The Psychological Impact of Lockdown on Dietary Intakes: Policy Lessons for Future Crises

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ABSTRACT

The COVID-19 pandemic has called on governments all over the world to impose lockdowns as a means of containing the virus's spread, and Malaysia is not exempt from this. Lockdowns may be beneficial in reducing the number of infected people, but they have also been found to have negative consequences for people's health. It was discovered to cause psychological and psychosocial stress, both of which were found to have a negative impact on people's food intake and, as a result, on their overall health. The goal of this study was to look into Malaysians' energy intake during the lockdown. The 24-hour dietary recall method was used to interview 472 respondents from 14 states in Malaysia. Findings revealed that during the lockdown period, there was a prevalence of energy overconsumption. These findings necessitate the implementation of specific health policies by the government to ensure that these dietary habits do not continue, as they may have negative health consequences in the future.

Keywords: 24-Hour Dietary Recall, COVID-19 Pandemic lockdown, dietary intakes, government policy, psychological impact, Recommended Nutrient Intake

INTRODUCTION

The novel coronavirus disease (COVID-19) was first identified in late December 2019 in Wuhan, China, and quickly became an emerging, rapidly developing situation, eventually spreading outside of China and the Asian continent before being declared a pandemic in March 2020 (Cucinotta, & Vanelli; 2020, Jiang et al., 2020). To prevent the virus from spreading, governments around the world, particularly those most affected by the pandemic, imposed a lockdown on major cities as well as the entire country (Sutaria, 2020; Ruiz Rosso et al., 2020). Most people's routines and lifestyles have been disrupted by the lockdown measures, which are expected to have a significant impact on physical activities and eating patterns (Di Renzo et al., 2020; Rodríguez-Pérez et al., 2020). These lockdowns, among others, have been found to cause unfavourable dietary habits, such as increased calorie intake, more frequent snacks, and decreased consumption of fresh fruits and vegetables, all of which lead to weight gain (Deschasaux-Tanguy et al., 2019; Zachary et al., 2020). In addition, more people reported increased rather than decreased food consumption (Sutaria, 2020). People were also cooking more frequently, snack, and consume more food than usual (Giacalone, Frøst & Rodríguez-Pérez, 2020).

Psychosocial stress has been shown to increase food intake (Huber et al., 2020) whereas psychological stress has been shown to affect dietary behaviour, resulting in significant weight gain (Block et al., 2009). The increased stress level among those affected by the lockdown leads to emotional overeating and cravings for high-sugar foods (Rodríguez-Martín & Meule, 2015; Yılmaz & Gökmen, 2020) which will impact overall health and body weight (Giacalone, Frøst & Rodríguez-Pérez, 2020; Holmes et al., 2020). These foods, which are mostly high in simple carbohydrates, can help reduce stress by increasing serotonin levels, which brings positive effects on mood (Ma, Ratnasabapathy & Gardiner, 2017). However, this carbohydrate-induced food craving is relative to the glycaemic index of foods, which is linked to an increased risk of obesity and cardiovascular disease (CVD), in addition to a chronic state of inflammation, which has been shown to increase the risk of more severe COVID-19 complications (Wu & McGoogan, 2019; Muscogiuri et al., 2020).

Studies found that those who are in stressful conditions, such as those under pandemic lockdown (Marjanovic, Greenglass, & Coffey, 2007; Reynolds et al. 2008) switch to hyper-palatable comfort foods like fast food, snacks, and calorie-dense foods (Oliver, Wardle, & Gibson, 2000; Zellner et al., 2006) that also happens to be high in sugar and fats (Torres & Nowson, 2007; Warne, 2009). To make matters worse, this pressing condition will also increase the craving towards hyper-palatable food, even when the person is both without hunger and in homoeostatic calorie requirement (Rutters et al., 2009). In addition to that, researchers also found high fat and high sugar foods may be addictive. Also, stress is found to be a significant factor in addiction development and recurrence and can lead to an increased risk of obesity and other metabolic diseases that were caused by the consumption of hyper-palatable foods (Yau & Potenza 2013). It is also important to note that these hyper-palatable foods have addictive properties that can lead to lasting changes to eating behaviours (Gearhardt, White, & Potenza, 2011). In addition, individuals who are involved in binge eating, a condition where people eat a large amount of food in a short period of time, displayed increased food cue responsiveness and attentional biases, which are likely to contribute to the beginning and continual overeating (Schmitz et al, 2014). Thus, continuous exposure to palatable food may promote and intensify compulsive, habitual overeating, as well as enhance responsiveness to food signals (Moore, 2017). Therefore, even though lockdowns are temporary measures, these overeating behaviours, if not properly managed, may lead to further unhealthy eating habits in the future. This adverse behaviour may contribute to changes in body weight and dietary intake over the long run (Dubois et al. 2022). Given these circumstances, it is suggested that a study on the effect of pandemic on dietary changes be conducted to determine if there is an impact on dietary behaviour (Amuakwa-Mensah 2022).

The pandemic-related lockdown in Malaysia has resulted in some behavioural changes among the public, one of which is panic buying (Salman, 2021). This behaviour has been fuelled by the observation of others purchasing items even if they are not required (Yau et al., 2020). Fear of a food supply shortage has resulted in panic buying among the general public, where they began to stockpile food, more than they would normally do in a normal situation (Kohn et al., 2012; Wang et al., 2020). The abundance of food stored at home not only increases the prevalence of food waste (Ben Hassen, El Bilali, & Allahyari 2020), it also encourages overconsumption (Wansink, 2004). Furthermore, a study has discovered that one of the reasons people gained weight during the lockdown was due to the amount of food available to them, rather than based on internal hunger cues (Rodríguez-Pérez et al., 2020) Also, easy access to food may contribute to increase food consumption and therefore increase in energy consumption.

This unintended behaviour of food overconsumption has been found to bring impact of future diet quality (Dubois et al. 2022). Food overconsumption has impact not only people's health, but also on the economy and environment (Global Food Security, 2016). It has been found to bring significant impact on people, which includes obesity, adverse health impacts, reduced life expectancy and financial constraints (Mathur, 2023). Other than that, the agricultural food activities were found to account for 30 percent of the total greenhouse gas emissions from human activities around the world. Food overconsumption increases greenhouse gas emissions while also placing additional pressure on the world's resources (Bajzelj et al. 2015).

