

# Changes in Eating and Physical Activity Behavior of Indonesian Teenagers during the Corona Virus Disease 19 Pandemic

Rahayu Indriasari<sup>1</sup>, Healthy Hidayanty<sup>1</sup>, Muhammad Rachmat<sup>2</sup>, Nurhilda Resky Awalia Syam<sup>1</sup>

## ABSTRACT

**Background:** Restrictions on public gatherings during the CORONAVIRUS DISEASE 19 pandemic have caused a change in lifestyle of people, including Teenagers. Changes in diet and daily activities can occur, further affecting nutritional status and the risk of related health problems. The study describes changes in breakfast habits, snacks, eating habits, and activities among Indonesian Teenagers during coronavirus disease 19 pandemic. **Method:** A survey available distributed via WhatsApp targeted at Teenagers aged 10-21 in Indonesia who were willing to participate in the study. A total of 772 Teenagers completed an online questionnaire in October 2020. The distribution of Teenagers who experienced changes in breakfast, snack, eating habits, and physical activity (PA) was analyzed descriptively. **Results:** The study noted changes in various aspects of the lifestyle of Teenagers in Indonesia during the coronavirus disease 19 pandemic, including breakfast, snacks, food portions, and intensity of physical activity. Changes in breakfast occurred in reduced (27%) and increased (23%) breakfast frequency in Teenagers. The frequency of snacking also increased (36%) and decreased (25%). Moreover, the findings showed reduced eating portions (21%) and increased eating portions (19%). The intensity of physical activity also decreased (45%) and increased (28%). These change patterns are indicated differently according to differing Teenagers age groups. **Conclusion:** Breakfast habits, snacking, meal portions, and daily activities of Indonesian Teenagers have changed during the coronavirus disease 19 pandemic. It is essential to pay attention to prevent further effects of these lifestyle changes in order to increase the risk of nutritional problems and health problems in teenagers.

**Keywords:** Teenagers, eating habit, physical activity, coronavirus disease 19

<sup>1</sup>Department of Nutrition Science, Faculty of Public Health, Hasanuddin University, Indonesia

<sup>2</sup>Department of Health Promotion and Behavioural Science, Faculty of Public Health, Hasanuddin University, Indonesia

**Corresponding Author:** Dr. Rahayu Indriasari, Ph.D., Department of Nutrition Science, Faculty of Public Health, Hasanuddin University, Indonesia **E-Mail:** rahayu.indriasari@unhas.ac.id

**Received:** 07<sup>th</sup> December 2022

**Accepted:** 15<sup>th</sup> December 2022

**How to Cite this Article:** Indriasari R, Hidayanti H, Muhammad R, Syam NRA. Changes in eating and physical activity behavior of Indonesian Teenagers during the coronavirus disease 19 Pandemic. *Int Med Sci Acad* 2023;36(1):81-85.

**Access this article online :** [www.jimsaonline.com](http://www.jimsaonline.com)



## Introduction

Adolescence is a period of rapid progress that demands balanced nutritional fullness [1,2]. Since teenagers experience dramatic physiological, emotional, and social changes, they may have unique lifestyles that put them as a nutritionally vulnerable group [3]. Imbalanced dietary intake and physical activity (PA) can result in undernutrition or overnutrition among Teenagers [1].

In Indonesia, the proportion of the young/Teenagers population reaches 21% of the total population [4], indicating an important proportion of the next generation. However, many studies have reported that Indonesian Teenagers experience nutritional problems that can put them at the risk of low-quality human resources. The Indonesian Basic Health Survey or RISKESDAS 2018 reported 25.7% of 13 to 15-year-old Teenagers are stunted, and 26.9% of 16- to 18-year-old Teenagers are severely stunted. In addition, 8.7% of Teenagers from 13 to 15 years of age are underweight and 8.1% of Teenagers from 16 to 18 years of age are severely underweight. The prevalence of overweight and obesity in Teenagers

from 13 to 15 years and from 16 to 18 years is 16.0% and 13.5%, respectively. Research has documented that the problem of youth obesity is a risk factor for a variety of metabolic and degenerative diseases, including cardiovascular disease, diabetes mellitus, cancer, osteoarthritis, and others [5]. In contrast, undernutrition in Teenagers can impair growth and development, leading to an increased risk of complications during pregnancy and adverse birth outcomes [6].

