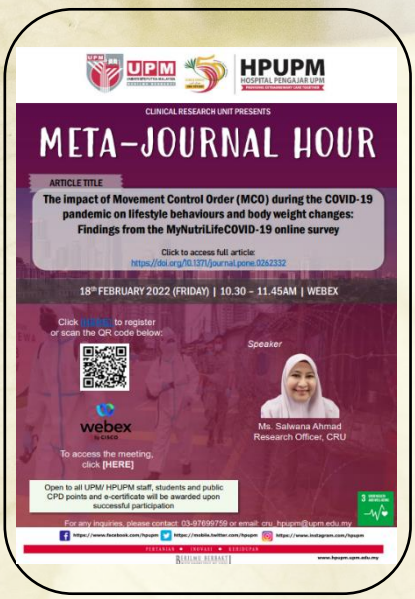
APPRAISALS IN META-JOURNAL HOUR 6

By: Salwana Ahmad, Nurul Iman Hafizah and BH Chew

The paper:

The impact of Movement Control Order during the COVID-19 pandemic on lifestyle behaviors and body weight changes: Findings from the MyNutriLifeCOVID-19 online survey. DOI: https://doi.org/10.1371/journal.pone.0262332



Watch the video recording on:

YouTube

Click [HERE] and don't forget to subscribe to our channel!

Why was this study conducted?

The COVID-19 pandemic was declared as a global pandemic on March 11, 2020, by the World Health Organization (WHO). Due to the persistent increase in COVID-19 cases in Malaysia, the government officially announced a national lockdown (Movement Control Order) on March 18, 2020 to prevent the further spread of the disease. However, early studies in a few countries found that prolonged home confinement during a disease outbreak could lead to dramatic changes in lifestyle behaviors of the population and subsequent changes in body weight(1-3). Therefore, the MyNutriLifeCOVID-19 study was conducted in Malaysia to determine the lifestyle behaviors during the lockdown and to assess whether these lifestyle behaviors are associated with bodyweight changes.

How was it done?

Study design and respondents

A cross-sectional online survey was conducted between April 21 – June 7, 2020 among 1319 Malaysian adult volunteers aged 18 years and above. Sampling was done using non-probability sampling (convenience sampling method) since it was an online survey. Information on study background, objectives and the scope of questions was provided before the study was conducted. Participants were also informed their participation was voluntary, which they may withdraw anytime without penalty or loss of benefit to which the participant is entitled before the participants agreed and gave their written consent and continue with the online survey. Before taking the online survey, participants were also informed that all data collected would be used solely for research purposes, and their permission for data sharing and publication was obtained.

Questionnaire administration

The online survey was disseminated through emails and social media (Facebook, Instagram, WhatsApp, and personal networks of respondents) using Google online survey platform. It was made available in 3 languages: English, Malay, and Chinese. Before the study commenced, the questionnaire was compared for consistency in usage for different languages and was pre-tested before data collection to ensure clarity and ease of understanding among respondents.

Questionnaires

The self-administered questionnaire consisted of five sections that assessed socio-demographic characteristics, body weight status, disease history, and lifestyle habits that include eating patterns, physical activity, and sleep quality.

Sections	Tool/Assessment	Validity and Reliability of Measurements.
Characteristics of the respondents	• Age • Ethnicity • Sex • Educational level • Marital status • Occupation • Monthly household income • Number of family members • Current living condition **Assessment:** • Self-reported diseases history • Type of diseases • Adoption of weight management strategies.	-