To mitigate the prolonged effects of food overconsumption, the government must take actions so that these problems do not carry over to the future. Consumers are constantly bombarded with food advertisements, social conceptions of norms, prestige and status (Bernhardt et al., 2013; Mozaffarian, 2013; Taylor & Jacobson, 2016). All of these factors, combined with the carried over habit of food overconsumption, can have catastrophic consequences to public health. If left uncoordinated, these various factors are powerful influences and they are the obstacles to adopting appropriate eating behaviour many people around the world (Mozaffarian et al., 2018). These factors have the potential to create new health burdens while also maintaining or exacerbating the current ones. However, with carefully-thought, evidence-based policy, each of these issues allows the governments to assist changes in diets and wellbeing (Mozaffarian et al., 2018). Government policy in term of public health is so important that even a single or basic interventions can produce multiple impacts in a complex web of connection (Lang & Rayner, 2015).

As with other countries in the world, Malaysia is also affected by the pandemic. To contain the further spread of the virus, the Malaysian government has stepped up measures and one of them is imposing the lockdown. On March 16, 2020, the Malaysian Prime Minister declared the first controlled lockdown, which is called the

Movement Control Order (MCO). Until the second quarter of 2021, the Malaysian government has enforced a series of lockdowns, depending on the fluctuation of confirmed COVID-19 cases across the country. This study, therefore, aims to investigate Malaysians' dietary intake during the series of lockdowns, particularly in terms of energy intake in comparison to Malaysians' Recommended Nutrient Intake (RNI). This study will report the Malaysians' energy intake and energy contribution from macronutrients by gender characteristics of the population during a series of lockdowns in Malaysia. Based on previous studies, this paper looked at the potential effects that these dietary patterns may have on Malaysians' overall health as a result of the change in dietary intake during the lockdowns. Previous studies emphasises the importance of the strengthening government policies, particularly when it comes to sustaining public health. This paper will go into more detail regarding the impact of the lockdowns on Malaysian's dietary intakes as well as the potential effects on future Malaysian diets. This can provide useful insights to the government in focusing on the areas of Malaysian food consumption that are problematic.

METHODOLOGY

The 24-hour dietary recall (24HR)

The 24-hour dietary record method (24HR) is one of the most extensively utilised nutritional assessment measures (Wright, Ervin, & Briefel, 1994). For this study, data on the consumption of food items and drinks consumed in the past 24 hours were collected. The interviewer specifically guides respondents while also providing necessary explanations such as type of food and portion size to the respondents (Thompson & Subar, 2008) which can help them to report intakes with greater accuracy and validity (Castell, Serra-Majem, & Ribas-Barba, 2015). Respondents' nutritional knowledge isn't required, and because the recall time is nearly instantaneous, respondents can usually recall what they have eaten (Thompson & Subar, 2008).

Sapling and data collection

472 respondents were selected using a non-probabilistic convenience sample where the selections of samples were carried out through the snow-balling process (Czaja,& Blair, 1996). They are Malaysians ranging in age from 12 to 70 years old from Malaysia's 14 states who were affected by the lockdown. Each respondent was interviewed over the phone using a single 24HR interview. Before interviewing respondents under the age of 18, either verbal consent was obtained from their parents or the parents were asked to provide their children's consumption. The interviews were conducted between April 2020 and February 2021, during the series of lockdowns. Respondents were asked to list each food and drink they had consumed in the previous 24 hours, including the amount consumed. The interviewer instructed respondents on how to report their intakes. The volume of each dish was calculated based on household inventory, and each person interviewed was recorded according to the proportion of each dish consumed. To improve the accuracy of portion size, the interviewers guided the interviewees in terms of size estimation. For those who needed more information about serving sizes, a pictorial guide about standard portion size estimation was made available via the WhatsApp application.

Data analysis

The Nutritionist Pro software was used to analyse the data collected from the 24HR. Respondents' mean of total energy consumption, as well as the percentage of energy consumed from carbohydrates are compared with total calories. The data were presented as mean intake, standard deviation, and frequency. The nutritional intakes extracted were compared to the Malaysian RNI 2017 (NCCFN, 2017).

FINDINGS

Malaysians' Total Energy Intakes (TEI) and Macronutrient Composition (% Energy)

In general, results showed that the overall energy intake ratio did not show that Malaysians' energy intake was comprised of the recommended percentage of RNI. It is recommended that the macronutrient contribution towards TEI for Malaysian adults should be 50 to 65% from carbohydrates, 25 to 30% from fat, and 30% from

protein (NCCFN, 2017). Table 1 shows the total energy intake (TEI) and estimated energy requirement (EER) percentage based on various age groups and gender. In terms of gender differences, the 70 above male group consumed 69% more energy than they should have. Females between the ages of 60 and 69, on the other hand, had the highest percentage of TEI. With a daily calorific intake of 4350 kcal, they have exceeded 119% of the EER. According to the survey, the male counterpart exceeded the EER by 78% or 1585.85 kcal more than they should have consumed. In comparison to other age groups, this age group had the highest intake of TEI, both male and female. The overall comparisons of male and female TEI to EER as recommended in the Malaysian RNI 2017 are shown in Figure 1. Except for the 60 to 69 years old female group, male respondents consumed more energy than their female counterparts in the same age group in all cases.

Table 1: Total energy intake (TEI) to estimated energy requirement (EER) percentage

Age group	Gender	n	Total Energy Intake (TEI) (kcal/day)[a]	Estimated Energy Requirement (EER)[b]	TEI % to EER
12 to 19	Male	31	3466.49	2340.00	148%
	Female	35	3008.35	2130.00	141%
20 to 29	Male	33	3788.22	2240.00	169%
	Female	92	2900.84	2080.00	139%
30 to 39	Male	28	3606.48	2190.00	165%
	Female	35	2771.95	2130.00	130%
40 to 49	Male	54	3357.21	2190.00	153%
	Female	62	2942.65	2130.00	138%
50 to 59	Male	23	3465.63	2190.00	158%
	Female	36	2805.17	2130.00	132%
60 to 69	Male	14	3615.85	2030.00	178%
	Female	15	4350.08	1990.00	219%
70 above	Male	8	3435.02	2030.00	169%
	Female	6	2556.59	1990.00	128%

[a] Source: NCCFN, 2017

[b] For measuring the general population, the energy requirements have been based on Physical Activity Level (PAL) 1.6 based on the recommendation by RNI for Malaysians 2017 (NCCFN, 2017)