The world is currently affected by the CORONAVIRUS DISEASE 19 pandemic, which is affecting all walks of life, including nutrition. Furthermore, the implementation of social restrictions or lockdowns to prevent the spread of Coronavirus disease 19 can affect the psychosocial aspects, lifestyle and behavior of the family, including Teenagers. Recent studies have shown that the Coronavirus disease 19 pandemic is turning to unhealthy eating habits that have been characterized by an increase in the amount of unhealthy foods, eating more light foods or snacks than heavy meals, and an increase in the size and frequency of meals portions [7-10]. A study of teenagers in Brazil found similar results, which showed that being

restricted by coronavirus disease 19 increased unhealthy eating habits, such as reduced consumption of fruits and vegetables and increased intake of snacks and sugary drinks [11]. On the other hand, the CORONAVIRUS DISEASE 19 confinement has positively affected the increase of healthy eating behavior among Spanish people, as reflected by a higher adherence to the Mediterranean Diet [12].

During the pandemic, mobility restrictions in the local area have also impacted daily activities. The survey undertaken in many countries revealed that confinement altered PA intensity in all levels (light, moderate and vigorous) [7]. Social restrictions make teenagers mostly carry out activities at home [13]. A recent qualitative study in Indonesia reported that Teenagers tended to be less active and more sedentary based on their mothers' perspectives, with increasing screen activities [14].

However, the coronavirus disease 19 epidemic has a potentially significant negative impact on nutrition-related behaviors, especially due to the implementation of social restrictions to reduce disease transmission. Information is still lacking on changes in diet and physical activity for adolescents living in low- and middle-income families or in Asian countries. Therefore, the purpose of this study is to describe changes in breakfast intensity, portions, snacks, and physical activity among Indonesian adolescents during the coronavirus disease 19 epidemic. The results of this study are expected to study provide information to formulate the necessary guidelines and appropriate interventions to help adolescents enjoy good health conditions during the pandemic and incarceration, and subsequently protect them from more adverse nutritional problems.

## Methods

A cross-sectional design was applied for this study by distributing an online questionnaire via WhatsApp groups to Teenagers aged 10-21 throughout Indonesia. The data was collected using a Google form. A total of 772 Teenagers gave their consent and completed the questionnaire during October 2020. Changes in breakfast frequency, snack frequency, meal portion, and physical activity intensity were measured using one question for each variable. . . . : How does your breakfast frequency/snack frequency/food portion/BP intensity today compare to the time before the Coronavirus disease 19 pandemic? The responses were a decrease, no change, an increase, or I don't know. Since the restrictions were implemented throughout Indonesia in March 2020, the time before the Coronavirus disease 19 pandemic was defined as before March 2020. Self-reported body weight and height along with other demographic data were also recorded.

A descriptive analysis was carried out to monitor the distribution of Teenagers who experienced changes in breakfast, snack, consumption ways, and PA during the coronavirus disease 19. In addition, the consequences were presented in tabular form according to age group and area of residence of teenagers.

## Results

### Characteristics of Participants

The majority of Teenagers who participated in the study were female (82.4%) and over 18 years of age (72.5%). Half of the Teenagers' nutritional status was normal according to WHO criteria. However, the prevalence of being underweight (28.4%) and overweight and obese (19.7%) were alarming. Most respondents were at the undergraduate level of education (76.4%), with a very small proportion who had not completed schooling at the time of

the survey. Most of the respondents were from Sulawesi Island, and the number of Teenagers residing in rural areas was relatively equal to their urban counterparts.