Anthropometric Information	• Height • Bodyweight • BMI • Bodyweight changes (weight decreased, no difference, weight increased)	-
Physical Activity	**Assessment:** • Performing any physical activities or exercise for at least 30 minutes per day during MCO. • Changes in the pattern of exercise or physical activity they performed during MCO as compared to pre-MCO	*Both translated and back-translated were compared for consistency and pre-tested before data collection for clarity and understanding.*
Sleep Pattern	**Assessment** of sleep pattern was measured using the Pittsburgh Sleep Quality Index (PSQI): • Sleep duration, sleep latency, and overall sleep quality	▪ *A useful tool for the assessment of subjective sleep quality in non-clinical and clinical settings.* ▪ *Validated questionnaire in Malay, with acceptable internal consistency (Cronbach's α coefficient= 0.74), fair test-retest reliability (intra-class correlation coefficient (ICC) = 0.58), and adequate convergent validity with comparison with Epworth sleepiness scale (ESS-M) score (Pearson's correlation coefficient, r=0.37)* (*Farah et al, 2019 (9)*)
Eating pattern	**A series of self-developed questions to identify changes in eating patterns during MCO:** **(1)** Perceived eating behaviors changes during MCO in comparison to pre-MCO. **(2)** Dietary habits including consuming homecooked meals, consuming foods or drinks from restaurants/hawker centers/coffee shops/other food stalls, consuming foods or drinks from western fast-food restaurants, going out to pack foods/drinks, ordering foods/drinks through Food Delivery Apps, obtaining free/donated foods/drinks, obtaining free foods/drinks, baking and preparing desserts at home, practicing healthier cooking methods, and practicing healthy eating concept "Quarter-Quarter-Half" **(3)** Food group consumption including rice/noodles/bread/cereals/cereal products/tubers, egg/fish/chicken, meat and meat products, legumes and nuts, milk and dairy products, fruits, vegetables, sugar-sweetened beverages, fried foods/high-fat foods, sweet foods/high sugary foods, dietary supplements, probiotic drinks. **(4)** Main meal consumption including breakfast, lunch, and dinner as well as snacking between main meal consumption	*Both translated and back-translated were compared for consistency and pre-tested before data collection for clarity and understanding.*

Data analysis

Descriptive statistics were presented as frequency and percentage for categorical variables and mean and standard deviation for continuous variables. Chi-square test of independence was used to determine the bivariate associations between the lifestyle behaviors and body weight changes; followed by generalized linear mixed model (GLMM) for variables with p-value <0.05 in the preceding statistical tests of association between lifestyle and body weight changes during MCO. Study sites and respondents were entered as random effects. Multivariable models are adjusted for potential confounding (age, sex, ethnicity, and BMI categories before MCO). Data were presented as odds ratio (OR) and 95% confident interval (CI), while all statistical significance level was set at $p<0.05$.

What was the finding?

Characteristics of the respondents

A total of 1319 Malaysian adults participated in the present study with a mean age of 36.3 ± 11.2 years. The majority of them were females (76.3%), attained tertiary education (90.9%), had a moderate to high monthly household income (84.5%), and lived with their family members during MCO (79.2%). A quarter of them were Malays (44.4%), 51.9% were married, and more than half of them began working from home during MCO (54.3%). Less than one-quarter of the respondents had chronic diseases (21.4%), with hypertension (8.5%), diabetes (5.2%), and hyperlipidemia (2.3%) as the top three common chronic diseases. Changes in body weight and BMI category during MCO.

Table 1 shows the overall changes in body weight and BMI category during MCO. Before MCO, about half of the respondents had a normal weight (54.7%), 7.8% were underweight, 25.5% were overweight, and 12.1% were obese. About one-third of the respondents gained weight during MCO (30.7%) with an average weight gain of 2.1 kg, while 32.2% lose weight with an average weight loss of 2.3 kg. About 11.0% of the respondents who were underweight before MCO had a further reduction in their body weight, while 46.3% gained weight, respectively. In terms of BMI category changes, 14.8% of the respondents who were underweight and 9.5% who were overweight attained normal BMI during MCO. For respondents who were normal weight before MCO, 1.5% and 4.5% of them became underweight and overweight, respectively.