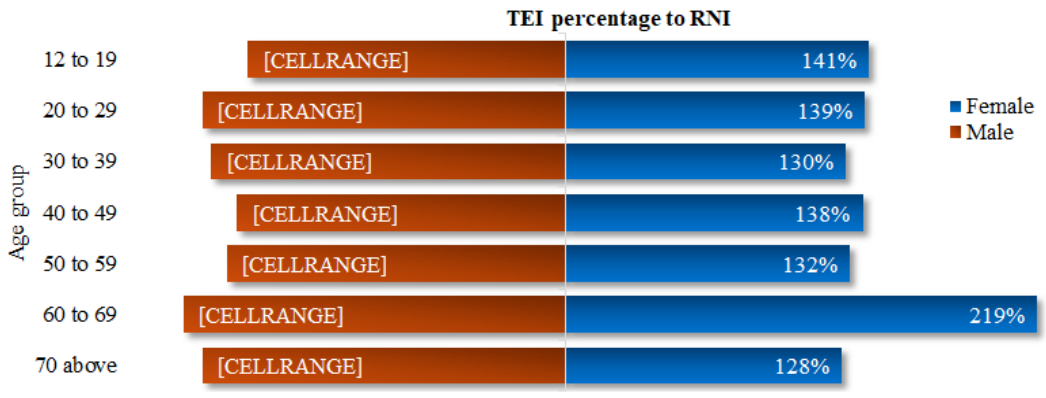


Figure 1: Total Energy Intake (TEI) to Estimated Energy Requirement (EER) Percentage – Gender Comparisons

Carbohydrates Intakes

Table 2 shows that none of the groups met the recommendations of carbohydrate intake. The group that was closest to the recommended level were the 30 to 39 years old female group, where 47.75% of TEI came from carbohydrate. On the other hand, the group with the lowest adherence to the recommended TEI from carbohydrates were males aged 12 to 19 years old, with only 38.11% of their energy came from carbohydrates, which is far below the recommended amount of carbohydrate intake percentage to TEI. The 70 years old male had the highest carbohydrate intake, with an average of 406.9 grams per day, while the female counterpart had the lowest, with an average of 286 grams of carbohydrate intake. According to the Malaysian RNI, the recommended energy intakes from carbohydrates is between 50 to 65 percent (NCCFN, 2017). However, according to the survey results, none of the age group followed this recommendation (Figure 2).

Table 2: Average carbohydrate intake and total energy intake (TEI) from carbohydrates during lockdown

Age group	Gender	n	Total Energy Intake (TEI) (kcal/day)	Average Carbohydrates intake (g/day) (mean ± SD)	% of total energy intake (TEI) from carbohydrates [a]
12 to 19	Male	31	3466.5	330.2 ± 107.5	38.11%
	Female	35	3008.3	325.042 ± 91.2	43.22%
20 to 29	Male	33	3788.2	389.9 ± 129.4	41.18%
	Female	92	2900.8	307.8 ± 105.5	42.44%
30 to 39	Male	28	3606.4	375 ± 123.1	41.59%
	Female	35	2771.9	330.9 ± 164.9	47.75%
40 to 49	Male	54	3357.2	372.2 ± 179.3	44.35%
	Female	62	2942.6	301.7 ± 114.9	41.02%
50 to 59	Male	23	3465.6	400 ± 60.6	46.17%
	Female	36	2805.1	316.8 ± 85.2	45.17%
60 to 69	Male	14	3615.8	389.4 ± 94.6	43.08%
	Female	15	4350.1	417.4 ± 119.4	38.38%
70 above	Male	8	3435	406.9 ± 98.8	47.38%
	Female	6	2556.6	286 ± 24.8	44.75%

Note: [a] Calculated based on 4 kcal/gram of carbohydrate (NCCFN, 2017).

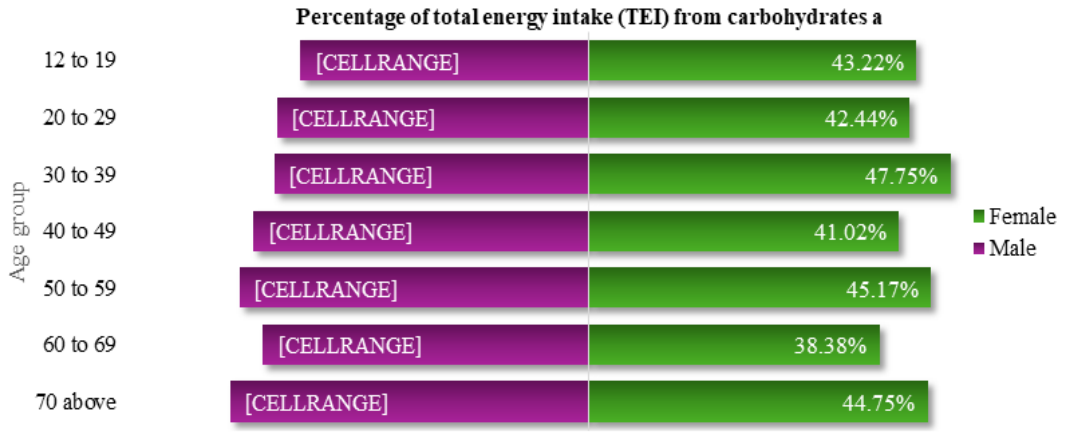


Figure 2: Total Energy Intakes from Carbohydrates

Note: [a] Calculated based on 4 kcal/gram of carbohydrate (NCCFN, 2017).

DISCUSSION

The analysis comparing Malaysians' TEI to RNI showed that the energy intakes of the Malaysians exceeded the recommended level. Even though the previous studies such as Chong et al. (1984), Arshad et al. (1996), Chee et al. (1997), and Mirnalini et al. (2008) found that Malaysians' energy intake was below RNI, results from this study proved otherwise. The major difference of this study was that this study was carried out during the pandemic lockdown. Numerous studies have proven that lockdowns, especially those related to the COVID-19 pandemic bring along several conditions. The lockdowns were found to cause among others, boredom (Moynihan et al., 2015) low mood and anxiety (Brooks et al., 2020), stress (Marjanovic, Greenglass, & Coffey, 2007; Reynolds et al. 2008), emotional distress, depression, low mood, irritability, insomnia, and psychological stress (DiGiovanni et al., 2004; Hawryluck et al., 2004). These situations have been linked to inducing cravings towards highly palatable foods, (Oliver, Wardle, & Gibson, 2000; Zellner et al., 2006) which were also found to be high in sugar and fat (Torres & Nowson, 2007; Warne, 2009).