**Table 1: Characteristics of Teenagers (N=772)**

| Characteristics             | n   | %    |
|-----------------------------|-----|------|
| <b>Gender</b>               |     |      |
| Male                        | 136 | 17.6 |
| Female                      | 636 | 82.4 |
| <b>Age group (years)</b>    |     |      |
| <13                         | 18  | 2.3  |
| 13-15                       | 73  | 9.5  |
| 16-18                       | 121 | 15.7 |
| >18                         | 560 | 72.5 |
| <b>Nutritional status</b>   |     |      |
| Underweight                 | 219 | 28.4 |
| Normal                      | 401 | 51.9 |
| Overweight                  | 55  | 7.1  |
| Obese I                     | 71  | 9.2  |
| Obese II                    | 26  | 3.4  |
| <b>Education</b>            |     |      |
| No Schooling                | 4   | 0.5  |
| Junior High School          | 66  | 8.5  |
| Senior High School          | 112 | 14.5 |
| Undergraduate               | 590 | 76.4 |
| <b>Region</b>               |     |      |
| Sumatera                    | 34  | 4.4  |
| Java                        | 54  | 7.0  |
| Borneo                      | 123 | 15.9 |
| East Nusa Tenggara and Bali | 77  | 10.0 |
| Sulawesi                    | 409 | 53.0 |
| Maluku and Papua            | 75  | 9.7  |
| <b>Residential Area</b>     |     |      |
| Rural                       | 429 | 55.6 |
| Urban                       | 343 | 44.4 |

### Changes in Breakfast Frequency

According to Table 2, more Teenagers (50%) experienced changes in their breakfast frequency, either decreased (27%) or increased (23%), than those who did not change (46%). The changes were prominent in the oldest phase group(>18 years) and happened more in rural than urban areas. More Teenagers tended to decrease rather than increase the frequency for those who experienced breakfast changes, both by age and residential area.

### Changes in Snacking Frequency

Changes in snacking frequency were also observed among Teenagers during CORONAVIRUS DISEASE 19 since 61% of respondents reported either a decrease (25%) or an increase (36%) in frequency. The change was the highest in the >18 years of age group, with more Teenagers increasing than decreasing the frequency. More rural Teenagers than their urban counterparts tended to change snacking frequency, but the tendency was similar in both areas. Increased frequency was more common.

### Changes in Eating Portions

The eating portion of about 40% of Teenagers had changed, as they reported their meal portion size decreased or increased (21% and 19%, respectively). Changes happened more at >18 years old and were relatively similar between urban and rural areas. Of the

**Table 2: Changes in breakfast frequency based on respondent's age and residential area (N=772)**

| Category                 | Breakfast Frequency |    |           |    |           |    |             |   |
|--------------------------|---------------------|----|-----------|----|-----------|----|-------------|---|
|                          | Decreased           |    | No change |    | Increased |    | Do not know |   |
|                          | n                   | %  | n         | %  | n         | %  | n           | % |
| <b>Age group (years)</b> |                     |    |           |    |           |    |             |   |
| <13                      | 3                   | 1  | 8         | 1  | 6         | 1  | 1           | 0 |
| 13-15                    | 18                  | 2  | 28        | 4  | 22        | 3  | 5           | 1 |
| 16-18                    | 44                  | 6  | 49        | 6  | 25        | 3  | 3           | 1 |
| >18                      | 146                 | 18 | 269       | 35 | 125       | 16 | 20          | 2 |
| <b>Residential area</b>  |                     |    |           |    |           |    |             |   |
| Rural                    | 123                 | 16 | 201       | 26 | 91        | 12 | 14          | 2 |
| Urban                    | 88                  | 11 | 153       | 20 | 87        | 11 | 15          | 2 |

