Exploring the impact of COVID-19 movement control orders on eating habits and physical activity in low-resource urban settings in Malaysia

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Abstract:
Background: The COVID-19 pandemic led Malaysia to introduce movement control orders (MCOs). While MCOs were intended to slow the spread of COVID-19, the effects of such measures on the noncommunicable disease (NCD) risk factors have not been fully explored. This exploratory study aimed to understand the effect of the MCO on the eating habits and physical activity levels of the urban poor in Malaysia as well as potential health promotion interventions during the COVID-19 pandemic.

Methods: This rapid assessment used a mixed-method approach in three low-cost public flats in Kuala Lumpur targeting the B40, which is the bottom 40% of the economic spectrum. A total of 95 community members participated in a quantitative phone survey, while 21 respondents participated in a qualitative phone survey, including 12 community members and nine community health volunteers (CHVs).

Results: The movement restriction imposed during the MCO significantly reduced the frequency and duration of respondents’ physical activity. At the same time, respondents reported significantly increased consumption of home-cooked meals. More than half of respondents reduced their consumption of packaged snack foods (53.7%), street desserts (54.7%), fast food (50.5%), soft drinks (50.5%), and 3-in-1 or instant drinks (50.5%) due to limited access during the MCO. B40 communities were receptive to potential interventions to encourage healthier eating and physical activity leveraging digital approaches under the ‘new normal’. Reported concerns included internet accessibility and affordability, functionality, and digital literacy.

Conclusion: The COVID-19 pandemic requires innovation to address diseases and risk factors at the community level. While movement restrictions reduced physical activity, they created opportunities for low-income individuals to have greater control over their diet, enabling them to adopt healthier eating habits. Lifestyle changes experienced by vulnerable populations provide an opportunity for creative and technology-enabled interventions to promote healthy eating and exercise.

Keywords: COVID-19, movement control order, eating habits, diet, physical activity, urban poor, Malaysia
Background

The COVID-19 pandemic and related containment measures changed daily life around the world. From January to September 2020, Malaysia experienced a lower COVID-19 burden than many other countries (1), attributed to strong health system responses including early preparedness and planning, diagnostics, contact tracing, and coordination across government agencies to enforce a strict lockdown and other control measures (2).

Malaysia imposed its first movement control order (MCO) on March 18, 2020 in response to a spike of COVID-19 cases. The first MCO prohibited travel and mass gatherings including religious, sports, social, and cultural activities across the country. All religious institutions, business and government offices were closed, except for essential services such as supermarkets, banks, petrol stations, and pharmacies (3). The MCO period was extended to a conditional movement control order (May 1–June 9) and then a recovery movement control order (RMCO) through December 31, 2020 (4,5). Loosening restrictions in the last two periods allowed religious, educational, and social activities to return to almost normal with adherence to strict requirements such as physical distancing (4).

While MCOs were intended to slow the spread of COVID-19, they had concerning impacts on socioeconomics and health. Low-income groups, particularly the bottom 40% of the economic spectrum known as the B40 in Malaysia, were most affected due to insufficient savings (6). Quarantine lockdowns and movement restrictions may have also exacerbated the root factors that lead to obesity and other risks and management of noncommunicable diseases (NCDs) (7,8). Managing weight may be difficult during lockdowns. Others have documented decreased physical activity and limited access to fresh food, leading to negative changes in eating habits such as frequent snacking and increased intake of snacks, sweets, and candies (9–11). The importance of these effects is illustrated by the reality that people with NCDs and risk factors have a higher risk of experiencing COVID-19 complications, severe illness, and death in comparison to those without NCDs (12–14). In Malaysia, a report released in August 2020 stated that 91.5% of people who died of COVID-19 had at least one NCD (15).

The most recent National Health and Morbidity Survey (NHMS) found that 8.1% or 1.7 million Malaysians are living with all three major risk factors of NCDs: diabetes, hypertension, and high cholesterol (16). Half of Malaysian adults are either overweight or obese (16). One-third of urban dwellers are physically inactive, and 95% of Malaysian adults do not consume enough fruit and vegetables (16). NCDs and their risk factors are disproportionately distributed across gender, income levels, ethnic groups, and locations (17). Obesity prevalence was found to be higher in one studied low-income Kuala Lumpur population than it was nationally (18). Three-quarters of Malaysians live in urban areas (19) where high urbanization reinforces NCD and COVID-19 risks, specifically among the urban poor.

Our study aims to understand the effects of COVID-19 restrictions (MCO) on the eating habits and physical activity among the urban poor in Malaysia. This will inform potential interventions to encourage healthier eating and physical activity during the COVID-19 pandemic.