The overconsumption of energy discovered in this study could also be linked to an overabundance of foods at home. This was because people tend to panic-buy when a lockdown is announced. Malaysians, like people in other countries, were panic buying as soon as the lockdown was announced (Salman, 2021). The panic buying behaviour was found to be fuelled by the fear of a food supply shortage (Kohn et al., 2012; Wang et al., 2020; Sterman & Dogan, 2015) and the desire to avoid frequent shopping due to the fear of being infected by the virus (Aday & Aday, 2020) as well as because of the lockdown restrictions itself. Aside from that, the effect of observing the public's buying behaviour, also known as the 'herd effect', has caused people to overstock their food supplies unnecessarily (Aday & Aday, 2020). The abundance of food supply has been found to cause people to consume more than they should Rolls, Roe, & Meengs, 2007; Warne, 2009). In addition, research also found that one of the reasons for weight gain during lockdown was that people were eating because of the availability of food rather than based on hunger (Rodríguez-Pérez et al., 2020). Consequently, it was found that stockpiled foods encourage people to eat larger portions (Chandon & Wansink, 2002) and therefore consume more calories (Raynor & Wing, 2007). Previous studies have shown that food stockpiling caused by panic buying as a result of the pandemic lockdown has increased the amount of food available at home. Studies have also shown that the abundance stock of food available at home may increase food consumption. This study found that during the lockdowns, people have consumed more than they needed and panic buying and food stockpiling may be one of the reasons for this event.

Findings also revealed that there has been calorie overconsumption by the Malaysians during the lockdowns. Based on previous studies, this overconsumption of energy may have been caused by among others, the increased stress level, and boredom during lockdowns. A normal eating pattern is usually associated with feelings of hunger or satiety. People were found to consume more food under stressful conditions, such as during lockdowns (Cheikh Ismail et al., 2020), even when there were no feelings of hunger or calorific requirements (Rutters, et al., 2009). In addition to that, the lockdown has caused people to engage in less physical activity (Maugeri, Castrogiovanni, & Battaglia, 2020; Theis et al., 2021) When energy intake surpasses energy expenditure, a situation of positive energy balance is reached (Hill, Wyatt, & Peters, 2012) resulting in an increase in body mass, 60 to 80% of which is usually body fat (Hill & Commerford, 1996).

This study also discovered that women between the ages of 60 and 69 have the highest rate of calorie overconsumption. They consumed an average of 4350 kcal per day, which is 219% of the RNI. This finding can probably be related to a report where women (28%) are more likely than men (20%) to experience high levels of stress, and most women also report overeating or eating unhealthy foods as a result of stress far more frequently than men (American Psychological Association, 2012). This could be due to the fact that women have higher levels of perceived stress during lockdowns than men (Pieh, Budimir, & Probst, 2020; Bermejo-Martins et al., 2021). In terms of age group, the findings can be attributed to the fact that obesity prevalence increases with age, rising from 18% in the 40 to 56 years old age group to 82% in the 60 and older age group (Hsaini et al., 2020). Therefore, it is critical that food consumption, particularly energy intakes, be properly managed, particularly during the lockdown period, in order to reduce the prevalence of obesity among Malaysians.

Malaysia has been frequently identified as a country with an alarming obesity rate, with 48.3% of men and

48.6% of women in Malaysia were found to be obese (Ng et al., 2014). In addition, the Malaysian National Health and Morbidity Survey (NHMS) 2015 reported that 30% of individuals in Malaysia are overweight, with 17.3% are obese (IPH, 2015), while a more recent survey reported that 30.8% of Malaysians are overweight, with 22% classified as obese (Lee & Wan Muda, 2019). In terms of age group, 60.9% of Malaysians between 55 to 59% were reported to be either overweight or obese (NIH, 2020). In addition, Malaysian National Health and Morbidity Survey (NHMS) 2019 stated that one in two adults in Malaysia were overweight or obese, where the majority of them were females (54.7%) (IPH, 2020). Also, despite the fact that male and female energy consumption are comparable, obesity is found to be more common in women than in men (Nuryani et al., 2021). As a result, calorie overconsumption during the lockdown period must be properly regulated so that Malaysia's current obesity epidemic does not worsen in the post-COVID-19 era. Given the prevalence of overweight and obesity in Malaysia, it is essential for Malaysians to be aware of the calorie-rich food consumption during the lockdown so that they are cognizant of the implications that they may experience if this unlikely dietary behaviour is carried over for an extended period. Furthermore, intervention programmes such as energy intake restrictions, which are effective in reducing weight gain (Weta et al., 2020) can be implemented during or after the lockdown to assist people in improving their health.

Nutrition transition in Malaysia has been well documented since the 1980s, discussing the changes in eating habits with an increase of prevalence in obesity and a subsequent increase in mortality rates due to non-communicable diseases (NCDs) and cardiovascular diseases (CVDs) (Noor, 2002). The dietary intakes of Malaysians during the pandemic lockdown were highlighted in this study. As compared to previous reports, this study discovered the prevalence of dietary energy overconsumption by Malaysians during pandemic lockdowns. It is possible that these temporary dietary intake patterns will become a long-term habit (Dubois et al. 2022). Furthermore, Malaysia has been “awarded” as the fattest country in Asia in 2014 (Ng et al., 2014) and has maintained the record since then. Besides, statistics from the National Health and Morbidity Survey (NHMS 2019) showed that one in every two adults in Malaysia is either obese or overweight (Lee & Wan Muda, 2019). Therefore, proper strategies are needed to control the changes in eating behaviours for better health outcomes (Goh et al., 2020). The public needs to be aware of the prevention of obesity, NCDs, and CVDs. While critical steps were taken to curb the spread of COVID-19, the fight against obesity, NCD, and CVD is far from over.

The government plays a critical role in shaping public policies that could influence dietary behaviour. Governmental policies have great potential on encouraging people to choose healthier foods (Pineda et al., 2022). Obesity and excessive food consumption will not only bring impact to the individuals but also the country in terms of its economy as well as other consequences that relates to adverse dietary behaviour (Global Food Security, 2016). Based on this study’s findings, psychological stress during lockdowns may have played a role in unhealthy eating patterns such as excessive calorie consumption and favouring foods that are high in fat and sugar. If this behaviour is not adequately managed, it could develop into lifelong habits that eventually result in NCDs (Dubois et al. 2022).

Government policies were found to have its stance on agricultural production, industrial assistance, economics, businesses, and food security, despite the growth of NCDs and the associated expenses. To help create a sustainable, prosperous, equitable, and healthful food system that serves everyone, a strong government policy is needed (Mozaffarian et al. 2018). Policies such as mandatory nutrition labelling not only can help consumers make healthier choices (Ares et al., 2023; Shrestha et al., 2023), but also encourages food manufacturers to reformulate their products (Shangguan et al., 2018). Other than that, Gressier, Sassi, & Frost (2020) explained that government policies can affect the demand for particular food product categories, specifically the healthier ones, by educating consumers about the hazards and health advantages associated with particular foods through environmental signals.