**Table 3: Changes in snacking frequency based on respondent's age and residential area (N=772)**

| Category                 | Snacking Frequency |    |           |    |           |    |             |     |
|--------------------------|--------------------|----|-----------|----|-----------|----|-------------|-----|
|                          | Decreased          |    | No change |    | Increased |    | Do not know |     |
|                          | n                  | %  | n         | %  | n         | %  | n           | %   |
| <b>Age group (years)</b> |                    |    |           |    |           |    |             |     |
| <13                      | 3                  | 1  | 8         | 1  | 8         | 1  | 1           | 0   |
| 13-15                    | 18                 | 2  | 21        | 3  | 31        | 4  | 3           | 0.5 |
| 16-18                    | 35                 | 5  | 40        | 5  | 43        | 6  | 3           | 0.5 |
| >18                      | 136                | 17 | 213       | 27 | 194       | 25 | 17          | 2   |
| <b>Residential area</b>  |                    |    |           |    |           |    |             |     |
| Rural                    | 109                | 14 | 166       | 21 | 136       | 18 | 18          | 2   |
| Urban                    | 83                 | 11 | 114       | 15 | 140       | 18 | 6           | 1   |

**Table 4: Changes in eating portion based on respondent's age and residential area (n=772)**

| Category                 | Eating Portion |     |           |    |           |    |             |    |
|--------------------------|----------------|-----|-----------|----|-----------|----|-------------|----|
|                          | Decreased      |     | No change |    | Increased |    | Do not know |    |
|                          | n              | %   | n         | %  | n         | %  | n           | %  |
| <b>Age group (years)</b> |                |     |           |    |           |    |             |    |
| <13                      | 3              | 0.3 | 6         | 1  | 6         | 1  | 3           | 1  |
| 13-15                    | 13             | 2   | 23        | 3  | 18        | 2  | 19          | 2  |
| 16-18                    | 31             | 4   | 35        | 4  | 18        | 2  | 37          | 5  |
| >18                      | 113            | 15  | 141       | 18 | 108       | 14 | 198         | 26 |
| <b>Residential area</b>  |                |     |           |    |           |    |             |    |
| Rural                    | 76             | 10  | 127       | 16 | 74        | 10 | 152         | 20 |
| Urban                    | 84             | 11  | 78        | 10 | 76        | 10 | 105         | 14 |

**Table 5: Changes in physical activity based on respondent's age and residential area (n=772)**

| Category                 | The Intensity of Physical Activity |    |           |    |           |    |             |   |
|--------------------------|------------------------------------|----|-----------|----|-----------|----|-------------|---|
|                          | Decreased                          |    | No change |    | Increased |    | Do not know |   |
|                          | n                                  | %  | n         | %  | n         | %  | n           | % |
| <b>Age group (years)</b> |                                    |    |           |    |           |    |             |   |
| <13                      | 8                                  | 1  | 5         | 1  | 4         | 1  | 1           | 1 |
| 13-15                    | 21                                 | 3  | 27        | 3  | 25        | 3  | 0           | 0 |
| 16-18                    | 59                                 | 8  | 28        | 4  | 32        | 4  | 2           | 1 |
| >18                      | 258                                | 33 | 136       | 18 | 155       | 20 | 11          | 2 |
| <b>Residential area</b>  |                                    |    |           |    |           |    |             |   |
| Rural                    | 179                                | 23 | 131       | 17 | 111       | 14 | 8           | 1 |
| Urban                    | 167                                | 22 | 65        | 8  | 105       | 14 | 6           | 1 |

respondents, 34% were unsure whether they changed their eating portions.

### Changes in Physical Activity

About 73% of Teenagers reported changing their intensity of PA during the CORONAVIRUS DISEASE 19 pandemic. More of them decreased rather than increased the intensity (45% and 28%, respectively). Changes were reported mainly by Teenagers >18

years of age. A similar pattern was observed in PA intensity changes between urban and rural Teenagers. More participants in both areas reported a decreased intensity rather than an increased intensity.

### Discussion

The findings of this study present changes in some nutritional behaviors of Teenagers that occurred during the CORONAVIRUS

DISEASE 19 pandemic. Breakfast frequency decreased while snacking frequency increased. Teenagers changed their eating portions, with the tendency being slightly more to decrease rather than increase. Along with these changes in eating habits, Teenagers tended to decrease their intensity of PA. The changes indicate that the implementation of social restrictions or home confinements during the pandemic might have negatively affected the nutrition-related behaviors of Indonesian Teenagers. This raises the alarm for paying more attention to the condition of Teenagers since the data also showed existing undernutrition and overnutrition problems among this population group. The prevalence of being underweight and overweight and obese was concerning, although this data should be cautiously interpreted since it was derived from height and body weight self-reported by the study participants.

