020) shows that adolescents did less physical activity level (50%) and no change (30%) during lockdowns. Adolescents who did less physical activity level were more likely to be overweight (Ng *et al.*, 2020). This might be due to the restriction of social activities during the early days of the lockdown. All sports and recreational facilities such as gyms, public swimming pools, and playgrounds were closed. Hence, this directly affects their physical activity routines compared to before the virus outbreak. Moreover, despite the ongoing rapid pandemic crisis, people were looking for different ways and best practices for maintaining a normal daily life while trying to adapt to the social norms that follow social distancing guidelines.

Quarantines and confinement affect people in most aspects of human physiology. Previous studies found that during the quarantine period, a high prevalence of psychological distress and symptoms of the disorder such as emotional disorders, depression, stress, low mood, and insomnia were identified (Hawryluck *et al.*, 2004). Besides, during this period, students also were forced to continue their educational activities through online platforms which indirectly increased screen time and reduced outdoor activities. Home-based exercise should be implemented among students as it gives positive impacts on both physical and psychological variables in various clinical populations (Dwyer *et al.*, 2020).

The perceived barriers to physical activity among participants in this study were measured by using the Physical Activity Resource Assessment (PARA) instrument. Figure 1 shows the type of resources available among the participants. The highest type of resource available among participants in engaging physical activity is the combination of two or more resources (57.3%), followed by home or in the house (30.8%), respectively. This may also indicate that their housing area was provided with physical activity resources such as the park, community centre, trails for biking or running as well as a fitness club. Moreover, physical activity resources were free (87.6%) which did not require any charge prior to use, and have unlimited or no operation hours (59.0%) which makes these resources accessible for them to engage in physical activity.

Detailed features, amenities, and incivilities of the

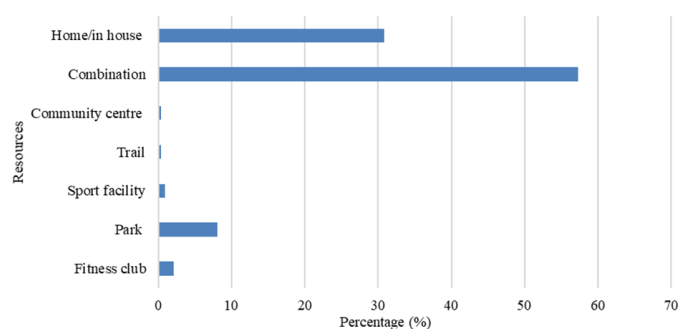


Figure 1. Types of resources available

resource were also measured in this study. The amenities of the resources, access points, bathrooms, benches, landscaping efforts, lighting, and shelters were reported

as mediocre which were available but need minor repair otherwise usable (Figure 2). Soccer fields, exercise stations, sidewalks, and trails for running and biking were reported present in the majority of the physical activity resources (Figure 3). This may indicate that the following types of features were common features available at most physical activity resources or recreational facilities in Malaysia. Hence, with the availability of these features around them, they were able to engage in physical activity. Results revealed that the participants were having moderate physical activity levels even though the facilities or amenities provided were not satisfying. Thus, physical environment measures had weaker effects on physical activity ( $p < 0.05$ ) among the students and indicate that physical environment is a necessary but insufficient causal factor for engaging in physical activity. Results were in agreement with the study done by Hoehner and colleagues (2005) which suggested no significant effects on the environmental measures and physical activity among urban adults.

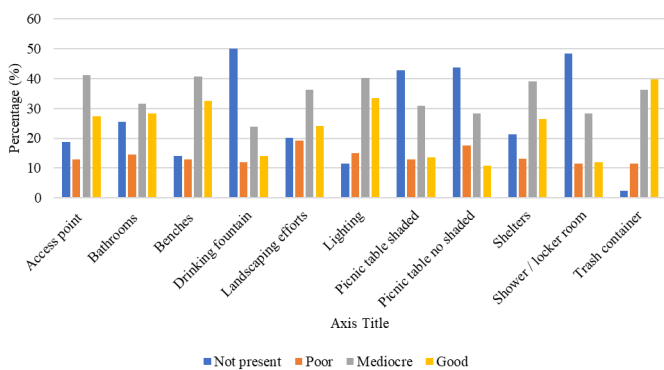


Figure 2. Physical activity resource assessment (Amenities)

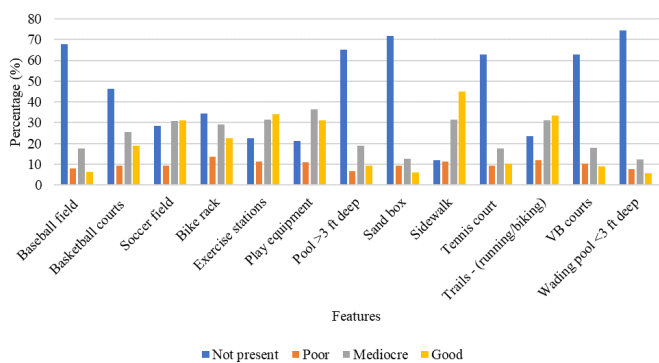


Figure 3. Physical activity resource assessment (Features)