The discoveries of the COVID-19 vaccines have shone a light at the end of the tunnel. However, the issues of obesity, coronary heart disease (CHD), and CVD associated with excessive food consumption have long been discussed and show little or no signs of improvement. Dietary changes during lockdowns, as well as new dietary behaviours carried over from COVID lockdowns, may raise additional challenges for the government and health professionals. Given the potentially detrimental consequences of these dietary changes, it is critical that food consumption, particularly in the Malaysian population to be monitored. The findings of this study

could provide insight into the dietary compositions of Malaysians, allowing some recommendations to be made based on other studies carried out elsewhere. This is important because any adverse changes in dietary habits have been shown to have detrimental effects on health, and it is feared that if these habits continue for an extended period, even after the lockdown has ended, they will pose a threat to the public health in the future. Therefore, it remains to be seen if these consequences apply to other countries, such as Malaysia given the occurrences of changes in dietary patterns and the magnitude of the lockdown measure imposed by the Malaysian government.

CONCLUSIONS

COVID-19 lockdowns have been found to have a wide range of effects on people's lives, all of which have an impact on their overall diet. The current study discovered a high prevalence of energy overconsumption by the Malaysians during the COVID-19 lockdowns. Consequently, numerous studies have revealed the negative effects of energy overconsumption on health. As a result, it is critical for governing bodies to implement intervention measures to promote a healthier diet in the post-COVID era. The government must be proactive in preventing the long-term health effects by enforcing robust public health policies, controlling nutritional standards, and encouraging sustainable dietary practices. By addressing to these issues, Malaysia can improve its resilience against future public health crises and promote a healthier population.

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REFERENCES

1. Aday S. & Aday M.S. (2020). Impact of COVID-19 on the food supply chain. Food Quality and Safety, 4(4), 167–180. https://doi.org/10.1093/fqsafe/fyaa024
2. Amuakwa-Mensah, F., Amuakwa-Mensah, S., Klege, R. A., & Adom, P. K. (2022). Stockpiling and food worries: Changing habits and choices in the midst of COVID-19 pandemic. Socio-Economic Planning Sciences, 82, 101-181.https://doi.org/10.1016/j.seps.2021.101181
3. Ares, G., Antúnez, L., Curutchet, M., & Giménez, A. (2023). Warning labels as a policy tool to encourage healthier eating habits. Current Opinion in Food Science. 51. https://doi.org/10.1016/j.cofs.2023.101011
4. Arshad, F, Nor, I.M., Ali, R.M., & Hamzah, F. (1996). Energy, protein, fat and carbohydrate intakes of underweight, normal weight and obese government office workers in an urban area. Asia Pacific Journal of Clinical Nutrition, 5(2), 88-91.
5. American Psychological Association, (2012). Gender and Stress [Press release]. https://www.apa.org/news/press/releases/stress/2010/gender-stress
6. Bajzelj, B., Benton, T., Clark, M., Garnett, T., Richards, K., Smith, P. & Vasiljevic, M. (2015). Synergies between healthy and sustainable diets. Brief for GSDR. https://sustainabledevelopment.un.org/content/ documents/635987-BajzeljSynergies%20between %20healthy % 20and%20sustainable%20diets.pdf
7. Ben Hassen T., El Bilali H., & Allahyari M.S. (2020). Impact of COVID-19 on food behavior and consumption in Qatar. Sustainability, 12(17), 6973. https://dx.doi.org/10.3390/su12176973
8. Bermejo-Martins, E., Luis, E.O., Sarrionandia, A., Martínez, M., Garcés, M.S., Oliveros, E.Y., Cortés-Rivera, C., Belintxon, M., & Fernández-Berrocal, P. (2021). Different responses to stress, health practices, and self-care during COVID-19 lockdown: A Stratified Analysis. International Journal of Environmental Research and Public Health, 18(5), 2253. https://doi.org/10.3390/ijerph18052253
9. Bernhardt, A.M., Wilking, C., Adachi-Mejia, A.M., Bergamini, E., Marijnissen, J., & Sargent. J.D. (2013). How television fast food marketing aimed at children compares with adult advertisements. PLoS One, 8(8), https://doi.org/10.1371/journal.pone.0072479
10. Block, J.P., He, Y., Zaslavsky, A.M., Ding, L., & Ayanian, J.Z. (2009). Psychosocial stress and change in weight among US adults. American Journal of Epidemiology, 170(2), 181–192. https://doi.org/10.1093/aje/kwp104