Methods

Research design

This exploratory cross-sectional study was designed as a rapid assessment using a mixed-method approach. It was conducted at three low-cost public flats that were developed under the government affordable homes programme [also known as the People’s Housing Project (Program Perumahan Rakyat or PPR) or Public Housing (PA)] for the B40 in the Federal Territory of Kuala Lumpur (KL), Malaysia. The maximum monthly household gross income threshold of the B40 in KL is RM9,149 (USD 2,195) in 2019 (20).

Three flats were selected through purposive sampling based on the geographic representation of East and West Kuala Lumpur. The selected flats were in PPR Seri Kota, PPR Pekan Kepong, and PA Seri Negeri Sembilan. The study focused on two groups of respondents in the selected sites, including (1) community members and (2) community health volunteers (CHVs) from the ‘Komuniti Sihat Pembina Negara’ (KOSPEN) programme, aged 18 years and above and able to provide verbal informed consent. KOSPEN, translated as ‘Healthy Communities, Building the Nation’, is a programme initiated by the Malaysian Ministry of Health.
(MOH) that aims to bring NCD risk factor intervention to the community through trained CHVs (21).

To rapidly assess – and be ready to react to – the fast-changing developments and challenges of the COVID-19 pandemic, convenience sampling was conducted to select study respondents. We aimed to recruit 90 community members for the quantitative survey to enable meaningful statistical tests (both parametric and non-parametric). However, we note that this sample would not be representative of the urban poor population in Kuala Lumpur as a whole. To mitigate the limitation of using convenience sampling and small size in the quantitative survey, we also planned that the rapid assessment would include qualitative interviews with 12 community members and nine KOSPEN volunteers as a complement to the quantitative results.

A quantitative questionnaire was designed as a short phone survey (15–20 min) to explore the impacts of the MCO on NCD conditions, changes in eating habits and physical activity, as well as potential interventions for healthier eating and physical activity due to COVID-19 restrictions among community members. Respondents were asked about their conditions and practices before-MCO and then the same items during-MCO. Also, a semi-structured interview guide was developed to understand what drives eating habits and physical activity changes, and the context and mechanism of decisions related to those changes.

The research instruments were validated by a panel of experts from RTI International, National Health Service (NHS) Joint Unit, and MOH Malaysia and translated into Mandarin and Malay. We pilot tested and revised the quantitative questionnaire to explain technical or specific words using layman’s terms or examples. These included, for example, NCDs, chronic diseases, physical activity, commercially baked goods, interventions, and healthier (food) options.

**Data collection**

We obtained the contacts of the KOSPEN leaders for the respective study sites through the MOH District Health Offices. We briefed the KOSPEN leaders and volunteers at each study site to inform them about the study purpose, content, and survey methods, seeking their support and buy-in. Throughout the data collection period, KOSPEN leaders shared a contact list of 193 community members (with their consents) with the research team. The research team reached out to all community members in the list through phone calls and the messaging platform WhatsApp, successfully recruiting 95 respondents to participate in quantitative interviews. In each site, in addition to the KOSPEN leader, two KOSPEN volunteers and four community members (recommended by KOSPEN leaders) participated in the qualitative study. Data was telephonically collected July 1–31, 2020, during the period of the recovery movement control order.

**Data analysis**

A descriptive analysis of the demographics and background characteristics was conducted for all the quantitative outcome indicators. Taking into consideration the distribution of the data and the type of variables, a non-parametric test (Wilcoxon matched-pair signed-rank test) was performed to test for significant differences (at 5% level of significance) in the outcomes before and during MCO. Stata 16 software was used for quantitative analysis of the data. All qualitative audio recordings were transcribed and translated to English. Manual coding was conducted and thematic analysis in Microsoft Excel identified common themes, and similarities and differences amongst the target audience. The qualitative and quantitative data was triangulated for final analysis.

**Results**

**Socio-demographic background of respondents**

Out of 95 community members who participated in the quantitative phone survey, the majority were female (63.2%), Malay (81.1%), married (66.3%), aged 40 years and older (67.4%), had completed secondary education (73.7%), and had a job (54.7%). Almost all respondents had a monthly household income falling under the income threshold for the B40 group (84.2%) (Supplemental Appendix Table A). Among the 52 respondents who had a job, 42.3% were unable to work during the MCO period. By the time of the interview in July 2020
(during the RMCO), however, the majority had resumed work as usual (82.7%) (z = 5.208, \( p < 0.005 \)).

Twelve community members and nine KOSPEN volunteers participated in the qualitative interview, and the majority were female (16/21) and aged between 40 and 60 years (18/21).

**Impact of MCO on respondents’ perceived health status and NCDs management**

Hypertension (27.4%), high cholesterol (15.8%), and diabetes (13.7%) were the most commonly reported NCDs and NCD risk factors in the quantitative survey (Supplemental Appendix Table B). However, almost half of the respondents (57.2%) perceived that there was no difference in their NCD condition before and during MCO, while 16 of them (38.1%) thought that their health improved, as they took medication according to prescription and had better control of their diet. The qualitative interviews also found that movement restrictions during the MCO period either did not have an impact on perceived health or encouraged respondents to take care of their health more consciously.