Eating behaviour among participants during MCO was classified into two categories which are healthy eating behaviour and unhealthy eating behaviour. Based on the result obtained, the participants were found to eat healthier ( $p < 0.05$ ) compared to before the MCO (Figure 4). These include cooking at home, taking breakfast, lunch, dinner, snacks between meals, consuming fruits and vegetables, consuming milk and dairy products, noodles, bread, cereals, tubers, eggs, fish, poultry, meat and practising healthy cooking methods. No changes in

the frequency of consuming probiotics and nuts as compared to before the MCO. It may be suggested that no changes in the frequency of certain healthy eating behaviour may be defined as positive or negative changes depending on their previous dietary behaviour before the MCO. Good eating habits may improve due to the greater availability to cook healthily at home (Canello *et al.*, 2020; Di Renzo *et al.*, 2020).

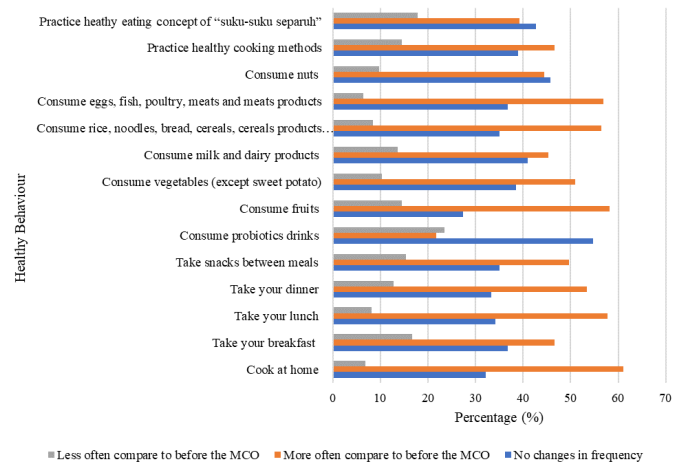


Figure 4. Eating behaviour (Healthy behaviour)

In contrast, for the unhealthy eating behaviour, participants were reported to eat more fast foods from any fast-food restaurant, consume oily and high-fat foods, consume sweet foods, and sugar-dense foods, and cook and serve dessert at home ( $p < 0.05$ ) more often compared to before the MCO (Figure 5). Moreover, the increased frequency of ordering foods through delivery application and less often going out to buy food was significantly higher ( $p < 0.05$ ) compared to before the MCO. This is expected as during the MCO, they have greater time spent in their house instead of going out to buy food and following the guidelines implemented by the government.

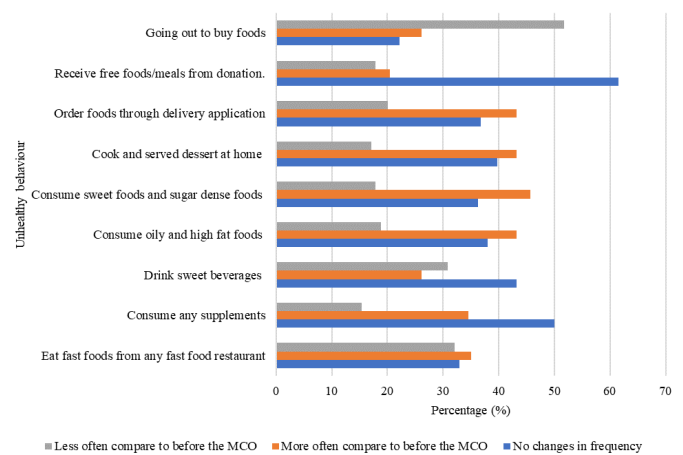


Figure 5. Eating behaviour (Unhealthy behaviour)

According to a previous study, boredom, hearing, or reading constantly about COVID-19 on the internet can be stressful and contributes towards overeating especially "comfort foods" that are high in sugar or also

known as "food craving" (Rodríguez-Martín and Meule, 2015). "Comfort foods" were known rich in simple carbohydrates and reduce stress as they encourage serotonin production which results to positive effects on moods (Ma *et al.*, 2017). Hence, "food craving" was linked with an increased risk of obesity and cardiovascular disease which leads to an increased risk of severe complications of COVID-19 (Wu *et al.*, 2020).

#### 4. Conclusion

Students were still able to engage in physical activity and stay active during the pandemic COVID-19. The quality of physical activity resources and facilities provided around them may be associated with the physical activity level. Thus, it is recommended that improvement to the quality and maintenance of physical activity resources by the authorities may be a relevant strategy to improve physical activity levels among the population. Nutritional changes among the participants were also identified in which there was an increase in the frequency of healthy eating behaviour as well as unhealthy eating behaviour. Home-based workouts and nutritional education by using social media platforms should be implemented to increase and maintain physical activity levels among the population and prevent the comorbidities of COVID-19. The limitation of this study is all data obtained were based on self-reported which might cause an overestimation of the dietary behaviour throughout the MCO period. Moreover, the location and the area where the participants live, either in a rural or urban area may also affect the perceived barriers for them to engage in physical activity. Hence, this could be evaluated in further research to precisely determine the perceived barriers among the students.

#### Conflict of interest

The authors declare no conflict of interest.

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