11. Brooks, S.K., Webster, R.K., Smith, L.E., Woodland, L., Wesseley, S., Greenberg, N., & Rubin, G.J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet, 395, 912-920, https://doi.org/10.1016/S0140-6736(20)30460-8
12. Castell, G.S, Serra-Majem, L., & Ribas-Barba, L. (2015). What and how much do we eat? 24-hour dietary recall method. Nutricion Hospitalaria, 31(3), 46–48. https://doi.org/10.3305/nh.2015.31.sup3.8750
13. Chandon, P., & Wansink, B. (2002). When are stockpiled products consumed faster? A convenience–salience framework of postpurchase consumption incidence and quantity. Journal of Marketing Research, 39(3), 321-335. https://doi.org/10.1509/jmkr.39.3.321.19111
14. Chee, S.S., Ismail, M.N., Ng, K.K., & Zawiah, H. (1997). Food intake assessment of adults in rural and urban areas from four selected regions in Malaysia. Malaysian Journal of Nutrition, 3, 91-102.
15. Cheikh Ismail, L., Osaili, T.M., Mohamad, M.N., Al Marzouqi, A., Jarrar, A.H., Abu Jamous, D.O., Magriplis, E., Ali, H.I., Al Sabbah, H., Hasan, H., AlMarzooqi, L.M.R., Stojanovska, L., Hashim, M., Shaker Obaid, R.R., Saleh, S.T., & Al Dhaheri, A.S. (2020). Eating habits and lifestyle during COVID-19 lockdown in the United Arab Emirates: a cross-sectional study. Nutrients, 12(11), 3314. https://doi.org/10.3390/nu12113314
16. Chong, Y.H., Tee, E.S., Ng, T.K.W., Kandiah, M., Hussein, R.H., & Shahid, S.M. (1984). Status of Community Nutrition in Poverty Kampungs. Kuala Lumpur: Division of Human Nutrition, Institute for Medical Research.
17. Cucinotta, D. & Vanelli, M. (2020). WHO Declares COVID-19 a pandemic. Acta Biomedica, 91(1),157-160. doi:10.23750/abm.v91i1.9397
18. Czaja, R. & Blair, J. (1996). Designing Surveys: A Guide to Decisions and Procedures. Thousand Oaks, CA: Pine Forge Press.
19. Deschasaux-Tanguy, M., Druesne-Pecollo, N., Esseddik, Y., de Edelenyi, F.S., Allès, B., Andreeva, .A., Baudry, J., Charreire, H., Deschamps, V., Egnell, M., Fezeu, L.K., Galan, P., Julia, C., Kesse-Guyot, E., Latino-Martel, P., Oppert, J-M., Péneau, S., Verdot, C., Hercberg, S., & Touvier, M. (2020). Diet and physical activity during the coronavirus disease 2019 (COVID-19) lockdown (March-May 2020): results from the French NutriNet-Santé cohort study. The American Journal of Clinical Nutrition. 113(4), https://doi.org/10.1093/ajcn/nqaa336
20. Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attinà, A., Cinelli, G., Leggeri, C., Caparello, G., Barrea, L., Scerbo, F., Esposito, E., & De Lorenzo, A. (2020). Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. Journal of Translational Medicine,18(1), https://doi.org/10.1186/s12967-020-02399-5
21. DiGiovanni, C., Conley, J., Chiu, D., & Zaborski, J. (2004). Factors influencing compliance with quarantine in Toronto during the 2003 SARS outbreak. Biosecurity and Bioterrorism, Biodefense Strategy, Practice, and Science, 2(4), 265–272. https://doi.org/10.1089/bsp.2004.2.265
22. Dubois, L., Bédard, B., Goulet, D., Prud'homme, D., Tremblay, R.E., & Boivin, M. (2022) Eating behaviors, dietary patterns and weight status in emerging adulthood and longitudinal associations with eating behaviors in early childhood. International Journal of Behavioral Nutrition and Physical Activity, 19(139). https://doi.org/10.1186/s12966-022-01376-z
23. Gearhardt, A.N., White, M.A., & Potenza, M.N. (2011). Binge eating disorder and food addiction. Current Drug Abuse Reviews, 4(3), 201–207. https://doi.org/10.2174/1874473711104030201
24. Giacalone, D., Frøst, M. B., & Rodríguez-Pérez, C. (2020). Reported changes in dietary habits during the COVID-19 lockdown in the Danish population: The Danish COVIDiet study. Frontiers in Nutrition, 7, 592112. https://doi.org/10.3389/fnut.2020.592112
25. Global Food Security (2016, August 16). Overconsumption and Influences on Diet. https://www.foodsecurity.ac.uk/publications/insight-issue-five-overconsumption-influences-diet.pdf
26. Goh, E.V., Azam-Ali, S., McCullough, F., & Roy Mitra, S. (2020). The nutrition transition in Malaysia; key drivers and recommendations for improved health outcomes. BMC Nutrition, 6(32). https://doi.org/10.1186/s40795-020-00348-5
27. Gressier, M., Sassi, F., & Frost, G. (2020). Healthy foods and healthy diets. How government policies can steer food reformulation. Nutrients, 12(7), https://doi.org/10.3390/nu12071992
28. Hawryluck, L., Gold, W.L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. Emerging Infectious Diseases, 10(7), 1206–

1212. https://doi.org/10.3201/eid1007.030703
29. Hill, J.O. & Commerford, R. (1996). Physical activity, fat balance, and energy balance. International Journal of Sport Nutrition, 6(2), 80–92. https://doi.org/10.1123/ijsn.6.2.80
30. Hill, J.O., Wyatt, H.R., & Peters, J.C. (2012). Energy balance and obesity. Circulation, 126(1), 126–132. https://doi.org/10.1161/CIRCULATIONAHA.111.087213
31. Holmes, E. A., O'Connor, R.C., Perry, V.H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A.K., Shafran, R., Sweeney, A., Worthman, C.M., Yardley, L., Cowan, K., Cope, C., Hotopf, M., & Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. The Lancet Psychiatry, 7(6), 547–560. https://doi.org/10.1016/S2215-0366(20)30168-1
32. Hsaini A., Aboussaleh Y., Bikri S., & Ahami A. (2020). Association between BMI and iron status among diabetic patients in Oujda-Angad-Morocco. Current Research in Nutrition and Food Science, 8(2). https://dx.doi.org/10.12944/CRNFSJ.8.2.07
33. Huber, B.C., Steffen J., Schlichtiger J. & Brunner, S. (2020). Altered nutrition behavior during COVID-19 pandemic lockdown in young adults. European Journal of Nutrition, 60(5), 2593–2602, https://doi.org/10.1007/s00394-020-02435-6
34. Institute for Public Health (IPH) (2015). National Health and Morbidity Survey 2015 (NHMS 2015). Vol. II: Non-Communicable Diseases, Risk Factors & Other Health Problems. Kuala Lumpur: Institute for Public Health, Ministry of Health, Malaysia, 315. https://www.moh.gov.my/moh/resources/nhmsreport2015vol2.pdf
35. Institute for Public Health (IPH), National Institutes of Health, Ministry of Health Malaysia (2020). National Health and Morbidity Survey (NHMS) 2019: Vol. I: NCDs – Non-Communicable Diseases: Risk Factors and other Health Problems. Selangor: Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia; 392.
36. Jiang, S., Xia, S., Ying, T., & Lu, L. (2020). A novel coronavirus (2019-nCoV) causing pneumonia-associated respiratory syndrome. Cellular & Molecular Immunology. 17(5), 554, https://doi.org/10.1038/s41423-020-0372-4
37. Kohn, S., Eaton, J.L., Feroz, S., Bainbridge, A.A., Hoolachan, J., & Barnett, D.J. (2012). Personal disaster preparedness: An integrative review of the literature. Disaster Medicine and Public Health Preparedness, 6(3), 217–231. https://doi.org/10.1001/dmp.2012.47
38. Lang, T. & Rayner, G. (2015). Beyond the Golden Era of public health: charting a path from sanitarianism to ecological public health. Public Health, 129(10), 1369-1382, https://doi.org/10.1016/j.puhe.2015.07.042
39. Lee, Y.Y., & Wan Muda, W.A.M. (2019). Dietary intakes and obesity of Malaysian adults. Nutrition Research and Practice, 13(2), 159–168. https://doi.org/10.4162/nrp.2019.13.2.159
40. Ma, Y., Ratnasabapathy, R., & Gardiner, J. (2017). Carbohydrate craving: not everything is sweet. Current Opinion in Clinical Nutrition and Metabolic Care, 20(4), 261–265. https://doi.org/10.1097/MCO.0000000000000374
41. Mathur, A. (2023). Food overconsumption: Concept and its measurement. Journal of Consumer Behaviour, 23(3), 1556-1573. https://doi.org/10.1002/cb.2292
42. Maugeri, G., Castrogiovanni, P., & Battaglia, G. (2020). The impact of physical activity on psychological health during COVID-19 pandemic in Italy. Heliyon, 6(6), https://doi.org/10.1016/j.heliyon.2020.e04315
43. Marjanovic, Z., Greenglass, E.R., & Coffey, S. (2007). The relevance of psychosocial variables and working conditions in predicting nurses' coping strategies during the SARS crisis: an online questionnaire survey. International Journal of Nursing Studies, 44(6), 991–998. https://doi.org/10.1016/j.ijnurstu.2006.02.012
44. Mirnalini, K., Jr, Zalilah, M.S., Safiah, M.Y., Tahir, A., Siti Haslinda, M.D., Siti Rohana, D., Khairul Zarina, M.Y., Mohd Hasyami, S., & Normah, H. (2008). Energy and Nutrient Intakes: Findings from the Malaysian Adult Nutrition Survey (MANS). Malaysian Journal of Nutrition, 14(1), 1–24.
45. Moore, C. F., Sabino, V., Koob, G. F., & Cottone, P. (2017). Neuroscience of Compulsive Eating Behaviour. Frontiers in Neuroscience, 11, 469. https://doi.org/10.3389/fnins.2017.00469
46. Moynihan, A.B., van Tilburg, W.A., Igou, E.R., Wisman, A., Donnelly, A.E., & Mulcaire, J.B. (2015).