Variables	Total (n = 1319)	BMI before MCO, n (%)				
		Underweight (n = 108)	Normal (n = 717)	Overweight (n = 328)	Obesity (n = 166)	*p*-value
Body weight changes during MCO (kg) [a]	-0.1 ± 2.1	0.6 ± 1.3	0.0 ± 1.8	-0.3 ± 2.3	-0.9 ± 3.1	< 0.001
Decreased	425 (32.2)	12 (11.1)	211 (29.4)	118 (36.1)	84 (50.3)	< 0.001
No change	489 (37.1)	46 (42.6)	290 (40.4)	113 (34.6)	40 (24.0)	
Increased	405 (30.7)	50 (46.3)	216 (30.1)	96 (29.4)	43 (25.7)	
BMI during MCO						
Underweight	103 (7.8)	92 (85.2)	11 (1.5)	0	0	< 0.001
Normal weight	721 (54.7)	16 (14.8)	674 (94.0)	31 (9.5)	0	
Overweight	336 (25.5)	0	32 (4.5)	281 (85.9)	23 (13.8)	
Obesity	159 (12.1)	0	0	15 (4.6)	144 (86.2)	

[a] Data are presented as mean ± standard deviation (SD).

https://doi.org/10.1371/journal.pone.0262332.t002

Table 1: Changes in body weight of the respondents during MCO

Lifestyle behavioral changes during MCO

More than half of the respondents reported managing their weight during MCO (84.4%). More than two-fifth of them practiced a healthier eating pattern (41.2%), 36.3% reduced their physical activities, and 25.7% had a poorer sleep quality during MCO. Amongst respondents who reported having lost weight during MCO, 68.1% claimed they managed their weight, 38.4% practiced healthier eating patterns, 41.0% performed more physical activities, and 37.0% had a better sleep quality as compared to before MCO. About 29.1% of respondents who have gained weight did not manage their weight during MCO, 49.0% practiced less healthy eating patterns, 38.6% performed lesser physical activities, and 38.9% had poorer sleep quality as compared to before MCO.

Eating pattern of the respondents during MCO.

Overall, respondents who gained weight reported ordering foods or drinks through food delivery apps (43.4% vs. 18.9%), consuming foods or drinks from restaurants, hawker centers, coffee shops, or other food stalls (41.7% vs. 26.2%), drinking sugar-sweetened beverages (41.1% vs. 26.2), consumed fried or high-fat foods (39.0% vs. 29.1%), consumed sweet or high sugary foods (39.6% vs. 29.5%), and snacking (36.3% vs. 26.5%) more frequently as compared to those who lose weight during MCO. On the other hand, respondents who lose weight tend to practice healthier cooking methods (36.5% vs. 24.3%) and comply with the healthy eating concept "Quarter-Quarter-Half" (36.1% vs. 24.9%), as well as consumed lunch (31.6% vs. 30.1%) more frequently compared to those who gained weight during MCO. No significant associations were found between consumption of home-cooked meals, going out to pack foods or drinks, obtaining free foods or drinks, consumption of foods or drinks from western fast-food restaurants, baking and preparing desserts at home, consumption of rice, noodles, bread, cereals, cereal products, and tubers, consumption of egg, fish, chicken, meat and meat products, consumption of legumes and nuts, consumption of milk and dairy products, consumption of fruits, consumption of vegetables, consumption of dietary supplements, consumption of probiotic drinks, as well as consumption of breakfast and dinner with body weight changes during MCO (data not shown).

In terms of **physical activity**, a total of 76.0% of respondents performed physical activities at least 30 minutes per day at less than five days per week during MCO. Respondents who lose weight performed physical activities at least 30 minutes per day more frequently as compared to those who gained weight (42.6% vs. 18.3%).

In terms of **sleep pattern**, more respondents had 6 to 7 hours of actual sleep at night (53.7%), with average sleep latency (32.3%), and fairly good sleep quality (58.7%) during MCO. More respondents who lose weight reported having a very poor sleep latency (34.0% vs. 33.3%) as compared to those who gained weight. There were no significant associations between duration of actual sleep at night and overall sleep quality with body weight changes during MCO (data not shown).