Breakfast is an important meal for maintaining healthy body weight, improving macro and micronutrient intake, and enhancing cognitive and academic performance [15]. Despite the significant benefits, breakfast is the most frequently skipped meal by Teenagers. The CORONAVIRUS DISEASE 19 pandemic may have worsened the situation. This present study shows more Teenagers reported decreasing breakfast frequency during the pandemic. This finding is similar to that reported among Saudi Arabian Teenagers, in which half of the study participants had a lower frequency of breakfast meals during the pandemic than before [16]. Another study in Brazil has observed that around 54% of Teenagers did not have irregular breakfast regularly during the pandemic [17]. This different condition was observed in other studies, indicating that the pandemic can positively affect breakfast habits among Teenagers. Breakfast frequency among Korean Teenagers has increased during the CORONAVIRUS DISEASE 19 pandemic [18]. Another study in Italy shows that eating breakfast became significantly more regular among Teenagers from isolated families than non-isolated families [11].

The CORONAVIRUS DISEASE 19 pandemic appears to have influenced the snacking habits of Teenagers. This present study observed changes in the frequency of snacking among Teenagers as more respondents increased rather than decreased snacking frequency. This is consistent with a previous international study with participants over 18 years of age who reported that during lockdown, the number of snacks eaten between meals or late at night increased dramatically [7]. Moreover, in the present study, Teenagers reported having more fried and sweet foods than salty foods during snacking (data not shown). This finding is consistent with that reported in a study among Teenagers from five countries, as the average consumption of fried and sugary foods climbed considerably during the pandemic [12]. The tendency to increase snacking frequency might be related to boredom or stress during a lockdown or social restrictions [19]. The significant highlight of these findings is that these types of snack foods are of high-calorie content, Increases the risk of being overweight and obese in teenagers.

The pandemic also seems to have impacted changes in meal portion size in Indonesian Teenagers, as more respondents of this study reported decreasing rather than increasing their eating portions. This is similar to the research findings of participants >18 years old from five countries, Brazil, Argentina, Peru, Mexico, and Spain, in which the majority of respondents did not change their meal consumption patterns but reduced their main meal consumption and increased their intake of short meals and snacks [20]. However, a study in India found that most respondents (72%) increased their meal portion size [21].

Changes in the intensity of PA occurred among the Teenagers in this present study, as more participants reduced rather than increased their physical activities. This condition might be closely related to the school closures and restrictions of open public spaces, leading to more time spent at home. Referring school activities and schedules to home might also increase screen time; thus, the Teenagers became more sedentary. A qualitative study of Teenagers' mothers in Indonesia reported that the participants perceived their children became less active and more engaged in screen-based activities, either for educational or leisure purposes, during the pandemic compared to before [14]. The findings from this present study were in line with that in Brazil, as Teenagers tended to be physically inactive (minutes per day) during isolation [11].

The current study also describes pattern of changes in ingestion performance and physical activity among Teenagers based on their age group and residential area. It seems that all behavioral eating changes existed more in the older age group, particularly among those 18 years of age and older, since the respondents were mainly in this age category. The changes appeared not to be substantially different between urban and rural locations, except that more rural Teenagers decreased their breakfast frequency than their urban counterparts. In terms of PA changes, all age groups experienced changes, with more Teenagers in the oldest age group decreasing the intensity. According to a study conducted in Spain, participants from all gender and age categories decreased general PA (measured in weekly minutes) significantly before and after confinement [22]. Another review study found substantial evidence for the detrimental impacts of coronavirus disease 19 restrictions on children's PA behavior, suggested that the coronavirus disease 19 pandemic worsened the trend of inactivity, which was worrisome even before the pandemic. PA has decreased in minutes per day, especially when the children are older and have a poorer socioeconomic background [23]. In terms of the residential area, the present study found no differences in changes of PA intensity between urban and rural Teenagers. On the other hand, a study among Croatian Teenagers showed that the living environment significantly affected the decrease of PA levels, with more changes occurring in urban Teenagers [24].