Eaten up by boredom: consuming food to escape awareness of the bored self. Frontiers in Psychology, 6, 369. https://doi.org/10.3389/fpsyg.2015.00369

47. Mozaffarian, D. (2013). Salt, sugar, and fat or branding, marketing, and promotion? Lancet, 382(9901), 1322 – 1323.
48. Mozaffarian, D., Angell, S. Y., Lang, T., & Rivera, J. A. (2018). Role of government policy in nutrition-barriers to and opportunities for healthier eating. BMJ (Clinical research ed.), 361, k2426, https://doi.org/10.1136/bmj.k2426
49. Muscogiuri, G., Pugliese, G., Barrea, L., Savastano, S., & Colao, A. (2020). Commentary: Obesity: The "Achilles heel" for COVID-19?. Metabolism: Clinical and Experimental, 108, https://doi.org/10.1016/j.metabol.2020.154251
50. National Coordinating Committee on Food and Nutrition (NCCFN 2017). RNI Recommended Nutrient Intakes for Malaysia. A Report of the Technical Working Group on Nutritional Guidelines. Putrajaya, Malaysia: Ministry of Health Malaysia. https://hq.moh.gov.my/nutrition/wp-content/uploads/2023/12/ FA-Buku-RNI.pdf
51. National Institutes of Health (NIH) (2020). National Health and Morbidity Survey 2019: Non-communicable diseases, healthcare demand, and health literacy: Key findings. Kuala Lumpur: Institute for Public Health, Ministry of Health, Malaysia; 2020:40 http://iptk.moh.gov.my/images/ technical_report/2020/4_Infographic_Booklet_NHMS 2019_-_English.pdf
52. Ng, M., Fleming, T., Robinson, M., Thomson, B., Graetz, N., Margono, C., Mullany, E.C., Biryukov, S., Abbafati, C., Abera, S.F., Abraham, J.P., Abu-Rmeileh, N. M., Achoki, T., AlBuhairan, F.S., Alemu, Z.A., Alfonso, R., Ali, M.K., Ali, R., Guzman, N.A., Ammar, W., … Gakidou, E. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis for the Global Burden of Disease Study 2013. Lancet, 384(9945), 766–781. https://doi.org/10.1016/S0140-6736(14)60460-8
53. Noor, M. I. (2002). The nutrition and health transition in Malaysia. Public Health Nutrition, 5(1A),191–195. https://doi.org/10.1079/PHN2001293
54. Nuryani, N., Muhdar, I.N., Ramadhani, F., Paramata, Y., Adi, D.I., & Bohari, B. (2021). Association of physical activity and dietary patterns with adults' abdominal obesity in Gorontalo Regency, Indonesia: A cross-sectional study. Current Research in Nutrition and Food Science, 9(1), http://dx.doi.org/10.12944/CRNFSJ.9.1.26
55. Oliver, G., Wardle, J., & Gibson, E.L. (2000). Stress and food choice: a laboratory study. Psychosomatic Medicine, 62(6), 853–865. https://doi.org/10.1097/00006842-200011000-00016
56. Pieh, C., Budimir, S., & Probst, T. (2020). The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. Journal of Psychosomatic Research, 136, 110186. https://doi.org/10.1016/j.jpsychores.2020.110186
57. Pineda, E., Poelman, M. P., Aaspõllu, A., Bica, M., Bouzas, C., Carrano, E., De Miguel-Etayo, P., Djojosoeparto, S., Blenkuš, M. G., Graca, P., Geffert, K., Hebestreit, A., Helldan, A., Henjum, S., Huseby, C. S., Gregório, M. J., Kamphuis, C., Laatikainen, T., Løvhaug, A. L., Leydon, C., … Vandevijvere, S. (2022). Policy implementation and priorities to create healthy food environments using the Healthy Food Environment Policy Index (Food-EPI): A pooled level analysis across eleven European countries. The Lancet Regional Health - Europe, 23, https://doi.org/10.1016/j.lanepe.2022.100522
58. Raynor, H.A., & Wing, R.R. (2007). Package unit size and amount of food: do both influence intake? Obesity (Silver Spring, Md.), 15(9), 2311–2319. https://doi.org/10.1038/oby.2007.274
59. Reynolds, D.L., Garay, J.R., Deamond, S.L., Moran, M.K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. Epidemiology and Infection, 136(7), 997-1007.https://doi.org/10.1017/S0950268807009156
60. Rodríguez-Martín, B.C., & Meule, A. (2015). Food craving: new contributions on its assessment, moderators, and consequences. Frontiers in Psychology, 6, 21. https://doi.org/10.3389/fpsyg.2015.00021
61. Rodríguez-Pérez, C., Molina-Montes, E., Verardo, V., Artacho, R., García-Villanova, B., Guerra-Hernández, E.J., & Ruíz-López, M.D. (2020). Changes in dietary behaviours during the COVID-19 outbreak confinement in the Spanish COVIDiet study. Nutrients, 12(6), 1730. https://doi.org/10.3390/nu12061730