*I have diabetes and high cholesterol. Before MCO the readings were high, but during MCO it was lesser. My conditions are better [diabetes and high cholesterol] because I have to cook since my children are working. My doctor said it was better. (Female, age 50)*

**Changes in physical activity and eating habits before and during the MCO period**

The movement restrictions imposed during the MCO increased respondents’ daily sedentary time. As shown in Table 1, the frequency (z = 3.515, \( p < 0.003 \)) and average time (z = 4.543, \( p < 0.001 \)) of exercise decreased significantly during the MCO, while the average time spent in front of the TV/mobile/laptop increased significantly (z = 5.479, \( p < 0.001 \)). Several reasons were cited by the respondents in the qualitative interviews for physical inactivity during the MCO, including changes in working conditions (reduced labour intensity due to the MCO), lack of personal space, and access to facilities (such as gyms).

*Before MCO, I was more active because of my work. My work was uncertain during MCO, that was why I was not as active as before. (Male, age 39)*

While nearly half of the respondents indicated that there was no change in their eating habits as compared to before the MCO (46.3%), consumption of home-cooked meals changed significantly (z = 5.099, \( p < 0.001 \)). The percentage of respondents who had home-cooked dishes for every meal increased from 42.1% before the MCO to 68.4% during the MCO. As shown in Figure 1, respondents also reported reduced consumption of packaged snack food, street fried/dessert food/kuih, fast food, soft drinks, street fried foods, and 3-in-1 or instant drinks. The quantitative and qualitative results affirmed that the movement restrictions during the MCO had limited the access to unhealthy street food, as these stalls were not allowed to open and respondents were unable to leave their homes. The movement restrictions provided opportunities for respondents to prepare home-cooked meals and have more control over their diet, enabling the opportunity to adopt healthier eating habits, which included eating on time, making healthy food choices with healthier cooking methods such as boiled, steamed, reduced oil, etc., and controlling the eating frequency. Eating home-cooked meals was perceived as healthier, with better quality, safety, and hygiene.

*My high blood pressure dropped because I eat less. I have been eating less. Even when I want to go out to eat I can’t, right? (Male, age 60)*

*I try to eat more vegetables, don’t eat so much oily food. When we eat at home, we eat soups and steamed food. (Female, age 33)*

Reported fruit and vegetable intake was low despite 46.3% and 63.2% of respondents reporting no respective change in fruit and
vegetable intake (Figure 1). On average, the respondents reported that they consumed vegetables six days per week, with 1.5 servings per day before the MCO. As for their fruit intake before the MCO, most ate fruit only 3.7 days a week, with 1.3 servings per day.
Potential interventions to adopt healthier eating and physical activities under the ‘new normal’ and challenges in implementation

The quantitative survey found that about one-third of the respondents were receptive to digital approaches such as online healthy cooking classes (30.5%), home workout tutorials (42.1%), and health information (36.8%) as potential interventions to adopt a healthier lifestyle under the ‘new normal’. In the qualitative interviews, a few respondents also suggested sharing information through social media platforms such as WhatsApp and Facebook or teleconferencing platforms such as Zoom.

Yes, that should be possible [on cooking video], things to do with nutrition. (Male, age 26)

We could Zoom to make sure people are healthy. Maybe we can do Zumba, we can see their reaction. If they feel they can’t do it, then we will try different ways of doing exercise. We can combine. (Female, age 50)

Despite the respondents being open to technology-enabled approaches, they also highlighted the need to address issues such as internet accessibility and affordability, functionality, and digital literacy. They suggested that constant encouragement, peer or community support would help the community members to adopt digital approaches.

Digital should be OK but maybe only half of them might do because some don’t use the Internet. Some have a smartphone, some don’t. Some have the Internet, some don’t. (Female, age 38)

Always encourage. Always teaching people to be consistent in doing it. (Female, age 29)

Discussion

COVID-19 has affected both health and health behaviours, with diverse implications for NCDs and NCD risk factors. Our study highlights the impact of this pandemic on diet and physical activity for a vulnerable population in a low-resource setting. COVID-19 restrictions led people to behave differently, especially those living with NCDs. This work complements early evidence from settings around the globe on how lockdowns and related home confinements have been associated with observed changes in dietary and physical activity patterns (22–24).
Community members in our study became physically inactive, with significantly higher time spent in sedentary activities during the pandemic. The time spent on exercise decreased significantly, while sedentary time spent in front of screens increased significantly. Similar patterns have been observed among adults in other regions who reported substantial lifestyle changes during the societal lockdown, including daily sitting time increasing from 5 to 8 hours per day (24). In contrast, a study that measured the impact of COVID-19 on 2,524 adults in Italy during the movement restrictions demonstrated that the amount of time spent on physical activity among those with moderate and high levels of physical activity decreased, while physical activity among sedentary individuals increased (25). This surprising observation was attributed to increases in household chores. Country variation may be attributable to differing underlying circumstances, including people’s daily routines and psychological status, given the variation in lockdown terms.