This present study provides information from a large sample size and various regions in Indonesia. The findings suggest the potential impacts of the coronavirus disease 19 pandemic in nutrition-linked behaviors among Indonesian Teenagers that can provide input for the initial development of programs and policies regarding efforts to prevent worsening nutritional problems in this population group. This study's results also contribute to the literature regarding the impact of the pandemic on Teenagers' lifestyles globally. However, the convenient sampling method used to recruit participants has several disadvantages. There might be a selection bias, as there were some regions underrepresented. The selection of a wide age range (10–21 years) may cause a lack of representation of subgroup ages since most of those who responded to the survey came from the oldest age group. This is also implied with gender representativeness, as more females than males responded to the survey. The information is also provided from self-reported data without direct measurements or observations; thus, under or overreporting is possible. These limitations may have resulted in a skewed estimation of the study's outcomes; therefore, interpretation of the findings should be made in light of this knowledge. The study's cross-sectional design also prevents us from inferring any causality.

## Conclusion

This recent study found that social restrictions during the coronavirus disease 19 pandemic could potentially disrupt the eating behaviors and physical activity of Teenagers in Indonesia. The changes can be positive or negative and subsequently affect the nutritional problems of Teenagers. Therefore, more attention needs to be paid to this population in terms of guidelines for healthy behaviors and better living conditions during the pandemic. Programs or policies should be highly encouraged to maintain healthy eating habits and active lifestyles for Teenagers and their communities.

## What is known about the subject?

Indonesian adolescents currently face triple burden of nutrition that closely related to their eating and physical activity behaviours. The nutrition problems could be worsening due to negative impacts of social restriction implementation during the coronaviruses Disease-19 pandemic.

## What does the study performed add to the literature?

This present study provides evidence to understand more about changes in nutrition-related behaviour of adolescents during the coronaviruses Disease-19 pandemic, since impact of the pandemic on adolescents are understudied.

## What are the implications of the results obtained?

The findings of this study provide evidence to assist development of further guidelines, interventions and policies to prevent increase of nutritional problems among adolescents during pandemics

## Acknowledgment

The authors would like to express their gratitude to the study participants and to all parties who assisted in the process of collecting information.

|                              |  |
|------------------------------|--|
| <b>Conflict of Interest:</b> | All authors declare no COI   |
| <b>Ethics:</b>               | There is no ethical violation as it is based on voluntary anonymous interviews           |
| <b>Funding:</b>              | No external funding  |
| <b>Guarantor:</b>            | Dr. Rahayu Indriasari will act as guarantor of this article on behalf of all co-authors. |

## References

1. Malahayati PJ, Malahayati U. Metadata, citation and similar papers at core.ac.uk. 2019;171-6.
2. Remaja P, Desa DI, Wetan B, et al. Edukasi Gizi Seimbang Sebagai Upaya Meningkatkan Pengetahuan Pada Remaja Di Desa Bedingin Wetan Pada Masa Pandemi Coronavirus disease 19 Balanced Nutrition Education As An Effort To Increase Teenagers Knowledge In Bedingin Wetan Village During Pandemic Coronavirus disease 19. 2021;4:66-74. 92-247-2-PB.
3. Ariani R. Perilaku Gizi terkait Pedoman Gizi Seimbang dan Kaitannya dengan Status Gizi dan Kesehatan Siswa SMA Bina Bangsa Sejahtera Bogor.
4. Marbun R, Dea V. Edukasi Kesehatan Pada Remaja Dalam Pentingnya Gizi Seimbang Dan Aktivitas Fisik Di Era Pandemi Coronavirus disease 19. 2021;4:508-12.
5. Christian P, Smith ER. Teenagers Undernutrition: Global Burden, Physiology, and Nutritional Risks. *Ann Nutr Metab.* 2018;72:316-28.
6. Ammar A, Brach M, Trabelsi K, et al. Effects of CORONAVIRUS DISEASE 19 Home Confinement on Eating Behaviour and Physical Activity/: Results of the ECLB-CORONAVIRUS DISEASE 19 International Online Survey. 2020;1-14.
7. Ellison B, Prescott MP. Examining Nutrition and Food Waste Trade-offs Using an Obesity Prevention Context. *J Nutr Educ Behav.* 2021;53:434-44.
8. Ismail LC, Osaili TM, Mohamad MN, et al. Eating habits and lifestyle during Coronavirus

disease 19 lockdown in the united arab emirates: A cross-sectional study. *Nutrients.* 2020;12:1-20.