62. Rolls, B.J., Roe, L.S., & Meengs, J.S. (2007). The effect of large portion sizes on energy intake is sustained for 11 days. Obesity (Silver Spring, Md.), 15(6), 1535–1543. https://doi.org/10.1038/oby.2007.182
63. Ruiz-Roso, M.B., Knott-Torcal, C., Matilla-Escalante, D.C. Garcimartín, A, Sampedro-Nuñez, M.A., Dávalos, A, & Marazuela, M. (2020). COVID-19 Lockdown and Changes of the Dietary Pattern and Physical Activity Habits in a Cohort of Patients with Type 2 Diabetes Mellitus. Nutrients, 12(8), 2327, https://doi.org/10.3390/nu12082327
64. Rutters, F., Nieuwenhuizen, A. G., Lemmens, S. G., Born, J. M., & Westerterp-Plantenga, M. S. (2009). Acute stress-related changes in eating in the absence of hunger. Obesity (Silver Spring, Md.), 17(1), 72–77. https://doi.org/10.1038/oby.2008.493
65. Salman, A. (2021). Media dependency, interpersonal communication and panic during the COVID-19 Movement Control Order. SEARCH Journal of Media and Communication Research, 13(1), 79-92.
66. Schmitz, F., Naumann, E., Trentowska, M., & Svaldi, J. (2014). Attentional bias for food cues in binge eating disorder. Appetite, 80, 70–80. https://doi.org/10.1016/j.appet.2014.04.023
67. Shangguan, S., Afshin, A., Shulkin, M., Ma, W., Marsden, D., Smith, J., Saheb-Kashaf, M., Shi, P., Micha, R., Imamura, F., Mozaffarian, D., & Food PRICE (Policy Review and Intervention Cost-Effectiveness) Project (2019). A meta-analysis of food labeling effects on consumer diet behaviors and industry practices. American Journal of Preventive Medicine, 56(2), 300–314, https://doi.org/10.1016/j.amepre.2018.09.024
68. Shrestha, A., Cullerton, K., White, K. M., Mays, J., & Sendall, M. (2023). Impact of front-of-pack nutrition labelling in consumer understanding and use across socio-economic status: A systematic review. Appetite, 187, 106587. https://doi.org/10.1016/j.appet.2023.106587
69. Sterman J.D. & Dogan G. (2015). "I'm not hoarding, I'm just stocking up before the hoarders get here.": Behavioral causes of phantom ordering in supply chains. Journal of Operations Management, 39, 6–22. https://doi.org/10.1016/j.jom.2015.07.002
70. Sutaria, M., Keny, G., & Pratinidhi S.A. (2020). COVID-19 and its effect on nutrition. International Journal of Community Medicine and Public Health, 7(10), 4112-4117. http://dx.doi.org/10.18203/2394-6040.ijcmph20204385
71. Taylor, A.L., & Jacobson, M.F. (2016). Carbonating the world: the marketing and health impact of sugar drinks in low- and middle-income countries. Center for Science in the Public Interest https://ncdalliance.org/fr/node/8294
72. Theis, N., Campbell, N., De Leeuw, J., Owen, M., & Schenke, K.C. (2021). The effects of COVID-19 restrictions on physical activity and mental health of children and young adults with physical and/or intellectual disabilities. Disability and Health Journal, 14(3), https://doi.org/10.1016/j.dhjo.2021.101064
73. Thompson F.E. & Subar A.F. (2008) Dietary assessment methodology, In: A.M. Coulston, & C.J., Boushey (Eds.), Nutrition in the prevention and treatment of disease. (2nd ed., pp. 3-30.) San Diego, California: Elsevier Academic Press.
74. Torres, S.J., & Nowson, C.A. (2007). Relationship between stress, eating behavior, and obesity. Nutrition (Burbank, Los Angeles County, California), 23(11-12), 887–894. https://doi.org/10.1016/j.nut.2007.08.008
75. Wang, E., An, N., Gao, Z., Kiprop, E., & Geng, X. (2020). Consumer food stockpiling behavior and willingness to pay for food reserves in COVID-19. Food Security, 12(4), 739–747. https://doi.org/10.1007/s12571-020-01092-1
76. Wansink B. (2004). Environmental factors that increase the food intake and consumption volume of unknowing consumers. Annual Review of Nutrition, 24, 455–479. https://doi.org/10.1146/annurev.nutr.24.012003.132140
77. Warne J.P. (2009). Shaping the stress response: interplay of palatable food choices, glucocorticoids, insulin and abdominal obesity. Molecular and cellular endocrinology, 300(1-2), 137-146. https://doi.org/10.1016/j.mce.2008.09.036
78. Weta, I.W., Sutirtayasa, W.P., Sucipta, W.C., Malik, S.G., Subawa, A.A.N, & Widyadharma I.P.E. (2020). Supplementation Of Low Ratio N-6:N-3 PUFA reduces body fatness in young obese Balinese women: A randomized study with optimized energy regulation. Current Research in Nutrition and Food Science, 8(2). http://dx.doi.org/10.12944/CRNFSJ.8.2.24

79. Wright, J.D., Ervin, B., & Briefel, R.R. (1994) Consensus Workshop on Dietary Assessment: Nutrition Monitoring and Tracking the Year 2000 Objectives. Hatsville, Maryland: US Department of Health and Human Services. https://www.cdc.gov/nchs/data/misc/nutri94acc.pdf
80. Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the Coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. JAMA, 323(13), 1239–1242. https://doi.org/10.1001/jama.2020.2648.
81. Yau, Y. H., & Potenza, M. N. (2013). Stress and eating behaviors. Minerva Endocrinologica, 38(3), 255–267.
82. Yau, K.B.E., Pang Tze Ping, N., Shoesmith, W. D., James, S., Nor Hadi, N. M., & Loo, J. L. (2020). The behaviour changes in response to COVID-19 pandemic within Malaysia. The Malaysian Journal of Medical Sciences: MJMS, 27(2), 45–50. https://doi.org/10.21315/mjms2020.27.2.5
83. Yılmaz C., Gökmen V. (2020). Neuroactive compounds in foods: Occurrence, mechanism and potential health effects. Food Research International, 128,https://doi.org/10.1016/j.foodres.2019.108744.
84. Zachary, Z., Brianna, F., Brianna, L., Garrett, P., Jade, W., Alyssa, D., & Mikayla, K. (2020). Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. Obesity Research & Clinical Practice, 14(3), 210–216. https://doi.org/10.1016/j.orcp.2020.05.004
85. Zellner, D.A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. Physiology & Behavior, 87(4), 789–793. https://doi.org/10.1016/j.physbeh. 2006.01.014