Associations between lifestyle behaviors and body weight changes during MCO

Results of the multivariable generalized linear model of associations between lifestyle behaviors and body weight changes during MCO are shown in the paper. After adjustment for confounding variables namely age, sex, ethnicity, and BMI category before MCO, practicing the healthy eating concept "Quarter-Quarter-Half", skipped lunch, and more frequent physical activities were factors that accounted for significant weight loss. Meanwhile, respondents who never consumed lunch were more likely to lose weight as compared to those with daily consumption (OR = 3.87, 95% CI = 1.27–11.73). Performing any physical activities at least 30 minutes/day for at least 5 days/week was associated with 1.4 times higher odds of weight loss among the respondents (OR = 1.44, 95% CI = 1.05–1.97).
After adjustment for confounding variables, respondents who practiced healthy cooking methods (OR = 1.61, 95% CI = 1.08–2.40) and consumed lunch (OR = 2.39, 95% CI = 1.25–4.60) less frequently were associated with higher odds of weight gain as compared to their counterparts. In contrast, respondents who consume fried/high-fat foods (OR = 0.64, 95% CI = 0.41–0.99) less frequently were less likely to gain weight as compared to those with daily consumption. Performing physical activities at least 30 minutes/day for at least 5 days/week reduced the odds of weight gain by 45% (OR = 0.55, 95% CI = 0.38–0.79). In terms of sleep patterns, respondents with good sleep latency were less likely to gain weight as compared to those with average sleep latency (OR = 0.62, 95% CI = 0.43–0.90).
The associations between lifestyle behaviors and body weight changes during MCO were further analyzed by adding BMI before MCO as an interaction term to the adjusted multivariable models. Among the overweight respondents, never (OR = 4.16, 95% CI = 1.13–15.26) or less frequent practice of healthy cooking methods (OR = 2.45, 95% CI = 1.05–5.68) were associated with weight gain, omit of high-fat foods were associated with higher odds of weight loss (OR = 14.98, 95% CI = 0.28–79.53), while not practicing healthy eating concept was associated with lower odds of weight loss. On the other hand, obese respondents who never practiced the healthy eating concept (OR = 6.32, 95% CI = 1.26–31.68) were more likely to gain weight, while those who performed physical activity more frequently were more likely to lose weight (OR = 3.35, 95% CI = 1.11–10.12). Among the normal weight respondents, those who consumed high-fat foods less frequently performed physical activity more frequently (OR = 0.53, 95% CI = 0.32–0.85), and had good sleep latency (OR = 0.52, 95% CI = 0.31–0.85) were less likely to gain weight, while those who skipped lunch were more likely to lose weight (OR = 4.76, 95% CI = 1.11–20.36). No significant associations were found between lifestyle behaviors and body weight changes during MCO among underweight respondents.

How much can we take out from this research/paper?

This study is considered a success in terms of the online recruitment of respondents. Another remarkable achievement is being relevant to the situation of the nation to know the people's health behaviors amid MCO and their lifestyle effect on body weight. The ability of a research group to garner support and to harness effort to complete a relevant study is always recommendable. Additionally, MyNutriLifeCOVID-19 uses many important and validated measures to capture lifestyles. Although inherent to an online survey to base on self-reporting of these measures including body weight and height, and other challenges of data quality, complete and comprehensive reporting are indispensable to make clear the study to others to have a wide impact.

Online surveys are more commonly completed by those who have access to the internet or those who are sufficiently biased to be interested in the subject [4]. The sociodemographic characteristics of the participants in this online survey are the middle-to-high income earners with 90% of them having at least tertiary education which presumably indicates that they might be more "health-cautious" as compared to the whole Malaysian population [6]. It would be more educational to have a note in the paper on how the recruitment was conducted, how wide it reached the Malaysian people, was reminder used, what token was given, was there any inquiry from prospective participants, response pattern according to the social media and states. This information would be helpful for future researchers who want to conduct online surveys. This learning point is more important than the results of the study because the MCO is unlikely to be repeated in any near future for the current socio-political reasons. This lacking of details is also quite substantial in other parts of the study, especially the analysis strategy and results sharing. In future similar studies where probability sampling is not possible or the need to correct non-representativeness in the study samples, statistical analysis techniques such as weighting [5], bootstrapping or propensity score matching could be done to improve the generalizability and representativeness of the data, or to make a fairer comparison between two groups of the primary exposure on the outcomes [6,7].