10. Robinson E, Boyland E, Chisholm A, et al. Obesity, eating behavior and physical activity during CORONAVIRUS DISEASE 19 lockdown: A study of UK adults. *Appetite.* 2021;156:104853.
11. Teixeira MT, Vitorino RS, da Silva JH, et al. Eating habits of children and Teenagers during the CORONAVIRUS DISEASE 19 pandemic: The impact of social isolation. *J Hum Nutr Diet.* 2021;34:670-8.
12. Rodríguez-Pérez C, Molina-Montes E, Verardo V, et al. Changes in dietary behaviours during the CORONAVIRUS DISEASE 19 outbreak confinement in the Spanish CORONAVIRUS DISEASE 19 pandemic: A study. *Nutrients.* 2020;12:1-19.
13. Zulfia I, Meilinda M, Ilma N, et al. Kesehatan Mental Remaja Pada Masa Pandemi.
14. Andriyani FD, Biddle SJH, De Cocker K. Teenagers' physical activity and sedentary behaviour in Indonesia during the CORONAVIRUS DISEASE 19 pandemic: a qualitative study of mothers' perspectives. *BMC Public Health.* 2021;21:1-14.
15. Gibney MJ, Barr SI, Bellisle F, et al. Breakfast in human nutrition: The international breakfast research initiative. *Nutrients.* 2018;10:1-12.
16. Hanbazaza M, Wazzan H. Changes in eating habits and lifestyle during CORONAVIRUS DISEASE 19 curfew in children in Saudi Arabia. *Nutr Res Pract.* 2021;15:1-12.
17. Ribas SA, Tonhoqui GKM, Vitorino RS, et al. Changes of food consumption in Teenagers during the CORONAVIRUS DISEASE 19 pandemic according to socioeconomic status. *Res Soc Dev.* 2021;10:e516101220644.
18. Kim SY, Yoo DM, Min C, et al. Changes in dietary habits and exercise pattern of Korean Teenagers from prior to during the Coronavirus disease 19 pandemic. *Nutrients.* 2021;13:1-9.
19. Wang G, Zhang Y, Zhao J, et al. Mitigate the effects of home confinement on children during the CORONAVIRUS DISEASE 19 outbreak. *Lancet.* 2020;395:945-7.
20. Enriquez-Martinez OG, Martins MCT, Pereira TSS, et al. Diet and Lifestyle Changes During the CORONAVIRUS DISEASE 19 Pandemic in Ibero-American Countries: Argentina, Brazil, Mexico, Peru, and Spain. *Front Nutr.* 2021;8:1-14.
21. Madan J, Blonquist T, Rao E, et al. Effect of Coronavirus disease 19 pandemic-induced dietary and lifestyle changes and their associations with perceived health status and self-reported body weight changes in India: A cross-sectional survey. *Nutrients.* 2021;13.
22. López-Buena R, López-Sánchez GF, Casajús JA, et al. Health-Related Behaviors Among School-Aged Children and Teenagers During the Spanish Coronavirus disease 19 Confinement. *Front Pediatr.* 2020;8:1-11.
23. Rossi L, Behme N, Breuer C. Physical Activity of Children and Teenagers during the CORONAVIRUS DISEASE 19 Pandemic — A Scoping Review. 2021;
24. Zenic N, Tajar R, Gilic B, et al. Levels and changes of physical activity in Teenagers during the CORONAVIRUS DISEASE 19 Pandemic: Contextualizing urban vs. Rural living environment. *Appl Sci.* 2020;10:1-14.