While decreases in physical activity exacerbate NCD risk, our study identified positive changes in dietary habits. Respondents reported a significant increase in homemade meal consumption, corresponding to a significant decrease in eating out-of-home meals and consuming processed foods. This was in line with the findings observed among the Italian and Spanish adult populations (22,26), where home confinement led to significantly higher adherence to the Mediterranean diet (22). It stands in contrast to the multi-country ECLB-COVID-19 study (24) and a study of Polish adults (27), which documented increases in unhealthy food consumption and increased snacking between meals. This inconsistency in findings suggests that lockdown effects on diet likely vary by population and context. Some people may find that lockdowns provide more time to prepare home-cooked meals as they intentionally care for their health during confinement. Others may snack as they are sedentary in front of the television, computer, and phone screens. Our rapid assessment of a low-income urban population supports the former narrative, with reported decreases in unhealthy food choices such as packaged snack foods, convenience foods, street foods, fast food, soft drinks, and instant drinks. On the other hand, while our study documented that respondents’ intake of fruit and vegetables remained the same during the MCO, their diet did not include recommended levels of fruit and vegetables. The low levels of fruit and vegetable consumption before and during MCO were consistent with the 2019 NHMS findings (16). A study has shown that low-income urban populations in Kuala Lumpur, especially adults aged between 30 and 59 years, have higher odds to have high consumption of carbonated, sweetened drinks and fast food, and low consumption of fruit and vegetables, due to limited financial resources and the habit of eating out (28). People in lower-income households considered fruit and vegetables to be expensive (28). Given long working hours and unavailable time to prepare home-cooked meals, they tended to eat out or buy street food that is energy-dense, high in salt, oil, and sugar, less nutritious, cheap, and easily available (28,29). As such, movement restrictions during MCO might have provided an opportunity for lower-income people to prepare food at home with reduced access to unhealthy food options.

The COVID-19 pandemic has changed people’s dietary and physical activity patterns, presenting an opportunity to revisit how we address NCD prevention and control and hastening the dominance of digital tools for health monitoring, promotion, and surveillance (30,31). In our study, community respondents were open to technology-enabled interventions that would encourage healthier lifestyles during and after the pandemic. Increases in screen use suggest an opportunity for digital approaches to health promotion, particularly those appropriately tailored to the specific circumstances and risks of their target populations. Future community-based digital interventions must rethink their delivery approach, including focusing on user-centred design, simplicity in the function that is less dependent on data or bandwidth, or allowing for offline use, in order to address concerns about internet availability, accessibility, and affordability (32,33). Such digital tools can support individual adoption of improved eating habits and physical activity.

This early effort to explore the effects of the COVID-19 movement control order on the Malaysian urban poor is not without limitations. Selection bias is a risk, as we depended on the KOSPEN volunteers for the study sample recruitment. All collected information was self-reported, meaning that we captured respondents’ perceptions about the healthiness of their diet. While...
our approach encouraged respondents to be forthright, we recognize the risks of self-serving bias and reporting bias due to perceived social desirability. There was also a potential of recall bias as the study was conducted in July 2020, three months after the first MCO. Our analysis assumes that home cooking is healthier than street food alternatives on the basis of limited evidence. It is possible that reported changes could be less positive than interpreted if home cooking is less healthy than outside meals and snacks, or if the reported perceived improvements in diet do not reflect true change. Despite these limitations, this evidence on diet and physical activity among low-income populations during the MCO can inform various stakeholders for future efforts to target appropriate health promotion interventions for NCD prevention and control both during and after the pandemic.

Conclusion
The COVID-19 pandemic provides an impetus for national governments to rethink their approaches to population health and disease control. While lockdowns and similar measures to reduce COVID-19 transmission do restrict movements and decrease physical activity, they may also offer the opportunity for vulnerable populations to experience improved dietary patterns. Healthy living under the ‘new normal’ requires a whole-of-society and whole-of-government approach to address the pertinent issues of food affordability and accessibility, socially distanced physical activity, and appropriate access to health promotion and education.

Authors’ contributions
SCL, IK and CN developed the manuscript outline and coordinated the manuscript development. SCL, IK, CN and VSU contributed to draft development and VSU and SRK contributed to data analysis. AC and FIM provided valuable inputs for revising the manuscript. SCL finalized the manuscript. All authors read and approved the final manuscript.

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Research ethics and consents
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