It was not explained how the collected samples were handled and the quality control applied to the data. Although the excluded number of respondents from the final analysis was small (about 20) but it is a good reporting practice to disclose this including handling of missing or extreme value data. The findings from pre-testing of the survey questionnaire and approaches could also be reported of any changes made.

The choice of GLMM and the modeling were not justified and elaborated, respectively. The statistical assumptions of the final GLMM model were not reported. The decision to estimate predictors/determinants on weight changes both on the Decreased and Increased could be made clear in the text. The number of samples included in each of the modelings should appear on the respective tables will increase readability.

Baseline characteristics and the lifestyles of the respondents were very illustrative of the 'who' and 'what' they behaved during the MCO. The findings right from the descriptive statistics to the inferential GLMM should bear in mind the characteristics of the respondents. These were mostly below 40-year-old of age, had tertiary education, were female, and were over-represented by Chinese in terms of ethnicity proportion in the larger population. Tables 2 and 3 are very informative as they describe weight changes and lifestyles. The former shows that at the most about 15% of the respondent reported a weight change. This information could be discussed by comparing to the people's behaviors before the COVID-19 pandemic, and I believe much we could learn from this alone.

The inferential statistics from GLMM provided many expected determinants of the weight changes but also some 'unexpected' factors. It is uncertain whether this observation was purely due to chance or multiple testing in the analysis that was not adjusted for with a reduced alpha value such as by the Bonferonni method where 0.05 is divided by the additional number of testings. There are some inconsistencies within and between the 2 outcome variables of Decreased and Increased weight.

Discussion and the limitations suggested were fair and rightly cautioned when interpreting and applying the results from the study. Future studies using online surveys should take to heart disseminating the survey invitation to different social media populated by different groups of people. This could improve the representativeness of the study samples to the population at large.

References

1. Sidor A, Rzymski P. Dietary choices and habits during COVID-19 lockdown: Experience from Poland. *Nutrients*. 2020; 12(6):1657. https://doi.org/10.3390/nu12061657 PMID: 32503173
2. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 International Online Survey. *Nutrients*. 2020; 12(6):1583. https://doi.org/10.3390/nu12061583 PMID: 32481594
3. 14. Rodrı´guez-Pe´rez C, Molina-Montes E, Verardo V, Artacho R, Garcı´a-Villanova B, Guerra-Herna´ndez EJ, et al. Changes in dietary hehaviours during the COVID-19 outbreak confinement in the Spanish COVIDiet Study. *Nutrients*. 2020; 12(6): 1730. https://doi.org/10.3390/nu12061730 PMID: 32531892
4. Andrade, C. The Limitations of Online Surveys. *Indian J Psychol Med*. 2020;42(6):575-576.
5. Lavrakas, P. J. (2008). Encyclopedia of survey research methods (Vols. 1-0). Thousand Oaks, CA: Sage Publications, Inc. doi: 10.4135/9781412963947. https://methods.sagepub.com/reference/encyclopedia-of-survey-research-methods/n632.xml
6. MyCensus 2020 Recorded Population (2022). Department of Statistics Malaysia. Accessed via: https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=117&bul_id=akliVWdIa2g3Y2VubTVSMkxmYXp1UT09&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09
7. Austin, P.C. An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. *Multivariate Behav Res*. (2011);46(3):399-424.
8. De Bin, R., Janitza, S., Sauerbrei, W., Boulesteix, A-L. Subsampling versus bootstrapping in resampling-based model selection for multivariable regression. (2014) Department of Statistics, University of Munich, 171.
9. Farah, N. M., Saw Yee, T., & Mohd Rasdi, H. F. (2019). Self-Reported Sleep Quality Using the Malay Version of the Pittsburgh Sleep Quality Index (PSQI-M) In Malaysian Adults. *International journal of environmental research and public health*, *16*(23), 4750. https://doi.org/10.3390/ijerph16234750.